EDUCATIONAL ATTAINMENT IN INDIA: AN EMPIRICAL ANALYSIS

Thesis Submitted to Jadavpur University, West Bengal for the Degree of Doctor of Philosophy in Arts (Economics)

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Dedicated to

My Parents

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"EDUCATIONAL ATTAINMENT IN INDIA: AN EMPIRICAL ANALYSIS" submitted by me for the award of the Degree of Doctor of Philosophy in Arts at Jadavpur University is based upon my work carried out under the Supervision of **Dr. Rilina Basu (Banerjee), Associate Professor, Dept. of Economics, Jadavpur University and Dr. Poulomi Roy**, **Associate Professor, Dept. of Economics, Jadavpur University.** And that neither this thesis nor any part of it has been submitted before for any degree or diploma anywhere/elsewhere.

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Contents

List of Abbreviations

1. GER: Gross Enrolment Ratio
2. NCERT: National Council of Educational Research and Training
3. ASER: Annual Status of Education Report
4. SC: Scheduled Caste
5. ST: Scheduled Tribe
6. GPI: Gender Parity Index
7. AYS: Average Years of Schooling
8. SES: Socio-Economic Status
9. SECC: Socio-Economic Caste Census Survey
10. OBC: Other Backward Class
11. NSSO: National Sample Survey Office
12. OECD: Organization for Economic Cooperation and Development
13. IHDS: India Human Development Survey
14. DISE: District Information System for Education
15. ELA: English Language Arts
16. NCR: National Capital Region
17. UC: Upper Caste
18. GDP: Gross Domestic Period
19. UGC: University Grant Commission
20. RTE: Right to Education Act
21. NCAER: National Council of Applied Economic Research
22. OLS: Ordinary Least Square

23. NPE: National Education Policy

24. IGRC: Intergenerational Regression Coefficient

25. BPL: Below Poverty Line

26. MPCE: Monthly Per Capita Consumer Expenditure

27. PTA: Parent Teacher Association

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CHAPTER 1

1.Introduction

Education refers to the act of bestowing general knowledge, strengthening one's capacity for argument and judgment, and generally preparing oneself and others intellectually for life. Education can be seen as the dissemination of a society's values and collective wisdom. Sociological aspects confirm that education is necessary to develop human talents and interests, which in turn allows for personal flourishing and societal upliftment (Pinheiro et al. 2015; Musgrave, 2017)[1]. The fundamental ideals of human progress, such as well-being, freedom, solidarity, social relationships, dignity and recognition, and cultural advancement, are increased by education. Since it helps in expanding social mobility, facilitates economic development, and promotes equality of opportunity. A balanced education system promotes not only economic development, but also economic growth. Evidence suggests that improved education leads to a reduction in income inequality, which in turn can contribute to higher economic growth.

It has been observed that educational outcome is biased by caste, religion, gender, and other demographic factors. This bias remains true across time and space. Educational outcome maintains social hierarchy. As World Bank report (2005) points out unequal opportunities for different groups increase unequal chances of acquiring education. This is particularly important for developing countries like India, which are characterized by discrimination-based societies.

There has been substantial inequality of opportunity with respect to the acquisition of human capital. One aspect of inequality can be traced to the inequality of human capital in the current

[1] See Ravi (2015) and Dyer (2010)

generation which reflects the very unequal opportunities that people have inherited from their parents. This approach focuses on intergenerational educational mobility. It shows that lower persistence in educational outcomes across generations means higher educational mobility in a society. The educational success of a generation is dependent on the educational level of their parents in cases where public policies are not adequate. Since ancient times in India, the right to education was graded, i.e the higher caste had access to it while those lower in the social hierarchy were deprived of it. Moreover, India has been a good case study to examine the extent of this historically persistent educational attainment gap in presence of societal stratification in terms of caste, gender, and religion[2].

Social scientists have placed a high priority on identifying the factors that can reduce inequality across different demographic groups in order to promote equity and justice in society. There is always a social approbation of the principle of equality of opportunity. However, still now contemporary societies across the globe have been experiencing inequalities of different types and shockingly these inequalities hardly show any symptom of perceptive decline. The income inequality, employment gap and poverty gap in different regions or countries in the world are biased by gender, caste or race, religion and economic class (such as poor, middle and comfortable class). Education can play a significant role in bridging the gap.

There has been a plethora of research which corroborates the role of education as a facilitator of economic development. The role of education in bringing about economic development has been a much-researched topic. Becker (1964) in his treatise Human Capital offered an analytical framework to explain why people invest in education and training. Individuals will expect a return

[2] Ray and Majumder (2014), Emran and Shilpi (2015), Azam and Bhatt (2015), Kishan (2018).

on their investment in human capital and will therefore seek to maximize economic benefits over their lifetime. Becker (1993), once again, points out that there is a difference in income level that originates from different levels of education. Lucas (1988); Barro (1991); Mankiw, Romer, and Weil (1992); Lin (2004) and Fukase (2010) shows how educational attainment affects economic growth i.e. through the channel of increased human capital. Specifically, growth literature explores three alternative channels through which education can influence economic growth. Firstly, education can raise the intrinsic human capital of the labour force, which boosts labour productivity and leads to a higher level of equilibrium output (Mankiw et.al,1992). Secondly, education can boost the economy's capacity for innovation, through new scholastic information about emerging technology, products, and hence promote growth (Lucas (1988); Romer (1990); Aghion and Howitt (1998) Kruss et. al.,2015). Thirdly, education may help spread and transmit the knowledge required to effectively process new information and apply newly developed domestic and foreign technology, which again promotes economic growth[3]. Moreover, the skill level of workers has a significant impact on economic growth and skill is generated through education (Hanushek and Wossman,2010). This in turn raises wages and income of the labour force. The positive association between education and earnings has been established by Becker (1964); Mincer (1974) and Card (1999). In agriculture, there is evidence of the positive effects of education on farmers' productivity using modern technologies (Birdsall (1993) and Moock (1994)). Wedgwood (2007), Ladd (2012), Tilak (2018) and Ngepah, Makgalemele and Saba (2022) identified that education reduces the poverty gap between different socio-economic and ethnic groups across the nations. A higher level of education helps to reduce income inequality (Abdullah et al.,2015 and Yang and Qiu,2016). The positive relationship between education and

[3] See Benhabib and Spiegel (1994); Barro (1991); Ansari and Singh (1997); Chatterji (2008,1998); Tilak (2007); Schundeln and Playforth (2014); Self and Grabowski (2004)

employment is universally significant, and it is identified that education is an important employment predictor. Dixon (2016), Unni (2016), and Brown and Oterio (2020) conclude that a higher level of education increases the opportunities for prestigious employment.

This chapter is embodied as follows. We begin by exploring the importance of education on economic development, equality of opportunity, and societal upliftment. Section 1.1 undertakes a survey of the literature which helps to point out the research gap and our contribution to the existing literature. The chapter concludes with the organization of the research in section 1.2.

1.1 Survey of Literature

In this section, we have tried to identify the attractive issues pertaining to different aspects of education in India. We aim to present an extensive survey of literature to identify the caveats, where this thesis can contribute.

1.1.1 **Indicators of Education Development**

Given the importance of education in to expedite economic growth, it becomes imperative on our part to have a closer look at the different indicators of educational development. In practice there are four widely used indicators of educational development that are used to track the progress of educational development in a country. These are literacy rate, enrolment ratio, educational attainment and achievement. Literacy refers to the ability to read. The main purpose of literacy programs is to teach basic proficiency to the population and communicate through the written word. A high literacy rate indicates the presence of an efficient primary school system and literacy programs. The literacy rate of the total population in India has increased from 18.33 percent to

74.04 percent from 1951 to 2011 - but there is a significant gender gap in literacy rates[4]. On the other hand, the overall literacy rate of the "scheduled caste" (SC) and the "scheduled tribe" (ST) also increased in 2011 to 66.10% and 59.0%, respectively, but is well below the national level. On the other hand, enrolment refers to accepting admission for participation in educational institutions. It provides information on the capacity of the educational system to absorb students of a given age group.

Enrolment is measured in two ways: Gross Enrolment Ratio (GER) and Percentage Enrolment Distribution. GER refers to the total enrolment of a given age group in different levels of education[5]. The main advantage of enrolment is that it allows us to determine the exact proportion of enrolment accounted for by different ethnic groups. The percentage distribution of the 12.2 crores primary going students among the social groups is 19.40% for SC, 10.37% for ST, 25.66% for General and Other Backward Class (OBC) 44.57%, respectively (DISE, 2020-21)[6]. However high enrolment rate does not imply that all enrolled students will complete their education. Given the limitations of GER, social scientists focus on educational attainment, which refers to the highest level of education a person has attained. A person's level of education is also referred to as years of schooling completed. A higher level of completed years of schooling means a more skilled and productive workforce, which in turn increases the production of goods and

[4] According to the Socio-Economic Caste Census Survey (SECC), 31.15 percent and 39.35 percent of total scheduled caste(SC) and scheduled tribe(ST) families do not have a literate family member age 25 or older.
[5] The main limitation of GER is that it is measured with respect to the total static population size. As a result, GER often exceeds 100%. Therefore, the population percentage of different age groups should be collected every year so that we can measure the GER of the current population of a certain age group at a certain education level.
[6] In India, the estimated gross enrollment ratio (GER) in higher education is 27.1 percent based on age groups 18-23 in 2019-20, and the GER for SC and ST are 23.4% and 18%, respectively, in higher education(AISHE,2019-20). Despite around 22.5% of seats being reserved for the SC and ST, it has been largely observed that seats remain vacant in higher education institutions.

services in an economy. All three of the above indicators are quantitative features of educational development.

While majority of the indicators focus on quantitative aspect of education, one must remember that it is not merely the years of schooling but the depth of understanding and knowledge which defines educational outcome. So next we look into educational achievement which sheds light on qualitative aspect of education. The last indicator of educational development is educational achievement, which is characterized as a qualitative feature of educational development. Educational achievement is often referred to as learning outcomes. The learning outcome, i.e. what a student learns in school, is called scholastic achievement. There have been relatively fewer surveys which focused on it. In a nationwide study conducted by the NCERT in 1994 (Shukla et. al., 1994), it was observed that children scored 47 percent in vernacular language and 41 percent in mathematics. According to ASER (2022) 57.2% of grade 5 students were not able to read a story text at the grade 2 level of difficulty. In mathematics, approximately 74.4% and 55.3% of grade 5 and 8 students could not calculate a simple division such as three digits divided by one digit at grade-II level. Evidence suggests the poor educational achievement across grade in India, while there have been papers which investigate educational achievement gap outside India[7].

To estimate the disparity in educational attainment, the basic indicators which majority of literature have chosen are literacy rate, enrolment ratio and drop-out rates. Kapur and Murthi (2009) showed that more than one in three Indians above the age of 15 years is unable to read and write by observing the literacy rate. Dreze and Loh (1995) presented a comparative analysis of census-based evidence on the literacy rates between China and India, and showed China fared

[7] See Fryer and Levitt (2004); Clotfetter, Ladd and Vigdor (2006); Todd and Wolpin (2007).

better than India. Basu and Foster (1998), Subramanian (2004) and Basu and Lee (2008) explored a new approach "proximate illiterate's" externality to evaluate the aggregate literacy level in a country or region[8]. Cross-national enrolment gap in school education and higher education is identified by Gao and Chen (2010) and Sancez and Singh (2018)[9]. Several researchers have identified the factors which affect enrolment like Sanchez and Singh (2018), Gupta and Gupta (2012); Bhatia and Dash (2011); Azam and Blom (2008). Shavit and Blossfeld (1993) and Barro and Lee (2013) used educational attainment i.e. highest level education for their analysis. Green and Iverson (2022) also chose educational attainment to understand the situation of natives of Norway. Kingdon (2002); Mukherjee (2004); Chin (2005); Beaman et al. (2012); Asadullah and Kambhampati (2014) and Kugler and Kumar (2017) analyzed the trends, patterns and interacting factors affecting the educational attainment in schools and higher education in India[10]. In recent times, Varughese and Bairagya (2020) analyzed the pattern of educational attainments in terms of average years of schooling (AYS) in India. This research concluded that policy interventions have done little to reduce the group-based educational attainment gap.

With quality of learning gaining momentum, researchers shifted to educational achievement as a measure of educational development. While Heyneman and Loxley (1983) and Hanushek (2002) investigated it in the United States, in India this was undertaken by Shukla et al (1994), Pratham (2005), Jalan and Panda (2010) and Das (2019). Using PISA 2006 data, Zhang and Lee, (2011) and Ammermueller (2007) showed that the explainable proportion of educational

[8] An illiterate person can co-resident with a literate person, which is known as the "proximate illiterate's" externality. This is basically ignored when we measure standard literacy rate.

[9] Boys do better in India and girls perform better in Vietnam when it comes to enrollment in higher education. Kabir (1955); Muralidharan and Prakash (2017); Duebey (2008); Arshed, et al. (2018); Dahal and Nguyen(2014); Siddhu (2011); Heymann, Raub and Cassola (2014) Jayaram (2004); Rani (2004); Agarwal (2007); Gupta(2008); Singh(2011); Gupta and Gupta (2012); Sheikh (2017) have worked in similar direction.

[10]The changing patterns and trends in educational attainment in India have been attributed to a number of critical factors, including gender, caste, religion, household characteristics, region, and school infrastructure.

achievement difference varies across nations, whereas unexplained country-specific variables still dominate in others. Though there are papers on literacy rate, enrolment ratio, and educational attainment among the less privileged, there has not been much research with respect to qualitative disparity in education across castes in India.

1.1.2 **Factors Affecting Educational Development**

Academic literature has identified some factors which can help in understanding gaps in educational attainment. In this section, we attempt to trace the role of such variables like socio-economic status (SES), caste or race, gender, geographic or regional dimension in India.

The relevant factors that affect first-generation students' educational attainment in higher education include geographical location, caste, academic achievement, household income, stream of study, and social and cultural capital (Wadhwa, 2018)[11]. Parental education and socioeconomic position are also relevant, though less important to a child's higher education achievement (Meehan, Pacheco, and Pushon, 2019) (Filmer and Pritchett, 1998)[12]. A line of research has shown that participation in a higher educational institution is biased by gender, caste or ethnicity, and religion in India (Sundaram (2008); (Chanana, 1993); (Chanana K. , 2000)[13] (Deshpande, 2007) (Deshpande,2017). There is no evidence that upper-income groups are benefited more from affirmative action (reservation policy) than lower-income groups among backward castes in higher education (Desai and Kulkarni, 2008). Malish and Ilavarasan (2016) demonstrate how diverse institutional cultures affect individuals with similar educational and familial backgrounds

[11] See Banerjee (2016)

[12] The poor socio-economic background of SC community is the main cause against low participation in higher education (Acharya and Sahoo, 2019) (Chitnis, 1972). See for inequality of scheduled caste student in higher education (Sharma, 1974) (Wankhede, 2001).

[13] Caste is an important determinant of education in India (Neelakandan and Patil, 2012); Khan (2015), Khan (2022).

differently by giving ethnographic narratives of the educational experiences of fourteen scheduled caste engineering students in Kerala. Family assets, parental years of schooling, and “household member uses computer or internet" are all key factors of a student's completion of secondary and higher secondary level; the admittance to secondary school, particularly for government school students, is a stumbling obstacle for most children (as a lower caste and Muslim) (Kumar, 2020).

Socioeconomic status essentially includes household factors such as parental education, parental employment status, household income, and household class in terms of poor, middle, and comfortable. Unequal opportunities for different groups (e.g., caste, gender, or class) increase unequal chances of acquiring education. Poverty can also be associated with loss of equal opportunity. The Socio-Economic Caste Census Survey (SECC) 2011 revealed that 1.6(0.91%) million of the 179 million households surveyed were suffering from severe poverty, and 87.2(48.54%) of the 179 million households surveyed were victims of deprivation. According to the Sachar Committee report (2006), reserved castes and non-Hindu religious groups in India have endured deprivation both educationally and economically. The 61st round NSSO report confirm that the incidence of poverty for the scheduled tribe (ST) is more than the incidence of poverty of scheduled caste(SC), while the incidence of poverty for other backward class(OBC) is more than the incidence of poverty of other or non-reserved categories.

According to SECC (2011) 2/3rd of the households in the SC and ST groups belong to the lower income groups, i.e., the monthly income is less than Rs 5000. This is a clear indication that the households in the lower caste groups are suffering from low-level equilibrium trap and that the opportunities and conduciveness of the households towards education are much lower. Moreover, 50% of the households in the SC community earn from casual occupation, while 1% of the households from SC and ST beg on the streets to make their daily living (SECC,2011). In rural

India, 71.99% of scheduled caste (SC) and 74.48% of scheduled tribe (ST) households have been suffering from deprivation of basic amenities, such as free healthcare, elementary education, and employment opportunities (SECC, 2011). Such an abysmal picture of reality motivated us to investigate whether such conditions are responsible for lesser educational attainment among the marginalized groups.

Researchers have obtained family-related socio-economic resources to explain educational achievement gap within the different social groups[14]. Individual student and household characteristics can have a significant bearing on learning outcomes[15]. In Britain both Black Caribbean and White British students having low socio-economic status (SES) had the lowest educational achievement and made the slowest growth (Strand,2014)[16]. The study also identified that if both low and high SES students attend good quality school they improve academically, but low SES students perform better in good schools compared to high SES students. Yang and Lee (2022) found that more privileged students acquire higher educational achievement from high-quality teachers compared to their disadvantaged peers and the socioeconomic academic gap may widen as a result of the disparity in educational resources among schools, particularly in non-OECD nations[17]. Nambissan (1996), Chauhan (2008), Jeffery et al. (2005) and Driver (1962) among others infer that the high dropout rates among poor Dalit students is the consequence of the high indirect cost of schooling. Parents of Dalit students consider education as a luxury and they prefer to engage their children in jobs. A surprisingly consistent result in the context of the black-white test score gap is that a collection of family-related socio-economic resources appears to

[14]See Fryer and Levitt (2004), Magnuson and Duncan (2006) and Brooks-Gunn et al. (2010)
[15]See Govinda and Varghese (1993), Kindgon (2002) and Jalan and Panda (2010)
[16] See Cobb-Clark and Moschin(2017).
[17] See for European countries Passaretta , Skopek and Huizen (2022); Immigrant children face lower achievement in Italy Triventi, Vlach and Pini (2022);

account for little less than half a standard deviation of the black-white test score gap regardless of the evaluation used or the populations studied (Magnuson and Duncan, (2006); Brooks-Gunn et al. (2010))[18]. In Peru, the test score gap identified between indigenous and non-indigenous students can be explained by peer characteristics up to 58-71% in language and 45-62% in mathematics (Sakellarious, 2008). Moreover, in a country like India, where the return to education is determined by occupation, parental education and parental employment can be important determinants of the education of the child[19]. After controlling for a range of family, parental, and school characteristics, Borooah (2012) found that children from disadvantaged societies have lower reading, writing, and mathematics achievement than those from Brahmin. The Hindu-Muslim educational achievement disparity persists, even after controlling for several socioeconomic and parental factors. Asadullah, Kambhampati and Boo (2013) showed that Muslim educational attainment disadvantage in India today is higher than that suffered by girls and Scheduled Caste Hindu children[20]. This infers that religion might also be a determinant of educational attainment. Kumar (2020) using IHDS-I and IHDS-II data, identified household assets, parental education and computer or internet usage are the main factors in the completion of secondary and higher secondary education.

Gender inequality is a major obstacle to overall progress of human race. Women empowerment, defined as an adequate representation of women in all aspects of life, beginning with political decision-making, can be a powerful weapon for eradicating gender inequity. Like other cultures across the globe, India too is marked by patriarchal monopoly and gender

[18] Total inequality is not only a function of socioeconomic factors, but also a function of the intensity of schooling such that better trained teacher has less dispersion in achievement(Montt,2011)

[19]See Maitri and Sharma (2010), Hnatkovskay et al. (2013),Emran and Shilpi (2015); Jalan and Murgai (2008).

[20]Their findings demonstrate that the gap between dalits, adivasis, and others in terms of primary school completion is narrowing; Muslims, a minority group that does not benefit from affirmative action, have not witnessed such progress (Desai and Kulkarni, 2008). See Nambissan (2009); Thorat and Neuman (2012).

discrimination either in domestic space or in working space. In spite of several state laws being enacted in India since the 1950s to establish social equality between men and women, 62.90% of female headed households were found to face deprivation (SECC,2011). Gender inequality in educational participation is measured using the Gender Parity Index (GPI) which is the ratio of GER of girls to GER of boys[21]. It is heartening to note that in India, the GPI in 2019-20 is greater than 1 at all levels of school education for all categories except GPI of ST in primary and upper primary level (DISE,2020). According to the responses received in the higher education survey by MHRD, the total number of students who received doctoral degrees in 2019 is 38986, of which 21577 are male and 17409 are female.

There has been a number of literatures which looks into the gender gap in educational achievement at elementary level. Katiyar (2016) and Kumar, Kumar and Rani (2016) focused on gender disparity in literacy rates using census data. The positive effect of female education on economic development has been identified by Hill and King (1995); Tansel and Gungor (2013). Ghosh and Kundu (2021) explored female enrolment in higher education in India and identified that state gross domestic product, college availability, and presence of girls' hostels play a significant role in girls' GER[22]. Emran and Shilpi (2015) mentioned lower caste urban women show maximum intergenerational educational mobility. A comprehensive report by PISA (2003) infers that while girls outperform boys in reading, boys perform better when it comes to mathematics. However, Goldin, Katz, and Kuziemko (2006) and Legewie and Diprete (2012) conclude that in higher

[21] It tracks the advancement of girls' educational participation and/or learning opportunities relative to boys. GPI values greater than or equal to 1 indicate that GPI is in the girls' favor, whereas GPI values lower than 1 indicate that girls are underrepresented at a given level of education.

[22] Biswas and Kundu (2022) identified that midday meal, school development grant and father's education positively influences girl's primary enrolment in India.

education girls perform better than boys in most subjects and particularly in verbal test scores[23]. In USA, there is no gender gap in mathematics, but there is a significant gender gap in English Language Arts (ELA) by 0.23 standard deviations (Reardon et al., 2019)[24]. In comparison to studies conducted in the United States, Lai (2010) found that in China's elementary and middle schools, females outperformed males in terms of educational achievement in mathematics and science. India's findings are closely related to the 'usual' tale, in which girls, particularly those in rural regions, have lower attainment and attend less effective schools. In Vietnam and Ethiopia, on average, girls have higher exam scores particularly in rural areas (Marshall and Moore, 2022; Sanfo and Ogawa, 2021; Crookston et. al., 2014; Azubuike, Moore and Iyer,2017; Rolleston and James, 2015). In Bihar and Uttar Pradesh, females are less likely to graduate from elementary and middle school (Chaudhuri and Roy, 2009).

Regional variation has also been identified as a determining factor for educational achievement. Literature has been classified into 3 categories in this regard; these which identify i) cross-national differences in educational attainment, ii) differences within states in educational attainment within a country, and iii) micro-level regional variation, such as differences between rural and urban areas in educational attainment. Dreze and Loh (1995); Gao and Chen (2010); Barro and Lee (2013); Sancez and Singh (2018) discussed cross-national disparities in educational attainment. Das et. al., (2013); Borooah (2012) and Khan (2022) Banerjee, et al., (2007); Chaudhuri and Roy (2009); Muralidharan and Sundararaman, (2011) and Banerjee, Das and Mohanty (2014) focus on state-wise disparity in educational attainment in India[25]. The educational

[23]Niederle and Vesterlund (2010) attribute this to the differential manner in which the different genders respond to competitive test taking environment.

[24] See Luo et al.,(2021). Workman and Heyder (2020).

[25] According to these studies, the infrastructure of schools varies greatly between states in India, which has a significant impact on the indicators of educational development in each state.

disparity on educational attainment between rural and urban areas was identified by Chakrabarti (2010); Munshi and Rosenzweig (2009) and Emran and shilpi (2015). Kingdon (2007) found that there is a significant inter-state disparity in both math and reading in India[26]. Jalan and Panda (2010) analyzed "Low Mean, Low Variance" in test scores between West Bengal and Jharkhand, and observed that Jharkhand had Low Mean and Low Variance compared to West Bengal's Low Mean and High Variance. The state-wise disparity in literacy rate is an important phenomenon in India. Kerala and Mizoram have the highest literacy rates at 94.0 percent and 91.33 percent, respectively, while Bihar has the lowest literacy rate at 61.80 percent (Census, 2011). West Bengal is in the third quintile for literacy rate and gross enrollment ratio at all levels of schooling. The rural-urban gap in educational attainment is prominent across all regional zone in India (SECC,2011)[27].

Evidence also shows that school infrastructure and home environment can also play an important role in shaping learning outcome of students. There has been an extensive literature that looks into the effect of supply-side factors like school level expenditures, teacher-student ratios, teacher quality and teacher performance on the educational attainment of children[28]. While Coleman et al. (1966) showed that school inputs had a relatively lesser impact on learning outcomes, Heyneman and Loxley (1983) and Kingdon (2008) concluded that these are equally important in explaining educational attainment variance[29]. Dey and Bandyopadhya (2018) demonstrate how combining a blended learning environment in classrooms with high-quality digital content, professional online teachers, and on-site teaching assistants as class coordinators

[26] See Bashir (1994), Govinda and Varghese (1993), Aggarwal (2000), Goyal (2007).

[27] The rural-urban illiteracy gap is much higher in the central and eastern regions of India compared to rest of India.

[28] See Ferguson (1998), Hanushek (2002), Hoxby (2000), Krueger and Whitmore (2001), Jalan and Panda (2010)

[29] However, we have not been able to include these variables explicitly since these are individual household data and matching school infrastructure with these data is not possible.

creates a learning environment that can significantly improve student's learning outcomes and well-being, regardless of socioeconomic status. Chudgar and Sankar (2008) reveal that a female teacher in a classroom is beneficial for language learning achievement, but gender of the teacher does not affect in mathematics learning, which supports the policy of recruiting more female teachers[30]. The remedial education program has proved to be an effective policy in urban slums of Mumbai and Vadodara (Banerjee, et al., 2007). After implementing this policy in treatment schools, it is seen that the test score increased by 0.14 standard deviation in the first year and 0.28 standard deviation in the second year compared to other schools where the policy was not implemented. They also showed that computer-assisted learning, such as an educational game that reinforced mathematical skills helped to raise mathematics scores by 0.35 in the first year and 0.47 in the second year. Moreover, school-based discrimination and racial socialization can adversely affect learning ability according to Banerjee, Byrd and Rowlie (2018). Appointing quality teacher can reduce racial test score gap (Hartney and Flavin, 2015). Moreover, using nationally representative data from India, it was observed that higher time to fetch safe drinking water led to lower mathematics, reading and writing test scores of children (Hamlet, Chakraborty and Kaminsky, 2021).

