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Correlates and Issues of Academic Course-Selection in Post-Secondary Education in India: Evidence from National Sample Survey, 2007-08

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Abstract

Background: With the rising educational unemployment in India, one can recognize the possibility of certain imbalance in the acquirement of tertiary education and the requirement of workforce in India. An assessment of youth's selection of their post-secondary courses could provide a layout for the effective planning of higher education with respect to the demand of workforce in the country. This study examines a set of individual/household, institutional, and regional factors influencing the selection of academic courses in post-secondary level education in India among the population aged 29 years and younger. Methods and Findings: The study is based on the information collected by the 64th round of National Sample Survey (NSS) on "Participation and Expenditure in Education" in India during July 2007-June 2008. Using multivariate multinomial logistic regression model, the study shows that more than half of the total population aged ≤ 29 years were likely to opt for Arts/Humanities courses while controlling for selected potential factors at their mean. However, approximately one in every five students had chance to opt for Science courses, and nearly 13% and 12% students were likely to choose Commerce and Technical/Professional/Vocational (TPV) courses respectively. The selection of academic courses was significantly different by a set of individual/household factors. The study also recommends ways to deal with the imbalance in course-selection based on research studies undertaken elsewhere. Conclusion: The major individual, household and institutional factors were found significant determinants of the choice of subject-course at post-secondary level in India, which can be persuaded to make a balance between the job-market requirements and the trained workforce in order to make plans for the use of available human resource effectively as a bonus.

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Keywords

Academic Course-Selection, Post-Secondary Education, Higher Education in India, National Sample Survey

1. Introduction

South and West Asia are only next to sub-Saharan Africa in terms of the lowest tertiary (post-secondary) gross enrolment ratio (GER) in the world. India, however, with only 12% (2007) of GER in the tertiary education, is considered as the world's third largest academic system in tertiary education after China and USA, which is growing rapidly and will continue to do so [1]. On the other hand, with rising levels of education, unemployment is mounting in the country [2] [3].

With the census projection report estimating the youth-population (aged 15 - 24 years) as high as 240 million by 2011, there has been much discussion and uncertainties about whether India would be able to take advantage of this surge of working age people (well referred as "Demographic Dividend") in the next few decades. There is a huge opportunity to fuel the rapidly growing economy with an army of educated youth and which can change the face of poverty-stricken India. However, although efforts are well intentioned and progress is made, massive challenges persevere and many feel that India is likely to miss the boat. For India to maintain its economic growth in a global marketplace fueled by the knowledge economy, it needs to augment its number of students in higher education [4]. More than half of India's population is under the age of 25. Without proper access to education, the country's demographic dividend might turn into a demographic disaster [4]. The main obstacle is an inadequate college system that churns out thousands of graduates without a job-oriented skills, which renders them unemployable [5]. As per the estimates from "Employment and Unemployment Survey 2012" conducted by the Labor Bureau under the Union ministry of labour and employment, the unemployment among graduates was 9.4% and among post-graduates it was 10%, which is perhaps more than twice the unemployment rate for graduates in recession-hit countries like USA and UK [6]. The estimates were even higher for women, rural population, and socially backward castes. As per the 2004 estimates, out of 5.2 million educated unemployed in the country, the highest number was that of graduates and post-graduates in Arts subjects (over 2.1 million). This was followed by Science (over 1.0 million), Commerce (over 0.7 million) and Engineering (over 0.2 million). Those educated in Medicine and Veterinary science showed the lowest unemployment rate (about 50,000 and 7000 respectively). These figures were presented in reply to a question in Indian Parliament on the number of unemployed youth in the country [7]. However, this does not represent an unemployment rate, as the information on number of enrolled students by the subject course is missing. As per the National Science Survey 2004, 12.6% population with post-secondary education in Science were unemployed compared to 10.1% in non-Science subjects [8], however these estimates mask the nature and status of (un)employment. There is no denying the fact that Science oriented subjects fetch better employment and wage prospects [9] compared to Arts/Humanities subjects all across the world.

Several trainers and consultants opine that companies find it hard to employ educated youth even though there is a shortage of skilled work force because they lack communication skills, analytical skills and knowledge of their domains. The South Asian Voice (September 2005 edition) states that, "More small towns in India have more degree colleges than perhaps any other developing nation. However, unlike India, other developing nations do not waste precious academic resources on a dead-end degree such as a BA Pass."

The nature of the labor market in India is transforming from agricultural to non-agricultural, and unskilled to highly skilled, which renders the working age population to possess specific skills. However, the skill formation for the youth seems to be an outlying phenomenon so far, as about 90% youths in India were devoid of any kind of vocational training and among the rest, about one third had received through hereditary practices [2]. Similarly, a slightly more than 2% population (aged 15 years and above) had diploma/certificate/degree in technical education [2]. Moreover, the lack of the competent workforce is also attributed to the suboptimal quality of education, as according to the latest report by NASSCOM only 25% engineering graduates in India were employable. However, if India has to harness the productivity of the buoyant young workforce, there is a need to make a balance between the educational and employment orientation of the population. Now, the questions arise,

why such imbalance comes about; what renders the young population to opt for general education and not for technical or vocational education? What are the factors, which determine the youths to select particular subject course after their secondary education? However, there are few studies in existing Indian literature, which could allow legitimate understanding over such inquiries. Even in general, the research on educational inequalities focuses on educational level, and does not acknowledge the importance of field of study or subject. However, the field of study affects many aspects of people's lives, such as labour market outcomes [10] [11], lifestyles [12], and political orientations [13] [14]. This study proposes a comprehensive framework for academic-course selection and examines a set of individual/household, institutional, and regional factors influencing the selection of academic courses in post-secondary level education in India among the population aged 29 years and younger. The study also figures out the socioeconomic disparities in the level of post-secondary education among the population aged ≥ 15 years to provide a background before the subject-choice discussion.

Conceptual Framework

The subject-course selection or the college selection by students in their post-secondary level of education is a complex, multistage process during which an individual develops aspirations to continue formal education beyond high school, followed by a decision to attend a specific college/university/institution of advanced education and training [15], and then opt for a specific subject course. College or subject-choice is dependent upon an interactive set of factors involving student background characteristics and external influences, which include influential persons, institutional characteristics, and communication from institutions [16] [17]. Empirical studies and models based on factors of college choice can also be comprehended to understand the potential determinants of subject-choice by students at post-secondary level. James *et al*. (1999) document that the course of study decisions tend to be closely related to institutional choice decisions [18].

