

Impact of parental socio-economic factors on the performance of students in IIT-JEE

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Impact of socio-economic factors (SEFs) on the academic performance of students has always been a matter of debate. Some studies have argued that students from low socio-economic background lagged behind those from well-to-do families. However, there are also others which rule out this notion. Therefore, this article analyses the impact of parental SEFs on the performance of students in IIT-JEE, which is considered to be one of the most difficult examinations for engineering admission in India. However, there are some limitations of the study due to paucity of time-series data on the relevant attributes.

Keywords: Academic performance, coaching institutions, socio-economic factors.

THE prestigious Joint Entrance Examination (JEE) is conducted every year for admissions to undergraduate courses in engineering and technology in the National Institutes of Technology (NITs) and Indian Institutes of Technology (IITs). More than one million students appear every year for the JEE, out of which around 20,000 students qualify for admission in the IITs. The success ratio of the JEE is very low, nearly 1 : 60, which leads to tough competition. To get admission in the IITs is the dream of most science students. Hence they take up coaching in privately managed institutions. As a result, private coaching institutions are mushrooming in almost all the big and small cities of India. For example, in one such coaching hub in Kota, Rajasthan, it was estimated that there was a Rs 300 crore coaching industry during 2012–13, with 1.5 lakh students taking classes to crack the IIT-JEE¹. As a result, such coaching has acquired the status of a big industry in India. According to the Associated Chambers of Commerce and Industry of India (ASSOCHAM), the size of the coaching industry was about Rs 10,000 crores during 2008. This conclusion was based on the assumption that 6 lakh students attend these classes every year and the average cost for each student is Rs 1.7 lakhs². These estimates were only for admission in IITs and other engineering colleges. There are coaching centres for other competitive examinations as well such as GATE, CAT, banking, Staff Selection Commission (SSC) and civil services examinations. Thus there is a huge potential in future for the coaching industry due to increasing number of potential students taking these examinations. The demand for private coaching to get admission in IITs and other institutions has raised strong debate

on the fairness of such examinations, as underprivileged students are unlikely to get an equal opportunity for admission in these premier institutions.

Sociological studies have established the relationship between socio-economic status of family and academic performance of the children³. Socio-economic factors (SEFs) like ethnicity, parental education and income, housing type and student age as reflected at school level were found statistically significant variables and predictors of academic performance. However, it was argued that family structure, the main source of family income and geographical location did not significantly predict variation in school performance⁴. Though there are arguments in favour and against the influence of socio-economic factors on performance of the students, there is scope for further analysis of this hypothesis. This article analyses the influence of socio-economic factors on the performance of aspirants in IIT-JEE.

Relevance of the problem

Several earlier studies have established that the distribution of personal income in society is strongly related to the education level of people⁵. Studies from the United States have highlighted that there are direct and consistent estimates on the impact of income on performance in a test^{6,7}. Thus, the relationship between socio-economic factors performance of students in examinations is a matter of policy concern. It needs to be addressed as a large number of aspirants for IIT-JEE and other similar examinations come from small towns and rural areas in the country. The present analysis could be useful for the policy makers and students taking IIT-JEE and other competitive examinations. This analysis may highlight the issues of emerging trends of private coaching for competitive examinations.

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Earlier contextual studies

The socio-economic status of a family is based on income, education level of the parents and their occupation, which affect the performance of students⁸. This implies that students from high socio-economic status often have chances of greater success because they have access to a wide range of resources that help them in their education and development. The parents of such students are able to provide them good care, and education, including learning resources like private coaching, in addition to regular school education. In a study of American students it was found that involvement of parents affected the education of children. However, there could be a debate on the definition of involvement⁹. However, schooling of parents was found to be an important socio-economic factor to be considered in both policy and research, while looking at school-going children¹⁰. The relationship between socioeconomic status (SES) and academic performance of students has been analysed broadly that establishes modest association between academic performance of students and SES of families¹¹.

Amutabi¹² discussed the impact of socio-economic status on children's readiness for school. Mayer¹³ argued that parental income is positively associated with a wide range of children's academic achievements. His report advances beyond simple analyses of the connection between parental income and children's academic achievements by focusing on research that attempts to separate the effect of income from that of other potentially confounding variables. The report provides estimates of the effect of parental income on a range of children's outcomes in order to determine the magnitude of such effects. The American Psychological Association¹⁴ has studied the relationship of family socio-economic status and children's readiness for school. According to Okioga⁸, across all socio-economic groups parents face major challenges when it comes to providing optimal care and education for their children. For families in poverty, these challenges can be difficult. Ominde¹⁵ found that even in families with above-average income, parents often lack the time and energy to invest fully in their children's preparation for school, and they sometimes face a limited array of options for high-quality childcare both before their children start school and during the early school years. This indicates that families with low socio-economic status cannot provide financial, social and educational support to their children. Therefore, poor families may have inadequate or limited access to resources that may help promote and support children's development and school readiness. Moreover, parents may have inadequate skills for such educational activities and may also lack information about their future career and professional exposure of their children. This adversely affects the performance of school/college-going students. Thus, inadequate resources and limited access to available

resources have a negative effort on the development, learning and academic performance of children. As a result, children from low socio-economic background have lesser chance of getting admission in IITs and other premier institutions through competitive examinations due to lack of better schooling and good education. However, there are a few exceptions.