Parvez and Laxminarayana (2022) identified schooling cost and time allocation for studies as the determinants of differential performances. In this context the choice of private schools over public schools become an important determining factor. There is strong evidence in India that the children who attend private schools achieve much higher learning than children who attend public schools, but, as a child's school attendance, time spent studying and, doing homework increases,

[30] The role of female teacher on girl's student's achievement in Nepal is discussed by Joshi, Digari and James (2022).

the achievement gap between private and public school-attending student's narrows (Kumar and Choudhury, 2021). The consistent gap in average mathematics learning between the children of private and public schools by Singh and Mukherjee (2018) support their findings. Low learning achievement in English was observed in pupils attending low-cost English medium elementary schools in Delhi and the national capital region (NCR) (Endow, 2018; Kingdon, 2020)[31].

Ever since the later Vedic ages in India, caste system emerged as an oppressor-oppressed class struggle. The caste system which had initially started on the basis of occupation, turned into a socio-economic and political vendetta where the lower "varnas" and "avarna"s were typically marginalized. Power and resources were mostly in the hands of the higher castes. Later in modern India, this system created the "minorities" who were categorized as Scheduled Castes and Scheduled tribes. The entanglement of religious norms, social obligations, and financial hardships in India has forever been imposed on reserved castes. Starting with Jyotiba Phule, Rammohan Roy the movement for inclusion of these "backward" castes into the general mainstream were carried forward by Mahatma Gandhi and B.R. Ambedkar. This eventually found its way in the reservation policy which aimed at discrimination and inclusion of the excluded. The reservation policy is a legal mandate which requires seats to be reserved in education, employment and political representation at both the national and the state level. The objective was to eradicate socio-economic marginalization of the classes at the bottom of the social hierarchy.

The association between caste and higher education in India has been a relatively under researched topic. While there have been some works looking into caste as a determinant on primary

[31] See for educational achievement gap between public and private schools, Wadhwa (2009); Wamalwa and Burns (2018); Chudgar and Quin (2012); Singh (2015); Goyel and Pandey (2009); Goyel (2009); Desai, Dubey, Vanneman and Banerji (2008).

education like (Nambissan 2009), (Majumder 2010a), (Ray and Majumder 2013), (Mungekar 2009) higher education has been relatively ignored. There have been multidisciplinary papers which look into the exclusion of the "Dalits" in higher education (Sukumar 2008), (Neelakandan and Patil 2012). The access to secondary, higher secondary and higher education has significantly increased over time among backward societies in public education institutions; but the increase in such academic excellence is higher among SC and ST groups compared to OBC. It is also identified that such backward group's participation in private educational institution is much lower compared to general caste peer. In this context, Khan (2018) recommended a structural change in higher education to provide equal opportunities. Velaskar (1986) pointed out that for the economically backward castes; higher education is a luxury which resulted in lesser enrolment in higher education among the dalits. (Weisskopf 2004) obtained similar conclusion for higher drop-out rates. (Chakrabarti, 2009) has shown that SC/ST in rural India is less likely to participate in higher education. A few studies by Thorat and Kumar (2008) and Subramanian (2015) have provided empirical evidence of caste-based discrimination in higher education in India after getting enrolled. Kirpal and Gupta (1999) showed that the majority of the students enrolling in IIT between 1989-1992 were second generation beneficiaries. Incontrovertibly, more than 50 years after the formal adoption of a constitution that expressly forbids caste recognition (except, ironically, to provide compensatory discrimination to the lower castes), the Hindu upper caste (UC) continue to hold a significant majority in Indian higher education, while the lower castes and Muslims are noticeably underrepresented[32]. As a consequence, in spite of being eligible by virtue of having the caste certificate, higher education becomes a liability for majority of the reserved category. Previous studies like (Henriques and Wankhede 1985) have shown that the reservation

[32] See Deshpande (2006); Srivastava and Sinha (2008).

policy has typically backed the Dalit and Adivasis coming from a higher socio-economic background. Higher education which is rarely funded completely by government aid, becomes accessible to a handful of these groups, who have been able to attain a higher income bracket. As a consequence, in spite of being eligible by virtue of having the caste certificate, higher education becomes a liability for majority of the reserved category. Arbitrary cost structures, an unfavorable entry procedure, the removal of reservation facilities, the lack of scholarship or student aid, and an unfavorable curriculum system have all combined to limit SC students' access to private universities (Bhoi, 2013). Higher education which is rarely funded completely by government aid, becomes accessible to a handful of these groups, who have been able to attain a higher income bracket. The reservation policy is still necessary for higher education for different groups because without such measures exclusion and social discrimination will be strengthened in India (Ghosh, 2006) (Chalam, 1990)[33].

It has also been seen that the second generation of the groups who have shifted to a higher income regime, reaped the benefits of the positive discrimination (Patwardhan and Palshikar 1992). It is in this context, that we aim to look into the spillover effect of the previous generation's achievements onto the current generation. In particular, we aim to trace the intergenerational mobility in higher education. If the educational achievement of the father has a significant bearing on the son's education level, then we would infer that mobility is absent. While there have been

[33] The representation of SC/ST population in formal job market and higher educational institution is still lower than their counterpart (Louis, 2003). The reservation policy creates upward mobility in higher education among SC/ST in India (Weisskope, 2004) (Benjamin, 2008).

no dearth of literature on intergenerational mobility[34], there has been substantial caveat when it comes to its association with reservation in higher education in India[35].

The role of reservation policy for castes in India has always been much deliberated upon. As recent as 19th March 2021, a five judge Constitution bench requestioned the justification behind reservation in higher education and employment. To understand the relevance of such "privileges" extended to the Scheduled castes and Scheduled Tribes, one needs to understand the issues of exclusion, discrimination and marginalization of these ethnic groups which have prevailed historically in India. While the Rights to Equality are an integral part of the Fundamental Rights, Fundamental Duties and Directive Principles of the State Policy in the Constitution of India**,** the real picture is quite bleak. These subgroups remaining at the bottom of the social hierarchy have been socially excluded and exploited despite different policies at the national level.

As a result of India's immutable social stratification, there is a significant discrepancy or inequality in several economic indicators among castes. Reservation was put in place with the primary goal of achieving economic freedom among backward castes. The reservation policy in India was first introduced in 1831 following the Dravidian movement in Tamil Nadu. Rajarshi Shahu, the Maharaja of the princely state of Kolhapur, implemented reservation of 50% seats in education, employment and other government organization for non-Brahmin and other lesser castes in 1902. After gaining independence, an ordinance was issued on 21.9.1947 that reserved 12.5% of vacancies for SCs in open competition recruitments. After the adoption of the Constitution, in the Ministry of Home, in its resolution dated 13.09.1950, set a reservation of 5% for STs. Accordingly,

[34] See (Cheng and Dai 1995), (Checchi 1997), (Bowles and Gintis 2002), (Louw, Berg, and Yu 2006), (Checchi, Fiorio, and Leonardi 2013a), (Brown, McIntosh, and Taylor 2011)

[35] There has been some significant contribution by (Kumar, Heath, and Heath 2002a) (Kumar, Heath, and Heath, 2002b), (Jalana and Murgaib 2008), (Maitra and Sharma 2009), (Majumder 2010a), (Ray a and Majumder 2013), (Motriam and Singh 2021), (Hnatkovska, Lahiri, and Paul 2013)

the percentage of reservations for SC and ST increased from 12.5% and 5% to 15% and 7.5% respectively, in educational institutions, public sector jobs, and the assembly or parliament on 25.03.1970. Later, following the Mandal commission report (1980)[36], 27% of seats were reserved in educational institutions and public sector jobs for the bottom community of the caste pyramid (Sudra) in 1990 and this community is identified as other backward class (OBC). Since, 1990 the total reservation extended to lesser caste groups in educational institution by 49.5%.

The implementation of reservation policy has led to a surge in the enrolment of the "lesser" castes into higher education, especially in elite educational institutions. Reservation policy requires the possession of a caste certificate. The question still remains how many can avail of this opportunity and how many of the enrolled can actually complete their degree. Moreover, how many of these groups have access to these certificates also needs to be explored. The absence of proper documentation necessary for this certificate is a major deterrent to apply for the same. The mechanism of scrutinee and legal verification for the certificate becomes extremely complicated in a country plagued by racism. There have been several instances where the certificate has been denied illegally by citing purely bureaucratic reasons. So irrespective of the egalitarian objective of the policy makers, the policy has failed to achieve the desired outcome.

How far reservation policy has been able to eliminate discrimination on the basis of caste needs to be investigated. While on one hand, the supply side is imperfect, on the other hand, the demand side also has its own tribulations. The presence of social, cultural and economic hierarchies within the Dalit communities have restricted the lower sub groups within these communities to access the

[36] The president of India appointed a Backward Classes Commission based on Article 340 of the Indian Constitution, headed by B. P. Mandal, to look into the situation of socially and economically backward classes. This commission first identified 52% Other Backward Class(OBC) of total population and recommended 27% reservation for OBC category in public educational institution and public sector job.

perks coming with these policies. So like the anti-reservation policy lobbyists claim, the same families might continue to have access to these opportunities generation after generation. This would defeat the overall purpose of equality of opportunity. So it becomes imperative to trace whether these policies have attributed to intergenerational mobility, thus reducing inequality even within these communities. This remains a major dilemma for policy makers as to how to make the benefits available to those who need it the most.

According to 2011 Census, Scheduled Castes and Tribes comprise of 16.6% and 8.6% of total population of India. Within the groups also, there are considerable diversities, both socially and economically. Despite the advantages of reservation in educational institutions, the labor market, and politics, the people of backward societies have made little progress. The representation of the SC/ST population in the formal job market and higher educational institutions is still lower than their counterpart as presented by Louis (2010). In rural India, 71.99% of scheduled caste (SC) and 74.48% of scheduled tribe (ST) households have been suffering from deprivation of basic amenities, such as free healthcare, elementary education, and a non-agricultural workforce (SECC, 2011). However, according to the SECC survey, 31.15 percent and 39.35 percent of total SC and ST families, respectively, do not have a literate family member aged 25 or older. Chakrabarti (2009) has shown in her paper that SC/ST in rural India is less likely to participate in higher education. The reservation policy is necessary to promote inclusiveness and eradicate social discrimination in India[37].

Literature has also identified ethnicity or caste as a major determinant of disparity in educational attainment. Fryer and Levitt (2004) investigate the achievement test score gaps in primary

[37] See (Ghosh, 2006) (Chalam, 1990)

schooling between Black, White and children belonging to other races using the Early Childhood Longitudinal Study Kindergarten cohort in USA. Using rich longitudinal data, Todd and Wolpin (2007) found that there are test score gaps between white and other ethnic communities in educational achievement and, mother's "ability" and home inputs are important determinants of test score gap in the USA[38]. According to Lee (1998), there are four dimensions to the learning gap that exists between whites and other minority groups: i) the within-school achievement racial and social gap, which is defined as the disparity among students who attend the same school, ii) the gap that results from differences in socioeconomic status (SES), iii) the between-school racial and social gap, which is defined as the achievement disparity between schools and, iv) the gap that originates from same SES composition. According to the findings of Clotfetter, Ladd, and Vigdor (2006), the disparity between blacks and whites in the USA that was identified using longitudinal data is consistent with regional analysis. However, there are relatively few literatures relatively which focuses on caste based discrimination in educational achievement in India. Jalan and Panda (2010) address the issue of caste-based discrimination in educational achievement using an extensive primary survey in West Bengal and Jharkhand. In their study, they found that scores on Bengali and arithmetic achievement tests between SC/ST and Hindu general in West Bengal differ significantly by caste. Following their study Borooah (2012) identified that Muslim, Dalit, and Adivasi children, had the largest disadvantage[39]. On the other hand, Das (2019) found that socially excluded students, such as those from the scheduled caste and scheduled tribe, have lower literacy , enrollment and dropout, as well as lower achievement[40]. A few papers also focused on the

[38] See Condron (2009); Paige and Witty(2010); Gopalan(2019).
[39] Their findings demonstrate that the gap between dalits, adivasis, and others in terms of primary school completion is narrowing; Muslims, a minority group that does not benefit from affirmative action, have not witnessed such progress (Desai and Kulkarni, 2008). See Nambissan(2009); Thorat and Neuman (2012).
[40] See Bagde, Epple and Taylor (2016); Goel and Husain (2018).

learning disparity between general and lower caste groups in India at various state levels, such as the English learning achievement in Delhi (Endow, 2018); the life science learning achievement in West Bengal (Das and Mohanty, 2014); and the test score gap in Mumbai (Benerjee et al.,2007). Though there are papers on educational attainment among the less privileged, there has not been sufficient research with respect to the qualitative disparity in education across castes in India[41].

There is always a social approbation of the principle of equality of opportunity. However, contemporary societies across the globe have been experiencing inequalities of different types and shockingly these inequalities hardly show any symptom of perceptive decline. One such example of inequality is inter-generational inequality. Persistence of such intergenerational inequality may vary across different groups, classically identified by gender, race and region; which in turn signify differentiated access to economic prospects. Consequently, the extent to which economic opportunities are transmitted from one generation to the next has long been of significance to social scientists and policy-makers. Intergenerational mobility indicates the degree of fluidity between the parents and their children which has generated an extensive and spanning literature[42]. Higher mobility in the marginalized classes can actually bring about a convergence between the less and more privileged in the society and can steer the country towards inclusive development.

An important determinant of inequality is closely connected with intergenerational transmission of skill and education. Educational attainment is status enhancing in variety of ways. An

[41]Munshi (2019) points out that historical discrimination in educational attainment creates social isolation of the backward children from their non- backward counterparts. Not only are the backward children in most cases first generation learners, the monopoly of non-backward classes in education pushes them to inferior quality of schools.
[42]See Haveman and Wolfe (1995), Black, Devereux and Salvanes (2011), and Blanden (2013) for review of research in this area.

individual's status in a society has both economic and extra economic dimensions[43]. Education generates natural empowerment in a society in which educational opportunities are of a very skewed distribution[44]. Given the importance of education, one can understand why a lesser educated parent would prefer his/her child to be highly educated, since on one hand it improves economic opportunities, on the other, it entails societal upliftment of the individual. Educational mobility if achieved is expansion of capability in the sense that an individual can appear before the public without shame. Moreover, educational attainment is a precursor to economic mobility.

Intergenerational educational mobility renders long term income opportunity. There have been persistent gaps in educational attainment across alternative socio-economic groups. Higher mobility in the marginalized classes, however, can bring about a convergence between the less and more privileged in the society. Intergenerational educational mobility or fluidity is the degree of difference in educational attainment between parents and offspring. Simply educational mobility- is the degree to which a child's education is "unconnected" to their parents' education. High levels of intergenerational educational persistence result in a vicious circle of low-level educational attainment trap. Educational mobility if achieved is an expansion of capability in the sense that an individual can appear before the public without shame. Moreover, educational attainment is a precursor to economic mobility. Despite enormous importance of education, there has been a systematic neglect of basic and primary education at the grass root level. Removal of such grotesque inequalities seems to be an elusive milestone. Besides, data on educational attainment is more reliable and easy to obtain than data on income or earnings[45]. Furthermore, the educational

[43] See Cutler and Lleras-Muney (2008), Lochner (2013) Psacharopoulos and Patrinos (2018), Song and Mare (2017), Bernardi and Ballarino (2016)
[44]Torche 2019
[45] See Azam and Bhatt (2015).

attainment becomes fixed after a certain age, whereas income may be variable across different age groups (Haider and Solon, 2006; Black and Devereux, 2011). Hence it becomes imperative to explore the educational attainment in the framework of intergenerational educational mobility.

In several research papers, different methodological aspects were used to measure relative, absolute, vertical, upward and overall intergenerational educational mobility. The higher relative mobility or lower persistence means lower degree of association between parental and child's years of schooling. Relative mobility is measured using Altham metric[46] and regression coefficient[47]. The absolute mobility captures the total upgradation in educational attainment across generations and it is measured by correlation coefficient (Azam and Bhatt, 2015) and (Arnaud, Fumiaki and Takashi, 2012). On the other hand, upward mobility can be measured using simple transition matrix analysis (Azam and Bhatt,2015). Alternatively, the overall and vertical mobility can also be measured using transition matrix (Altham and Ferrie, 2007). In our thesis we have tried to capture the incidence of relative, absolute, vertical and upward mobility, using transition matrix, Altham metric, regression coefficient, correlation coefficient, probit and ordered logistic regression across different chapters. The study of intergenerational educational mobility has been a multipronged one, given the aspects of gender disparity, regional inequality, caste immobility among others. A more recent paper by Majumdar (2010) has observed substantial vertical educational mobility within the reserved classes[48]. We have focused on relative, absolute, vertical, upward and overall mobility in our thesis. Absolute and relative mobility are complementary concepts. While absolute mobility captures the total upgradation in educational attainment across

[46] We have borrowed the methodology from papers on race based discrimination in Europe and United States (Long and Ferrie, 2013) and (Altham and Ferrie, 2007) to understand the caste based discrimination in the Indian context.
[47] See Hertz et al. (2007), Aydemir and Yazici (2019), Emran and Shilpi(2015).
[48] Similar line of research by Ray and Majumdar (2013), Kishan (2018), Azam and Bhatt (2015) and Asher, Novosad and Rafkin (2021) using secondary data like the Indian Human Development Survey (IHDS) data base have considered the effects of ethnicity and religion, in particular on educational mobility in India

generations, relative mobility explores the degree of association between parental educational attainment and child's educational attainment. In our thesis, we have tried to explain these in terms of correlation coefficient and regression coefficient respectively. Alternatively, to measure the degree of association between children and parental educational attainment, we have used Altham metric[49]. We have also used transition matrix to measure upward, vertical, and overall educational mobility. The educational transition matrix shows specific patterns of association between parental and children educational attainment, using a few numbers of columns and rows of the entire sample population. We calculate education transition matrices that display how father-child and mother-child pairs are changing across different education levels. Lower-level upward mobility is indicated by higher values for diagonal terms, whereas a higher level of upward mobility is indicated by larger values for off-diagonal terms. Another important aspect is analyzed using a transition matrix that is a bottom-to-top probability which measures a child attained tertiary level education when their parent's education belongs to the bottom category of educational distribution. Vertical mobility is measured by taking the ratio off diagonal terms below the diagonal elements and number of overall observations of a transition matrix. On the other hand, we also measure overall mobility in transition matrix as the fraction of sons who attained different levels of educational attainment than their fathers. We have also calculated vertical mobility using ordered logistic regression (In this model, the probability of the i^{th} child to attain any of the educational categories j dependent on parental education) and probit regression (Here, dependent variable is considered as son's education is greater than father education equal to 1 otherwise 0).

[49] Which enables us to calculate how the row-column association of a matrix 'P or Q' differ from the row-column association of a particular matrix 'I' in which row-column are independent, and how the row column association in table 'P' differs from the row column association in table 'Q'.

An individual's status in a society has both economic and extra economic dimensions. Education generates natural empowerment in a society in which educational opportunities are of a very skewed distribution[50]. Following this line of research intergenerational educational mobility has been explore widely in academics[51]. Ramu and Weibe (1991) investigated intergenerational educational mobility in the India context. The research suggests that occupational and educational mobility maintains caste hierarchy in India. Maitra and Sharma (2010) found positive and statistically significant effects of parental education to be statistically insignificant on younger adults, indicating an increase in intergenerational mobility in India. Rapid economic expansion has typically been accompanied by greater disparity in results, including income, and educational attainment. Educational mobility ameliorates the economic growth through accumulation and distribution of human capital. The study of educational mobility is important for the study of economic growth because higher educational mobility means greater correlation between skill and human capital formation (Maoz and Moav, 2000). On the other hand, the positive relationship between economic development and intergenerational educational mobility is identified with respect to regional category and the findings suggest that in more developed area female child's educational attainment is less responsive to their parent's education (Aydemir and Yazici, 2019).

One such pertinent question is whether intergenerational mobility is intertwined with both caste and religion. Needless to say, that both caste and religion have profound bearing on political process and hence decision making. Marginalization on the basis of ethnicity, religion, gender and

[50] Torche (2019).

[51] Intergenerational educational mobility has been a recently researched topic by Black et al. (2005), Hertz et al. (2008), Long and Ferrie (2013), Guell et al. (2018), Wantchekan et al. (2015). Sharma and Dubey (2022) used 39,297 father-son pairs from the IHDS to examine the impact of migration during a child's schooling on intergenerational educational mobility and identified that when a family migrated during a child's schooling, a son's downward mobility increased.

economic status is a socioeconomic and political process. It has evolved historically and there exists barriers of different kinds pertaining to vertical mobility. This exclusion has spilled over to subsequent generations and the less privileged has remained so. However, when race is used as a control, white children's educational attainment is significantly higher than that of other races across all statuses and age groups, according to Spady (1967), who examined the educational attainment of American children between the ages of 25 and 64 in relation to their father's years of schooling[52]. India, being an excellent case study because of its diverse ethnicity and classes, have commanded sufficient academic interest. With respect to religion, while multigenerational educational and occupational mobility has increased across three generations of all lower caste groups compared to upper caste, it has declined over the three generations among Muslims compared to Hindus[53].

However, there has been a dearth of literature pertaining to intergenerational mobility within the "socially backward" classes. While there have been some papers like Kumar et al. (2002a, 2002b), who have explored class mobility, there have been lesser studies on educational mobility across generations. A more recent paper by Majumdar (2010) has observed substantial upward educational mobility within the reserved classes. Similar line of research by Ray and Majumdar (2013), Kishan (2018), Azam and Bhatt (2015) and Asher, Novosad and Rafkin (2021) using secondary data like the Indian Human Development Survey (IHDS) data base have considered the effects of ethnicity and religion, in particular on educational mobility in India. Using NSSO survey, Hnatkovska, Lahiri and Paul (2013) finds that intergenerational educational mobility among

[52] See for similar studies in USA, Kendrick (1970); Nam (1965). Gerstl and Perrucci (1965);

[53] Srikanth and Dey (2022) opposed literatures which focused on multigenerational study of educational mobility in India, existence literature focused on the effect of "grandfather effect". This article identified that "The Great Gatsby" link holds for religious groups but not for caste groups.

SC/ST converged to non-SC/ST during 1983 and 2005. Using IHDS data sets, Kundu and Sen (2022) examine multigenerational educational and occupational mobility in India. The results indicate that while there has been an increase in educational mobility across the generations, there has not been an increase in occupational mobility. Gupta (2021) using 2004-05 and 2011-12 data sets of the IHDS survey; the author shows that over time there is upward mobility in education and the mobility gap has reduced across social groups. This research also identifies that educational mobility is not translated into occupation and income mobility over time. Mahapatro and Choudhary (2022) used three analytical approaches to explain intergenerational education in Bihar. They conclude that state interventions are very effective for upward mobility among the SC community, but social discrimination is still a major obstacle to it. Our research is an analogous attempt to interrogate the complex hierarchy based on existing economic privilege and socio cultural identities of different groups. In this research, we also aim to identify the three interconnected factors—caste, reservation, and intergenerational higher educational mobility—using only observations of the reserved category in India.

Following Leone (2021), we have used the multivariate ordered logit methodology to investigate the reasons behind the gap in intergenerational upward educational mobility across different regions, castes, religions, genders, and income groups. The preference for boy child and sex selective abortion of female fetus particularly in East Asia has also caused education to be gender biased. Under such austere realities, one needs to look into how far educational mobility has percolated to the girl child. While there has been a more common line of analysis which aims to connect the father's education with the boy child[54], relatively less attention has been on father and daughter, mother and son and mother and daughter connections (Azam, 2016; Minello and

[54] See Corak et al., 2014; Bj¨orklund, J¨antti, and Roemer, 2012

Blossfeld, 2014). Bjorklund and Salvanes (2011) and Solon (1999) show that gender does not have a significant role in shaping the nature of association between parental and child's educational attainment[55]. On the other hand, Huo and Golley (2022) identified that educational mobility is higher among females than males in China. Emran and Shilpi (2015) using intergenerational regression coefficients report considerable progression of educational mobility in India. They mentioned lower caste urban women to benefit the most. In contrast to OBC and general caste females, Choudhary and Singh (2017) found that intergenerational educational mobility among female SC/ST was higher in terms of mother education. However, compared to women from lower castes, women from general caste have a better rate of upward mobility. Emran, Jiang and Shilpi (2021) observed that parental non-financial inputs, patrilineal states and unwanted girls are important determinants of gender disparity in intergenerational mobility. While there is no gender discrimination in absolute and relative mobility among daughters of uneducated fathers in either rural or urban; gender equality in absolute mobility is identified in the urban area of the children whose father is college educated. Aydemir and Yazici (2019) also observed similar patterns for women in Turkey.

Different perspectives on the geographic discrepancy in intergenerational educational mobility exist, including cross-national difference, interstate difference within a nation, and regional disparity within the states i.e. rural-urban gap. Despite significant educational expansion in recent decades, Torche (2019) demonstrates that developing countries have higher levels of intergenerational educational persistence than high-income nations[56]. Ahsan et al. (2022)

[55] They observed similar patterns for geographical regions.There have also been papers which. Chetty et al (2014), Guell et al (2018), Chetty and Hendren (2018) have also looked into the effects of regional disparity on inter-generational mobility.

[56] See cross-country difference in educational mobility (Chevalier, Denny and McMahon,2003).

identified that conditional variance of child's schooling in China, India and Indonesia is affected by parental education level. Similarly, Andrade and Thomsen (2018) showed the intergenerational educational mobility is higher in Denmark than USA[57]. On the other hand, inter-state variation in intergenerational educational mobility in India has been explored by Kishan (2018)[58]. Highest degree of association between father and son's years of schooling is identified in West Bengal and lowest in Goa. Emran et al., (2020) found that educational mobility among son's in rural China is higher than rural India. In Bangladesh, Hossain, Abdulla and Yeasmin (2021) identified rural-urban gap in intergenerational educational mobility.

Like all other instances of educational inequality, socio-economic status plays an important role in intergenerational mobility too[59]. According to the empirical findings of Lou and Li (2022), there is a positive export shock on intergenerational educational mobility in China, and using the intergenerational mobility framework of Becker et al. (2018), they also identified that rather than the substitution effect, the income effect is the underlying dominant force of such results. Intergenerational educational mobility is inversely correlated with credit limitations and income inequality, but positively correlated with per capita GDP (Lee and Lee, 2021). Using information from three sizable developing nations such as China, India and Indonesia, Lillard and willis (1994) and Ahsan et al. (2022) examine the impact of family background on the conditional variance of children's outcomes in the context of intergenerational educational mobility. As noted in Solon

[57] Emran, Greene and Shilpi (2018) identified intergenerational educational mobility is higher in India compared to Bangladesh widely using regression coefficient methodology. See Apouey et al. (2022) for upward and downward mobility in European countries.
[58] In USA, state disparity in educational mobility is identified by Kotera and Seshadri (2017).
[59] The relationship between poverty and intergenerational educational mobility is explored within OECD countries (Liu and Ding,2020).

(2004), children of wealthy parents earn a higher income because they invest more in human capital and have more education.