Of several college choice models of higher education and the opportunity to enroll in a single institution [19], the three-stage model of Hossler and Gallagher (1987) is the most simplified version and which combines all overlapping stages/aspects/processes [15]. This three-phase model has been the framework for many research studies surrounding the student choice process [19]-[21]. The model begins with the predisposition phase in which students "determine" whether to continue their education beyond high school. At this stage, student achievement and ability, level of educational aspiration, parental income, parental education, and parental encouragement are important influences [15] [16]. In the second phase, what they call the "search" phase, students gather information about institutions, decide to apply to certain schools, and are admitted. In the final stage of this model comes "choice", when the students decide on a particular college or university to attend. In context of students' subject choice, we can extend this model to a next phase where they get the opportunity to select their subject of study. However, the choice of subject sometimes may also determine the students' choice of particular college [18] or may be a simultaneous decision.

These phases of determination, search, and choice are destined to be influenced by a range of factors. Many studies on college student decision-making have used economic and sociologic theoretical frameworks to examine the factors of college choice [22]-[25]. The economic models focus on the econometric assumptions that prospective college students think rationally and make careful cost-benefit analyses when choosing a college [26]. The status-attainment models assume a utilitarian decision-making process that students go through in choosing a college, specifying a variety of social and individual factors leading to occupational and educational aspirations [27]. We can combine several such factors while assessing the subject-choice decisions made by individuals. **Figure 1** presents a schematic diagram of potential determinants of subject-choice at higher education level. Based on the existing empirical and conceptual literature, we have framed several potential factors in four broad categories. These are individual characteristics, family background, psychosocial factors, and contextual determinants.

The individual characteristics include gender, age at entry in school, academic interest or personal ambition, previous academic performance etc. An adequate number of studies conclude that when young people explain their reasons for their educational choice, they emphasize personal interest ([28]-[31], cited in [32]). Several interest studies in science education show that girls' and boys' interests are different ([33]-[38], cited in [32]). A few studies have also explored gender differences in young people's reasons for their post-16 subject choices in relation to the study of mathematics and/or science subjects [39]-[45]. On a general level, the findings suggest that girls are more interested in issues to do with human health and well-being, whereas boys are more interested

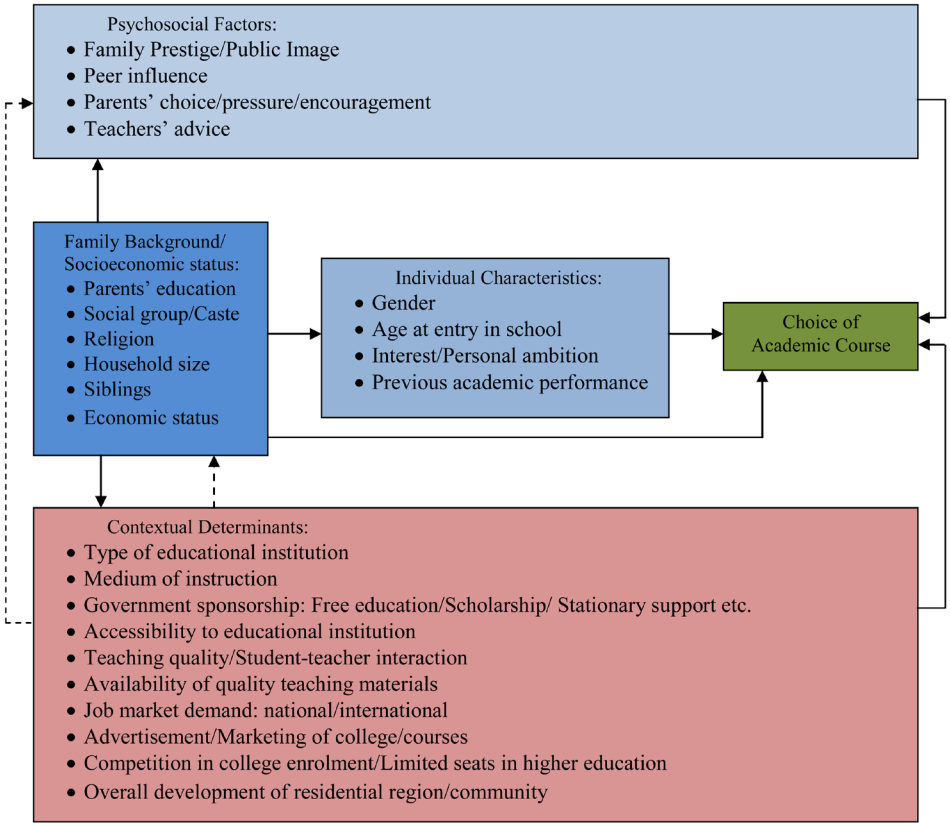

Figure 1. A conceptual framework illustrating potential determinants of the choice of academic course in higher education.

in things to do with e.g. science and technology. One's perception of one's own abilities and qualifications is reported as important for educational choice. While girls in general outperform boys in many school subjects, boys do better than girls in a number of science/technology/mathematics subjects, and girls express less self-confidence in such subjects [46]. An empirical study based on German students [47] found that boys' physics-related self-concept was higher than their general school-related self-concept, whereas it was in contrast for girls. Bandura *et al*. (2001) have pointed to young people's self-efficacy beliefs as important determinants of educational aspirations and career trajectories [48]. The educational achievement is also found to be influencing in selection of educational institution [23] [49]-[51], and thus likely to affect the individuals' decision on opting for particular stream of study.

Family background or the socioeconomic characteristics of the students play a major role in decisions related to their continuation to higher education and the selection of stream of study/education. These characteristics comprise of parental education, social/caste/ethnic group, religious affiliation, family size, sibling composition, financial status of the family etc. Several studies in international literature have investigated statistical associations between students' subject choices (especially towards Science, Mathematics, technical or vocational courses) and socio-demographic factors likely to influence those choices. Some of these studies focused exclusively on subject choices relating to the final two years of compulsory education [52] [53] and some investigated post-16 students [39] [45] [54]-[56]. A few studies also explored gender differences in young people's reasons for their post-16 subject choices in relation to the study of mathematics and/or science subjects [39]-[45]. Cultural models often entail ideological values that serve to construct social groups and social identities, such as those defined by aspects of gender, ethnicity and class [57]. Arguably students' positions are maintained through various ideologies, which are understood to be sets of factual and evaluative beliefs (socially shared belief systems) which people acquire through the accumulated experience and draw upon to help make sense of the world, and to engage in patterned social practices [58]. A number of studies have found significant impact of the social environment [59], financial characteristics [60] [61] and net cost in education [62] while examining the individuals'

college-choice decisions.

The factors such as peer influence, parent's choice, teachers' advice, family prestige/public image etc. often govern the psychological mindset of the individual towards opting for a particular field of study at higher education level. Several studies have concluded that family, peers, and agents have an impact on education choice and affect the persistence of students in the education system [63]-[65]. A Lipman Hearne report (2009) claimed parents are deeply involved and influential to their high-achieving children's college choices [66] [67]. The report also found open houses, dialogue with college friends, alumni, and admitted-student programs are extremely influential to students. The report claimed these sources are not well known, but very powerful to student's decision making for their college. The study also found 26% of sampled students paid a specialist or advisor during the college decision process.