Research methodology

To analyse influence the SEFs on the performance of students in IIT-JEE, mean deviation (MD) and standard deviation (SD) techniques were applied. These are most popular measures of variability which convey a certain kind of information, with strengths and weaknesses. Statistical measures of variation are used frequently with qualitative variables. Accordingly, statistical variance approach is used to study the effect of prominent SEFs, namely education, occupation and income of parents on the performance of their children in IIT-JEE. Data were collected from various reports of the Joint Implementation Committee of the IITs. MD (\bar{x}) and SD (σ) were calculated using the following formulae

$$\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n},$$

where x_1, x_2, \dots, x_n are the variable and x represents the mean of variables.

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}.$$

SD is a measure that is used to quantify the amount of variation or dispersion of a set of data values.

Data analysis and discussion

Descriptive statistics tools, namely MD and SD were used to analyse the collected secondary data regarding parental income, occupation and education of the successful students in IIT-JEE. The data were collected from different JEE (Advanced) reports. Every year more than one million IITs aspirants appear in the examination. They comprise students from all social and socio-economic strata, which make the data unbiased and random. The collected data were analysed using the statistical package SYSTAT¹⁴. Tables 1–3 give the respective results.

Table 1. Mean deviation and standard deviation for different levels of income of parents

Level of income (Rs)	Mean deviation	Standard deviation
<1 lakh	12.900	8.397
1–3 lakhs	7.827	4.926
3–6 lakhs	27.065	18.490
6–10 lakhs	19.207	11.839
>10 lakhs	19.360	14.170

Table 2. Mean deviation and standard deviation of qualification of parents

Level of qualification	Mean deviation	Standard deviation
Both are graduates	32.050	24.326
One parent is graduate	15.705	18.816
Neither parent is graduate	9.880	11.795

Table 3. Mean deviation and standard deviation of profession of parents

Profession	Mean deviation	Standard deviation
Agriculture	4.958	3.867
Business	10.625	7.778
Medicine	4.125	1.824
Engineering	3.860	0.987
Law	1.640	1.121
Teaching	3.853	1.703
Government	16.035	15.563
Private	6.008	5.105
Defence	1.490	1.103

The analytical results indicate that the SEFs of parents affect performance of the students in IIT-JEE. As argued in earlier studies, the parental income, occupation and level of education are directly associated with academic performance of their children. Based on the summary findings, it was observed that in case of parents whose income was Rs 3 lakhs or less, the performance of students was comparatively more consistent. Similarly, when both parents were not graduates, the performance of the students was consistent. Also, the performance of those students whose parents' occupation was engineering was consistent. However, maximum number of entrants in IITs are those who have taken regular coaching from private institutions, which is expensive. This analysis shows that students from low socio-economic background can also perform well if they get good opportunities.

Conclusion

It can be concluded that SEFs influence the performance of the students in IIT-JEE. However, students from the low-income strata and those whose parents were not highly educated, showed consistent performance compared to others. Thus if they get good opportunity, schooling and resources, they are likely to perform better in such examinations, which is evident from the present analysis. This has been substantiated by a report in the *Times of India*, in 2013, that almost 80% (8000 out of 9700) of the students who qualified for IIT-Advanced examination came from three school boards only – Central Board of Education (CBSE), Andhra Pradesh State Board and Punjab State Board. In 2010, 58% of the students qualified from CBSE Board, 36% from State Boards and 6% from Indian Certificate of Secondary Education (ICSE) Board. However, in 2014, 42% of the students in

IITs were from CBSE. Thus the statistics indicates that IIT-JEE does not provide a fair chance to aspirants from all the State Boards, as the pattern of the examination seems skewed towards a few boards only. This has resulted in a knowledge divide between CBSE and other State Boards. There is a need to break the dominance of private coaching institutions and domination of few education Boards by integrating uniform syllabus across all the State Boards. This will help in nurturing talent across the social strata and will bridge the gap between haves and have nots with respect to admissions in the premier institutions of the country.

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