It is the role of the government to promote egalitarian development when society is experiencing low mobility and deprivation. If the market for education fails, it means that not enough is being consumed or produced; consequently, it is still up to the government to support educational development. Smith (1776) observed that government-supported education plays an essential role in enhancing personal life and increasing national wealth. In India, the budgetary allocation for education purposes has been increasing sufficiently over time both at the central and at the state levels. Friedman (1955) studied the importance of government budget allocations in improving educational development and found that the impact is observed most in higher education and vocational training. Since the demand for education by lower income groups is perfectly elastic, the government should extend a helping hand to endorse the demand for education. For their educational development, many governments have implemented two key public policies, namely direct and indirect policy. Direct policies are those where the government donates to the pupils in cash or kind. One can consider mid-day meal, sanitation, free books, school fees paid by govt., and free uniforms as examples of direct policies. Conversely, indirect policies are those that, while not specifically intended to support educational development, do so by facilitating it. For instance, if the government improves the quality of motorable roads, it may be simpler for students to get to school.

To improve educational mobility in China, Guo, Sang and Chen (2019)[60] inferred that demand-side policies for education are required. Lee and Lee (2021) conclude that the increase in public

[60] See Latif (2017) – the role of public spending on educational mobility in Canada.

spending on education helps to enhance educational mobility. When a child's learning outcome is less influenced by parental human capital, a more uniform distribution of public school spending under a foundation program by relaxing a borrowing credit constraint is found to improve intergenerational educational mobility in USA (Kotera and Seshadri, 2017)[61]. This paper also finds that initiating full funded state program helps to enhance educational mobility, though not significantly. Dreze and Goyal (2003); Singh et al. (2014); Jayaraman and Simroth (2015); Kundu and Biswas (2019) and Ramchandran (2019) identified the positive effect of mid-day meals on enrollment and learning outcomes in India. On the other hand, Hossler (2002); Cornwell, Lee and Mustard (2006); Dinkelman and Martinez (2014); Chaudhury and Parajuli (2010) and Hasan et. al., (2022) identified that scholarship decreases dropout rate and consequently increases the learning outcome among students. Banerjee et. al., (2007) identified that computer-assisted remedial class increases the learning outcome in urban India. The role of school infrastructure such as a number of female teachers, teacher incentive, school grant, qualification of teacher, schooling cost, girls hostel, drinking water, sanitation and blended learning method on educational development have also attracted sufficient academic interest[62]. High college tuition fees in China reduced intergenerational educational mobility Chen, Liu and Wu (2020). Adukia, Asher and Novosad (2020) investigated the impact of recently built roads on educational achievement in India and came to the conclusion that construction of new roads enhanced school attendance of students and improved their scores.

[61] See Gioacchino, Sabani and Usai (2022).
[62] See Chudgar and Sankar (2008); Murlidharan and Sundaraman(2011); Das et. al., (2013); Kundu and Biswas (2019); Dey and Bandyopadhyay(2019); Gillani(2021); Ghosh and Kundu(2021); Yang and Lee(2022) and Parvez and Laxminarayan(2022) .

In line with its nation-building goals, the Indian parliament passed a law, which came into effect from 1st April, 2010, giving all children from the age of 6 to 14 years of age free and compulsory education (Sarbha Sikha Abhijan). In addition to this momentum policy, the government of India has also taken three broad categories of education policies – a) public education policies such as scholarships and mid-day meal, b) public infrastructure policies such as motorable roads to school and increasing the number of schools[63]; c) school infrastructure policies like improving sanitation facilities and increasing the number of classrooms[64]. The pre- and post-metric scholarships for SC/ST students (1st April, 1977), minorities (June 2006) and persons with disabilities (1st April, 2012) and in the Ph.D. program, the Rajib Gandhi National Fellowship (UGC) for SC/ST candidates and the Moulana Azad National Fellowship for minorities (UGC) are examples of the first category[65]. Midday meal is another flagship program implemented by the Government of India in 2005 with the primary purpose of supplementary nutrition support to primary school-going children and preventing iron deficiency anemia. Dreze and Goyal (2003) and Jayaraman and Simroth (2015) found that the program resulted in a significant reduction in school dropout rates. On the other hand, different state governments have implemented several policies to promote female education such as Balika Samraddhi Yojana (Gujrat), Delhi Ladli Scheme (Delhi), Sabooj Sathi Scheme (West Bengal) etc.

A thorough review of the literature indicates that there are substantial caveats in the literature regarding caste-based disparity in learning outcomes in India. Moreover, though there

[63] Adukia (2020) observed that newly built roads increased time spent in school, resulting in students performing better on standardized tests in different subjects.

[64] Banerjee et al., (2007), Dey and Bandhopadhay (2019) and Yang and Lee (2022) explained the role of school infrastructure in educational development. An important school infrastructure such as sanitation facilities increases enrollment and has a strong positive impact on female enrollment (Gillani, 2021).

[65] The positive role of scholarship on educational development is identified by Chaudhury and Parajuli (2010) and Hasan et al (2022).

has been sufficient research based on literacy rate and enrolment ratio among the less privileged, there has not been much work with respect to qualitative disparity in education in India. According to the evidence, there is a significant disparity in the percentage distribution of enrolment in primary education, it has to be seen whether caste-based differences in learning outcomes or scholastic achievement exist across caste in India. This research is an attempt in this direction to identify the qualitative educational achievement gap between the general caste and the reserved castes in India based on secondary data. We explore the reading, writing and mathematics test scores of primary school going children aged 8-11 years. In particular, we focus on whether there exists gap in this test scores across castes, socio-economic groups and gender. We found that there is a significant achievement gap between general and reserved caste children in India. These results vary across different socio-economic sub-groups. Moreover, child and school specific factors are also important predictor of such gap. This disparity in achievement motivated us to explore whether this was a one-point phenomenon or was being transmitted through generations within these marginalized groups. So next, we took up the concept of intergenerational educational mobility in India. While there has been no dearth of literature on overall intergenerational educational mobility, there has been systematic gaps when it comes to its treatment with respect to policies in India. Observing significant achievement gap among SC/ST children in primary education, we wanted to look into the higher education scenario in India. Reservation policy has been implemented with the objective of facilitating education among the marginalized classes. So

the thesis looks into the role of reservation policy in educational attainment of reserved classes. We obtained that while the possession of caste certificate gave an impetus at the entry to the reserved category, it is not sufficient for completion of the degree. We also tried to identify the other variables like household per capita income, father education and urban residential status which could be instrumental in explaining the disparity between the different caste groups at the higher education level. This was undertaken in intergenerational education mobility framework. The second analysis showed that there were other variables like government policies other than reservation which could explain differential educational attainment. So, we undertake a primary survey to get a firsthand idea with respect to the role of public policy on intergenerational educational mobility. We found that public policy variables not only increase vertical mobility, but also reduces the degree of association between children and parental years of schooling. Given primary data, we have also tried to assess the relationship between maternal education attainment with the level of the child's educational attainment, which is also an extension over the existing research.

1.2 Organization of Work

The dissertation is planned as follows.

Chapter I begins with emphasizing the role of education on societal upliftment, equality of opportunity, and economic development. Then, we define indicators of educational development

such as literacy rate, enrolment ratio, attainment and achievement, and we investigate their statistical relevance to India and corresponding literature. According to the evidence, there is substantial variation in educational development indicators across caste, gender, region, and other socioeconomic groups in India. According to the available literature, there has been a substantial research gap in identifying the caste-based disparity in educational achievement. Next, we explore statistical evidence and corresponding literature on important factors affecting educational development like socio-economic status, gender, geographical location and caste or race. Since education is not restricted to a singular time point, we then explore the time dimension of educational attainment through intergenerational educational mobility. We have then attempted to an extensive literature survey to identify the gap in literature on intergenerational educational mobility. Existing literature exhibit that there is no dearth of literature on educational mobility, but there is substantial research gap when it comes to its association with reservation policy and public policy. After noting our contributions to the existing literature, we briefly outline the chapters of this thesis.

Chapter II examines the gap in scholastic achievement or learning outcomes in reading, writing, and mathematics between general and reserved categories in India. The gap is further explored in the context of pre-primary and primary school level. We aim to identify factors which causes this gap to exist. We found socio-economic status index, child effort variables, PTA participation, gender and others as relevant factors. We have then looked into the sensitivity of the test score gap across alternative specifications like, gender, quintile of SES index, region, location and school

type. We then explore the effects of covariates within castes. Next, we focus on how and whether test score gaps vary within different academic levels, namely preprimary and primary. School specific factors were also taken into account.

The emphasis of Chapter III is on reserved groups' higher levels of educational attainment, such as secondary, higher secondary, graduate, and post-graduate degrees. In this chapter, we aim to investigate how far such reservation has been instrumental in increasing the incidence of higher education within the reserved sub groups. In particular, we aim to analyze how far the possession of caste certificate has contributed to higher level of academic achievement among the reserved groups. Here, we mainly estimate higher educational attainment in the framework of intergenerational educational mobility using transition matrix and Altham metric methodology. Next, we reran the same regression on different subgroups of individuals. The subgroups that we have considered are family income below median, family income above median, father's education level higher secondary and above and father's education level below higher secondary. We observe that possession of caste certificate brings about a change in the degree of association between father and son's educational attainment. For both the methodologies undertaken. our analysis confirms that third generation son is more mobile than second generation son. With regard to the regression analysis, we obtain that if the father's educational attainment is equal and above higher secondary, then caste certificate does not have a significant contribution towards upward mobility. Caste certificate becomes very important when we consider father's education below the higher secondary level. We also identify that the probability of higher education mobility is maximum for the groups having income above median and staying in urban region. For the targeted reserved category (those with incomes below the median and fathers with just secondary schooling or less), having a caste certificate is required at the entry level, but it is insufficient to obtain a higher

education degree. Therefore, although reservation policy is still significant today, it is not the only factor affecting higher education for reserved castes. To make higher education more convenient, it must be combined with socioeconomic opportunities like expansion of household income, enhanced supply of educational infrastructure, proper efficacy of public policy at all levels, among others.

We have explored absolute and relative intergenerational educational persistence in chapter IV using an extensive primary survey in West Bengal. We have also investigated the interrelationship between socio economic, demographic and regional variables in explaining vertical mobility between parents, both father and mother with their sons and daughters. We have divided the sample into subgroups and investigated the extent of intergenerational educational mobility. We look into the connection between parental educational attainment and the child's probability of reaching different academic levels across socio economic and regional conditions. The role of public policies on relative, absolute and vertical mobility gets high attention in this chapter. The empirical analysis indicates that in West Bengal there is a strong association between parents' and child's (both son and daughters) educational attainment in both relative and absolute terms. Absolute mobility is higher in terms of mother education. After inclusion of household and individual specific factors, public policy variables and education migration variable, we find a substantial decrease in degree of association between children and parent's years of schooling. Using ordered logistic regression method, we find that the likelihood that a child will complete tertiary level of education depends on whether the parent's education level fall in the category of tertiary education. When we disaggregated our analysis across all socio-economic groups using ordered logistic regression, we observed that vertical mobility has been varied across the subgroups. Using all methodologies, we find that all the policy variables considered play a positive and significant role

on mobility. All policy variable helps to decrease the degree of association between children and parent's years of schooling. On the other hand, using ordered logistic regression methodology, we find that all policy variables like mid-day meal, scholarship, sanitation, all weather road etc. have a significant positive impact on the probability of reaching secondary or tertiary level of education by the descendants. In geographical areas where state policies like scholarships are sparse and school infrastructure is generally subpar, raising a child's educational aspirations solely depends on their parents' education levels.

Finally, chapter V concludes the study and summarizes the results of the other chapters. Moreover, we present the policy implications of our analysis results. We also comment on the short comings of the thesis and pave the way for future research.

CHAPTER 2

Gap in Educational Achievement in India: A Primary Level Analysis

2.1. Introduction:

Chapter 1 highlighted the statement of the problem, perspective of the study and brief literature review of the proposed research. Evidence suggests that there is substantial variation in indicators of educational development like literacy rate, enrolment ratio etc. across caste, gender, region, and other socioeconomic groups in India. While there are some primary survey which focus on educational achievement across socioeconomic groups, a large part still remains unexplored[66]. Moreover, there has been a substantial research gap in literature in identifying the caste-based disparity in educational achievement. So, this chapter explores to identify the qualitative educational achievement gap between the general caste and the reserved castes in India based on secondary data.

Educational achievement is alternatively called learning outcome which is measured in terms of learning ability in reading and writing, and the ability to reason through mathematics test scores. The educational achievement gap is quantified in terms of mean test scores gap between more and less privileged students in society. Earlier studies in USA revealed that Black students typically perform about one standard deviation below than White students on standardized test scores[67]. Fryer and Levitt (2004) investigate the achievement test score gaps between White and Black using the Early Childhood Longitudinal Study Kindergarten (ECLSK) cohort in USA and identified substantial test score gap[68]. In India, Borooah (2012) identified that Muslim, Dalit, and Adivasi

[66] Heyneman and Loxley (1983) and Hanushek (2002) focused on it in the United States. In India Shukla et al (1994), Pratham (2005), Benerjee et al., (2007), Jalan and Panda (2010) and Das (2019) have contributed to this literature.
[67] See Bracken, Sabers, and Insko (1987), Brooks-Gunn, Duncan and Klebanov (1996), Naglieri (1986).
[68] Todd and Wolpin (2007), Condron (2009); Paige and Witty (2010); Gopalan (2019) have similarly estimated educational achievement gap between Black and White students.

children, had the largest disadvantage in educational achievement compared to general caste children[69].

It is crucial to comprehend the underlying factors that contribute to the test score gap. There are numerous rationales that could account for the test-score disparity. These explanations include differences in family environment like socio economic status, poverty etc. (Lee, 1998; Fryer and Levitt, 2004; Sakellarious, 2008; Strand, 2014), difference in school factors (Cook and Evans, 2000; Dey and Bandyopadhya ,2018; Kingdon, 2020; Yang and Lee, 2022), difference in culture, socialization or behavior (Hess et. al., 1987; Cook and Ludwig, 1998; Fryer, 2002; Toro and Wang, 2021), difference in genetic factors like nutrition, child birth, length of pregnancy, maternal stress and intrauterine environment (Hernstein and Murray, 1984; Jensen, 1998; Petrill and Wilkerson, 2000), and difference in teachers' perception or racial bias in assessment (Ferguson, 1998; Uhlenberg and Brown, 2002; Redding, 2019; Gale, 2020).

In this chapter, we look into reading, writing and mathematics test scores of pre-primary and primary school going children aged 8-11 years using India Human Development Survey (IHDS-II). This chapter also considers the effect of child effort variables at home and school, and other environmental factors on test scores gap between general and reserved category student. The students have then been divided in two age groups, i.e. 8-9 years which is categorized as the pre - primary students (class III- IV) and 10-11 years which is categorized as primary students (class V – VI). We have standardized raw test scores with mean 0 and standard deviation 1. The main advantage of transforming raw test scores to standardized test scores is that we can easily compare

[69] Bagde, Epple and Taylor (2016) and Das (2019) found that socially excluded students, such as those from the scheduled caste and scheduled tribe, have lower educational achievement.

two test scores comes from different distributions. In our empirical analysis, we have used weighted least square (WLS) regression technique.

We have identified a substantial test score gap between general and reserved caste groups. The gap reduces when children move from pre- primary to primary level. The achievement disparity is much higher in rural India compared to non-metro urban residing children. This result arises due to substantial differences in the opportunity set available between urban and rural areas. The learning outcome gap of students attending in public school is higher than children attending private school. This scenario may exist due to the difference in school environment between public and private schools. Next, taking into account school fixed effect in our regression analysis, we identify lower test scores gap between general and reserved caste groups in each test scores.

The rest of the chapter is organized as follows. Section 2.2 provide the outline of the data. In section 2.3 we elucidate the empirical models and summarize the findings. Section 2.4 comments on policy implications and concludes the chapter.

2.2. Data

The data we use are taken from unit level survey data. We use The India Human Development Survey (IHDS-II) data[70] for the year 2012 in this paper. It is a nationally representative sample of 14702 children of age group 8-11 years. IHDS-II survey collects information on completed short reading, writing and arithmetic tests of the children of above-mentioned age group. After dropping the missing data on test scores, caste and age we have 6609 children level data. Standardized tests were administered to all available children aged 8-11 orally on short reading, writing and arithmetic knowledge in the household. These tests were developed in collaboration with

[70] Data is available at *https://www.icpsr.umich.edu/web/DSDR/studies/36151/datadocumentation#*

researchers from Pratham, India and were pretested to ensure comparability across languages. The mathematics test evaluates number recognition, subtraction and division. Similarly, the reading test was used to measure basic skills on recognition of alphabets, words and reading paragraphs and story. The writing test score also evaluate the basic quality of students' writing skill on specific questions and were evaluated on three levels such as cannot write, write with 2 or less mistakes and write with no mistake. The values reported of the test scores are associated to the questions which we have standardized to have mean 0 and standard deviation 1. In all cases we have used sample weights provided by IHDS.

General caste students are on an average score 0.272 standard deviation above the mean on math exam in the age group of 8-11 years, whereas other backward caste (OBC), scheduled caste (SC) and scheduled tribe (ST) students perform 0.0015, 0.090 and 0.379 standard deviation below the mean respectively. The initial UC-OBC, UC-SC & UC-ST gaps in reading are 0.201, 0.355 and 0.527 standard deviation below the mean respectively. Similarly gaps in writing of UC and OBC, SC & ST are reported in table-2.1 as 0.276, 0.354 and 0.550 respectively.

Table 2.1.- Summary Statistics by Caste: Student Characteristics

Variable	Full Sample	General Caste	OBC	SC	ST
Reading Test Score	.003 (.012)	.216 (.021)	.015 (.019)	-.139 (.027)	-.311 (.043)
At aged 8-9 years reading test score	-.200 (.017)	.059 (.030)	-.175 (.026)	-.373 (.036)	-.562 (.056)
At aged 10-11 years reading test score	.231 (.016)	.381 (.028)	.243 (.026)	.115 (.036)	-.0004 (.062)
Math Test Score	.005 (.012)	.272 (.023)	-.015 (.019)	-.090 (.026)	-.379 (.038)
At aged 8-9 years math test score	-.210 (.016)	.081 (.031)	-.236 (.024)	-.349 (.034)	-.535 (.049)
At aged 10-11 years math test score	.240 (.017)	.458 (.032)	.229 (.027)	.170 (.037)	-.208 (.059)
Writing Test Score	.008 (.012)	.252 (.022)	-.018 (.019)	-.102 (.026)	-.298 (.043)
At aged 8-9 years writing test score	-.143 (.017)	.109 (.032)	-.142 (.026)	-.275 (.036)	-.482 (.058)
At aged 10-11 years writing test score	.163 (.017)	.393 (.029)	.107 (.027)	.077 (.035)	-.072 (.061)
GENERAL CASTE	.266 (.442)	1.000	.000	.000	.000
OBC	.406 (.491)	.000	1.000	.000	.000
SC	.234 (.423)	.000	.000	1.000	.000
ST	.092 (.289)	.000	.000	.000	1.000
Socio Economic Status Index	-.007 (.007)	.216 (.014)	-.046 (.010)	-.108 (.013)	-.221 (.022)
Child Spends Private Tuition (Hours/Week)	2.133 (.005)	2.959 (.123)	1.920 (.083)	1.979 (.111)	1.096 (.141)
Child Spends School(Hours/Week)	32.533 (.097)	31.301 (.202)	33.331 (.145)	32.603 (.198)	32.432 (.320)
No Books in Household	.478 (.006)	.310 (.011)	.470 (.009)	.615 (.012)	.650 (.019)
Female	.484 (.006)	.466 (.012)	.486 (.009)	.498 (.013)	.495 (.020)
Age	9.539 (.013)	9.546 (.025)	9.551 (.020)	9.525 (.027)	9.507 (.041)
Teenage mother	.042 (.002)	.035 (.004)	.039 (.003)	.053 (.005)	.046 (.008)
Mother Age Above 30 Years	.151 (.004)	.145 (.008)	.143 (.006)	.158 (.009)	.184 (.015)
PTA Attendance	.486 (.006)	.584 (.012)	.445 (.009)	.456 (.013)	.460 (.020)

Note: The entries are means and standard deviations.

Only general caste students of age group 8-9 years (students of class III to IV) on an average, score 0.081 standard deviation more than mean on the math exam, whereas the other backward classes, scheduled caste and scheduled tribe students score 0.236, 0.349 and 0.535 standard deviation below the mean on the math test respectively, yielding a upper caste and Backward castes (OBC,

SC and ST) gaps of 0.317, 0.430 and 0.616 standard deviation respectively. For the next age group students (i.e. students of class V and VI) this gap decreases to 0.229 and 0.228 standard deviation for OBC and SC respectively but increases to 0.666 for ST group. The reading test score gap between upper caste and OBC, SC and ST decrease in the age group (10-11 years) compared to (8-9 years). The writing score gap on the other hand increases for SC and OBC students but decreases for ST students. The rest of the table 2.1 represents the summary statistics for the other variables used in the analysis.

The rest of table 2.1 reports summary statistics of other socio-economic and policy variables used in our analysis. Following Fryer and Levitt (2004) we have constructed a composite measure of socio-economic status namely SES index. The SES index is constructed using parental education, parental occupational status and household income. Other control variables are time spent by child in school, time spent in private tuition, age of the children at entry level, PTA participation, gender of the child (male=1, female=0), teenage mother and mother's age above 30 years.[71] Our study is based on the data at the individual level, household level as well as village level. We compare general caste (UC) with socially backward castes like scheduled caste (SC) and scheduled tribes (ST). Our key outcome variables are standardized test scores of mathematics, reading & writing.

We obtain considerable test score gap in many of the variables considered. For reserved categories we observe lower SES, less PTA and so on. This reflects the fact that the circumstances in which the majority of the reserved categories reside are not favourable to academic growth. While we report a subset of the variables considered, the results are more or less similar when we include all 60 covariates. The summary statistics give an overview of the overall distribution pattern but does

[71] See Appendix Table A1

not provide an in depth analysis. Hence, we have undertaken a detailed regression analysis to investigate the extent and factors behind such gaps.

2.3. Results and discussions:

2.3.1 Estimating caste wise test score gaps for students of classes III to VI

Table 2.2 below reflects the test score gaps for all reserved castes and factors responsible for variations in test scores for the students of classes III to VI. The empirical model used for estimation is of the form

$$TESTSCORE_i = CASTE_i'B + X_i'\Phi + \varepsilon_i \quad \text{.....(1)}$$

Where i represents students. Caste dummies (SC, ST and OBC) are included in the regression, with general caste as the omitted dummy variable. Therefore, the coefficients associated with different caste dummies capture the gap between that particular caste and general caste. Our primary emphasis is on test score gap between upper caste and scheduled caste and scheduled tribes. The vector of other covariates included in the above model, denoted by the vector Xi, varies across columns in table 2.2. As we move to the right of the table, we find that the number of explanatory variables increases. In all cases, we apply the weighted least squares technique, with weights corresponding to the sampling weights provided in the data.

TABLE 2.2: - The Estimated Backward-Forward Caste Test Score Gap in Mathematics, Writing and Reading of Classes III to VI Student

Variable	*Mathematics*					*Writing*					*Reading*				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
SC	-.362***	-.199***	-.140***	-.127***	-.084**	-.354***	-.218***	-.167***	-.158***	-.098***	-.355***	-.213***	-.143***	-.137***	-.072**
	(.034)	(.033)	(.033)	(.033)	(.034)	(.034)	(.034)	(.034)	(.034)	(.036)	(.034)	(.034)	(.034)	(.034)	(.035)
ST	-.651***	-.432***	-.352***	-.345***	-.197***	-.550***	-.366***	-.307***	-.313***	-.197***	-.527***	-.336***	-.249***	-.244***	-.110**
	(.046)	(.045)	(.045)	(.044)	(.043)	(.046)	(.045)	(.046)	(.045)	(.046)	(.046)	(.045)	(.045)	(.045)	(.044)
OBC	-.287***	-.153***	-.120***	-.108***	-.018	-.276***	-.163***	-.140***	-.132***	-.043	-.201***	-.084***	-0.049	-.037	.047
	(.030)	(.029)	(.029)	(.029)	(.028)	(.030)	(.030)	(.030)	(.030)	(.030)	(.030)	(.029)	(.029)	(.029)	(.029)
Socio Economic Status Index	_	.507***	.434***	.382***	.027	_	.424***	.368***	.323***	.055	_	.439***	.359***	.321***	.041
		(.021)	(.021)	(.022)	(.033)		(.021)	(.022)	(.023)	(.035)		(.021)	(.022)	(.023)	(.034)
Child Spends Private Tuition (Hours/Week)	_	_	.026***	.024***	.015***	_	_	.014***	.013***	.007***	_	_	.021***	.020***	.013***
			(.002)	(.002)	(.002)			(.002)	(.002)	(.002)			(.002)	(.002)	(.002)
Child Spends School(Hours/Week)	_	_	.002	.001	.0006	_	_	.003**	.003**	.003*	_	_	.003**	.003**	.0007
			(.001)	(.001)	(.001)			(.001)	(.001)	(.001)			(.001)	(.001)	(.001)
No Books in Household	_	_	-.197***	-.170***	-.093**	_	_	-.177***	-.162***	-.111***	_	_	-.254***	-.228***	-.145***
			(0.024)	(.024)	(.024)			(.025)	(.025)	(.025)			(.024)	(.024)	(.025)
Female	_	_	_	-.068***	-.049**	_	_	_	.012	.030	_	_	_	-.032	-.007
				(.022)	(.022)				(.023)	(.023)				(.023)	(.022)
Age	_	_	_	.166***	1.172	_	_	_	.115***	2.849	_	_	_	.150***	1.939
				(.011)	(4.179)				(.011)	(4.424)				(.011)	(4.281)
Teenage mother	_	_	_	-.139**	-.120**	_	_	_	-.014	-.004	_	_	_	-.144**	-.115**
				(.057)	(.055)				(.059)	(.058)				(.058)	(.056)
Mother Age Above 30 Years	_	_	_	-.129***	-.046	_	_	_	-.107***	-.035	_	_	_	-.129***	-.030
				(.032)	(.032)				(.033)	(.034)				(.032)	(.033)
PTA Attendance	_	_	_	.204***	.150***	_	_	_	.160***	.114***	_	_	_	.151***	.108****
				(.024)	(.023)				(.024)	(.025)				(.024)	(.024)
R^2	0.035	0.112	0.134	0.176	0.257	0.027	0.088	0.094	0.120	0.163	0.026	0.084	0.108	0.139	0.213
Number of Observations			6345					6315					6372		

Note: Standard errors reported in parentheses. *, ** and * indicate significance at 10%, 5% and 1% respectively.**

First, sixth and eleventh columns of table 2.2, capture the caste test score gaps without including other explanatory variables. For overall sample the test score gap is highest for ST caste followed by SC group and least for OBC group. These results are synonymous to the raw test score gaps reported in Table 2.1. Next, we add the variable composite measure of socio-economic status. This is the most important variable constructed by the authors. The components used in the SES measure are parental education, parental occupational status, and household income. Inclusion of this variable reduces test score gap in reading, writing and mathematics largely for all the backward castes (SC, ST, OBC). One standard deviation increase in the SES variable increases test score in math, reading and writing by 0.50, 0.44 and 0.42 points respectively. Test score gap in mathematics, reading and writing between general caste (GC) and scheduled caste falls by 44%, 42% and 37% respectively (approximately). Composite SES variable similarly reduces test score gap between GC and ST in mathematics, reading and writing by 34%, 36%, 33% respectively[72].