Moreover, there are several institutional, infrastructural and developmental factors which directly or indirectly determine the course of study opted by an individual. These contextual factors may include the type of educational institution, medium of instruction, government sponsorship/subsidies in terms of fee waiving and by providing scholarships or stationary support, accessibility to educational institution, quality of education/teaching material, job-market demand, advertisement/marketing of college/courses, competition for limited seats in higher educational institute, and the overall development of the region/community etc. James *et al*. (1999) has identified a range of factors influencing course preference including: the reputation of the course among employers; graduate satisfaction from the course; graduate employment rates from the course; the quality of teaching in the course; approaches to teaching, learning and assessment from the course including opportunities for flexible study [18]. Studies have well recognized the significance of the institutional climate [16], and institutional characteristics [15] [51] in a comprehensive college choice model. Geography also imposes constraints on college choices. That most students attend public, in-state institutions implies that college options are circumscribed by state of residence [68]. The impact of geographical regions [55] and urbanity [54] on students' choice of mathematics and science subjects have also been examined empirically.

2. Methods

2.1. Data

This study is based on the information collected by the 64th round of National Sample Survey (NSS) on "Participation and Expenditure in Education" (Schedule 25.2) in India during July 2007-June 2008. With a nationally representative sample of 445,960 persons from 63,318 rural and 37,263 urban households spread over the country, the survey adopted a stratified multi-stage sampling design. The NSS is a standard and impeccable source of information on a range of socioeconomic issues in India, which is conducted by the National Sample Survey Office (NSSO) of the National Statistical Organisation under the aegis of the Ministry of Statistics and Programme Implementation, Government of India. The major purpose of the schedule 25.2 was to canvass on a range of information related to education including educational infrastructure, current attendance status, educational incentives, magnitude and nature of private expenditure, and the extent of educational wastage in terms of dropout and discontinuance, and its causes. The survey covered the entire Indian Union except Leh (Ladakh) and Kargil districts of Jammu & Kashmir (for central sample), interior villages of Nagaland situated beyond five kilometers of the bus route and villages in Andaman and Nicobar Islands, which remain inaccessible throughout the year. To make the estimates representative and comparable, and to account for the multi-stage sampling design adopted in the survey, we used appropriate weights in the analysis recommended by the NSS. The details of the sampling weights as well as the extensive information on survey design, data collection, and management procedures are described in the 64th round NSS report [69] and supplementary documents provided with the electronic data disk.

2.2. Limitations of Data

In order to comprehensively analyze the factors of subject-choice by individual at post-secondary level education, we required to accommodate all possible dimensions of potential determinants, as conceived in **Figure 1**. However, this study could not manage to arrange information on some of the indicators such as related to psychosocial factors; a few individual indicators like personal ambition, previous academic performance etc.; as well as a range of contextual variables such as teacher-student interaction, availability of quality teaching material,

job market demand, advertisement/marketing of courses, and extent of competition etc. In fact, the application of such a comprehensive model is seldom empirically examined. Despite these limitations, analysis of a range of potential factors included in this study representing a national-level scenario is among the rare efforts ever made in Indian context while analyzing the determinants of subject-choice decisions at higher-level education. Acknowledging these limitations, the analysis and findings of this study are expected to augment further inquiries in this field of study.

2.3. Measures Used in the Study

The extensive information on educational status and associated features were collected for household members aged 5 - 29 years who were currently (at the time of the survey) attending at primary level education and above. The mutually exclusive academic course selection[1] by an individual at post-secondary level was used as the outcome variable in the study. Selecting an optional course of study is a general practice in Indian education system after the secondary level education. More often, the selection of study courses at post-secondary level leads to the continuation of higher education in India with a few exceptions. The outcome variable is categorized in four major groups of courses, *i.e.* Arts/Humanities, Science, Commerce, and Technical/Professional/Vocational. The first three categories are considered under general education, whereas the fourth category involves the hands on training in addition to theoretical classes. Education, such as Engineering, Medicine, Agriculture, Management, Chartered Accountancy, Cost Accountancy etc. are examples of technical/professional courses. The education which aims at imparting training in very specific fields through providing significant "hands on" experience in acquiring necessary skill, which make them employable or create for them opportunities of self employment and the degree/diploma/certificate awarded by the institute should have recognition by State/Central Government/public sector or similar employers are included under vocational education [69]. The education offered by Industrial Training Institutes (ITI), polytechnics, etc. are examples of vocational courses.

The likelihood of selection of these academic courses at the senior secondary and higher education level was assessed using a set of selected socioeconomic, regional and institutional factors. The individual and household factors such as sex/gender (male/female), age at entry in school (≤5 years/≥6 years), parents' education level (not literate/below primary/primary/middle/secondary & higher), social group (scheduled tribes (ST)/scheduled castes (SC)/Others), religion (Hindu/Islam/Christian/Others), household size (≤5/6 - 9/≥ 10), sibling composition, and household economic status were selected from the available information in the survey data. The categorization of exposure variables was based on the discretion in order to account adequate sample size to offer robust estimates from the multivariate analysis. However, the categorization approach followed the general practices applied in policy and programme execution. For instance, based on the terminology adopted by the Government of India, the social group was classified in three categories, which focuses more on the socially disadvantaged castes/groups, and all privileged caste groups are represented in the "Others" group [70]. Siblings of the individual were segregated by sex, and classified based on their numbers in the household. The categories for sibling composition includes: only son in the household, only daughter, 1 brother and 1 sister, more than one (1+) brothers and no sister, more than one brothers and one sister, more than one brothers and sisters, and other mixed composition. The quintile of the monthly per capita household expenditure (MPCE) was adopted as a surrogate variable representing the household economic status of the individual. In the absence of direct data on income in household sample surveys such as NSS, the household expenditure is widely used as a surrogate indicator for assessing the economic status of the households [71] [72].

Institutional factors include type of educational institution (Government or Public/Private), medium of instruction in the course for which a student is enrolled (English/Hindi/Other language), status of free education (free/partially exempted from the tuition fee/neither free nor exempted), scholarship received for opting particular course (yes/no), books or stationary received for free or at subsidized rate (yes/no), distance of educational institution from the place of residence (1 - 2 km/>2 km), and mode of transport up to the institution (on foot/school or public vehicle with no concession/public vehicle with concession/bicycle or other modes). The type of residence (rural/urban) and the region of residence (broad geographical regions) were two regional factors included in the multivariate analysis. The census of India definition of urban/rural is used to classify a household

[1]The use of the term "subject-selection" or "subject-choice" throughout the paper should not be assumed to indicate that all students were completely free to choose whatever subjects they liked. Even at post-16 level, choice may be constrained in many ways; students may only be superficially free to choose, or not free to choose at all.

as urban or not [73]. The broad geographical regions were formed based on homogeneity and contiguity of states in different parts of the country [74], which also carry diverse development records.

2.4. Statistical Analysis

The proportions were estimated with 95% confidence intervals (CI) using appropriate sampling weights and accounting for survey design [75]. The bivariate association between the outcome variable and the independent predictors were assessed using chi-squared tests [76]. Moreover, since the nature of the outcome variable was nominal and classified into four categories (*i.e*. polytomous), the analysis used the multinomial logistic regression model [77]. However, to avoid any complexity in the interpretation and for easier dissemination of the results obtained from the regression model, we report the model-based predicted probabilities (PP) with 95% CI. These predicted probabilities can be converted to percentage form and are easily interpreted. The general formulation of the model in probabilistic form may be specified as [78] [79];

$$P_j = \frac{e^{\sum_k b_{jk} X_k}}{1 + \sum_i e^{\sum_k b_{jk} X_k}}, \; j = 1, 2, \cdots, J$$

where P_j denotes the response variable with J mutually exclusive and exhaustive categories, denoting $j = 1, 2, \cdots, J$ (*i.e*. 4). The three probability categories of the response variable are: P_1 = estimated probability for selecting Arts/Humanities courses, P_2 = estimated probability for selecting Science, P_3 = estimated probability for selecting Commerce, and P_4 = estimated probability for selecting Technical/Profession/Vocational courses. $X_0 = 1$, the summation Σ_k ranges from $k = 0$ to $k = K$, the summation Σ_i ranges from $i = 1$ to $i = J - 1$, and b_{j0}, b_{j1}, $\cdots$, b_{jK} are all defined to be zero. The latter definition implies that $e^{\sum_k b_{jk} X_k} = e^0 = 1$, when $j = J$.

Since the study considered a range of covariates in the model, we examined for multicollinearity with variance inflation factors, all of which were much lower than 2.5, suggesting that the possibility of high multicollinearity was ostensible. The final analytic sample size by each predictor variable used in the multivariate model is reported in **Table A1**. All analyses were conducted using STATA version 10 [80].

3. Results

3.1. Proportion of Population with Post-Secondary Level Education

Table 1 presents the prevalence (%) of population aged 15 years and above with senior secondary and higher level education in India by their background characteristics during 2007-08. With nearly 14% population aged ≥ 15 years achieving post-secondary level education, the country demonstrated a wide variation in the proportion across different socioeconomic, demographic and regional groups. Female, rural, and population belonging to SC/ST and Muslim households were disadvantaged in achieving post-secondary level education, as these groups of population were nearly half in proportion compared to male, urban, non-SC/ST (others), and Hindu (and other religious group) population respectively. The economic status manifested a linear pattern, as the proportion increased with the increasing level of monthly per capita expenditure. However, the age group and the household size had non-linear pattern, where the highest proportion of population with post-secondary education was estimated in the age group 20 - 24 years and in households with five members or less. Island and Union Territories (excluding Delhi) recorded the highest proportion of population with post-secondary level education. Western, northern and southern regions of the country recorded less variation in proportion and were above national average. The lowest proportion of population with post-secondary education was recorded in the eastern region of India, whereas the central region recorded slightly lower proportion than the national average.

3.2. Predictors of Course-Selection in Post-Secondary Education

Given the low participation rate in post-secondary education in India, there are indications of a skewed pattern in the selection of academic courses as well. More than half of the total population aged ≤ 29 years, who were attending any educational institution at the time of survey, were likely to opt for Arts/Humanities courses adjusting for selected socioeconomic, regional and institutional factors at their mean (**Figure 2**). Approximately one in every five students aged ≤ 29 years had chance to opt for Science courses, whereas nearly 13% and 12% students were likely to choose Commerce and Technical/Professional/Vocational (TPV) courses respectively.

Table 1. Proportion of population (aged ≥ 15 years) with senior secondary and higher level education by their background characteristics, India, 2007-08.

Background Characteristics	Proportion (%)	95% CI
Sex		
Male	17.0	(16.5, 17.4)
Female	9.6	(9.6, 10.3)
Age group		
15 - 19	9.2	(8.8, 9.6)
20 - 24	24.6	(23.6, 25.5)
25 - 29	18.8	(18.1, 19.6)
30 - 34	15.5	(14.9, 16.1)
35 - 39	13.7	(13.1, 14.3)
≥40	9.3	(8.9, 9.7)
Social group		
ST	5.1	(4.7, 5.5)
SC	7.4	(7.1, 7.8)
Others	16.1	(15.6, 16.6)
Religion		
Hindu	14.0	(13.6, 14.4)
Islam	7.7	(7.1, 8.3)
Christian	20.6	(18.8, 22.5)
Others	17.3	(15.7, 18.9)
Household size		
≤5	15.2	(14.8, 15.7)
6 - 9	10.8	(10.4, 11.2)
≥10	12.0	(11.1, 12.9)
MPCE[a] *quintile*		
Q1	3.4	(3.1, 3.7)
Q2	5.4	(5.1, 5.7)
Q3	8.4	(8.0, 8.8)
Q4	14.1	(13.6, 14.7)
Q5	38.0	(36.9, 39.2)
Type of residence		
Rural	8.0	(7.7, 8.3)
Urban	27.7	(26.8, 28.6)
Region of residence		
North	15.7	(14.8, 16.7)
Central	12.5	(11.7, 13.3)

Continued

East	9.5	(8.9, 10.1)
West	16.6	(15.7, 17.7)
South	15.0	(14.1, 15.9)
Northeast	10.7	(9.6, 12.0)
Island/UTs	27.9	(23.5, 32.8)
Total	**13.5**	**(13.2, 13.9)**

[a]Monthly Per Capita Expenditure

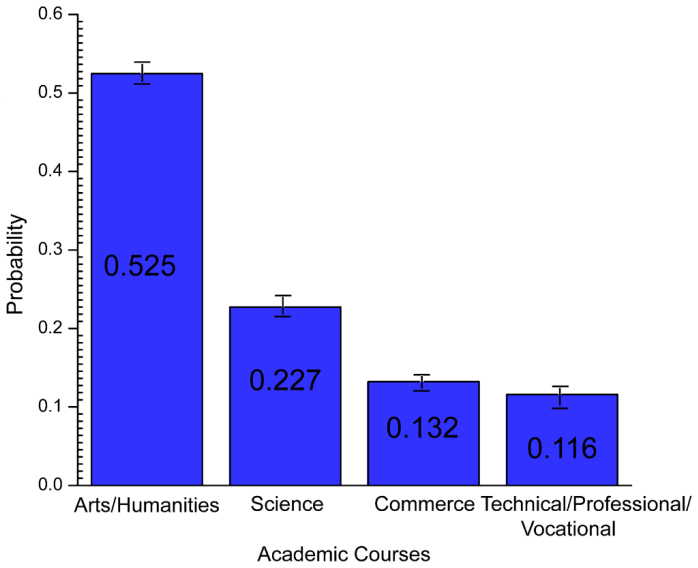

Figure 2. Overall probability (with 95% CI) to select academic courses in post-secondary level education (currently attending population aged ≤ 29) adjusting for selected socioeconomic, regional and institutional factors at their mean, India, 2007-08.