Next set of variables includes child specific variables such as child school hours, child private tuition hours and possession of any/no book in the child's home. Interestingly time spent in school does not affect Mathematics test score but time spent in private tuition significantly increases the mathematics test score. If there are no books in the child's home, then all the score of the child significantly reduces. Possession of books is taken to be a proxy variable for academically conducive environment at home. Child willingness to study is captured by hours spent in school and private tuition. Inclusion of all three variables eliminates the gap in reading scores for OBC s. The gap for SCs and STs also shrinks.

Next we control for female dummy, age, mother's age at the birth of the child and Parent Teachers' Association (PTA) participation as shown in columns 4 and 9 and 14. Our analysis conforms to the expected results. PTA participation increases Z score across all subjects chosen. Adding these variables to the model eliminates the test score gap between OBC and general caste in reading.

Columns 5, 10 and 15 report the results of the final specifications which include roughly a set of 60 variables encompassing regional dummies, home environment variables like siblings, parental

[72] Similar changes are observed for OBC caste groups.

education and occupational status, parental association with political parties and social groups, neighbourhood characteristics like practice of untouchability, existence of community conflict and village conflict, parental and school interaction variables with child; like PTA participation, scolded in school etc and policy variables like mid-day meal and Antodaya. While the complete results are provided in Table A2, only a subset of regressors are reported in Table 2.2. The sign of the coefficients of the final regression model come in predicted direction. The inclusion of these additional variables does not change the results considerably. In the full regression model, the co-efficient of SES declines considerably and becomes insignificant because of inclusion of parental education and occupational status which have been used in the construction of SES.

2.3.2 Test score gaps across alternative specifications

Table 3 presents the sensitivity of the test scores gaps between reserved castes and the GC across alternative specifications. The estimated caste coefficient and corresponding standard error is only reported in the Table 2.3. The baseline result, that is, result reported in Table 2.2 is reported at the top row of the table. We undertake the sensitivity analysis to test whether the results accruing to the full sample conform to the results of the sub samples across gender, region, SES categories, location type and school type. Our analysis shows that results vary for certain sub groups.

There is evidence that SC females perform better relative to ST females in all subjects like SC males. The gap is being removed completely when we consider Maths test scores between SC males and GC males. Similar results are obtained for reading between OBC males-females and GC males-females. We have categorized the SES into 6 categories; namely a) very low SES (below 10%), b) low SES (10%-25%), c) below median SES (25% - 50%), d) above median SES (50%-75%), e) high SES (75%-90%) and f) very high SES (above 90%). In the very low and the very high SES categories, we observe that SCs and STs perform similar to the GCs. It seems individuals facing the same opportunity sets behave similarly. In the low SES category and the high SES category, there is no gap between SC, OBC and GCs in all the subjects. However, for STs, we find there is gap in mathematics only for high SES, where as there is gap across all subjects for the other 3 quintiles. The place of residence plays an important role in affecting the test score gap between reserved castes and GC students. Rural subset of the data yields roughly similar results to

that of the overall sample. In urban areas, however, SCs perform relatively worse in reading in comparison to the other castes but there is no gap in reading and writing between ST, OBC and the GCs. In metro urban areas no significant gap in mathematics test score is observed between any reserved castes and the GCs. Interestingly STs group of students also reported no significant test score gap in reading and writing as well but SCs demonstrated higher test score gaps in writing than baseline study. The test score gap vanishes for non-metro urban areas. The test score gap in mathematics and writing for SCs and STs studying in public schools give similar results to the baseline model. However, the gap narrows for the same caste groups in private schools. This implies that there must be other factors which become important in explaining the gap in the context of private schools.

Table 2.3: - Sensitivity Analysis and Extensions of the Basic Model for Classes III-VI Test Scores

	Coefficient on OBC for:			*Coefficient on SC for:*			*Coefficient on ST for:*		
	Math	Reading	Writing	Math	Reading	Writing	Math	Reading	Writing
Baseline	-.108***	-.037	-.132***	-.127***	-.137***	-.158***	-.345***	-.244***	-.313***
	(.029)	(.029	(.030)	(.033)	(.034)	(.034)	(.044)	(.045)	(.045)
By Gender:									
Male	-.112***	-.044	-.146***	-.063	-.125***	-.125**	-.301***	-.173***	-.224***
	(.040)	(.041)	(.041)	(.047)	(.047)	(.048)	(.062)	(.063)	(.064)
Female	-.106**	-.029	-.118***	-.194***	-.148***	-.191***	-.389***	-.314***	-.399***
	(.042)	(.043)	(.043)	(.047)	(.049)	(.049)	(.063)	(.064)	(.065)
By SES quintile:									
Bottom	-.096	-.049	.049	-.183	-.199	-.154	-.260*	-.253*	-.216
	(.118)	(.130)	(.130)	(.123)	(.136)	(.137)	(.134)	(.147)	(.149)
Second	-.095	.041	-.154	-.081	-.076	-.099	-.351***	-.327***	-.358***
	(.091)	(.100)	(.101)	(.100)	(.110)	(.111)	(.114)	(.125)	(.126)
Third	-.098	-.060	-.135**	-.151**	-.199***	-.144*	-.380***	-.215**	-.280***
	(.064)	(.068)	(.067)	(.072)	(.076)	(.074)	(.097)	(.101)	(.099)
Fourth	-.128**	-.089*	-.156***	-.094	-.193***	-.236***	-.414***	-.234**	-.320***
	(.054)	(.053)	(.056)	(.062)	(.060)	(.064)	(.097)	(.094)	(.099)
Fifth	-.111*	-.040	-.073	-.135	.027	-.021	-.382***	-.045	-.121
	(.067)	(.063)	(.064)	(.083)	(.078)	(.079)	(.121)	(.114)	(.117)
Sixth	-.090	-.0001	-.213***	-.162	-.058	-.167*	-.078	-.188	-.265*
	(.073)	(.064)	(.071)	(.099)	(.086)	(.096)	(.147)	(.127)	(.141)
By Region:									
Northern	-.083	.032	-.050	-.141**	-.092	-.048	-.318**	.016	-.050
	(.061)	(.059)	(.060)	(.061)	(.059)	(.060)	(.133)	(.128)	(.130)
Central	-.057	-.065	-.153**	-.245***	-.384***	-.366***	-.426***	-.532***	-.508***
	(.062)	(.069)	(.066)	(.076)	(.083)	(.080)	(.087)	(.095)	(.091)
Eastern	-.196	-.118*	-.193***	-.120	-.129*	-.255***	-.453***	-.372***	-.499***
	(.070)	(.070)	(.074)	(.074)	(.074)	(.078)	(.100)	(.100)	(.105)
Western	-.129*	.019	-.260***	-.117	-.035	-.021	-.095	.137	-.114
	(.066)	(.065)	(.072)	(.093)	(.092)	(.101)	(.094)	(.092)	(.102)
North-Eastern	.301*	.429**	.223	-.042	.004	.005	.609***	.247	.428***
	(.169)	(.177)	(.174)	(.200)	(.211)	(.205)	(.144)	(.151)	(.150)
Southern	-.064	.018	.143*	-.176**	-.051	.028	-.281**	.103	-.100
	(.077)	(.079)	(.085)	(.089)	(.093)	(.101)	(.138)	(.142)	(.152)
By School Type									
Public School	-.099**	-.063	-.151***	-.141**	-.184***	-.220***	-.351***	-.240***	-.323***
	(.046)	(.041)	(.041)	(.046)	(.046)	(.047)	(.061)	(.061)	(.062)
Private School	-.115***	-.023	-.103**	-.114**	-.089*	-.083	-.322***	-.281***	-.284***
	(.042)	(.044)	(.044)	(.049)	(.050)	(.051)	(.066)	(.068)	(.069)
By Location									
Metro Urban	-.076	-.277***	-.265**	-.079	-.179*	-.243**	-.584	.087	.112
	(.101)	(.099)	(.102)	(.107)	(.105)	(.107)	(.486)	(.479)	(.492)
Other Urban	-.070	-.035	-.003	-.104	-.090	-.048	-.152	.077	-.078
	(.051)	(.049)	(.053)	(.066)	(.063)	(.069)	(.108)	(.104)	(.113)
More Developed Village	-.158***	-.009	-.172***	-.196***	-.032	-.147**	-.483***	-.232**	-.375***
	(.058)	(.059)	(.059)	(.063)	(.064)	(.064)	(.091)	(.091)	(.092)
Less Developed Village	-.083*	-.019	-.156***	-.076	-.231***	-.224***	-.271***	-.286***	-.297***
	(.049)	(.052)	(.051)	(.056)	(.052)	(.058)	(.064)	(.067)	(.066)
Rural	-.113***	-.016	-.164***	-.127***	-.141***	-.183***	-.349***	-.263***	-.330***
	(.037)	(.039)	(.039)	(.042)	(.043)	(.043)	(.051)	(.053)	(.053)
Urban	-.093**	-.080*	-.077*	-.117**	-.115**	-.104*	-.211**	.055	-.137
	(.045)	(.043)	(.046)	(.055)	(.054)	(.057)	(.104)	(.101)	(.107)

Note: Standard errors reported in parentheses. *, ** and * indicate significance at 10%, 5% and 1% respectively.**

2.3.3 Factors affecting test scores within caste groups

In both the tables 2.2 and 2.3 we assume that test scores of students of different castes react equally to the change in other regressors of the model. Next, we have examined the cross-caste differences to interpret the results reported in table 2.2 and 2.3. The backward students have limited opportunities on average. If students of a particular backward class do not experience much gain from improvements in any one of the variables, then we can conclude that our earlier results are overstating/understating the probable path of eliminating backward caste and upper caste test score gap.

Coefficients of table 2.4 below reflect the extent to which variations in different controlling regressors within a caste group affect the test score. Columns 1 and 6 and 11 report results obtained from entire sample and our parsimonious set of controls (Columns 4, 9 and 14 of table 2.2). The other columns report results from within the specific caste groups. Compared to full sample we find variation in socio economic status index is more responsive for reserved groups than GC children. This would imply creating opportunities for the reserved castes might lead to reduction in the education achievement gap. Mathematics test scores are relatively lower among SC and ST[73] girl child in comparison to general caste and OBC. So, gender has an important role to play in the context of SC and ST. Increased parental involvement in child's education is increasing the test score significantly for the SCs. Presence of books at home are affecting the overall performance of ST children much more than the other caste groups.

[73] For STs performance in mathematics, reading and writing are worse for girls.

Table 2.4.- Estimates of the Responsiveness of Test Scores to Covariates by Caste

	Math					*Writing*				
Variables	1	2	3	4	5	6	7	8	9	10
	Full Sample	GC	OBC	SC	ST	Full Sample	GC	OBC	SC	ST
SC	-.127***	-	-	-	-	-.137***	-	-	-	-
	(.033)					(.034)				
ST	-.345***	-	-	-	-	-.244***	-	-	-	-
	(.044)					(.045)				
OBC	-.108***	-	-	-	-	-.037	-	-	-	-
	(.029)					(.029)				
Socio Economic Status Index	.382***	.359***	.388***	.394***	.376***	.321***	.312***	.316***	.338***	.365***
	(.022)	(.039)	(.036)	(.054)	(.071)	(.023)	(.038)	(.038)	(.054)	(.083)
Child Spends Private Tuition (Hours/Week)	.024***	.028***	.020***	.020***	.036***	.020***	.020***	.003	.016***	.015
	(.002)	(.004)	(.004)	(.005)	(.010)	(.002)	(.004)	(.004)	(.006)	(.012)
Child Spends School(Hours/Week)	.001	.001	.004*	-.001	.0003	.003**	.004*	.006***	.001	-.003
	(.001)	(.002)	(.002)	(.003)	(.004)	(.001)	(.002)	(.002)	(.003)	(.005)
No Books in Household	-.170***	-.132***	-.159***	-.146***	-.378***	-.228***	-.022	-.153***	-.205***	-.449***
	(.024)	(.048)	(.037)	(.053)	(.078)	(.024)	(.047)	(.038)	(.053)	(.091)
Female	-.068***	-.005	-.030	-.169***	-.142**	-.032	.074*	.048	-.037	-.176**
	(.022)	(.042)	(.035)	(.049)	(.069)	(.023)	(.042)	(.037)	(.050)	(.081)
Age	.166***	.166***	.180***	.151***	.136***	.150***	.132***	.116***	.102***	.100**
	(.011)	(.020)	(.017)	(.024)	(.034)	(.011)	(.020)	(.017)	(.024)	(.040)
Teenage mother	-.139**	-.125	-.065	-.250**	-.169	-.144**	.116	-.023	-.068	-.177
	(.057)	(.116)	(.092)	(.111)	(.167)	(.058)	(.115)	(.096)	(.114)	(.194)
Mother Age Above 30 Years	-.129***	-.054	-.122**	-.187***	-.173*	-.129***	-.080	-.082	-.147**	-.126
	(.032)	(.060)	(.052)	(.070)	(.092)	(.032)	(.060)	(.054)	(.071)	(.108)
PTA Attendance	.204***	.207***	.191***	.255***	.125*	.151***	.175***	.178***	.191***	-.038
	(.024)	(.046)	(.037)	(.056)	(.072)	(.024)	(.045)	(.039)	(.053)	(.084)
R^2	0.176	0.158	0.143	0.135	0.200	0.139	0.111	0.082	0.092	0.133
Number of Observations	6345	1701	2564	1476	604	6315	1687	2555	1469	604

	Reading				
Variables	11	12	13	14	15
	Full Sample	GC	OBC	SC	ST
SC	-.158***	-	-	-	-
	(.034)				
ST	-.313***	-	-	-	-
	(.045)				
OBC	-.132***	-	-	-	-
	(.030)				
Socio Economic Status Index	.323***	.281***	.310***	.377***	.402***
	(.023)	(.037)	(.037)	(.054)	(.081)
Child Spends Private Tuition (Hours/Week)	.013***	.021***	.013***	.027***	.031***
	(.002)	(.004)	(.004)	(.006)	(.011)
Child Spends School(Hours/Week)	.003**	.002	.008***	.0009	.001
	(.001)	(.002)	(.002)	(.003)	(.005)
No Books in Household	-.162***	-.144***	-.225***	-.190***	-.531***
	(.025)	(.046)	(.038)	(.053)	(.088)
Female	.012	.021	-.011	-.056	-.197**
	(.023)	(.041)	(.036)	(.050)	(.079)
Age	.115***	.129***	.170***	.136***	.159***
	(.011)	(.019)	(.017)	(.024)	(.038)
Teenage mother	-.014	-.019	-.269***	-.155	-.051
	(.059)	(.111)	(.095)	(.113)	(.189)
Mother Age Above 30 Years	-.107***	-.099*	-.112**	-.197***	-.045
	(.033)	(.057)	(.053)	(.071)	(.104)
PTA Attendance	.160***	.095**	.154***	.261***	.016
	(.024)	(.044)	(.038)	(.053)	(.081)
R^2	0.120	0.106	0.115	0.128	0.189
Number of Observations	6372	1710	2574	1481	607

Note: Standard errors reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

2.3.4 The Evolution of the caste Test Score Gaps as pre-primary and primary

In the previous section we obtain that although the SCs and STs test scores lag the general caste by a large margin, inclusion of certain covariates helps in eliminating the gap altogether. In this section we sub divide the data into pre-primary and primary[74] and explore how the caste test -score gaps change across different academic years.

Using the raw test scores from table 2.1 and applying some simple calculations, we find that reserved students gain some ground relative to general castes as they move from preprimary to primary; gap reduces by 33% on math for SCs, 38% in reading for SCs and 18% in writing for SCs[75]. Table 2.5 presents regression results for those two different academic years. Our results from the overall regression across the caste groups provide better results since the gap is eliminated which was not the case in parsimonious regression specification[76]. Our results differ from Fryer and Levitt (2004) since they consider the performance of the same student over different academic sessions where as we have selected samples across academic years. So, in our case there has been a marked improvement in test scores as we move from lower to higher classes.

[74] Pre-primary include students studying in classes III and IV and Primary includes students studying in classes V and VI.
[75] There have been similar results for STs and OBCs except in maths for STs.
[76] Gap is observed only in the case of ST maths.

Table 2.5: Estimated Test Score Gaps at Pre-Primary Vs Primary level

Variables	*Pre-Primary*			*Primary*		
	Math	**Reading**	**Writing**	**Math**	**Reading**	**Writing**
SC	-.195***	-.187***	-.184***	-.059	-.087*	-.132***
	(.044)	(.047)	(.049)	(.049)	(.047)	(.047)
ST	-.321***	-.308***	-.352***	-.373***	-.162**	-.258***
	(.057)	(.061)	(.063)	(.067)	(.064)	(.065)
OBC	-.143***	-.060	-.111***	-.056	-.0007	-.151***
	(.038)	(.041)	(.042)	(.043)	(.041)	(.042)
Socio Economic Status Index	.388***	.409***	.347***	.359***	.207***	.286***
	(.030)	(.032)	(.033)	(.032)	(.031)	(.032)
Child Spends Private Tuition (Hours/Week)	.026***	.025***	.012***	.020***	.013***	.012***
	(.003)	(.003)	(.004)	(.003)	(.003)	(.003)
Child Spends School(Hours/Week)	.0009	.0003	.0009	0.001	.006***	.006***
	(.001)	(.002)	(.002)	(.002)	(.002)	(.002)
No Books in Household	-.174***	-.240***	-.194***	-.159***	-.207***	-.118***
	(.032)	(.034)	(.035)	(.036)	(.035)	(.035)
Female	-.023	-.00004	.034	-.136***	-.077**	-.018
	(.030)	(.032)	(.033)	(.033)	(.032)	(.032)
Age	.118***	.100***	.085***	.057***	.053***	.044**
	(.015)	(.016)	(.017)	(.019)	(.019)	(.019)
Teenage mother	-.102	-.087	-.013	-.166**	-.201**	-.011
	(.078)	(.083)	(.086)	(.081)	(.078)	(.079)
Mother Age Above 30 Years	-.203***	-.185***	-.150***	.010	-.015	-.028
	(.041)	(.044)	(.046)	(.049)	(.047)	(.048)
PTA Attendance	.237***	.160***	.180***	.158***	.129**	.131***
	(.032)	(.034)	(.035)	(.035)	(.034)	(.034)
R^2	0.182	0.163	0.118	0.130	0.080	0.087
Number of Observations	3389	3404	3375	2956	2968	2940

Note: Standard errors reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

2.3.5 Does the Importance of school specific Inputs affect performance?

Why the reserved class children are performing worse than the general caste may be of paramount importance on two grounds. Firstly, knowing the causes will help the government in designing adequate policies to reduce the gap. Secondly it will help us to identify whether the policies already undertaken by the government has had the intended effects or not. In the subgroup analysis we failed to explain why students of the different caste groups performed differently in private and public schools. Our data set includes students from a wide number of schools. So, we bring in school fixed effects to explain why the gap is existing among the castes attending the same school[77]. Once we include school fixed effects, we find that the gap is vanishing for all categories

[77] We have got test scores for 43.5% students whose school has been included in the survey.

for the OBCs and the gap is reducing considerably for all categories for the STs. Hence the facilities available in school might have a bearing on the academic performance of the students.

Table 2.6. –Does school-specific fixed effect affect explain the Test Score gaps between reserved caste and general caste?

Variables	*Without School Fixed Effect*			*With School Fixed Effect*		
	Math	**Reading**	**Writing**	**Math**	**Reading**	**Writing**
SC	-.127***	-.158***	-.137***	-.139***	-.155***	-.136***
	(.033)	(.034)	(.034)	(.036)	(.037)	(.038)
ST	-.345***	-.313***	-.244***	-.200***	-.199***	-.212***
	(.044)	(.045)	(.045)	(.055)	(.056)	(.057)
OBC	-.108***	-.132***	-.037	-.020	-.017	-.032
	(.029)	(.030)	(.029)	(.033)	(.034)	(.035)
Socio Economic Status Index	.382***	.323***	.321***	.307***	.274***	.256***
	(.022)	(.023)	(.023)	(.025)	(.026)	(.026)
Child Spends Private Tuition (Hours/Week)	.024***	.013***	.020***	.012***	.009***	.005*
	(.002)	(.002)	(.002)	(.003)	(.003)	(.003)
Child Spends School(Hours/Week)	.001	.003**	.003**	.005***	.006***	.008***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
No Books in Household	-.170***	-.162***	-.228***	-.112***	-.146***	-.122***
	(.024)	(.025)	(.024)	(.027)	(0.027)	(.028)
Female	-.068***	.012	-.032	-.067***	-.028	-.0002
	(.022)	(.023)	(.023)	(.023)	(.023)	(.024)
Age	.166***	.115***	.150***	.160***	.146***	.106***
	(.011)	(.011)	(.011)	(.011)	(.011)	(.011)
Teenage mother	-.139**	-.014	-.144**	-.129**	-.126**	-.025
	(.057)	(.059)	(.058)	(.058)	(.060)	(.061)
Mother Age Above 30 Years	-.129***	-.107***	-.129***	-.110***	-.126***	-.075**
	(.032)	(.033)	(.032)	(.033)	(.034)	(.035)
PTA Attendance	.204***	.160***	.151***	.178***	.145***	.098***
	(.024)	(.024)	(.024)	(.027)	(.027)	(.028)
R^2	0.176	0.120	0.139	0.370	0.356	0.317
Number of Observations	6345	6372	6315	6336	6363	6306

Note: Standard errors reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

2.4. Conclusion

An important objective of the educational policy of the Government of India has been to eradicate caste and gender discrimination. This chapter is an attempt to show how the Scheduled castes, tribes and other backward castes have performed qualitatively relative to the general castes. Using unit level data from IHDS we have first calculated Z scores for all the three categories i.e. reading, writing and mathematics and then we have regressed using caste dummies. We have also included factors which represent household environment to learning conduciveness, child effort variables, student characteristics variable, policy variables, and school factors in our analysis. The estimated test score gap between general and reserved category in reading, writing and mathematics follows caste hierarchy that is gap between general and scheduled tribe is highest, the gap between general and SC is second largest and the gap between general and OBC is lowest. We also find that the

test score gap is the maximum for the scheduled tribes in both pre-primary and primary schooling. This could be due to a number of reasons like being first generation learners and having no help at home, facing discriminations in school, socio economic environment non conducive to learning.

Our analysis also conforms to the general hypothesis that with better socio-economic status like higher household income and parental education the test score gap reduces. An interesting finding is that the gap reduces and becomes almost zero when we compare within groups across geographical locations i.e., between rural households and non-metro urban households. This once again suggests that when the opportunity set available to the different castes, general of otherwise is the same, then there is nearly no difference in educational outcome. In the sub-sample analysis gender difference in test score gap is more prominent among SC and ST category. SC and ST female child perform much worse in each test score than their male counterpart. To further validate this, we include school fixed effect in our regression. In this case, the test score gap between general and OBC totally disappear, and the test score gap of SC and ST with general students substantially reduces. The mathematics and writing scores for SC and STs reduce when we compare the baseline results and private schools. However, similar results are obtained in the context of public school. Incorporating school fixed effects lead to better performance for OBCs and STs.

The results of this chapter suggests that rather than having reservation for the sake of it, with time it has become more important to expand the opportunity set available to all. If the government can provide adequate support to these backward castes particularly in the rural areas with regard to their livelihoods, then the children may have a better future with similar skill sets as the other classes. But at the onset, there has to be some impetus to bring these children to the classes and treat them equally. An educated second generation can bring about the reforms in the society by bringing in the light of knowledge to their off springs. So, it becomes imperative to trace the role of reservation policy on educational attainment of reserved categories.