Table 2 presents the predicted probabilities of population aged ≤ 29 years for opting four major categories of group of academic courses in post-secondary level education controlling for all selected variables (listed in the table) in the multinomial logit model. Among individual/household factors, sex/gender, age at entry in school, father's and mother's education level, religion, household size, and economic status were found statistically significant predictors of course selection. Female students were observed more likely to opt for Arts/Humanities courses compared to their male counterparts, while their participation in Science, Commerce, and TPV courses were relatively lower than the male students. Students who entered early (at age ≤ 5 years) in school were more likely to go for Science and Commerce courses, while there was little impact of age at entry in school on selection of TPV courses. Although, the education level of father's and mother's separately had no linear and static pattern on individual's choice of particular academic course, however, more than a quarter of the sample population were likely to opt for Science courses in post-secondary education, whose father's and mother's education level were secondary and higher. Hindu population was observed relatively more likely to select Science and TPV courses compared to other religious groups. Household size had a distinct pattern on course selection. Sample population from small size (≤5 members) households were relatively more likely to choose Science courses, while population from medium size (6 - 9 members) and large size (≥10 members) households were observed opting for Commerce and TPV courses more than other groups respectively. Except for Commerce courses and to some extent TPV courses, the economic status of household did not appear to have a linear and static pattern in particular course selection at post-secondary level.

Table 2. Predicted probabilities (PP) with 95% confidence intervals (CI) for opting courses at senior secondary and higher education level across categories of selected socioeconomic, regional and institutional determinants, India, 2007-08.

Selected covariates	Arts/Humanities		Science		Commerce		Technical/Professional/ Vocational		*p*-value
	PP	95% CI	PP	95% CI	PP	95% CI	PP	95% CI	
Sex									<0.001
Male	0.476	(0.453, 0.499)	0.254	(0.235, 0.273)	0.142	(0.127, 0.157)	0.128	(0.114, 0.142)	
Female	0.593	(0.567, 0.619)	0.191	(0.171, 0.210)	0.117	(0.101, 0.133)	0.099	(0.084, 0.114)	
Age at entry in school									<0.001
≤5	0.503	(0.484, 0.522)	0.241	(0.225, 0.256)	0.145	(0.132, 0.158)	0.111	(0.099, 0.123)	
≥6	0.567	(0.541, 0.599)	0.200	(0.180, 0.221)	0.108	(0.093, 0.123)	0.125	(0.108, 0.142)	
Father's education level									<0.001
Not literate	0.561	(0.515, 0.607)	0.188	(0.153, 0.222)	0.144	(0.112, 0.176)	0.107	(0.079, 0.135)	
Below Primary	0.505	(0.451, 0.560)	0.222	(0.180, 0.265)	0.145	(0.108, 0.182)	0.127	(0.092, 0.163)	
Primary	0.573	(0.529, 0.617)	0.225	(0.190, 0.259)	0.108	(0.084, 0.133)	0.094	(0.073, 0.115)	
Middle	0.556	(0.522, 0.589)	0.189	(0.164, 0.215)	0.150	(0.127, 0.173)	0.105	(0.086, 0.124)	
Secondary & Higher	0.489	(0.464, 0.515)	0.257	(0.236, 0.279)	0.126	(0.110, 0.141)	0.127	(0.111, 0.143)	
Mother's education level									0.003
Not literate	0.562	(0.533, 0.592)	0.229	(0.204, 0.254)	0.102	(0.085, 0.119)	0.107	(0.089, 0.124)	
Below Primary	0.519	(0.464, 0.573)	0.196	(0.156, 0.235)	0.153	(0.117, 0.188)	0.133	(0.101, 0.165)	
Primary	0.520	(0.484, 0.555)	0.222	(0.193, 0.251)	0.148	(0.123, 0.173)	0.110	(0.089, 0.131)	
Middle	0.532	(0.493, 0.570)	0.202	(0.175, 0.229)	0.144	(0.120, 0.168)	0.123	(0.101, 0.145)	
Secondary & Higher	0.474	(0.438, 0.510)	0.256	(0.227, 0.285)	0.150	(0.126, 0.174)	0.120	(0.101, 0.139)	
Social group									0.162
ST	0.610	(0.539, 0.681)	0.178	(0.120, 0.236)	0.114	(0.072, 0.156)	0.098	(0.055, 0.141)	
SC	0.525	(0.486, 0.565)	0.212	(0.180, 0.244)	0.128	(0.102, 0.154)	0.135	(0.109, 0.160)	
Others	0.520	(0.502, 0.537)	0.233	(0.219, 0.247)	0.134	(0.122, 0.145)	0.113	(0.102, 0.125)	
Religion									0.027
Hindu	0.514	(0.497, 0.531)	0.233	(0.219, 0.246)	0.132	(0.121, 0.143)	0.121	(0.110, 0.133)	
Islam	0.567	(0.515, 0.619)	0.220	(0.182, 0.258)	0.132	(0.102, 0.161)	0.081	(0.059, 0.103)	
Christian	0.592	(0.503, 0.682)	0.174	(0.119, 0.230)	0.138	(0.088, 0.189)	0.095	(0.059, 0.131)	
Others	0.587	(0.516, 0.658)	0.165	(0.111, 0.219)	0.134	(0.089, 0.180)	0.114	(0.077, 0.151)	
Household size									0.001
≤5	0.521	(0.499, 0.543)	0.234	(0.216, 0.251)	0.124	(0.110, 0.138)	0.121	(0.107, 0.135)	
6 - 9	0.523	(0.493, 0.554)	0.226	(0.202, 0.250)	0.152	(0.131, 0.173)	0.099	(0.083, 0.114)	
≥10	0.552	(0.477, 0.628)	0.155	(0.106, 0.204)	0.116	(0.067, 0.165)	0.176	(0.118, 0.233)	
Sibling composition									0.281
Only Son	0.479	(0.417, 0.542)	0.280	(0.230, 0.330)	0.113	(0.083, 0.143)	0.127	(0.095, 0.160)	

Continued

Only daughter	0.529	(0.449, 0.609)	0.238	(0.179, 0.297)	0.102	(0.057, 0.148)	0.131	(0.090, 0.173)	
1 brother, 1 sister	0.506	(0.467, 0.544)	0.221	(0.193, 0.249)	0.156	(0.129, 0.182)	0.118	(0.097, 0.139)	
1 + brother, no sister	0.510	(0.470, 0.550)	0.243	(0.210, 0.275)	0.137	(0.113, 0.161)	0.111	(0.089, 0.132)	
1 + brother, 1 sister	0.545	(0.509, 0.580)	0.217	(0.190, 0.244)	0.138	(0.114, 0.161)	0.101	(0.082, 0.119)	
1 + brother, 1 + sister	0.542	(0.493, 0.590)	0.204	(0.166, 0.242)	0.130	(0.099, 0.162)	0.124	(0.094, 0.155)	
Other mixed composition	0.533	(0.497, 0.568)	0.226	(0.198, 0.254)	0.120	(0.099, 0.140)	0.122	(0.100, 0.143)	
MPCE[b] *quintile*									0.007
Q1	0.553	(0.491, 0.616)	0.238	(0.184, 0.293)	0.096	(0.058, 0.134)	0.112	(0.073, 0.151)	
Q2	0.577	(0.532, 0.621)	0.224	(0.187, 0.262)	0.102	(0.076, 0.129)	0.097	(0.072, 0.123)	
Q3	0.554	(0.520, 0.588)	0.233	(0.204, 0.262)	0.114	(0.095, 0.134)	0.099	(0.081, 0.118)	
Q4	0.536	(0.505, 0.567)	0.218	(0.194, 0.243)	0.137	(0.116, 0.157)	0.109	(0.092, 0.126)	
Q5	0.482	(0.454, 0.510)	0.226	(0.205, 0.248)	0.156	(0.137, 0.176)	0.136	(0.117, 0.154)	
Type of institution									<0.001
Govt./Public	0.564	(0.543, 0.585)	0.197	(0.181, 0.213)	0.134	(0.120, 0.148)	0.105	(0.092, 0.118)	
Private	0.479	(0.456, 0.502)	0.264	(0.244, 0.283)	0.129	(0.115, 0.144)	0.128	(0.113, 0.143)	
Medium of instruction									<0.001
English	0.304	(0.278, 0.330)	0.333	(0.305, 0.362)	0.144	(0.125, 0.164)	0.219	(0.194, 0.244)	
Hindi	0.647	(0.613, 0.681)	0.167	(0.142, 0.192)	0.096	(0.075, 0.117)	0.090	(0.073, 0.108)	
Others	0.622	(0.594, 0.651)	0.174	(0.153, 0.195)	0.140	(0.119, 0.160)	0.064	(0.052, 0.076)	
Status of free education									<0.001
Free	0.547	(0.515, 0.578)	0.293	(0.265, 0.322)	0.118	(0.099, 0.136)	0.042	(0.031, 0.053)	
Partially exempted	0.501	(0.401, 0.600)	0.200	(0.130, 0.271)	0.082	(0.036, 0.129)	0.216	(0.148, 0.285)	
Neither free nor exempted	0.505	(0.486, 0.523)	0.204	(0.190, 0.218)	0.136	(0.124, 0.148)	0.156	(0.142, 0.169)	
Scholarship received									0.906
Yes	0.535	(0.490, 0.581)	0.230	(0.191, 0.269)	0.125	(0.097, 0.154)	0.109	(0.080, 0.138)	
No	0.523	(0.507, 0.540)	0.227	(0.213, 0.240)	0.133	(0.122, 0.144)	0.117	(0.106, 0.128)	
Books/stationery received[a]									0.841
Yes	0.488	(0.379, 0.596)	0.257	(0.164, 0.349)	0.151	(0.076, 0.226)	0.105	(0.035, 0.174)	
No	0.525	(0.509, 0.541)	0.227	(0.214, 0.240)	0.132	(0.121, 0.143)	0.116	(0.105, 0.127)	
Distance of institution									<0.001
1 - 2 km	0.511	(0.476, 0.547)	0.283	(0.252, 0.313)	0.121	(0.101, 0.141)	0.085	(0.068, 0.102)	
>2 km	0.527	(0.506, 0.548)	0.206	(0.190, 0.221)	0.136	(0.122, 0.151)	0.131	(0.118, 0.145)	

Continued

Mode of transport									<0.001
On foot	0.591	(0.553, 0.628)	0.225	(0.195, 0.255)	0.119	(0.096, 0.142)	0.065	(0.050, 0.080)	
School/Public Vehicle with no concession	0.475	(0.438, 0.511)	0.207	(0.179, 0.235)	0.123	(0.101, 0.146)	0.195	(0.168, 0.223)	
Public Vehicle with concession	0.507	(0.472, 0.542)	0.207	(0.182, 0.232)	0.151	(0.129, 0.173)	0.135	(0.114, 0.157)	
Bicycle/Others	0.503	(0.475, 0.531)	0.250	(0.228, 0.272)	0.130	(0.113, 0.148)	0.116	(0.100, 0.132)	
Type of residence									<0.001
Rural	0.580	(0.558, 0.602)	0.211	(0.194, 0.228)	0.096	(0.084, 0.107)	0.113	(0.099, 0.127)	
Urban	0.446	(0.421, 0.472)	0.242	(0.222, 0.263)	0.195	(0.175, 0.215)	0.116	(0.101, 0.132)	
Region of residence									<0.001
North	0.644	(0.606, 0.681)	0.143	(0.120, 0.167)	0.101	(0.078, 0.125)	0.112	(0.091, 0.132)	
Central	0.487	(0.442, 0.533)	0.293	(0.252, 0.335)	0.123	(0.094, 0.152)	0.096	(0.073, 0.119)	
East	0.706	(0.671, 0.740)	0.171	(0.142, 0.200)	0.058	(0.043, 0.073)	0.065	(0.049, 0.081)	
West	0.488	(0.451, 0.526)	0.149	(0.125, 0.173)	0.211	(0.181, 0.241)	0.152	(0.127, 0.177)	
South	0.368	(0.333, 0.404)	0.330	(0.297, 0.362)	0.167	(0.142, 0.192)	0.135	(0.114, 0.156)	
Northeast	0.809	(0.761, 0.858)	0.090	(0.049, 0.130)	0.038	(0.017, 0.058)	0.063	(0.033, 0.093)	
Island/UTs	0.543	(0.444, 0.642)	0.213	(0.143, 0.283)	0.110	(0.062, 0.157)	0.134	(0.083, 0.185)	

[a]For free or at subsidized rate; [b]Monthly Per Capita Expenditure; *p*-value refers to adjusted Wald test. Note: Predicted probabilities are based on the multivariate multinomial logistic regression model and adjusted for all covariates at their mean.