A2 Appendix

Table 2A.1- Summary Statistics by Caste: Student Characteristics (Full regression model)

Variable	*Full Sample*	*General Caste*	*OBC*	*SC*	*ST*
Geographic Controls:					
Northern	.247	.293	.199	.338	.093
	(.005)	(.011)	(.007)	(.012)	(.011)
Central	.280	.200	.332	.239	.387
	(.005)	(.009)	(.009)	(.011)	(.020)
Eastern	.177	.193	.147	.202	.194
	(.004)	(.009)	(.007)	(.010)	(.016)
North-Eastern	.030	.052	.012	.013	.089
	(.002)	(.005)	(.002)	(.003)	(.011)
Western	.131	.181	.122	.072	.175
	(.004)	(.009)	(.006)	(.006)	(.015)
Southern	.132	.078	.184	.133	.059
	(.004)	(.006)	(.007)	(.008)	(.009)
Baseline Child Characteristics:					
Female	.485	.465	.489	.496	.495
	(.006)	(.012)	(.009)	(.013)	(.020)
Age	9.541	9.552	9.550	9.528	9.505
	(.013)	(.025)	(.020)	(.027)	(.042)
Age^2	92.115	92.304	92.299	91.868	91.404
	(.247)	(.476)	(.392)	(.513)	(.796)
Age^3	899.280	901.777	902.129	895.763	888.602
	(3.565)	(6.860)	(5.641)	(7.384)	(11.430)
Home Environment:					
Sibling	2.079	1.799	2.143	2.194	2.319
	(.016)	(.030)	(.026)	(.033)	(.057)
Sibling^2	6.080	4.804	6.404	6.462	7.365
	(.098)	(.173)	(.159)	(.200)	(.356)
Sibling^3	22.362	16.857	23.918	23.455	28.624
	(.601)	(1.088)	(.970)	(1.209)	(2.149)
Father Illiterate	.221	.141	.206	.276	.379
	(.005)	(.008)	(.008)	(.011)	(.019)
Father Education Below Primary	.077	.052	.081	.086	.106
	(.003)	(.005)	(.005)	(.007)	(.012)
Father Education Below Secondary	.378	.312	.409	.413	.345
	(.006)	(.011)	(.009)	(.012)	(.019)
Father Education Below Higher Secondary	.148	.197	.154	.110	.077
	(.004)	(.009)	(.007)	(.008)	(.011)
Father Education Higher Secondary and Above	.174	.295	.148	.112	.091
	(.004)	(.011)	(.007)	(.008)	(.011)
Mother Illiterate	.411	.229	.430	.510	.605
	(.006)	(.010)	(.009)	(.013)	(.020)
Mother Education Below Primary	.074	.066	.074	.075	.091
	(.003)	(.006)	(.005)	(.006)	(.011)
Mother Education Below Secondary	.322	.371	.328	.303	.201
	(.005)	(.011)	(.009)	(.011)	(.016)
Mother Education Below Higher Secondary	.093	.144	.084	.069	.049
	(.003)	(.008)	(.005)	(.006)	(.008)
Mother Education Higher Secondary and Above	.098	.188	.082	.040	.052
	(.003)	(.009)	(.005)	(.005)	(.009)
Teenage mother	.042	.034	.039	.054	.045
	(.002)	(.004)	(.003)	(.005)	(.008)
Mother Age Above 30 Years	.152	.147	.143	.159	.186
	(.004)	(.008)	(.006)	(.009)	(.016)
Socio Economic Status Index	-.006	.215	-.044	-.107	-.222
	(.007)	(.014)	(.010)	(.013)	(.022)
PTA Attendance	.486	.582	.444	.456	.470
	(.006)	(.012)	(.009)	(.012)	(.020)
Mid-Day Meal	.523	.545	.498	.529	.549
	(.006)	(.012)	(.009)	(.013)	(.020)
Antodaya Card	.065	.026	.056	.111	.101
	(.003)	(.003)	(.004)	(.008)	(.012)

Parents Self-Helf Group Member	.183	.148	.183	.212	.209
	(.004)	(.008)	(.007)	(.010)	(.016)
Parents Social Association Member	.064	.088	.058	.034	.093
	(.003)	(.006)	(.004)	(.004)	(.011)
Parents Political Party Member	.036	.055	.028	.031	.025
	(.002)	(.005)	(.003)	(.004)	(.006)
Lot of Conflict in Village	.121	.125	.123	.120	.104
	(.004)	(.008)	(.006)	(.008)	(.012)
Some of Conflict in Village	.308	.272	.316	.315	.362
	(.005)	(.010)	(.009)	(.012)	(.019)
Lot of Communal Conflict in Village	.083	.091	.086	.074	.071
	(.003)	(.007)	(.005)	(.006)	(.010)
Some of Communal Conflict in Village	.349	.306	.351	.361	.433
	(.006)	(.011)	(.009)	(.012)	(.020)
Missing Communal Conflict in Village	.001	----	.001	.001	.003
	(.0004)		(.0008)	(.0009)	(.002)
Practice Untouchability (Yes)	.225	.249	.283	.093	.235
	(.005)	(.010)	(.008)	(.007)	(.017)
Missing Practice Untouchability	.002	----	.0007	.010	.001
	(.0006)		(.0005)	(.002)	(.001)
Father Cultivator	.254	.289	.275	.137	.357
	(.005)	(.011)	(.008)	(.008)	(.019)
Father Manual labourers	.383	.220	.376	.567	.417
	(.006)	(.010)	(.009)	(.012)	(.020)
Father's Occupation Business	.151	.200	.175	.095	.047
	(.004)	(.009)	(.007)	(.007)	(.008)
Father Engaged in Salaried Professional	.187	.010	.153	.178	.152
	(.004)	(.002)	(.007)	(.009)	(.014)
Father Unemployed or Retired	.006	.010	.003	.005	.003
	(.0009)	(.002)	(.001)	(.001)	(.002)
Father's Occupation Other	.017	.021	.014	.015	.021
	(.001)	(.003)	(.002)	(.003)	(.006)
Mother Cultivator	.043	.042	.044	.021	.096
	(.002)	(.004)	(.004)	(.003)	(.012)
Mother Manual labourers	.136	.043	.118	.229	.247
	(.004)	(.004)	(.006)	(.010)	(.017)
Mother's Occupation Business	.015	.017	.016	.012	.016
	(.001)	(.003)	(.002)	(.002)	(.005)
Mother Engaged in Salaried Professional	.042	.048	.032	.049	.047
	(.002)	(.005)	(.003)	(.005)	(.008)
Mother Unemployed or Retired	.004	.007	.002	.001	.010
	(.0008)	(.002)	(.0009)	(.0009)	(.004)
Mother Engaged in Other Occupation	.758	.841	.786	.686	.582
	(.005)	(.008)	(.008)	(.012)	(.020)
Child Spends Private Tuition (Hours/Week)	2.123	2.917	1.932	1.967	1.074
	(.055)	(.122)	(.083)	(.110)	(.141)
Child Spends School(Hours/Week)	32.547	31.331	33.346	32.642	32.328
	(.098)	(.202)	(.146)	(.198)	(.326)
No Books in Household	.476	.309	.468	.613	.646
	(.006)	(.011)	(.009)	(.012)	(.019)
Child Beaten in School- No	.677	.719	.674	.656	.620
	(.005)	(.010)	(.009)	(.012)	(.019)
Child Beaten in School- Yes	.247	.204	.254	.269	.285
	(.005)	(.009)	(.008)	(.011)	(.018)
Missing Child Beaten in School	.074	.075	.070	.073	.093
	(.003)	(.006)	(.005)	(.006)	(.011)
Child Scolded in School-No	.578	.638	.561	.552	.551
	(.006)	(.011)	(.009)	(.012)	(.020)
Child Scolded in School-Yes	.339	.271	.366	.366	.350
	(.005)	(.010)	(.009)	(.012)	(.019)
Missing of Child Scolded in School	.081	.090	.072	.081	.098
	(.003)	(.006)	(.005)	(.007)	(.012)
Child Studying in Pre-Primary Level	.534	.513	.564	.527	.561
	(.006)	(.012)	(.009)	(.013)	(.014)
Child Studying in Primary Level	.465	.486	.453	.472	.439
	(.006)	(.012)	(.009)	(.013)	(.020)

Note: The entries are means and standard deviations. In all cases, sample weights provided in IHDS-II are used in the calculation.

Table 2 A2 – Full Regression Results of Baselines Specifications: Students of classes III-VI

Variables	*Math Full Sample*	*Reading Full Sample*	*Writing Full Sample*
Caste:			
SC	-.083**	-.072**	-.095***
	(.034)	(.035)	(.036)
ST	-.189***	-.125**	-.187***
	(.044)	(.045)	(.046)
OBC	-.017	.043	-.040
	(.029)	(.029)	(.030)
Geographic Controls:			
Northern	.182**	.432***	-.036
	(.071)	(.043)	(.076)
Central	-.175**	.289***	-.231***
	(.044)	(.045)	(.077)
Eastern	-.006	.253***	-.167**
	(.071)	(.046)	(.076)
North-Eastern	omitted	.213***	omitted
		(.076)	
Western	-.237***	.136***	-.190**
	(.072)	(.047)	(.077)
Southern	-.128*	omitted	-.265***
	(.074)		(.079
Baseline Child Characteristics:			
Female	-.051**	-.006	.030
	(.022)	(.022)	(.023)
Age	.746	2.076	2.180
	(4.198)	(4.295)	(4.440)
Age^2	-.040	-.190	-.209
	(.443)	(.454)	(.469)
Age^3	.0004	.006	.006
	(.015)	(.015)	(.016)
Home Environment:			
Sibling	-.083*	.009	-.012
	(.048)	(.049)	(.051)
$Sibling^2$	-.006	-.041**	-.023
	(.017)	(.017)	(.018)
$Sibling^3$	.001	.004**	.002
	(.001)	(.001)	(.001)
Father Illiterate	-.314***	-.155***	-.037
	(.050)	(.048)	(.049)
Mother Education Below Primary	-.268***	omitted	omitted
	(.056)		
Father Education Below Secondary	-.223***	.007	-.010
	(.040)	(.045)	(.047)
Father Education Below Higher Secondary	-.108**	.101*	.080
	(.041)	(.053)	(.055)
Father Education Higher Secondary and Above	omitted	.201***	.189***
		(.058)	(.060)
Mother Illiterate	-.097**	-.120**	-.243***
	(.045)	(.046)	(.060)
Mother Education Below Primary	omitted	omitted	-.177***
			(.067)

Mother Education Below Secondary	.119***	.072	-.086
	(.045)	(.046)	(.051)
Mother Education Below Higher Secondary	.153**	.071	-.016
	(.058)	(.059)	(.055)
Mother Education Higher Secondary and Above	.254***	.133**	omitted
	(.063)	(.065)	
Teenage mother	-.129**	-.125**	-.011
	(.055)	(.056)	(.058)
Mother Age Above 30 Years	-.047	-.033	-.032
	(.032)	(.033)	(.034)
Socio Economic Status Index	.029	.037	.053
	(.033)	(.034)	(.035)
PTA Attendance	.147***	.109***	.113***
	(.023)	(.024)	(.025)
Mid-Day Meal	.015	.015	.050**
	(.022)	(.022)	(.023)
Antodaya Card	-.019	.054	.020
	(.045)	(.046)	(.047)
Parents Self-Helf Group Member	.016	.042	-.013
	(.031)	(.031)	(.032)
Parents Social Association Member	-.049	-.076	-.118**
	(.047)	(.048)	(.050)
Parents Political Party Member	.024	.015	-.023
	(.060)	(.062)	(.065)
Lot of Conflict in Village	-.003	.069	.048
	(.042)	(.043)	(.044)
Some of Conflict in Village	.044	.039	.029
	(.033)	(.034)	(.035)
Lot of Communal Conflict in Village	-.115**	-.124**	-.196***
	(.048)	(.049)	(.051)
Some of Communal Conflict in Village	-.068**	-.091***	-.143***
	(.033)	(.033)	(.035)
Missing of Communal Conflict in Village	-.380	-.610**	-.843***
	(.309)	(.302)	(.312)
Practice Untouchability (Yes)	-.029	-.004	-.038
	(.027)	(.028)	(.029)
Missing Practice Untouchability	.007	-.235	.109
	(.207)	(.214)	(.221)
Father Cultivator	-.222	.145	-.025
	(.148)	(.151)	(.091)
Father Manual labourers	-.251*	.053	-.066
	(.148)	(.152)	(.090)
Father's Occupation Business	-.070	.207	.046
	(.149)	(.152)	(.093)
Father Engaged in Salaried Professional	-.120	.142	.035
	(.149)	(.152)	(.093)
Father Unemployed or Retired	omitted	omitted	-.069
			(.177)
Father Occupation Other	-.101	.172	omitted
	(.168)	(.172)	
Mother Cultivator	.070	.222	-.109
	(.105)	(.192)	(.111)
Mother Manual labourers	.027	.247	-.091
	(.094)	(.188)	(.099)
Mother's Occupation Business	omitted	.297	omitted
		(.206)	

Mother Engaged in Salaried Professional	.088 (.104)	.286 (.194)	-.086 (.110)
Mother Unemployed or Retired	-.363* (.201)	omitted	.314 (.212)
Mother Engaged in Other Occupation	.049 (.089)	.273 (.185)	-.050* (.094)
Child Spends Private Tuition (Hours/Week)	.015*** (.002)	.013*** (.002)	.008** (.002)
Child Spends School(Hours/Week)	.0006 (.001)	.0006 (.001)	.003** (.001)
No Books in Household	-.093*** (.024)	-.144*** (.025)	-.108*** (.026)
Child Beaten in School-No	omitted	-.015 (.083)	.085 (.087)
Child Beaten in School-Yes	.028 (.037)	-.076 (.087)	.094 (.091)
Missing Child Beaten in School	.043 (.081)	omitted	omitted
Child Scolded in School-No	.063* (.034)	.037 (.035)	-.050 (.084)
Child Scolded in School-Yes	omitted	omitted	-.110 (.086)
Missing Child Scolded in School	-.077 (.081)	-.150* (.083)	omitted
Child Studying in Pre-Primary Level	-.292*** (.025)	-.279*** (.025)	omitted
Child Studying in Primary Level	omitted	omitted	.196*** (.026)
R^2	0.258	0.216	0.164
Observation	6345	6372	6315

Note: Standard errors reported in parentheses. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

CHAPTER 3

An Intergenerational Perspective of Education in India Across Social Hierarchies

3.1. Introduction

In chapter 2 we have identified that there are substantial test scores or achievement gaps in reading, writing, and mathematics between general and reserved caste groups in India. This once again highlights the opportunity gaps among the "backward" castes. Despite the implementation of reservation policy[78] by the Indian government for the backward castes for 75 years, the struggle for fundamental human freedom and the socioeconomic emancipation of these reserved groups remains to be fully realized. So, it becomes imperative to trace the fruitfulness or efficacy of reservation policy on educational achievement across reserved categories. In this chapter, we aim to investigate how far such policies have been instrumental in increasing the incidence of higher education within the reserved subgroups. In particular, we aim to analyze whether possession of caste certificates has contributed to a higher level of academic achievement among the reserved groups[79].

In this context, two important facts motivate us to deepen our investigation considerably. Firstly, on 19th March 2021 five-judge Constitution bench agreed that reservation in education and employment is an instrument used by the government as a part of affirmative action to ensure that everyone is moving towards the goals of an egalitarian society while combating inequities. It is not only a tool for including socially and educationally backward classes in society's mainstream but also for including any social group that is disadvantaged and fits with the definition of the weaker section in constitution by article 15(4), 15(5) and 16(4). The Hon'ble five Judges also concurred that even if reservations are only offered based on economic factors, this will not undermine any significant aspects of the Indian Constitution or weaken its core framework. Given this dictum, reservation is still relevant today for socially and economically backward society.

[78] According to Article 46 of the Indian Constitution, the State must take special care to advance the economic and educational interests of the weaker sections of the Indian citizen, particularly the Scheduled Castes and Scheduled Tribes, and must shield them from all types of exploitation and social injustice. As a result, since the constitution's enactment, the government of India and other state governments have implemented reservations for SC and ST in legislative assembly, education, and employment, according to their population share. Based on the recommendations of the Mandal Commission report (1980), the reservation policy was then extended to the other backward class (OBC) in both education and employment.

[79] The mechanism of scrutinee and legal verification for the caste certificate becomes extremely complicated in a country plagued by racism. There have been several instances where the certificate has been denied illegally by citing purely bureaucratic reasons. As a result, despite falling within the reserved category, every household lacks a caste certificate.

Secondly, the anti-reservation policy lobbyists frequently assert that if one generation of the reserved category benefits from this policy, then subsequent generations continued to use it to enhance their socioeconomic mobility further[80]. The overall goal of equality of opportunity would be defeated in this situation. So, it becomes imperative to determine whether these policies have contributed to higher educational achievement within the context of intergenerational educational mobility.

While there has been no dearth of literature on intergenerational mobility[81], there has been a substantial caveat when it comes to its association with reservation in higher education in India[82].

We have borrowed the methodology from papers on race-based discrimination in Europe and United States (Long and Ferrie 2013) to understand caste-based discrimination in the Indian context. Our paper is also in line with Majumder and Ray (2016), where they have considered caste-based discrimination in education, occupation, and income in India using the NSSO database. Though built on the same idea, we differ from their analysis in terms of a) identification of exact father-son pairs since we have used IHDS data for 2011-12; b) calculation of distance between two contingency tables and decomposition of square of Altham statistic in order to find out the components that contribute most to explain the difference in contingency table using Long and Ferrie (2013) and Altham and Ferrie (2007) methodology and c) exploring the situation in higher education where the instance of reservation policy is more pronounced.

The chapter is organized as follows. In section 3.2 we provide a summary of the data and outline the methodology used for analysis. In section 3.3 we present the empirical models and explore their outcomes. Section 3.4 concludes the chapter with relevant policy implications and the future scope of the chapter.

[80] (Kirpal and Gupta 1999) showed that the majority of the students enrolling in IIT between 1989-1992 were second generation beneficiaries. It is in this context, that we aim to look into the spillover effect of the previous generation's achievements onto the current generation. In particular, we aim to trace the higher educational attainment in the framework of intergenerational educational mobility.

[81] See (Cheng and Dai 1995), (Checchi 1997), (Bowles and Gintis 2002), (Louw, Berg, and Yu 2006), (Checchi, Fiorio, and Leonardi 2008a), (Brown, McIntosh, and Taylor 2011).

[82] There has been some significant contribution by (Kumar, Heath, and Heath 2002a) (Kumar, Heath, and Heath, 2002b), (Jalana and Murgaib 2008), (Maitra and Sharma 2009), (Majumder 2010), (Ray and Majumder 2013), (Motriam and Singh 2021), (Hnatkovska, Lahiri, and Paul 2013).

3.2 Data and Methodology

We compare the summary measures of mobility across three generations. Using new longitudinal data from Indian Human Development Survey (IHDS)[83] for the years 2011-12, we have identified mobility in higher education across different generations' father and son combinations within the reserved category[84]. Table 3.1 explains how we have identified two groups of father and son combinations.

Table 3.1 Construction of father-son combination across G1, G2 and G3[85]

	Sample size
Total number of IHDS Sample (2010-2011 data set)	2,04,569
Birth cohort of son (1940 to 1994)	1,36,771
Dropped general caste samples and samples with missing caste information	41,704
Total Reserves category samples (Scheduled caste, scheduled tribe and other backward caste)	95,067
Dropped samples who are enrolled now	9151
Total number of reserved category samples who have completed education	85,916
Number of 2nd and 3rd generation sons[86]	38,638
Number of 2nd and 3rd generation sons dropping if caste certificate information is missing	38,348
Number of 2nd and 3rd generation reserved category sons after dropping observation with missing father's education information	34,622
Combinations of reserved category 1st generation fathers (G1) & 2nd generation sons (G2)	23,669
Combinations of 2nd generations father[87] (G2) & 3rd generation sons (G3)	10,953

[83] A nationally representative, multi-topic panel survey of 42,152 households in 384 districts, 1042 urban and 1420 village neighborhoods across India was conducted by India Human Development Survey 2012. The researchers from the University of Maryland and the National Council of Applied Economic Research (NCAER), New Delhi jointly organized IHDS. Data source:https://www.icpsr.umich.edu/web/ICPSR/studies/36151/datadocumentation

[84] The reserved categories include Scheduled Castes, scheduled Tribes and Other backward classes.

[85] G1: generation one, G2: generation two, G3: generation three

[86] Female family members and family members other than father and son are dropped.

[87] We refer them as second-generation sons or G2 in the chapter.

Our data set comprises of two groups of son and father combinations, namely: (i) Son (G3) and Father (G2) pair where father is head of the family and (ii) Son (G2) and father (G1) combination[88] where son is the head of the family. We have identified 23669 pairs of G1 and G2 and 10953 pairs of G2 and G3. The variables that we have used in our analysis are completed years of schooling, possession of caste certificate by the household, place of residence (rural/urban) and categories of monthly per capita family income: below median or above median. Completed years of schooling is further classified into four sub-categories; namely, secondary and below (henceforth reference group), higher secondary, graduate, post graduate and above.

The following subsections elaborate on the methodologies undertaken.

3.2.1 Transition Matrix

We have analyzed intergenerational educational mobility using two dimensional matrices which contains father's education levels across one dimension and son's education levels across the other. Simply by comparing these two matrices (P and Q) we can comment on the mobility across two generations. Such a matrix will be represented by the form[89]

$$
\begin{array}{c}
 & 1^{st}\text{ Generation (Father)} \\
\text{P=2}^{nd}\text{ Generation (Son)} & \begin{bmatrix}
 & \textit{Secondary \& below} & \textit{Higher Secondary} & \textit{Graduate} & \textit{Post Graduate \& above} \\
\textit{Secondary \& below} & P_{11} & P_{21} & P_{31} & P_{41} \\
\textit{Higher Secondary} & P_{12} & P_{22} & P_{32} & P_{42} \\
\textit{Graduate} & P_{13} & P_{23} & P_{33} & P_{43} \\
\textit{Post Graduate \& above} & P_{14} & P_{24} & P_{34} & P_{44}
\end{bmatrix}
\end{array}
$$

[88] Where G1 is first generation, G2 is second generation and G3 is the third.
[89] All transition matrix is given in appendix from table A 3.1 to table A 3.6.

$$
\begin{array}{l}
\qquad\qquad\qquad\qquad\qquad\qquad 2^{nd}\ \text{Generation (Father)} \\
\text{Q=3}^{rd}\ \text{Generation Son}
\begin{bmatrix}
 & \begin{matrix}\text{Secondary} \\ \&\text{below}\end{matrix} & \text{Higher Secondary} & \text{Graduate} & \begin{matrix}\text{Post Graduate} \\ \&\text{above}\end{matrix} \\
\begin{matrix}\text{Secondary} \\ \&\text{below}\end{matrix} & Q_{11} & Q_{21} & Q_{31} & Q_{41} \\
\text{Higher Secondary} & Q_{12} & Q_{22} & Q_{32} & Q_{42} \\
\text{Graduate} & Q_{13} & Q_{23} & Q_{33} & Q_{43} \\
\begin{matrix}\text{Post Graduate} \\ \&\text{above}\end{matrix} & Q_{14} & Q_{24} & Q_{34} & Q_{44}
\end{bmatrix}
\end{array}
$$

Where number of fathers in the different categories is plotted along the columns and those of the sons are in the rows. The off-diagonal elements like P_{ij} is the number of son-father combinations where i=education level of father and j= education level of son. Our analysis is based on four categories of higher education; namely, secondary and below, higher secondary, graduate, post graduate and above. Vertical mobility is measured by taking the ratio off diagonal terms below the diagonal elements and number of overall sample observations. If son's educational attainment is higher than that of the father then vertical educational mobility takes place. Thus, the vertical mobility measurement is expressed as

$$M_V = \frac{\sum_{j>i} P_{ij}}{\sum_{i=1}^{4}\sum_{j=1}^{4} P_{ij}}$$

We measure overall mobility as the fraction of sons who attained different levels of educational achievement than their fathers. It is measured as follows.

$$M_P = \frac{\sum_{i\neq j} P_{ij}}{\sum_{i=1}^{4}\sum_{j=1}^{4} P_{ij}}$$

Mobility may arise due to change in distribution of education levels, that is, due to prevalence factor or because of change in row and column association in contingency tables. (Hauser 1980, Altham and Ferrie 2007, Long and Ferrie 2013). Association can change as government takes up new policies that removes or reduces disparities in opportunities, such as seat reservation policy for backward caste groups and peer pressure, family inclination and preference toward higher

studies. Thus, this mobility measure may be affected by the marginal frequencies. So, we have adjusted the marginal frequencies of one contingency table with another to accommodate for differences arising from other fundamental factors like socio-economic-regional background. Now using the marginal frequencies of matrix P for matrix Q we form the Q' matrix and measure M_P-$M_{Q'}$. Even after adjusting for the marginal frequencies the differences in mobility between P and Q may exist. Following Long and Ferrie (2013) we use the cross-product ratio from the mobility table as a pertinent measure of association between rows and columns. However, since we have a 4x4 matrix, we adopt the Altham statistic (1970) to understand the extent of association for the full set. The Altham statistic is the sum of the squares of the differences between the logs of the cross-product ratios in the two tables (P and Q). It helps in measuring the distance between the row -column associations for the two tables each having r rows and s columns. The Altham statistic is defined as

$$d(P,Q) = \left[\sum_{i=1}^{r}\sum_{j=1}^{s}\sum_{l=1}^{r}\sum_{m=1}^{s}\left|\log\left(\frac{P_{ij}P_{lm}Q_{im}Q_{lj}}{P_{im}P_{lj}Q_{ij}Q_{lm}}\right)\right|^2\right]^{\frac{1}{2}}$$

We have used the chi-square statistic G^2 to test for the independence between the row-column association of two matrices. Here, the null hypothesis is that the degree of row-column association between two matrices is identical. So, if we reject H_0 then it implies that mobility has occurred.

Next to identify which table has a stronger association we have calculated the distance between d(P,I) and d(Q,I) where I is the strict mobility matrix. Hence, we will observe higher mobility in Q if $d(P,Q)>0$ and $d(P,I)>d(Q,I)$. If under some circumstances $d(P,Q)>0$ but $d(P,I)\approx d(Q,I)$ then the row-column associations between the two matrices are equally distant.

In the contingency table the diagonal terms represent same education levels attained by both father and son whereas the off-diagonal terms indicate different education levels reached by father and son. We have also measured the row-column association of the off-diagonal terms only between the two matrices (P and Q). This new statistic $d_i(P, Q)$ has the likelihood ratio chi-square statistic G^2 with$[(r-1)^2-r]$ degrees of freedom (Agresti (2002, p426)).

The steps that we have followed are as follows: (i) Simple mobility measures are obtained across generations in overall data and also sub-group data. (ii) Marginal frequencies in two contingency

tables are adjusted and mobility estimates are obtained. (iii) Altham statistic measures such as d (P, Q), d (P, I), d(Q, I) and d^i(P, Q) and odd ratios for each component of the overall data are calculated.

3.2.2 Probit Regression Analysis

Higher education is often a criterion for getting high salaried jobs. Therefore, exploring intergenerational mobility in higher education becomes a crucial issue as this helps in creating opportunities to break the vicious circle of low education and low income. Caste reservation policy is one of the important policies that help the reserved category individuals in getting admission in higher education. In this chapter we first examine the role of caste reservation policy and place of residence in higher educational mobility. The dependent variable is a binary variable that takes value 1 if son's education level is higher than father's education level and zero otherwise. The independent variables that we have considered are son's generation dummy (2^{nd} or 3^{rd}), caste certificate possession dummy (yes=1, no=0) and place of residence dummy (urban=1 and rural=0). Therefore, the econometric model used for estimation takes the following form:

$$Pr(Mobility = 1) = \begin{pmatrix} \alpha\ son's\ \ generation\ dummy + \beta\ caste\ certificate\ possession\ dummy \\ +\gamma place\ of\ urban\ residence\ dummy \end{pmatrix}$$

First we try to gauge whether mobility has occurred in higher education. Then we have tried to identify the generations among G2 and G3 where the degree of mobility is higher. Next we have controlled for variables like possession of caste certificate by the household, place of residence (rural/urban) and categories of monthly per capita family income: below median or above median to explain educational mobility. Possession of caste certificate coupled with the household level of income can affect the educational outcome of the child. We have also controlled for that. Table 3.2 presents summary statistics of variables used in probit regression analysis.

Table 3.2: Summary Statistics

Variable	*Description*	*Mean*	*Standard Deviation*	*Min*	*Max*	*Number of Observations*
Higher Educational Mobility (Yes=1, No=0)	=1 if Son's education is greater than father's education =0 Otherwise	0.599	0.487	0	1	34622
Second Generation Son Dummy (Reference: First generation Son)	= 1 if second generation son =0 if First generation son	0.316	0.465	0	1	34622
Caste Certificate (Yes=1, No=0)	=1 if individual holds caste certificate =0 Otherwise	0.470	0.499	0	1	34622
Urban Residency (Yes=1, No=0)	=1 if in household living in urban area =0 Otherwise	0.311	0.463	0	1	34622

3.3 Results and Discussion

3.3.1 Observations from Transition Matrix

We have used the transition matrix method and estimated the Altham statistics to measure prevalence and association between father-son's educational attainments over three generations in India. In India second (G2) and third generation (G3) father-son combinations have experienced higher and significant mobility compared to the first and second generations' father – son combinations. We have also identified the group; namely, possessing caste certificate have experienced higher and significant mobility but for households who do not possess caste certificate we could not find any significant difference in association across generations.