Among selected institutional factors, type of educational institution, medium of academic instruction, the status of free education, distance of educational institution from the place of residence, and mode of transport were observed statistically significant predictors for academic course selection. Population attending private educational institutions was found more likely to opt for Science and TPV courses. Similarly, the medium of instruction in educational institutions had a profound impact on selection of Science and TPV courses. More than 33% of sample population who availed their academic instruction in English were likely to opt for Science courses compared to nearly 17% population for each who got instruction in Hindi and other languages. Population who got free education and whose tuition fee was partially exempted appeared more likely to choose Science courses and TPV courses respectively. Nearly 28% sample population whose institution happened to be within 2 km from their residences, appeared to opt for Science courses compared to 21% population who used to stay beyond 2 km from their educational institutions. However, the pattern was observed opposite in the selection of other academic courses. As it is apparent in **Table 2**, although, the population whose institution were beyond 2 km from their residences had higher probability to select Commerce and TPV courses, these courses were also relatively more likely to be opted by population used to travel by public vehicle with transport concession.

The urban population was found more advantageous compared to their rural counterparts in pursuing Science, Commerce and TPV courses in post-secondary education. Population belonging to the southern and the central regions of India had higher probabilities to pursue Science courses, while the population from the western region recorded the highest probability to opt for Commerce and TPV courses in post-secondary level education compared to population from other regions.

4. Discussion

As given the apparent socioeconomic differences in the attainment of post-secondary education, the differences in selection of academic courses did not appear clearly distinct and following any specific pattern. This suggests

that subject choice at the higher level is an interweaving function of a number of socioeconomic, psychosocial, political, regional and institutional factors, yet there are chances some of the evident patterns may remain unanswered. This study, however, obtained that sex/gender, age at entry in school, father's and mother's education level, religion, household size, and economic status were statistically significant predictors of course selection among individual/household factors. Besides, the selection of courses was also significantly different by the institutional factors such as type of educational institution, medium of academic instruction, the status of free education, distance of educational institution from the place of residence, and mode of transport along with the pertinent influence of type and region of residence.

Although a few studies investigated the role of gender in subject choices at the higher level, this still adds strength to the conclusion that male and female students make different subject choices that are not explained by systematic differences in ability, socioeconomic, ethnic, or institutions' organisational factors [81]-[83]. The issues that were most commonly raised as important influences on whether or not STEM (Science, Technology, Engineering and Mathematics) subjects were pursued at the higher level were the utility of the subject for future education or career purposes, enjoyment or interest in the subject, perceived ability in the subject, subject difficulty, and the importance of taking subjects that complemented one another [81] [84]. There is some evidence that girls are more likely than boys to give interest and enjoyment as a reason for their choice of certain STEM subjects, and some evidence that boys are more likely than girls to say that the easiness of the subject influenced them. Students' perceptions about their ability and subject difficulty also illuminate the link between prior attainment and subject choice. Given the link between socioeconomic status, school type and attainment [85] and the claimed differences in the way that science is taught between schools, it may be that the organisation of the education system is discouraging pupils with appropriate prior attainment and/or ability from more disadvantaged backgrounds from studying STEM subjects at a higher level. Warrington and Younger (2000) point out that mathematics and science subjects are socially constructed as masculine—it is therefore conceivable that STEM studies are conceived as boys' cultures and tend to alienate girls [86]. Moreover, in Indian/South Asian context, the gender preference in each social phenomenon is well recognized [87] [88]. Single-sex educational institutions may also have a profound influence on the gender differences in perceptions, ability and approach towards particular subjects.

Empirical studies carried out in different parts of the world have examined the extent to which children are likely to choose subjects that are associated with their parents' characteristics [89]-[93]. In general, these studies take the line that parents' interests are communicated to children, and the children are therefore likely to choose subjects that correspond to their parents' interests. According to a framework that integrates rational choice perspectives and cultural reproduction theory, children take their parents' social position as a reference for their own choices, and are guided mainly by the amount of economic and cultural capital that is available within the family [90] [92]-[94]. In relation to education, culture is not static, but changes according to socio-historical circumstances [95]. Cao *et al*. (2006) investigated the perceived parental influence on mathematics learning in Australia and China [96]. McPhan *et al*. (2008) identified that parents' occupation and education achievements and siblings were the influencing factor on students' decision to study mathematics [97]. Even some studies suggest that pupils considered parental advice to be far more important than teacher advice in influencing their option decisions [98].

However, in present Indian context, this study found that parents' lower education level were not likely to hinder the students' selection of Science or TPV courses substantially different from that of the parents' higher education level; such findings might be attributed to the increasing mass-media exposure, social network, institutional or other unobserved factors. Similarly, students from lower economic status did not appear to be disadvantaged in the selection of TPV courses substantially compared to the students from the highest economic class, and even the former were found more probable to opt for Science courses compared to the latter.

For the selection of subject field, a related hypothesis elaborates that lower social class students may be more inclined to choose subjects that offer better labour market prospects [99]. Moreover, Kelsall *et al.* (1972) maintain that lower social class students may tend to choose technical fields of study, which are closer to the occupational experience of many manual working class parents [99]. Boudon's (1974) model of "rational action" states that educational choices depend on the perception of the costs and benefits of each educational alternative available [100], which resembles the one commonly used by economists: Becker's (1975) human capital theory. According to Becker (1975) the costs and the returns to education are the main factors driving educational choices [101]. Some fields might be more closely linked to professions for which the presence of "social net-

works" (to which high social class students are typically better connected) is more important to ensure labour market success and a higher economic return of the educational investment. Moreover, since in the presence of capital market imperfections low social class individuals might have higher costs of enrolling in higher education, standard economic theory predicts that these individuals will require a higher return from their investment in university education [102].

Similar argument may be ascribed while interpreting the higher probability of TPV courses observed among the students from the large size households; however, their probability to opt for science courses was substantially lower compared to the small and medium size households. Moreover, the literature suggests that there is a positive effect of age at school entry on pupils' educational performance [103]-[105]. Given the lower proportion of tertiary education among Muslim (Islam) population, their probability to opt for TPV courses were the lowest among all religious groups, followed by the Christian population. Moreover, Christian and other religious groups had a lower probability to select Science courses. This may suggest the possibility of their engagement in their family businesses or activities, as their probabilities to opt for Commerce courses were relatively higher compared to Hindu and Muslim religious groups.

The role of institutional factors in determining subject choices is obvious, immediate and direct, and the increased impact of these factors in any society is appreciable, because it can be approached later or sooner through effective planning and management of available resources; not as complex as the socio-psychological and behavioural factors to deal with. The selection probability of Science and TPV courses among students in Private institutions and who were instructed in English were higher. The Private institutions are considered better equipped, disciplined, effective compared to the Government/Public institutions, however, the former are far expensive than the latter. Similarly, the higher-level education in Science and TPV courses cannot be pursued without knowing better English, as the standard books and study materials are primarily available in English. Students were likely to prefer Science and TPV courses more if their education expenses were fully waived or partially exempted, which suggests that if the provisions for required economic support to undertake these courses would be made by the Government, the subject orientation can be molded. As at present, the Government provides scholarships and subsidies on books/stationary, as well as transport concessions to continue their higher education, which can be expanded and modified with specific terms and conditions in order to influence students' subject choice as per the need of workforce, however, at early age of education.

The urban advantage in selection of Science and TPV courses are contingent upon the better institutional factors, better-informed social networks and better exposure to labour market and employment trends. Similarly, the deprivation of eastern and northeastern regions in the mainstream development can also have prolific impact on development of educational activities. The number of Government ITIs is very less in eastern region compared to other regions [106] of the country.

5. Policy Implications

The combination of subjects/courses one decides to take for higher-level study is the most crucial decision or choice in terms of one's livelihood prospects. As important as these choices are for individuals, such decisions also have wider economic implications for the country. Major government-funded inquiries elsewhere (e.g. [107] [108]) identified a mismatch between skills acquired during formal education and those required in the workplace. This phenomenon is not alien to India. Helping young people to make the most appropriate subject choices is therefore crucial; both to ensure that the country has the skills it needs for the economy and to enable young people to make the best choices to meet their own future needs and aspirations. However, the dynamics of students' subject choice is a significantly under-investigated area in India.

A key premise underpinning many of the proposals is the view that young people begin to make choices about careers early in their education [83]. Schools in India need to make aware of their role in assisting students to make informed choices about future studies and work options during various stages of their educational journey. Such assistance may be indirect, in terms of establishing curriculum structures that allow students to make choices with set alternatives, or direct, in terms of career education or less formal advice given to students to assist them individually in making their subject choices and/or decisions about post school destinations and career choices [109]. Consequently, there should be provision of more funds required for the procurement and installation of machines, and equipment, supply of furniture and fittings, construction of workshop and laboratories and provision of special incentives for vocational teachers in the secondary schools.

VET (Vocational Education and Training)—in-schools programs are increasing in importance relative to the traditional school to VET pathway [110]. Some studies have investigated the issue of how well the development of vocational learning in schools has helped to keep young people engaged in education [110] [111]. Vocational learning in schools can function as an equity strategy performing a "preventative function" by allowing students "to develop work-related skills while still advancing their general education, and the training encourages young people to stay at school longer [110]. This has potential benefits in both the general education and vocational learning areas [110] and in securing a range of good outcomes for school leavers [111].

In addition, careers guidance in schools is very poor in India. Patton and McCrindle (2001) investigated the role of career information and vocational guidance in students' post-school planning, and reported that students requested more information about their options [112]. Findings suggested that many students would have preferred more assistance when in the year 10 and felt that the year 12 was too late to be making course and career decisions [113].

However, we also need to deal with the sheer inertia of the academic community. Singh (1999) mentions based on his experience that promotion of vocational courses was not well responded by academic community whenever they were asked for [114]. As this mode of education is alien to them, they are reluctant to undertake any new experiment or relearn their academic digits. Nor has there been any shift at the policy-making level. Therefore, a policy of drift has been followed, so much so that students are content to get enrolled in colleges, and study in a casual and half-hearted way and clear their examinations which are not all that rigorous [114]. To some extent, decision-making in our institutions is largely bureaucratic in character; all kinds of misjudgments continue to be made. All these issues need to be given adequate consideration by the policy makers to deal with the barriers faced by the potential population to undertake academic courses as per the market demand.

6. Conclusion

This study has empirically examined a range of factors, which were instrumental in determining the course of study at post-secondary level education by individuals (adolescents/youths) in India. Moreover, a comprehensive framework for analyzing the factors of academic-course choice has also been proposed for further research in this field of study. Although, this study could not examine the proposed framework comprehensively due to the lack of required information, nonetheless, the discussions and findings of this study would certainly augment the future research conceptualized with all possible dimensions. The major individual, household and institutional factors were found significant determinants of the choice of subject-course at post-secondary level in India, which can be persuaded to make a balance between the job-market requirements and the trained workforce in order to make plans for the use of available human resource effectively as a bonus. We agree with this fact that supplying human capital to the labour market is not the exclusive role of the higher education, however, job-market opportunities are found to significantly affect the subject choice at higher level in several other studies. On the other hand, there are possibilities that adolescents or youths undesirably opt for the subject-courses in their higher education in want of adequate options. Hence, the mismatches between human resource training and workforce engagement could be rectified with certain interventions.

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Appendix 1

Table A1. Analytic sample (population aged ≤ 29 years currently attending educational institution) used for the multivariate analysis by selected covariates, NSS (2007-08).

Covariates	%	n	Covariates	%	n
Sex			*Medium of instruction*		
Male	57.9	6420	English	35.5	4949
Female	42.1	5031	Hindi	33.9	3279
Age at entry in school			Others	30.6	3221
≤5	68.1	7559	*Status of free education*		
≥6	31.9	3892	Free	23.7	2867
Father's education level			Partially exempted	2.3	235
Not literate	13.3	1194	Neither free nor exempted	74.0	8349
Below Primary	7.1	743	*Scholarship received*		
Primary	12.0	1160	Yes	11.2	1458
Middle	19.1	1965	No	88.8	9993
Secondary & Higher	48.6	5291	*Books/stationery received*[a]		
Mother's education level			Yes	1.3	173
Not literate	31.9	3130	No	98.7	11,276
Below Primary	8.5	953	*Distance of institution*		
Primary	15.9	1707	1 - 2 km	28.8	3859
Middle	17.3	2007	>2 km	71.2	7556
Secondary & Higher	26.4	3349	*Mode of transport*		
Social group			On foot	25.5	3215
ST	4.1	936	School/Public Vehicle with no concession	18.2	2033
SC	15.1	1525	Public Vehicle with concession	24.2	2343
Others	80.8	8990	Bicycle/Others	32.1	3257
Religion			*MPCE*[b]*quintile*		
Hindu	84.1	9071	Q1	6.5	564
Islam	9.5	1133	Q2	11.8	1090
Christian	2.9	723	Q3	17.6	1814
Others	3.6	524	Q4	22.2	2594
Household size			Q5	41.9	5389
≤5	65.7	7601	*Type of residence*		
6 - 9	29.6	3385	Rural	56.4	5208
≥10	4.7	465	Urban	43.6	6243
Sibling composition			*Region of residence*		
Only Son	7.7	883	North	15.2	2069

Continued

Only daughter	4.5	535	Central	23.4	1855
1 brother, 1 sister	17.4	2046	East	12.4	1459
1 + brother, no sister	16.4	1817	West	17.2	1793
1 + brother, 1 sister	19.3	2118	South	28.7	2891
1 + brother, 1 + sister	14.6	1594	Northeast	2.7	1,091
Other mixed composition	20.2	2458	Island/UTs	0.5	293
Type of institution					
Govt./Public	51.2	6220			
Private	48.8	5101			

[a]For free or at subsidized rate; [b]Monthly Per Capita Expenditure; "n" represents unweighted sample cases. Note: Proportions (%) are weighted. All covariates were significantly different at $p < 0.001$, except the variable "Books/stationary received" ($p = 0.003$) in the χ^2 test applied with the outcome variable.