3.3.2 First and second generation versus second and third generation

Simple measure of mobility (M) shows that second-third generations' father and son pairs are 9.4 percentage points more mobile compared to the first and second generation's father and son combinations (19.1 vs. 9.7). However, "the observed mobility is primarily the result of the differences in marginal frequencies between the two contingency tables, known as prevalence (Altham and Ferrie 2007, Lodh et al. 2021). We then adjust the marginal frequencies in order to isolate the impact of change in prevalence from the change in interaction or association. If total mobility is measured using the distribution of educational attainment of the second-third

generation then we observe that the third generations sons are more mobile by 0.9 percentage points (19.1 vs. 18.2) more mobile than second generations sons. Now if we measure the total mobility by using the distribution in higher educational attainment by the first and second generation, then third generation sons are only 9 percentage points more mobile than the second-generation sons and this difference is caused by difference in underlying association[90]. However, we still do not know how different the father and son's educational attainment is over two different father-son combinations. Hence, we use the Altham statistic to measure the strength of association." The Altham statistics for first and second generations' and second and third generations' are d(P, I)=22.78 and d(Q, I)=20.05 respectively and both are significant at 1 percent level of significance. Thus, we reject the null hypothesis that the association between father and son's different levels higher educational attainment was same as that would have been under independence. Similar to simple mobility analysis, Altham statistics also points out that intergenerational mobility in higher education is higher in second-third generation pairs over first-second generation pairs in overall data. The d(P, Q) is 7.34 and significant at 1 percent level of significance. Thus, we have identified that no identical association between two tables (First-Second generation and Second-Third generation). Hence, we conclude mobility across the generations within the backward caste groups in India. We cannot reject the null hypothesis of the equal association in two contingency tables when we focus on only the off diagonal terms; hence, we conclude that the significant difference in degree of association observed between the first and second generations father son combinations and second and third generations father son combinations is driven by the likelihood of sons inheriting father's educational attainment and not due to change in structure of association between father and son's educational attainment.

3.3.3 Second and first generation versus second and third generation if household holds caste certificate

In 1970 government of India introduced the policy of seat reservation for backward caste students in educational institutions. In our sample data we find that all the reserved category households do not hold the caste certificate but holding of caste certificate is necessary to get the benefits of seat

[90] This is known as interaction.

reservation policy. Hence, we have examined intergenerational higher educational mobility within the groups with or without caste certificates. The simple mobility measure indicates that if households possess the caste certificate, then third generation sons are 11.6 percentage points more mobile than the second-generation sons. Now to separate out the impact of change in prevalence from the change in interaction or association we first replace distribution of educational attainment of father and son of third and second generation for second and first generation and identify that third generation's sons are 1.4 percentage points more mobile than their fathers and this difference is result of change in degree of association between father and son's education levels. Similarly, if we replace the marginal frequencies of the second and third generation's table by first and second generation's distribution of education levels, we observe that third generation sons are only 11.1 percentage points more mobile than second generation's sons. Next, we used Altham statistic to test whether the degree of association between father and son's educational attainment is same in two contingency tables or not. We observe that d (P, Q) =6.51 and it is significant at 1 percent level of significance. Thus, there is a change in degree of association between father and son's educational attainment across generations if caste certificate is present in a household. Mobility exercise further exhibited that though for P matrix degree of association between father and son's educational attainment is significantly different from that would have been under independence but for Q matrix that is, for second and third generation combinations no such significant difference in association between the table and the independent table is observed. Mobility is higher in third generation sons compared to the second-generation sons. Next, we focus on the off-diagonal terms and observe no significant difference in degree of association in both P and Q tables, we conclude that the difference in degree of association is driven by likelihood of son's inheriting father's education level within the households that possess the caste certificate. No significant difference in degree of association between second and third generation and first and second generation is observed if caste certificate is not present in the household. This emphasizes the role of caste certificate in achieving higher educational mobility in India.

Table 3.3 Intergenerational Higher Educational Mobility

	Mv [1]	M'v [2]	M [3]	M' [4]	d(P,I) [5]	G^2 [6]	d(Q,I) [7]	G^2 [8]	d(P,Q) [9]	G^2 [10]	di(P,Q) [11]	G^2 [12]
First and Second Generation (P) vs. Second and Third Generation (Q) (Overall data)	0.097	0.182	0.107	0.202	22.78	1006.77***	20.05	829.79***	7.34	44.98***	4.61	5.764
	0.191	0.101	0.218	0.113								
First and Second Generation (P) vs Second and Third Generation (Q) if Caste certificate is present	0.134	0.236	0.145	0.259	22.76	574.23***	18.53	397.6***	10.55	44.84***	6.51	7.39
	0.250	0.139	0.285	0.155								
First and Second Generation (P) vs Second and Third Generation (Q) if Caste certificate is absent	0.066	0.130	0.075	0.148	22.60	405.5***	22.87	404.36***	7.3	13.704	1.829	0.514
	0.135	0.068	0.155	0.077								

Note: G2 is given in the parentheses, Significance levels for the likelihood ratio Chi-squared statistic G2 (df 9 for d(P,I), d Q(,I) and d(P, Q)); and df is 5 for di(P,Q)
Source: Author's own calculation
***significant at 1 percent level, ** significant at 5 percent level, *Significant at 10 percent level

3.3.4 Results of Probit Regression

Next, we reran the same regression on different subgroups of individuals. The subgroups that we have considered are family income below median, family income above median, father's education level higher secondary and above and father's education level below higher secondary.

We observe that there has been vertical mobility in the context of higher education across generations. In particular, the role of caste certificate and place of residence (urban) becomes significant for both the income groups as well as in entire sample. Moreover, for the fathers having education level in the range of higher secondary and below the effect is more pronounced. One can interpret it as the policy of reservation having an effect where it is necessary. We also observe that 3rd generation sons are more mobile than 2nd generation sons. One of the important implications of this result is that caste certificate must be provided to the reserved category sons specially to those whose father's education level is below higher secondary level. The findings are consistent with the results of the previous analysis. The following table summarizes our findings.

Table 3.4 Marginal effects

Higher Educational Mobility					
Sample	Full Sample	Income Above Median	Income Below Median	Father's Education Higher secondary and above	Father's Education Below Higher secondary
Generation 2 son dummy (Ref: Generation 1 son)	0.083*** (0.003)	0.112*** (0.011)	0.071*** (0.003)	0.053** (0.023)	0.084*** (0.004)
Caste Certificate dummy (yes=1, No=0)	0.077*** (0.004)	0.097*** (0.011)	0.057*** (0.003)	0.036 (0.024)	0.078*** (0.004)
Urban dummy (yes=1, No=0)	0.085*** (0.005)	0.116*** (0.011)	0.041*** (0.004)	0.099** (0.024)	0.084*** (0.004)
Observation	34622	6792	27830	1174	33448

Source: Authors' calculations
***significant at 1 percent level, ** significant at 5 percent level, *Significant at 10 percent level

We obtain that the probability of higher education mobility is maximum for the groups having income above median and staying in urban region. This is logically consistent because higher education might be luxury for the poor people and the opportunity set available to the urban residents are substantially more. By opportunity set we refer to the educational infrastructure, information regarding future career scope and similar. Summing up we can conclude that while the possession of caste certificate is necessary at the entry level for the targeted reserved group (income level below median and father's education secondary and below), it is not sufficient to procure a higher education degree. One cannot ignore the role of government in providing subsidized or free education, offering substantial scholarships, initiating more professional courses etc. The inclusion of such variables is beyond the scope of the current chapter.

One can argue in this way that the opportunity set increases if either individual possesses caste certificate while controlling place of residence or other way round. Joint influence of possession of caste certificate and place of urban residence is not important in getting vertical higher educational mobility for poor individuals. Caste certificate variable is found to have significant impact on higher educational mobility if father's education level is higher secondary level and below but if father reaches at least higher secondary level of education then we observe no significant effect of caste certificate on higher educational mobility.

3.4 Conclusion

The relationship between higher education and caste in India has had myriad dimensions and complexities. To address these issues, there have been affirmative policies like 'reservations' which would help the marginalized social classes to have an entry level advantage in higher education among other benefits. This chapter has been an attempt to investigate the efficacy of such policies in attaining social equality as desired.

Using the Indian Human Development Survey (IHDS) 2011-12 database we have identified 2 pairs of "lower caste" father-son to trace intergenerational mobility in higher education. First, we have measured mobility using 4x4 matrices. Then we have used Altham statistic to check the marginal effects of socio-economic variables and policy parameters. In particular, we have tried to investigate the effect of reservation policy through the acquisition of caste certificate among the three generations. We observe that possession of caste certificate brings about a change in the degree of association between father and son's educational attainment. Our analysis shows that third generation son is more mobile than second generation son. So, overtime intergenerational higher educational mobility of backward castes is increasing. We have also undertaken Probit regression to substantiate our findings using the transition matrix technique. We have also taken two subgroups i) with respect to father's education level and ii) with respect to income state. While the role of caste certificate has been significant for most of the cases, only with respect to highly educated fathers we find a different outcome. So, while reservation policy still remains relevant today, it is not the sole determinant of higher education for the lesser castes. It has to be coupled with socioeconomic opportunities like expansion of income, provision of educational infrastructure at all levels among others to facilitate higher education.

A3 Appendix

Table3 A1: Comparison of First-Generation Father's with Second Generation Son's Education: Reserved Category Males in India

Second Generation Son's Education						
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Row Total
First Generation Father's Education	Illiteracy and below primary	20945 (0.904)	1201 (0.051)	693 (0.029)	331 (0.014)	23170
	Primary	101 (0.393)	92 (0.358)	39 (0.151)	25 (0.097)	257
	Secondary	56 (0.325)	21 (0.122)	77 (0.447)	18 (0.104)	172
	Tertiary	13 (0.185)	14 (0.200)	22 (0.314)	21 (0.300)	70
	Column Total	21115	1328	831	395	23669

Note: Each cell ij presents the average probability of fathers with education level i having a son with education attainment level of son j.

Table 3 A2.: Comparison of Second-Generation Father's with Third Generation Son's Education: Reserved Category Males in India

Third Generation Son's Education						
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Row Total
Second Generation Father's Education	Illiteracy and below primary	8335 (0.811)	1131 (0.110)	561 (0.054)	251 (0.024)	10278
	Primary	142 (0.398)	109 (0.306)	79 (0.221)	26 (0.073)	356
	Secondary	67 (0.286)	40 (0.170)	87 (0.371)	40 (0.170)	234
	Tertiary	14 (0.164)	14 (0.164)	27 (0.317)	30 (0.352)	85

Note: Each cell ij presents the average probability of fathers with education level i having a son with education attainment level of son j.

Table 3 A.3: Comparison of First-Generation Father's with Second Generation Son's Education: Reserved Category Males in India (Caste Certificate present)

Second Generation Son's Education						
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Row Total
First Generation Father's Education	Illiteracy and below primary	9251 (0.867)	745 (0.069)	458 (0.042)	213 (0.020)	10667
	Primary	53 (0.358)	56 (0.378)	23 (0.155)	16 (0.108)	148
	Secondary	30 (0.270)	12 (0.108)	58 (0.522)	11 (0.099)	111
	Tertiary	7 (0.170)	7 (0.170)	11 (0.268)	16 (0.390)	41
	Column Total	9341	820	550	256	10967

Note: Each cell ij presents the average probability of fathers with education level i having a son with education attainment level of son j.

Table 3 A4: Comparison of Second-Generation Father's with Third Generation Son's Education: Reserved Category Males in India (Caste Certificate present)

Third Generation Son's Education						
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Row Total
Second Generation Father's Education	Illiteracy and below primary	3672 (0.748	679 (0.138)	370 (0.075)	182 (0.037)	4903
	Primary	89 (0.390)	70 (0.307)	54 (0.236)	15 (0.065)	228
	Secondary	41 (0.269)	28 (0.184)	51 (0.335)	32 (0.210)	152
	Tertiary	9 (0.176)	7 (0.137)	16 (0.313)	19 (0.372)	51
	Column Total	3811	784	491	248	5334

Note: Each cell ij presents the average probability of fathers with education level i having a son with education attainment level of son j.

Table 3 A5: Comparison of First-Generation Father's with Second Generation Son's Education: Reserved Category Males in India (Caste Certificate Absent)

Second Generation Son's Education						
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Row Total
First Generation Father's Education	Illiteracy and below primary	11694 (0.935)	456 (0.036)	235 (0.018)	118 (0.009)	12503
	Primary	48 (0.440)	36 (0.330)	16 (0.146)	9 (0.082)	109
	Secondary	26 (0.426)	9 (0.147)	19 (0.311)	7 (0.114)	61
	Tertiary	6 (0.206)	7 (0.241)	11 (0.379)	5 (0.172)	29
	Column Total	11774	508	281	139	12702

Note: Each cell ij presents the average probability of fathers with education level i having a son with education attainment level of son j.

Table 3A 6: Comparison of Second-Generation Father's with Third Generation Son's Education: Reserved Category Males in India (Caste Certificate Absent)

Third Generation Son's Education						
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Row Total
Second Generation Father's Education	Illiteracy and below primary	4663 (0.867)	452 (0.084)	191 (0.035)	69 (0.012)	5375
	Primary	53 (0.414)	39 (0.304)	25 (0.195)	11 (0.085)	128
	Secondary	26 (0.317)	12 (0.146)	36 (0.439)	8 (0.097)	82
	Tertiary	5 (0.147)	7 (0.205)	11 (0.323)	11 (0.323)	34
	Column Total	4747	510	263	99	5619

Note: Each cell ij presents the average probability of fathers with education level i having a son with education attainment level of son j.

CHAPTER 4

A Primary Survey of Intergenerational Educational Mobility in West Bengal: A Socio-Economic Perspective

4.1. **Introduction:**

In chapter 3 we have identified that reservation policy is still significant today. However, it is not the only factor affecting higher education for reserved castes. Reservation policy coupled with socioeconomic opportunities like expansion of household income, enhanced supply of educational infrastructure and proper efficacy of public policy at all levels, among others may lead to higher incidence of education. In this context, we look into the efficacy of public policy in bringing about intergenerational educational mobility in India.

All welfare states desire to decrease the inequality of educational opportunities across different groups. To meet the demand for educated workers and bring equality in the country, the government accords high attention to educational mobility. Higher levels of educational persistence lead to greater inequality in other economic outcomes in society. In order to increase educational opportunities among less privileged, governments have spent a large portion of their gross domestic product (GDP) on education. Latif (2017) identifies the positive role of public spending on intergenerational educational mobility in Canada and concludes that the degree of correlation between children and parental educational attainment decreases with an increase in public spending.

Two important public policies, referred to as direct and indirect policies, have been put into place by many governments to support their students' educational development. Direct policies are those in which the state makes a donation in kind or cash to the students[91]. In contrast, indirect policies are those that indirectly encourage educational development[92].

In 2021–22, in India the central government spend 3.1% of its GDP on education. National Education Policy (NEP, 2020) proposes for 6% of the GDP to be spent on public education. In 2022–23, the union government budgeted Rs. 350 and Rs. 10,233.75 crores, respectively, for the National Means Cum Merit Scholarship and the Midday Meal programs. The purpose of this chapter is to examine how such flagship education policies reduces educational inequality across social groups as well as across generations. While there are some research papers on educational

[91] Direct policy includes like mid-day meal, sanitation, free books, school fees paid by govt., and free uniforms etc.
[92] For instance, it might be easier for children to travel to school if the government provides all weather road.

mobility in India that uses secondary data to highlight caste, gender, and other socioeconomic categories as significant determinants, lesser focus is on primary data. A primary survey would be instrumental in providing information on father-daughter, mother-son and mother-daughter combinations and policy variables. So, we have conducted a primary survey to meet with these goals.

For this chapter, we have conducted an extensive field work in selected districts of West Bengal, from January 2019 to December 2019. Given the variations in ethnicity, West Bengal stands out as an excellent case study for policymakers. According to the 2011 census, 27.01% of West Bengal's population is Muslim vis-à-vis 14.2% Muslim in overall India. Similarly, while 25.2% of the population in India belongs to the scheduled caste (SC) and scheduled tribe (ST) group, the proportions are 28.5% when it comes to West Bengal alone. Furthermore, the geographical disparities across the three zones – north, south, and west are also profound. We also know that caste is an important factor in West Bengal's economic life, and could also affect the income opportunities available to the residents. When households in West Bengal are grouped based on their monthly income, we find that 87.48%, 93.14%, and 79.06% of SC, ST, and other community households, respectively, make less than Rs. 5000 each month (SECC,2011). In rural West Bengal, 83.59% of scheduled caste (SC) and 85.96% of scheduled tribe (ST) households have been suffering from deprivation of basic amenities, such as free healthcare, elementary education, good housing, sufficient land ownership, and a non-agricultural workforce (SECC,2011). Table 4.1 shows the various levels of monthly household income, the source of income for each household, and the percentages share of household suffering from deprivation and literacy of household for each caste group in West Bengal.

Table 4.1: Household Income and Source of Income by Caste in West Bengal

	% of households with monthly income of highest earning household member w.r.t total households			% households with salaried jobs in			% of household income source							Deprivation and Literacy of Household	
Caste	<5000	5000-10000	>10000	Govt.	Public Sector	Private sector	Cultivation	Manual casual labour	Part Time/Full Time Domestic Service	Foraging Rag Picking	Non-Agriculture : Own account enterprise	Begging	Other	Total Household Considered for Deprivation	No Literate Adult Above 25 Years
SC	87.48	8.30	4.22	3.46	1.15	1.54	4.06	59.15	0.38	0.08	0.12	0.15	2.35	83.59	30.34
ST	93.14	3.60	3.26	3.62	1.54	4.22	16.04	71.65	1.53	0.34	0.50	0.62	9.20	85.96	43.25
OTHER	79.06	13.80	7.14	4.79	1.80	2.66	20.26	53.39	2.03	0.23	4.05	1.43	18.58	74.24	29.26

Source: SECC(2011) https://secc.gov.in/

In terms of holistic educational attainment, West Bengal belongs to the median class in terms of literacy rate[93]. According to the Socio-Economic Caste Census Survey (SECC), 30.34 percent and 43.25 percent of total scheduled caste(SC) and scheduled tribe(ST) families do not have literate family members aged 25 or older in West Bengal. The largest SC enrolment in the primary and upper primary is found in the districts of Alipurduar, Bankura, Jalpaiguri, Cooch Behar, and Siliguri, whereas the highest ST enrolment is found in Darjeeling (DISE,2019). Table 4.2 presents percentage distribution of enrolment of different level of education within different caste groups in West Bengal.

Table: 4.2 The percentage Distribution of Enrolment by Social category and Education Level, West Bengal

Level of Education	Social Category	% Distribution of Enrolment	
		2010-11	2019-20
Primary (I-V)	General	57.05	54.95
	OBC	4.59	13.18
	SC	29.98	24.86
	ST	8.38	7.01
Upper Primary (VI-VIII)	General	55.50	49.48
	OBC	9.16	18.35
	SC	28.00	25.28
	ST	7.34	6.89
Secondary (IX-X)	General	56.38	48.38
	OBC	11.45	19.08
	SC	26.21	26.59
	ST	5.96	5.95
Higher Secondary (XI-XII)	General	66.10	51.97
	OBC	11.03	19.15
	SC	18.07	24.39
	ST	4.80	4.49
Higher Education (Graduate and Above)	General	75.92	62.62
	OBC	5.14	15.68
	SC	16.09	18.36
	ST	2.85	3.34

Source: ASER(2020) https://www.education.gov.in/en/statistics-new?shs_term_node_tid_depth=384

[93]West Bengal ranks 20th among the 36 states and union territories of India.

It is heartening to note that in West Bengal, the Gender Parity Index (GPI) in 2019-20 is greater than 1 at all levels of school education for all categories and especially for ST. SC girls participate more than SC boys do in all other educational levels, except the primary level. In West Bengal, boys perform better than girls across all caste categories when it comes to higher education participation in (ASER, 2019-20). In case of Muslims, girls perform better than boys in upper primary such as for 124 girls /100 boys (GPI=1.24) in 2016-17 (DISE, 2016-17).

While West Bengal, like other states, was included in the Sarba Shiksha Abhiyan initiated by the Government of India, the overall picture is far from satisfactory. In West Bengal, there are a total of 96418 schools, including 82993 government schools, 10404 private schools, 3021 Madarsa schools, and unrecognized schools (DISE,2016-17). There are around 82993 Government schools of which around 66592 are primary schools. Given a population of 9.03 crores in West Bengal, with children being 12.58% of the population, this number is far from sufficient. Mid-day Meal which has been another flagship program undertaken by the Central Government has also seen positive results in lowering drop-out rates in the state. In West Bengal, the percentage of schools covered by the Mid-Day Meal, Girls' toilet, and Boys' toilet, respectively, was 98.4%, 97.6%, and 98.9%. (DISE, 2016-17). More recently the State Government of West Bengal has adopted policies like Kanyashree, and Sabuj Sathi as an incentive for higher education. In 2021-22, pre- and post-metric scholarships for SC, ST, and OBC were funded with Rs. 97.8, Rs. 47.69, and Rs. 122 crores in West Bengal, respectively (Dept. of Finance, West Bengal Govt.). 88.5% of schools are approachable by an all-weather road. Free textbooks and uniforms are provided to 16.50 lakh and 13.65 lakh SC pupils as well as 4.60 lakh and 3.91 lakh ST students in 2016–17. The facts and evidence suggest why West Bengal has been chosen as the survey unit to trace intergenerational mobility and the role of public policies on mobility.

Next following generic survey[94] methods we have surveyed 900 households to obtain data points on 2611 child parent combinations. Individual level information on age, sex, religion, caste, income group in terms of BPL, years of schooling and parental education have been acquired. We have also tried to understand the association between policy variables like scholarships and mid-

[94] The details of the survey are given in the data section.

day meal, public infrastructural variables like motorableroad to school, proximity of schools from home, distance travelled to get primary level education and also school infrastructure like sanitation facilities. Since we are including the child parent combination of each household, the association we observe is much more direct than the secondary data, where the child-parent combination may not be identifiable. Moreover, the interconnectedness between father's and mother's education with the daughter's education has also been traced in this analysis. This is a value addition since in secondary data, information pertaining to mothers and daughters (who stay away from the family) is not considered. First, we have analyzed educational persistence using transition matrix for whole sample and then across all social groups. We find educational persistence is lower at lower level education categories and higher at tertiary level. Secondly, we have explored absolute and relative intergenerational educational persistence. Similar to existing results, we observe that the society has been largely immobile in terms of educational attainment. Thirdly, we have investigated the interrelationship between socio economic, demographic, regional and policy variables in explaining vertical mobility between parents, both father and mother with their sons and daughters.

The standard literature on educational mobility has developed on the basis of intergenerational regression coefficient (IGRC), intergenerational coefficient and sibling correlations.[95]To understand educational mobility, this chapter uses three related methodologies.1) transition matrix and Altham metric, 2) intergenerational simple regression and correlation coefficient, and 3) ordered logistic technique following Leone (2021). Firstly, we have focused on upward mobility for the overall sample as well as across all social groups using simple transition matrix. We have identified that persistence is lower in the bottom education categories and persistence is higher in the top education categories. We have measured mobility using Altham metric across all social groups and policy variables. The results suggest positive role of public policy variables on mobility. Secondly, we have explored the extent of absolute and relative measures of mobility for the overall sample. We have observed a strong association between parental education and child's mean years of schooling, i.e. the society is largely immobile. Thirdly, the role of parental education

[95] See Emran and Shilpi (2011), Jalan and Murgai (2008), Dahan and Gaviria (2001), Maitra and Sharma (2010), Emran and Shilpi (2015) , Azam (2016)

has been tested on vertical mobility. The analysis shows that the probability of the ward's attaining tertiary level of education increases if father's education falls in the tertiary level. Finally, we have broken the sample into subgroups and investigated the extent of intergenerational educational mobility. In particular, we analyse the inter relationship between parental educational attainment and the child's probability of reaching different educational attainment across religion, castes, gender, economic condition and region. The results have been varied across the subgroups.

The rest of the chapter will be organized as follows. Section 4.2 will provide the data and outline the methodology of the survey. In section 4.3 we elucidate the empirical models and summarize the findings. 4.4 includes disaggregated analysis. Section 4.5 comments on policy implications and concludes the chapter.

4.2 Data and Methodology

4.2.1 Data source

The data we use are taken from a primary survey conducted in rural West Bengal. Data relating to household level and individual level characteristics are collected using multi-stage purposive sampling method. At first stage, we divide twenty-three districts of West Bengal into three distinct geographical zones based on the triangular shape of the state; namely Northern, Western and Southern zones. Table 2.1 gives the decomposition of the districts across the three zones.

Table 4.3: Regional Distribution of Districts

North Zone	*West Zone*	*South Zone*
Alipurduar	Bankura	East Midnapore
Cooch Behar	Birbhum	Howrah
Dakshin Dinajpur (South Dinajpur)	Purulia	Hooghly
Darjeeling	West Midnapore	South-24 Parganas
Jalpaiguri	Paschim Burdwan	North -24 Parganas
Uttar Dinajpur (North Dinajpur)	Jhargram	Kolkata
Maldah	Purba Burdwan	Nadia
Kalimpong	-	-
Murshidabad	-	-

There are eight districts in the Northern and Western zones respectively, while the rest belongs to Southern Zone. In the 2nd stage, we select one district randomly from each zone. The chosen

districts in our survey are Cooch Behar, West Midnapore and South-24 Parganas. In the 3rd stage, we randomly choose two blocks from the rural sector of each elected district. In the 4th stage, we purposively select two Gram Panchayats (administrative village units) - one being the most developed and the other being the least developed based on male-female literacy gap for the year 2011 Census, Government of India. In the 5th stage, we employ systematic sampling in choosing five villages (from each Gram Panchayat) ensuring sufficient distance from one village to another. At the final stage, we randomly select 15 households from each chosen village. The inclusion restriction that we imposed was that all 2nd generation members must have completed their education. Thus, from one district, we have selected 300 (i.e., 1x2 x 2 x 5 x 15) households. Since we have three districts, the total household level sample size is 3 x 300=900. From each household we have collected individual level socio-demographic and educational attainment information of parents (father and mother) as well as all the children (both son and daughter). Here we have considered the head of the family if alive as the first generation and collected information on all the descendants (2nd generation) and spouse of the head of the household (mother of the descendants). Our sample consists of 2611 child-parent combinations. Due to some missing values in some of the variables, our regression analysis is based on 2310 child-parent combinations. We have used both individual and household level data. The variables that reflect individual level information are age, sex, years of schooling, received scholarship or not, used motorable road or not, received mid-day meal at school, went to government/private school, distance travelled to get primary level education, whether school had sanitation facility or not, information on father and mother's years of schooling, caste, religion, whether household belong to BPL category or not, district of residence are available at the household level. Table 4.4 provides the summary statistics of all variables used in our analysis.

Table 4.4: Summary Statistics

Variable	*Description*	*Mean*	*Standard Deviation*	*Min*	*Max*	*Number of Observations*
Child's years of schooling	Child's completed years of schooling (in years)	8.856	4.076	0	19	2611
Father's years of schooling	Father's completed years of schooling (in years)	4.235	4.097	0	17	2611
Mother's years of schooling	Mother's completed years of schooling (in years)	2.239	3.265	0	15	2611
Region (Reference group: North zone)	Takes value '1' for Cooch-Behar district of north of West Bengal and '0' otherwise	0.295	0.456	0	1	2611
South zone		0.370	0.483	0	1	2611
West zone	Takes value '1' for West Midnapore district of West Bengal and '0' otherwise	0.354	0.483	0	1	2611
Age	Child's age in years	35.386	12.789	16	70	2611
Sex:	Male or Female					
Male Child (Yes=1, No=0)	If male takes value '1' and if female takes value '0'	0.683	0.465	0	1	2611
Religion:	Hindu or Muslim					
Muslim (Yes=1, No=0)	=1 if Muslim =0 if Hindu	0.178	0.383	0	1	2611
Caste (Reference group: General caste)	Scheduled caste and Schedule tribes, Other backward caste, General caste					
Scheduled Caste& scheduled tribe (Yes=1, No=0)	=1 if belongs to schedule caste/scheduled tribe group =0 otherwise	0.480	0.499	0	1	2611
		0.012	0.111	0	1	2611
Other Backward Class (Yes=1, No=0)	=1 if belongs to other backward caste group =0 otherwise	0.137	0.344	0	1	2611
Non Below Poverty level (Yes=1, No=0)	=1 if household's monthly consumption expenditure is above poverty line =0 if household's monthly consumption expenditure is below poverty line	0.515	0.499	0	1	2594
Mid-Day Meal (Received=1, Not received=0)	=1 if the child is beneficiary of mid-day meal scheme =0 otherwise	0.324	0.468	0	1	2540
Motorable Road (Yes=1, No=0)	=1 if motorable road exit from the house =0 otherwise	0.656	0.475	0	1	2611
Sanitation facility in school (Yes=1, No=0)	=1 if primary school has proper sanitation facility =0 otherwise	0.832	0.373	0	1	2521
Scholarship received (Yes=1, No=0)	=1 if the child is a recipient of scholarship =0 otherwise	0.130	0.337	0	1	2540
Distance to primary school (in Kilometer)	Distance of primary school from the house in Kilometers	0.891	0.512	0.1	4	
School type (Pubic school=1, Private school=0)	=1 if studied in public school =0 if studied in private school	0.966	0.180	0	1	2611
Studied outside village (Yes=1, No=0)	=1 if migrated to other place for further study =0 otherwise	0.098	0.298	0	1	2397

4.2.2 Testable hypotheses

The hypotheses we intend to test are the following.

First, we consider the hypothesis that there is no strong association between parental educational attainment and child's years of schooling. If the association between father's/mother's years of schooling and children's years of schooling is positive and significant then we reject the null and we argue that it fits rather well with intergenerational immobility. The ordinary least square regression method is used for estimating the absolute and relative measures of mobility.

Secondly, we investigate how well the descendants' education level can be predicted from parental education level and policy variables. The ordered logistic regression method is used for this analysis. We further hypothesize that association of parental education level and children's education level varies across different socio-ethnic-economic-demographic and regional groups.

4.3 Empirical models and results

Few techniques were used by social scientists to understand the extent of change in economic outcome such as occupation, education etc. between two generations at two-time points across social groups. In this chapter, we estimate intergenerational educational mobility based on two widely used methodology used in the literature - transition matrices and intergenerational regression. In empirical econometric investigations, transition matrices are frequently used to quantify time dependency immobility in aggregated data. This matrix is useful to quantify the persistence prevailing between two generations from one education category to another. Then, we focus to Altham metric analysis which allows us to measure how the degree of association between row and column in a matrix differs from the row column association in another matrix. But, Altham metric failed to include exhaustive set of independent variables. Secondly, we use multivariate regression technique to check whether immobility is dependent on time or not. To make the empirical results comparable to the existing literature, we estimate intergenerational educational mobility in a widely standardized conceptual framework using two regression method[96]. The first approach investigates the intergenerational educational persistence and standardized persistence for the whole sample. We control for different socio-economic-demographic variables namely:

[96] See Azam and Bhatt (2015), Hertz et al. (2007), Emran and Shilpi (2015) and Arnaud, Fumiaki and Takashi (2012) for regression and correlation coefficient. See Long and Ferrie(2013), Altham and Ferrie(2007) and Lodh et al. (2012) for Altham metric. Following Leone (2021)

age, poverty status, caste, religion, as well as policy variables such as mid-day meal, scholarship, and public infrastructure related variables such as motorable roads, sanitation in school, distance of primary school from home etc. The second regression approach used in this chapter identifies the importance of different socio-economic-demographic and geographical factors in explaining vertical immobility other than parents' years of schooling[97].

4.3.1 Education transition matrix

In this section, we focus the vertical intergenerational educational mobility between children and highly educated parents using transition matrix analysis. First, we determine which parent has the highest level of education based on the maximum number of years of either the mother's or the father's education. The years of education for both the children and the parents were then divided into four groups: no primary certificate, primary certificate, secondary certificate, and tertiary certificate. One can assume that children of less educated parents may be able to pursue higher education, suggesting vertical mobility. Alternately, it is not socially desirable for children to receive a lower level of education than their parents. Such a situation may vary across other social groups. In this section, we examine the degree of educational vertical mobility conditional on a different educational level of parents. We calculate transition matrices that display how children-parent pairs are changing across different education levels [no primary certificate (or illiteracy and below primary level of education), primary certificate (or primary to below secondary education level), secondary certificate (secondary to below graduation education level), graduation certificate (graduate and above education level).

We generate a 4×4 transition matrix(P) when the educational outcomes of the two generations are crossed. Then we calculate P_{ij} (**(P_{ij} = ({child education category=j / Parents education category=i}))** where i represents the different education levels of parents and j represents the different education levels of the child. Then we calculate $P_{ij} = N_{ij} / \sum_{j=0}^{3} N_{ij}$, where N_{ij} = Cell count and $\sum_{j=0}^{3} N_{ij}$ =Row total. So P_{ij} means the probability of a parents with different level education categories i having a child with different education categories j. Lower-level vertical mobility is indicated by higher values for diagonal terms, whereas a higher level of mobility is

[97] We have used the multivariate ordered logit regression technique to investigate the gap in intergenerational upward mobility for full sample and across socio-economic group.

indicated by larger values for off-diagonal terms. We can simply explain the probability that a child would achieve higher level of education when their parent's education falls into the lowest category of educational distribution using a simple transition matrix analysis, which is also known as bottom-to-top probability.

Table 4.5 presents the results of the transition matrix for the whole sample and results of other social groups derived using transition matrix are presented in Appendix table 4.A. In the table 4.5, we plot parent's education categories along the row while the column indicates the education categories of children. The results of transition matrices shown in table 4.5 highlights a strong intergenerational educational persistence in West Bengal. Around 71.8% of children whose parents have completed tertiary education are likely to attain university degree. The same chance for offspring from parents with only a primary education falls to 13.5%. These prospects are significantly worse for children whose parents have no primary certificate. Across all sub-groups, including sex, caste, religion, region, and poverty, we find that illiterate parents are more likely to have illiterate children, and while parents with tertiary education are more likely to have children who complete tertiary education.

Table 4.5: Intergenerational Transitional Probabilities, West Bengal

		Children's Education				
Level of Education		Illiteracy and below primary	Primary	Secondary	Tertiary	Size
Parent's Education	Illiteracy and below primary	0.339	0.375	0.246	0.038	0.599
	Primary	0.100	0.330	0.434	0.135	0.263
	Secondary	0.034	0.191	0.430	0.344	0.112
	Tertiary	-	0.015	0.265	0.718	0.024

i) Each cell ij presents the average probability of parents with education level i having a child with education attainment level of child j.

ii) Column titled "size" reports the fraction of parents in each education category.

4.3.2 Educational Persistence using Altham Metric: By Caste and Gender

We have presented Altham metric results across caste and gender in table 4.6. The findings imply that compared to General and OBC parent-children combination, SC/ST parent-children combination exhibit lower row-column association in different education levels. Significant mobility is observed among SC/ST children compared to other caste groups. We do not find any

significant difference in row-column association between OBC parent-children and general parent-children combinations. We also do not observe any significant gender difference in row-column association.

Table 4.6 Altham Metric Results: By Caste and Gender

	d (P,I)	G^2	d (Q,I)	G^2	d (P,Q)	G^2	di (P,Q)	G^2
OBC Parents-Child Combination (P) vs. General Parents-Child Combination (Q)	29.23	136.38***	30.36	297.83***	11.91	5.60	9.03	3.43
SC/ST Parents-Child Combination (P) vs. General Parents-Child Combination (Q)	20.08	180.80***	30.36	297.83***	14.80	32.90***	12.50	27.34***
SC/ST Parents-Child Combination (P) vs. OBC Parents-Child Combination (Q)	20.08	180.80***	29.23	136.38***	19.49	25.76**	17.56	22.69***
Parents-Female Child Combination (P) vs. Parents-Male Child Combination (Q)	27.28	233.22***	27.67	417.57***	8.51	7.22	7.57	6.36

Note: G2 is given in the parentheses, Significance levels for the likelihood ratio Chi-squared statistic G2 (df 9 for d(P,I), d Q(,I) and d(P, Q)); and df is 5 for di(P,Q)
Source: Author's own calculation
***significant at 1 percent level, ** significant at 5 percent level, *Significant at 10 percent level

4.3.3 Educational Mobility Using Altham Metric by Policy Variables

In table 4.7, we focus on the effect of policy variables on the mobility using Altham metric analysis. The results suggest that the degree of association in different levels of education between parent and children is significantly lower for children who received scholarships, midday meal and motorable road at the time of their schooling than for those who did not benefit from such government policy. Significant mobility is seen among scholarships, midday meal and motorable road recipients. But, sanitation and distance of school do not change row column association between two tables.

Table 4.7 Altham Metric Results: Educational Mobility by Policy Variables

	d (P,I)	G^2	d (Q,I)	G^2	d (P,Q)	G^2	di (P,Q)	G^2
Parents-Child Combination if Child Receive Scholarship-No (P) vs. Parents-Child Combination if Child Receive Scholarship-Yes (Q)	28.66	539.05 ***	20.88	75.40 ***	27.67	21.48 **	18.71	11.10 *
Parents-Child Combination if Child Receive Mid-Day Meal-No (P) vs. Parents-Child Combination if Child Receive Mid-Day Meal-Yes (Q)	28.24	350.86 ***	26.09	197.94 ***	14.97	16.99 **	12.95	12.34 **
Parents-Child Combination if Child Receive Sanitation-No (P) vs. Parents-Child Combination if Child Receive Sanitation-Yes (Q)	26.74	72.77 ***	23.91	464.43 ***	12.43	6.08	5.83	1.07
Parents-Child Combination if Child Receive Motorable Road-No (P) vs. Parents-Child Combination if Child Receive Motorable Road-Yes (Q)	34.16	111.45 ***	26.72	1591.83 ***	16.79	184.01 ***	14.72	20.78 ***
Parents-Child Combination if Child's School Distance>1km (P) vs. Parents-Child Combination if Child's School Distance=<1km (Q)	27.72	87.04 ***	26.54	554.02 ***	12.82	12.80	8.79	2.26

Note: G2 is given in the parentheses, Significance levels for the likelihood ratio Chi-squared statistic G2 (df 9 for d(P,I), d Q(,I) and d(P, Q)); and df is 5 for di(P,Q)
Source: Author's own calculation
***significant at 1 percent level, ** significant at 5 percent level, *Significant at 10 percent level

4.3.4 Intergenerational educational persistence

The estimation of intergenerational educational persistence is based on the following empirical models:

(1) $Years\ of\ Schooling_i = \beta_0 + \beta_F Father's\ years\ of\ schooling_i + \beta_M Mother's\ years\ of\ schooling_i + \gamma X + e_i$

(2) $\frac{Years\ of\ Schooling_i}{\sigma_c} = \delta + \delta_F \frac{Fathe\ 'syearsofscho\ \ \ \ _i}{\sigma_F} + \delta_M \frac{Mother'syearsofschooling_i}{\sigma_M} + \lambda X + \varepsilon_i$

, where X is the vector of other control variables.

$$X=\begin{bmatrix} SCST\ Dummy \\ OBC\ dummy \\ Muslim\ Dummy \\ South\ zone\ dummy \\ West\ zone\ dummy \\ BPL\ dummy \\ Age \\ Mid-day\ meal\ dummy \\ Motorable\ road\ dummy \\ Scholarship\ dummy \\ Distance\ to\ primary\ school \\ Sanitation\ facility\ in\ school \\ School\ type\ dummy \\ place\ of\ education\ dummy \end{bmatrix}$$[98]

The coefficients β_F *and* β_M indicate the degree of association of educational attainment of father (F) and child and that of mother (M) and child respectively. This is termed as *intergenerational education coefficient*(β_j). A low β_j will denote high mobility and a high $\beta_j$will denote low mobility. Therefore, *(1 –*β_j*)* measures the degree of intergenerational educational mobility. A child is considered to be mobile when parents' education has less impact on the child's years of schooling. Thus, higher value of β indicates child's education is highly influenced by parent's years of schooling and if its value is equal to zero that means child's education is totally independent and perfectly mobile. The intergenerational educational mobility parameter $\hat{\beta}$ can be expressed as $\hat{\beta} = \rho_{cp}\frac{\sigma_c}{\sigma_p}$ where $\sigma_c$and $\sigma_p$are the standard deviations of child and parents' years of schooling respectively and ρ_{cp} is the correlation coefficient between child's and parents' years of schooling. In our model p is equal to F or M. Now, $\hat{\beta}$ may increase (decrease) if the dispersion of child's years of schooling relative to the dispersion of parents' years of schooling increases (decreases). Thus, $\hat{\beta}$ is the relative measure of mobility.

The absolute measure of mobility can be estimated by regressing the transformed model (2) where we have normalized the child's and parents' years of schooling by their corresponding standard deviations. The coefficient δ_F or δ_M in (2) simply measures the correlation coefficient between child and father's years of schooling or child and mother's years of schooling of the transformed model and thus indicate the absolute measure of intergenerational mobility from one generation to the other.

[98] It indicates whether the student has migrated to other place for education or not.

The intergenerational educational association has been estimated by using the heteroscedasticity corrected ordinary least square (OLS) regression technique. The ordinary least square method results in estimates that approximate mean of continuous dependent variable given certain values of the independent variables. We begin the empirical analysis by focusing on intergenerational association in the data. We regress years of schooling of the i^{th} child on years of schooling of father and mother of i^{th} child and other control variables. In this chapter, we have estimated both relative and absolute measures of mobility.

The effect of household income differences in this chapter is captured by poverty status, a dummy variable which takes the value one if monthly per capita consumer expenditure (MPCE) of the household is below poverty line, and thus the coefficient associated with the BPL variable indicates how being poor affects achievement levels. Other than these variables we have also introduced gender variable in our model. To our knowledge this is one of the first research that highlights gender gap in intergenerational mobility. We have also considered different religious groups (Hindu and Muslim) as well as caste dummies (SC/ST/OBC/General) in this chapter. This chapter also considers different policy related variables and thus provides an insight into what role government can play in reducing intergenerational educational persistence.

The results are presented in Table 3.2. The empirical analysis indicates that in West Bengal there is a strong association between parents' and child's educational attainment in both relative and absolute terms. The 2^{nd} generation's educational attainment increases more with the increase in father's educational attainment compared to mother's educational attainment. This result is consistent with Leone (2021) who also identified strong association between children's years of schooling and most educated parents in Brazil. We observe that the effect of fathers' years of schooling on child's education is more or less same. The sample data reveals that variation in child's years of schooling is more than the variation in mother's years of schooling and this results in higher absolute measure of mobility compared to relative measure with respect to mother's educational attainment. Now, as we include household and individual specific characteristics we find that the association between child's educational attainment with respect to father and mother falls by 22.8% and 20.8% respectively. Next, inclusion of other control variables like public policy

results in further reduction in association between child's and father's years of schooling and child's and mother's years of schooling by 23% and 12.9% respectively. Lastly, as we add the place (of education) dummy we observe that association between mother and child's education decreases further by 6.8% and that between child and father falls by 15.6%. In non-standardized model, we estimate $\left(\hat{\beta}_F, \hat{\beta}_M\right) \equiv (0.156, 0.188)$, i.e in relative terms child's education is more associated with mother's education compared to father's education.

Let us now look into the effects of control variables like age, gender, economic status etc. Age is considered here as a proxy of time. We find that age has a negative influence on years of schooling, i.e., on average the years of schooling have increased for the younger generation. We also identify that household poverty status plays a noteworthy role in child's education. Average years of schooling is found to be significantly higher in individuals belonging to households above poverty line. Both in absolute and relative terms gender disparity in mean years of schooling exists in West Bengal. In absolute terms, mean years of schooling is 0.269 years higher among the sons compared to daughters. In the absence of sufficient data on ST individuals we have combined SC and ST groups and observed that in backward castes like SC and ST mean education level is lower than general caste group but no significant difference in mean years of schooling is identified in other backward class (OBC) group and general caste group. Muslims have reported fewer average years of schooling than Hindus. No significant difference is observed between average years of schooling of north zone and south zone. West Midnapore i.e., the western region recorded lowest years of schooling. All the policy variables considered play a positive and significant role in child's years of schooling.

Table 4.8: Regression result: Relative and absolute mobility

	Child Years of Schooling Without Standardization (Relative)					*Child Years of Schooling With Standardization (Absolute)*				
	Model1	Model2	Model3	Model4	Model5	Model6	Model7	Model8	Model9	Model10
Father's years of schooling (β_F)	0.355***	0.274***	0.239***	0.184***	0.156***					
	(0.025)	(0.023)	(0.023)	(0.020)	(0.020)					
Mother's years of schooling(β_M)	0.293***	0.232***	0.232***	0.202***	0.188***					
	(0.029)	(0.027)	(0.027)	(0.025)	(0.024)					
Father's years of schooling(δ_F)						0.357***	0.276***	0.241***	0.185***	0.157***
						(0.025)	(0.024)	(0.023)	(0.020)	(0.020)
Mother 's years of schooling(δ_M)						0.235***	0.186***	0.185***	0.161***	0.150***
						(0.023)	(0.022)	(0.021)	(0.020)	(0.019)
Age		-0.091***	-0.058***	-0.053***	-0.054***		-0.023***	-0.014***	-0.013***	-0.013***
		(0.006)	(0.007)	(0.007)	(0.007)		(0.002)	(0.001)	(0.001)	(0.001)
Sex: Male Child (Yes=1, No=0)		1.735***	1.614***	1.120***	1.099***		0.426***	0.396***	0.274***	0.269***
		(0.154)	(0.153)	(0.137)	(0.136)		(0.038)	(0.037)	(0.033)	(0.033)
Region (Reference group: North zone)										
South zone		-0.112	0.008	-0.352	0.130		-0.028	.002	-.086	.031
		(.206)	(.239)	(.228)	(.231)		(.051)	(.058)	(.056)	(.056)
West zone		-1.058***	-1.148***	-1.309***	-0.730***		-0.260***	-0.281***	-0.321***	-0.179***
		(0.189)	(0.188)	(0.186)	(0.195)		(0.046)	(0.046)	(0.045)	(0.047)
Religion: Muslim		-2.103***	-2.112***	-1.386***	-1.188***		-0.516***	-0.518***	-0.339***	-0.291***
		(0.269)	(0.265)	(0.234)	(0.231)		(0.066)	(0.065)	(0.057)	(0.056)
Caste: SC/ST		-1.574***	-1.250***	-1.119***	-1.159***		-0.386***	-0.306***	-0.274***	-0.284***
		(0.203)	(0.206)	(0.196)	(0.195)		(0.050)	(0.050)	(0.048)	(0.048)
OBC		.073	.039	.056	-.078		0.018	.009	.013	-.019
		(.276)	(.270)	(.234)	(.229)		(.068)	(.066)	(.057)	(.056)
Below Poverty level (Yes=1, No=0)		1.016***	0.720***	0.422***	0.323**		0.249***	0.176***	0.103***	.079**
		(0.176)	(0.178)	(0.156)	(0.154)		(0.043)	(0.043)	(0.038)	(0.037)
Mid-Day Meal (Received=1, Not received=0)			0.763***	0.480***	0.379**			0.187***	0.117***	0.093**
			(0.194)	(0.176)	(0.173)			(0.047)	(0.043)	(0.042)
Sanitation facility in school (Yes=1, No=0)			0.773***	1.014***	0.930***			0.189***	0.248***	0.228***
			(0.227)	(0.204)	(0.200)			(0.055)	(0.050)	(0.049)
Motorable Road (Yes=1, No=0)			0.859***	0.568***	0.554***			0.210***	0.139***	0.136***
			(0.190)	(0.172)	(0.173)			(0.046)	(0.042)	(0.042)
Scholarship received (Yes=1, No=0)				1.870***	1.909***				0.458***	0.468***
				(0.213)	(0.205)				(0.052)	(0.050)
Distance to primary school (in Kilometer)				-1.827***	-1.592***				-0.448***	-0.390***
				(0.156)	(0.156)				(0.038)	(0.038)
School type (Pubic school=1, Private school=0)				3.287***	3.549***				0.806***	0.870***
				(0.530)	(0.511)				(0.130)	(0.125)
Studied outside village (Yes=1, No=0)					2.146***					0.526***
					(0.254)					(0.062)
Constant	6.113***	9.760***	7.449***	6.750***	6.067***	1.499***	2.394***	1.827***	1.655***	1.488***
	(0.117)	(0.375)	(0.479)	(0.686)	(0.671)	(0.028)	(0.092)	(0.117)	(0.168)	(0.164)
R^2	0.225	0.356	0.368	0.434	0.452	0.225	0.356	0.368	0.434	0.452

Note: Robust standard errors are reported in parentheses. ***, ** and * indicate significance at 1%, 5% and 10% respectively.
Source: Author's own calculation

4.3.5 *Intergenerational vertical educational mobility*

Social hierarchal position distinguished in terms of educational achievement often plays a major role in shaping income distribution, since higher education level is a prerequisite for high income jobs. Therefore, examining educational distribution of people becomes an important issue.

Asher, Novosad, and Rafkin (2021) examined the intergenerational upward mobility in India applying bottom half technique using IHDS and Socio Economic Caste Census (SECC) data. Leone (2021) on the other hand used the multivariate ordered logit technique to explain the gender gap in intergenerational mobility in Brazil. Following Leone (2021), we have used the multivariate ordered logit methodology to investigate the reasons behind the gap in intergenerational upward educational mobility across different regions/castes/religions/genders/income groups. As in Leone (2021) we have classified children and parents into four educational classes, j (0,1,2,3), j=0: no primary certificate (or illiteracy and below primary level of education), j=1 primary certificate (or primary to below secondary education level), j=2 secondary certificate (secondary to below graduation education level), j=3 graduation certificate (graduate and above education level). In this model, the probability of the child i to attain any of the four educational categories j is basically dependent on parental education. In addition, the estimated model depends on other control variables as described in table 3.3. Therefore, the econometric model used for estimation takes the following form:

$$\Pr\left(C_i^{Education\ Level} = j\right) = f\left(\begin{matrix}\alpha Father's\ years of\ schooling + \beta Mother's\ years of\ schooling + \gamma age \\ + \theta(vector of\ policy\ \text{var}iables) + \delta(set of\ group dummies)\end{matrix}\right) \quad (3)$$

Note that the children from fathers with a tertiary education have ceteris paribus a 15.3 percent lower chance of attaining no school and 18.9 percent more chances of achieving a graduate degree and above, compared to the reference group (fathers without education). Having a mother with a primary education, instead of no primary education, decreases the chance of the child to remain illiterate by 4.4 percent and increases the probability of tertiary education by 2.9 percent. For all four education levels of the child, the estimated marginal effects show the expected signs and thus indicate that the education level of the children increases with the increase in the education level of parents. If mother is at least secondary level educated, then the chances of descendants to attain tertiary level of education is higher compared to the descendants of father with at least secondary

education. Again, son is more likely to have tertiary certificate compared to daughter. Chances of getting tertiary level of education, is higher among the descendants of Hindu families, non-BPL families and non-SC-ST families. No regional variation is observed in vertical educational mobility.

In the context of policy variables, we observe that the probability of being illiterate or having below primary and primary level of education decreases if the 2nd generation child receive benefit of mid-day meal or scholarship. On the other hand, all these policy variables have a significant positive impact on the probability of reaching secondary or tertiary level of education by the descendants. Comparing all the included control variables we find the probability of reaching tertiary level of education is more associated with parental education than any other control variables.

Table 4.9: Marginal Effects for the Ordered Logit Estimations

Variables	*Children Education*			
	Illiteracy& below primary	Primary	Secondary	Tertiary
Parental Education				
Father, Illiteracy& below primary (reference)	-	-	-	-
Father, Primary	-0.078***	-0.056***	0.085***	0.049***
	(0.010)	(0.009)	(0.011)	(0.007)
Father, Secondary	-0.090***	-0.070***	0.099***	0.061***
	(0.014)	(0.016)	(0.017)	(0.013)
Father, Tertiary	-0.153***	-0.195***	0.160***	0.189***
	(0.015)	(0.038)	(0.011)	(0.051)
Mother Education				
Mother, Illiteracy& below primary (reference)	-	-	-	-
Mother, Primary	-0.044***	-0.031**	0.046***	0.029***
	(0.014)	(0.012)	(0.016)	(0.010)
Mother, Secondary	-0.098***	-0.101***	0.106***	0.092***
	(0.015)	(0.027)	(0.017)	(0.026)
Mother, Tertiary	-0.138***	-0.193**	0.125***	0.206*
	(0.026)	(0.078)	(0.018)	(0.119)
Age	0.003***	0.002***	-0.003***	-0.002***
	(0.0005)	(0.0003)	(0.0005)	(0.0003)
Sex				
Male Child (Yes=1, No=0)	-0.061***	-0.033***	0.060***	0.034***
	(0.010)	(0.005)	(0.009)	(0.005)
Region(Reference group: North zone)				
South zone	-0.012	-0.007	0.012	0.007
	(0.016)	(0.009)	(0.016)	(0.010)
West zone	0.017	0.008	-0.016	-0.009
	(0.014)	(0.007)	(0.014)	(0.007)
Religion:				
Muslim	0.094***	0.032***	-0.082***	-0.044***
	(0.021)	(0.004)	(0.016)	(0.008)
Caste:				
SC/ST	0.087***	0.047***	-0.085***	-0.049***
	(0.014)	(0.008)	(0.014)	(0.008)
OBC	0.007	0.004	-0.007	-0.004
	(0.017)	(0.008)	(0.017)	(0.010)
Below Poverty level (Yes=0, No=1)	-0.024**	-0.013**	0.023**	0.013**
	(0.011)	(0.006)	(0.011)	(0.006)
Mid-Day Meal (Received=1, Not received=0)	-0.035***	-0.019***	0.034***	0.020***
	(0.012)	(0.006)	(0.012)	(0.007)
Sanitation facility in school (Yes=1, No=0)	-0.042***	-0.023***	0.041***	0.024***
	(0.014)	(0.008)	(0.014)	(0.008)
Motorable Road (Yes=1, No=0)	-0.037***	-0.020***	0.037***	0.021***
	(0.012)	(0.006)	(0.011)	(0.007)
Scholarship received (Yes=1, No=0)	-0.143***	-0.078***	0.140***	0.081***
	(0.016)	(0.009)	(0.015)	(0.009)
Distance to primary school (in Kilometer)	0.135***	0.073***	-0.132***	-0.076***
	(0.012)	(0.007)	(0.010)	(0.008)
School type (Pubic school=1, Private school=0)	-0.191***	-0.104***	0.187***	0.108***
	(0.038)	(0.022)	(0.037)	(0.022)
Studied outside village (Yes=1, No=0)	-0.228***	-0.124***	0.223***	0.129***
	(0.025)	(0.015)	(0.027)	(0.012)

Source: Authors' own calculation

Note: All predictors at their mean values, **p < 0.05, *p < 0.01, * * *p < 0.001.

4.4. Disaggregated analysis

In this chapter we also examine how descendant's education level can be predicted by parental education category across individuals by all relevant variables selected. This will help us in identifying the group where the probability of 2nd generation to reach tertiary level is more dependent on parent's tertiary level of education. We use the same ordered logit methodology as in the previous section. Table 3.4 below represents marginal effects over different groups.

4.4.1 Caste discrimination

There is wide spread variation in upward educational mobility between classes. The chances of descendants to attain tertiary education is higher among general caste compared to other castes (SC&ST/OBC). If SC and ST mothers reach secondary education, then the chances of reaching tertiary education of the ward is higher. So, enhancing the education level of SC-ST girls will have a long term impact on the future generation. Disaggregated analysis reveals that child's tertiary level educational attainment among OBC group is not influenced by mother's educational attainment levels at all. While father's secondary level education affects the chances of attaining tertiary level by the ward, the tertiary level achieved by the father is not much relevant. Mobility is observed within the OBC sub-group only.

4.4.2 Religious diversity

Descendants of Muslim households are less likely to reach tertiary education compared to the descendants of Hindu households. It is observed that among the Muslim families the probability of children reaching secondary level or tertiary level is higher if father reaches secondary education level. Again if mother is secondary level educated then probability of reaching secondary and tertiary education by the child is higher. We also find that Hindu child's educational status is dependent on parents' specifically mother's educational status. Thus, diversity in mobility is observed across the religious groups.

4.4.3 Gender disparity

We observe gender disparity in parental impact on son's /daughter's educational attainment. Our sample data reveals that it is more likely that the son/daughter will reach tertiary level if their parents have also reached the tertiary level of education. Such predicted probability can be explained more from the mother's side than the father's. For highly educated parents we observe

that the cross-pair effect dominates. That is impact of mother on son is stronger than that on daughter and impact of father on daughter is stronger than that on son.

4.4.4 Income difference

To capture the income difference in our sample data we have divided the entire sample into two sub-groups, namely below poverty line and above poverty line households[99]. We find that probability of attaining tertiary level of education of the ward is higher if father belongs to tertiary level in comparison with the reference group for non-BPL households. For the BPL households it is more likely that the descendants will reach tertiary level if mother belongs to tertiary level in comparison to the reference group. Thus, educational achievements vary with the poverty status/ income status.

4.4.5 Regional variation

Ray and Majumder (2010), Azam and Bhatt (2015) , Asadullah and Yalonetzky (2012), Kishan (2018) discussed the regional variations in intergenerational educational mobility in India. We also observed regional variation in mobility within West Bengal. In the previous section we have identified that the performance of western region (or West Midnapore district) is worst.

While probabilities of descendants' educational level is independent of southern and western region of West Bengal for fathers having secondary education, the same does not hold for descendants reaching the tertiary level[100]. This indicates mobility, which is not observed in the case of maternal education for the same zones. In north zone (or Cooch Behar district) impact of parents who have attained the tertiary level is very strong on chances children attaining high education level (secondary or tertiary).

[99] BPL information was collected for the time period when son was in school/college/universities.
[100] The comparison is made with respect to fathers having secondary education compared to the below primary level in the first case and tertiary level in the second case.

Table 4.10: ***Parental impact on vertical educational mobility of children: A disaggregated analysis***

Variables	*Children Education: By Sex*							
	Male Children				Female Children			
	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Father, Illiteracy& below primary (reference)								
Father, Primary	-0.112***	-0.034***	0.106***	0.040***	-0.064***	-0.068***	0.079***	0.052***
	(0.023)	(0.011)	(0.024)	(0.009)	(0.010)	(0.013)	(0.014)	(0.010)
Father, Secondary	-0.139***	-0.055**	0.137***	0.057***	-0.075***	-0.087***	0.094***	0.067***
	(0.031)	(0.024)	(0.036)	(0.018)	(0.014)	(0.022)	(0.019)	(0.017)
Father, Tertiary	-0.216***	-0.165**	0.226***	0.155**	-0.199***	-0.196***	0.136***	0.197***
	(0.037)	(0.075)	(0.036)	(0.080)	(0.016)	(0.046)	(0.012)	(0.060)
Mother Education								
Mother, Illiteracy& below primary (reference)								
Mother, Primary	-0.064**	-0.022	0.061**	0.026*	-0.044***	-0.047***	0.053**	0.038***
	(0.030)	(0.016)	(0.031)	(0.014)	(0.013)	(0.018)	(0.017)	(0.014)
Mother, Secondary	-0.173***	-0.135***	0.175***	0.132***	-0.072***	-0.096***	0.088***	0.081***
	(0.029)	(0.048)	(0.029)	(0.050)	(0.016)	(0.032)	(0.019)	(0.029)
Mother, Tertiary	-0.245***	-0.365***	-0.318***	0.929***	-0.123***	-0.247***	0.075	0.295**
	(0.014)	(0.017)	(0.015)	(0.009)	(0.016)	(0.067)	(0.068)	(0.148)
Variables	Children Education: By BPL							
	BPL: Yes				BPL: No			
	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Father, Illiteracy& below primary (reference)								
Father, Primary	-0.053***	-0.022***	0.053***	0.021***	-0.096***	-0.070***	0.095***	0.070***
	(0.020)	(0.008)	(0.019)	(0.008)	(0.014)	(0.009)	(0.013)	(0.010)
Father, Secondary	-0.087***	-0.036***	0.088***	0.035***	-0.106***	-0.078***	0.106***	0.078***
	(0.029)	(0.012)	(0.029)	(0.012)	(0.022)	(0.015)	(0.021)	(0.016)
Father, Tertiary	-0.241***	-0.100***	0.242***	0.099***	-0.226***	-0.166***	0.226***	0.166***
	(0.078)	(0.033)	(0.078)	(0.032)	(0.052)	(0.040)	(0.052)	(0.038)
Mother Education								
Mother, Illiteracy& below primary (reference)								
Mother, Primary	-0.074***	-0.031***	0.075***	0.030***	-0.042**	-0.031**	0.042**	0.031**
	(0.027)	(0.011)	(0.027)	(0.011)	(0.019)	(0.014)	(0.018)	(0.014)
Mother, Secondary	-0.077*	-0.032*	0.077*	0.031*	-0.155***	-0.113***	0.155***	0.114***
	(0.045)	(0.018)	(0.045)	(0.018)	(0.036)	(0.026)	(0.036)	(0.026)
Mother, Tertiary	-0.481***	-0.200***	0.484***	0.197***	-0.226**	-0.165***	0.225***	0.166***
	(0.147)	(0.063)	(0.150)	(0.057)	(0.110)	(0.081)	(0.111)	(0.080)
Variables	Children Education: By Religion							
	Hindu Children				Muslim Children			
	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Father, Illiteracy& below primary (reference)								
Father, Primary	-0.091***	-0.064***	0.093***	0.062***	-0.031	-0.025	0.047	0.009
	(0.011)	(0.010)	(0.012)	(0.009)	(0.026)	(0.023)	(0.041)	(0.008)
Father, Secondary	-0.088***	-0.061***	0.090***	0.060***	-0.124***	-0.214***	0.245***	0.093***
	(0.016)	(0.016)	(0.018)	(0.014)	(0.022)	(0.053)	(0.043)	(0.033)
Father, Tertiary	-0.161***	-0.199***	0.150***	0.209***	-0.144***	-0.299***	0.251***	0.193**

	(0.017)	(0.047)	(0.013)	(0.067)	(0.022)	(0.057)	(0.044)	(0.096)
Mother Education								
Mother, Illiteracy& below primary (reference)								
Mother, Primary	-0.051*** (0.015)	-0.036** (0.014)	0.051*** (0.017)	0.036*** (0.013)	-0.054** (0.027)	-0.056 (0.036)	0.087* (0.049)	0.022 (0.013)
Mother, Secondary	-0.111*** (0.016)	-0.119*** (0.030)	0.110*** (0.014)	0.120*** (0.033)	-0.085*** (0.032)	-0.109* (0.065)	0.149** (0.068)	0.045 (0.028)
Mother, Tertiary	-0.158*** (0.016)	-0.247*** (0.061)	0.079 (0.065)	0.326** (0.141)	-	-	-	-
	Children Education: By Caste							
	General Children				OBC Children			SC/ST Children
	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Father, Illiteracy& below primary (reference)												
Father, Primary	-0.084*** (0.015)	-0.102*** (0.019)	0.120*** (0.021)	0.067*** (0.012)	-0.042* (0.025)	-0.043 (0.028)	0.066 (0.041)	0.020 (0.012)	-0.064*** (0.016)	-0.031*** (0.010)	0.058*** (0.015)	0.037*** (0.010)
Father, Secondary	-0.103*** (0.018)	-0.148*** (0.032)	0.151*** (0.025)	0.100*** (0.024)	-0.097*** (0.026)	-0.162** (0.065)	0.188*** (0.059)	0.072** (0.033)	-0.043* (0.026)	-0.018 (0.014)	0.039 (0.024)	0.023 (0.015)
Father, Tertiary	-0.130*** (0.019)	-0.237*** (0.051)	0.170*** (0.022)	0.196*** (0.076)	-0.124*** (0.024)	-0.269*** (0.084)	0.235*** (0.041)	0.158 (0.107)	-0.167*** (0.030)	-0.157** (0.061)	0.136*** (0.015)	0.189** (0.087)
Mother Education												
Mother, Illiteracy& below primary (reference)												
Mother, Primary	-0.028* (0.016)	-0.035 (0.024)	0.039 (0.024)	0.024 (0.016)	-0.040 (0.028)	-0.043 (0.040)	0.065 (0.052)	0.019 (0.016)	-0.063*** (0.023)	-0.033** (0.017)	0.057** (0.022)	0.039** (0.018)
Mother, Secondary	-0.067*** (0.020)	-0.109** (0.021)	0.093*** (0.027)	0.083** (0.045)	-0.071** (0.031)	-0.100 (0.069)	0.128* (0.071)	0.043 (0.029)	-0.142*** (0.024)	-0.123*** (0.038)	0.122*** (0.016)	0.144*** (0.048)
Mother, Tertiary	-0.096*** (0.019)	-0.202*** (0.070)	0.099*** (0.038)	0.199 (0.123)	-	-	-	-	-	-	-	-
	Children Education: By Region											
	Cooch Behar				South 24 Parganas				West Medinipur			
	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary	Illiteracy& below primary	Primary	Secondary	Tertiary
	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4	Model-1	Model-2	Model-3	Model-4
Father, Illiteracy& below primary (reference)												
Father, Primary	-0.061*** (0.017)	-0.062*** (0.016)	0.077*** (0.019)	0.046*** (0.013)	-0.060*** (0.017)	-0.041*** (0.011)	0.058*** (0.016)	0.043*** (0.012)	-0.089*** (0.023)	-0.033*** (0.008)	0.101*** (0.025)	0.021*** (0.006)
Father, Secondary	-.0160*** (0.030)	-0.164*** (0.027)	0.203*** (0.036)	0.121*** (0.019)	-0.045 (0.030)	-0.030 (0.021)	0.043 (0.029)	0.032 (0.022)	-0.023 (0.044)	-0.008 (0.016)	0.026 (0.049)	0.005 (0.010)
Father, Tertiary	-0.171*** (0.059)	-0.175*** (0.058)	0.217*** (0.074)	0.129*** (0.042)	-0.164*** (0.052)	-0.112*** (0.035)	0.158*** (0.050)	0.118*** (0.037)	-3.558*** (0.247)	-1.341*** (0.207)	4.037*** (0.281)	0.862*** (0.126)
Mother Education												
Mother, Illiteracy & below primary (reference)												

Mother, Primary	0.033	0.034	-0.042	-0.025	-0.039 *	-0.027 *	0.038 *	0.028 *	-0.123 ***	-0.046 ***	0.140 ***	0.029 ***
	(0.021)	(0.022)	(0.027)	(0.016)	(0.022)	(0.015)	(0.021)	(0.016)	(0.041)	(0.015)	(0.045)	(0.010)
Mother, Secondary	-0.065 *	-0.066 *	0.082 *	0.049 *	-0.156 ***	-0.107** *	0.151 ***	0.113 ***	-0.171 ***	-0.064 ***	0.194 ***	0.041 ***
	(0.037)	(0.037)	(0.047)	(0.027)	(0.049)	(0.033)	(0.047)	(0.034)	(0.057)	(0.021)	(0.065)	(0.013)
Mother, Tertiary	-0.640 ***	-0.654 ***	0.811 ***	0.483 ***	-0.232 **	-0.159 **	0.224 **	0.167 **	-	-	-	-
	(0.091)	(0.089)	(0.102)	(0.071)	(0.098)	(0.068)	(0.097)	(0.068)				

Note: Table reports only the coefficient associated with the parental education of the full regression model (equation 3), ***, ** and * indicate significance at 1%, 5% and 10% respectively.
Source: s Author's own calculation.

4.5 Conclusion

Using the data available from a primary survey in selected districts of West Bengal, the chapter investigates intergenerational transmission of educational attainment between parents and their children (both sons and daughters). Like Kishan (2018), Ray & Majumder (2010) we also find that the intergenerational persistence in education is high. Our study corroborates Azam and Bhatt's (2012) findings that son of less educated fathers are more probable to reach greater education than their fathers. But unlike them we find that the probability of reaching tertiary level of education by the sons of the highly educated father is also very high. We have also tried to explore the extent of intergenerational persistence across religion, caste and gender. Our analysis show that Hindus are more mobile compared to Muslims. While existing papers by Majumdar (2010) and Kishan (2018) report that the General castes compared to the backward castes (SC/ST/OBC) reported higher intergenerational mobility; we observe no such significant difference in intergenerational persistence between general caste and other backward caste (OBC). However, average years of schooling of descendants are found to be higher among general caste compared to scheduled caste (SC) and Scheduled tribes (ST).

With respect to gender, our result that males are more mobile than females, supports the findings of Dacuycuy and Bayudan (2019), Emran and Sun (2015) but contradicts that of Azomahou and Yitbarek(2016); Emran and Shilpi(2015). Javed and Irfan (2014) has found in case of Pakistan that paternal education is strongly attached to the son's education rather than maternal education. Contrary to this we observe that in relative terms child's education is more associated with mother's education than father's education. Our findings are very close to the results of Majumder

(2010). The difference between our result and Majumder (2010) is that we observe cross pair effect is stronger than same pair effect.

We have included policy variables like mid-day meals and scholarships which provide an incentive for further studies. Infrastructural variables like motorable road, distance to school, sanitation facilities in schools also comprise of variables which have significant association with the educational outcome of the child. We also make an attempt to understand whether the chance of higher education of an individual is shaped by his/her parental education in terms of his/her place of residence. We find that the region where public polices like scholarships are scarce and school infrastructure is relatively poor, it is the parental education level which is promoting educational attainment of the children singlehandedly. While these results do not imply causal relationship but they provide an insight into the factors which could probably account for explaining the persistent immobility and help in policy prescriptions.

A4 Appendix

Table 4A.1: Intergenerational Transitional Probabilities: By Sex

Level of Education		Male Children					Female children				
		Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size
Parent's Education	Illiteracy and below primary	0.274	0.395	0.284	0.046	0.592	0.470	0.336	0.170	0.022	0.613
	Primary	0.083	0.321	0.434	0.160	0.265	0.135	0.351	0.432	0.081	0.260
	Secondary	0.009	0.185	0.414	0.390	0.116	0.090	0.204	0.465	0.238	0.103
	Tertiary	0	0.022	0.227	0.750	0.025	0	0	0.350	0.650	0.023

Table 4A.2: Intergenerational Transitional Probabilities: By BPL

Level of Education		BPL: Yes					BPL: No				
		Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size
Parent's Education	Illiteracy and below primary	0.374	0.366	0.226	0.032	0.730	0.280	0.390	0.280	0.049	0.458
	Primary	0.135	0.382	0.364	0.117	0.205	0.069	0.297	0.483	0.148	0.327
	Secondary	0	0.287	0.465	0.246	0.053	0.046	0.158	0.415	0.378	0.173
	Tertiary	0	0.066	0.400	0.533	0.010	0	0	0.224	0.775	0.039

Table 4A.3: Intergenerational Transitional Probabilities: By Religion

Level of Education		Hindu Children					Muslim Children				
		Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size
Parent's Education	Illiteracy and below primary	0.332	0.381	0.242	0.044	0.596	0.372	0.352	0.261	0.013	0.609
	Primary	0.088	0.317	0.447	0.146	0.256	0.141	0.378	0.385	0.094	0.294
	Secondary	0.038	0.210	0.412	0.338	0.121	0	0.055	0.555	0.388	0.071
	Tertiary	0	0	0.230	0.769	0.024	0	0.083	0.416	0.500	0.023

Table 4A.4 Intergenerational Transitional Probabilities: By Caste and Region

Children Education: By Caste

Level of Education		General Children					OBC Children					SC/ST Children				
		Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size
Parent's Education	Illiteracy and below primary	0.257	0.414	0.303	0.024	0.448	0.333	0.372	0.267	0.026	0.621	0.377	0.359	0.215	0.047	0.696
	Primary	0.090	0.310	0.481	0.118	0.353	0.090	0.329	0.465	0.133	0.239	0.114	0.354	0.369	0.161	0.209
	Secondary	0.007	0.139	0.433	0.419	0.149	0	0.023	0.523	0.452	0.114	0.078	0.313	0.391	0.217	0.086
	Tertiary	0	0.022	0.227	0.750	0.048	0	0	0.111	0.888	0.024	0	0	0.545	0.454	0.008

		Cooch Behar					South 24 Parganas					West Medinipur				
		Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size	Illiteracy and below primary	Primary	Secondary	Tertiary	Size
Parent's Education	Illiteracy and below primary	0.390	0.305	0.267	0.036	0.569	0.291	0.397	0.250	0.061	0.618	0.353	0.409	0.223	0.013	0.603
	Primary	0.050	0.202	0.493	0.253	0.205	0.124	0.387	0.348	0.139	0.264	0.106	0.351	0.479	0.062	0.315
	Secondary	0	0.039	0.367	0.593	0.166	0.093	0.322	0.385	0.197	0.098	0.014	0.289	0.608	0.087	0.079
	Tertiary	0	0	0.155	0.844	0.058	0	0.055	0.555	0.388	0.018	0	0	0	1	0.001

CHAPTER 5

CONCLUSION AND POLICY PRESCRIPTION

5.1 Major Findings

The major findings of this research are presented in this chapter, along with prospective directions for future research.

Education is considered as an important determinant of economic growth as well as economic development. Therefore, all welfare states have a serious concern for educational development. In this thesis we concentrate on the myriad issues pertaining to educational development like quantitative measurers, qualitative dimension and intergenerational educational mobility. While the quantitative aspect of education deals with measures like enrolment ratio, literacy rate; learning outcome or educational achievement, or simply what pupils learn in school, is the qualitative aspect of education. Evidence suggests that quantitative measures of educational development in India, such as enrolment and literacy rates, have been rising over time, notwithstanding discriminations of different types. Intergenerational educational mobility is another key concept in understanding educational development. It is assessed by the degree of association between current and ancestor generations in terms of the number of years spent in school. Higher mobility caused by lower degree of association suggests that a nation has achieved egalitarian educational development.

The thesis has been organized as follows. In chapter 2 we have tried to identify the educational achievement gap for pre-primary and primary going children in India. Specifically, we have focused on the role of caste, gender, socio-economic status, school inputs, and government role in shaping such inequalities. Observing significant gaps in the primary level, we move to higher education in chapter 3, and explore whether reservation policy in India has been able to provide education for all at education levels of secondary, higher secondary, graduate, postgraduate and above. In particular, we have attempted to see whether such benefits or marginalization have the boundary of generations. Our final chapter deals with a primary survey in West Bengal where we trace the extent of intergenerational educational mobility and how it is being determined by various socio-economic and policy variables.

In chapter II, we aim to understand the inequality existing in learning outcomes and identify the factors which may be responsible for this. We use Indian Human Development Survey 2012 (IHDS-II) to identify the test score gaps of reading, writing and mathematics for a representative sample of 6363 children aged 8-11 in 2012. We have standardized their test scores in mathematics, reading and writing with mean zero and standard deviation 1 to compare mean test score gap between two groups which comes from two different distributions. We identify substantial test score gap between general and reserved category in each test scores. The test score gap maintain social hierarchy such as the gap between general and scheduled tribes is greater than the gap between general and scheduled castes which in turn is greater than the gap between general and other backward classes (OBC). Inclusion of child specific variables such as child school hours, child private tuition hours and possession of any/no book in the child's home and enhancement of socio-economic status reduces the gap considerably. Next, we have undertaken the sensitivity analysis to test whether the results accruing to the full sample conform to the results of the sub samples across gender, region, SES[101] categories, location type and school type. These variables affect the test scores mostly in the same way as the whole sample. Gender gap in achievement is more prominent among SC and ST. Female children of SC and ST community are performing much worse than their brother. Disparity is much higher in rural area compared to non-metro urban area. In comparison between private and public school, the students attend private school perform much better than students attending in public school. We have then disaggregated the data into pre-primary and primary and check the score gap across different academic years. We obtain a marked improvement in test scores as we move from pre primary to primary level. Given the variation in test scores across school types, we looked into the role of school effect on test score. Taking school fixed effects, we find that the gap between general and OBC totally disappear and the test score gap between general and ST substantially reduced. Overall the results suggest that improving the socio economic status of the reserved category may be helpful in achieving better

[101] The SES index is constructed using parental education, parental occupational status and household income. This index reflects household's socio-economic conduciveness of the children.

academic outcomes for the children. So, policies targeted towards broadening the opportunity set available may be useful in this regard.

In chapter III, we have concentrated on the intergenerational mobility of higher education among the reserved categories, and the effect of reservation policy on mobility across generations. In this chapter we have considered a two-fold empirical analysis using transition matrix and regression methodology. Using transition matrix and Altham metric, we have calculated overall as well as vertical mobility and degree of association between father and son's different education categories across generations among reserved categories. We have also calculated the gap in intergenerational vertical mobility using probit regression methodology. We also included generation dummy, urban and caste certificate as independent variables. We have also extended our regression analysis based on two important groups such as 1) father education group below and above higher secondary level and 2) household per capita income below and above median. For both the methodologies undertaken, we observe the incidence of vertical mobility and the effect being more prominent for the third-generation sons. In particular, for the first methodology, we obtain that there has been substantial change in the degree of association between father-son educational achievements if the household possesses caste certificate, but it is not so for the group which do not have caste certificate. With regard to the regression analysis, we obtain that if the father's educational attainment is equal and above higher secondary, then caste certificate does not have a significant contribution towards upward mobility. Caste certificate becomes very important when we consider father's education below the higher secondary level. 3rd generation becomes more mobile in this group. We also identify that the probability of higher education mobility is maximum for the groups having income above median and staying in urban region. The result is logically consistent in the sense that the demand for children's higher education among lower income households is more elastic and opportunity set is more available in the urban area. For the targeted reserved category (those with incomes below the median and fathers with just secondary schooling or less), having a caste certificate is required at the entry level, but it is insufficient to obtain a higher education degree. Therefore, although reservation policy is still significant today, it is not the only factor affecting higher education for reserved castes. To make higher education more convenient,

it must be combined with socioeconomic opportunities like expansion of household income, enhanced supply of educational infrastructure, proper efficacy of public policy at all levels, among others.

In chapter IV, we have mainly focused on the role of public policy on intergenerational educational mobility using the data available from an extensive primary survey in selected districts of West Bengal. To understand educational mobility, this chapter uses three related methodologies - 1) transition matrix and Altham metric, 2) intergenerational simple regression and correlation coefficient, and 3) ordered logistic technique. The empirical analysis indicates that in West Bengal there is a strong association between parents' and child's (both son and daughters) educational attainment in both relative and absolute terms. After inclusion of household and individual specific factors, public policy variables and education migration variable, we find a substantial decrease in degree of association between children and parent's years of schooling. From the transition matrix analysis, we conclude that across all socio-economic groups persistence is lower at lower-level education category, but persistence is much higher at the tertiary level of education in West Bengal. Using ordered logistic regression method, we find that the likelihood that a child will complete tertiary level of education depends on whether the parent's education level fall in the category of tertiary education. When we disaggregated our analysis across all socio-economic groups using ordered logistic regression, we observed that vertical mobility has been varied across the subgroups. Hindus are more mobile compared to Muslim. We do not identify any significant difference in intergenerational persistence between general and OBC groups. However, we find SC/STs are mobile than OBC in terms of Altham metric analysis. Our findings confirm males are more mobile than female and we also observe cross pair effect is stronger than same pair effect. Using all three methodologies, we identify that all the policy variables considered play a positive and significant role on mobility. All policy variable helps to decrease the degree of association between children and parent's years of schooling. Using transition matrix, the results of vertical as well as overall mobility suggest that all policy variables have a positive effect on vertical and overall mobility, and mobility is higher in terms of mother's education. So, in West Bengal, female educational achievement is an important predictor to enhance education of future generation. On

the other hand, using ordered logistic regression methodology, we find that all policy variables like mid-day meal, scholarship, sanitation, all weather road etc. have a significant positive impact on the probability of reaching secondary or tertiary level of education by the descendants. We also make an attempt to understand whether the chance of higher education of an individual is shaped by his/her parental education in terms of his/her place of residence. We identify that in areas where state policies like scholarships are sparse and school infrastructure is generally subpar, raising a child's educational aspirations solely depends on their parents' education levels. Although these results do not suggest causation, they do give insight into the potential causes of the persistent immobility and aid in the formulation of policy recommendations.

5.2 Limitations and future scope

In conclusion, given the importance of education, the government should be more instrumental in its egalitarian dissemination. We observe gaps in educational attainment at both primary level of education and higher education across genders and different caste groups. While policies have been instrumental in bridging the gap in certain cases, the disparity still persists. It once again highlights the role of government and successful implementation of inclusive policies.

However, there are several influencing factors of educational achievement that have not been included in this thesis. The inclusion of the genetic factors such as nutrition, child birth, length of pregnancy, maternal stress and intrauterine environment have been left untouched in this work. One can also focus on the effect of cultural, socialization or behavioral factors, and school inputs such as quality of teachers on children’s scholastic achievement in India. Moreover, the study can be expanded to include the influence of public policy on intergenerational educational mobility across all of India. The impact of public policy on intergenerational mobility in the global setting or cross-country study is another significant problem that we are unable to examine in this thesis.

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