Intergenerational mobility in educational attainments: a comparative analysis at provincial level of Pakistan

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Abstract: Skills and talents of the poor are wasted due to persistence in socio-economic status. Consequently, their incentives to work hard decrease, and their current and future generations remain backward. We use education level as a proxy of socio-economic status and investigate its mobility across the generations in four provinces of Pakistan. Data reveal that the percentage of fathers is greater in the lower education level than their sons in all four provinces. Transition matrices and multinomial logit models indicate strong persistence in educational status along with upward mobility. Sons of less-educated fathers are less likely to attain high education levels than the sons of high-educated fathers. Further, the probability of achieving high education levels increases with the increase in income and wealth. Also, large family size is a hurdle in attaining high education levels and increases the chances of achieving a low education level or never attending school.

Keywords: inequality of opportunity; education; intergenerational mobility.

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1 Introduction

Most of the economies, worldwide, are experiencing inequality in income, wealth, and education, beside their rapid economic growth. Intergenerational persistence in socio-economic status is one of the primary sources of inequality. The greater the persistence in socio-economic status between generations, the worse would be the problem of inequality. On the other hand, intergenerational mobility ensures equal opportunities to everyone and reduces inequality in opportunities and inequality in outcomes.

Intergenerational mobility can be defined as a process through which parental status is transferred to their children (Becker and Tomes, 1979; Goldberger, 1989). The strength of intergenerational mobility can be measured by the correlation of socio-economic status between children and parents. A stronger correlation would mean less mobility. On the other hand, a society can be deemed as more mobile if this correlation is weak. In a less mobile society, the poor are excluded from capability formation opportunities, which causes backwardness, deprivation, and poorly endowed in terms of the human capital of the current and future generations (Muhammad and Syed, 2019). This persistence would make it difficult for a child born in a poor family to escape his start position in life, and thus inequality continues in the child generation. Talented from poor families remain under-developed, their skills and talents are wasted. Further, the lack of equal opportunities affects their motivations, efforts, and productivity, which causes a decrease in the overall efficiency and growth potential of an economy (Muhammad and Jamil, 2017). On the other hand, mobility ensures individuals' placement in a society according to their competence rather than the social origin (Hout, 1988). It helps the poor and excluded groups to increase their share in overall income and enhance economic growth.

Most widely, economists use earning as a measure of socio-economic status. However, earnings suffer from problems, like measurement error, life cycle biasness, transitory fluctuation, etc. Moreover, as Goldberger (1989) mentioned, restricting socio-economic status and its mobility to monetary measures underestimates family background's influence on inequality. Therefore, researchers recently focus on educational attainments as a proxy for overall socio-economic status. The level of education provides information about the lives of individuals they live in (Muhammad

and Syed, 2019). It creates mobility aspirations, socialises an individual for a better position, and prepares for a better work role (Muhammad, 2018). Further, there is a vast literature (Solon et al., 1994; Blanden, 2009; Black and Devereux, 2011; Currie and Almond, 2011; etc.) which shows that higher education is associated with higher earnings and leads to better health and other economic outcomes. Educational attainment is relatively stable over time (Nickell, 1982; Ermisch and Francesconi, 2002) and is not subject to year-by-year fluctuations and transitory shocks. Therefore, education is a reasonable proxy to measure individuals' overall socio-economic status and mobility of education; consequently, would mean mobility in overall socio-economic status.

We will use PSLM-2012-13 survey data to explore the distributions of fathers and sons generations in different educational categories. We will also explore the strength of intergenerational educational mobility across the generations. Educational policies and facilities are not the same across different provinces of Pakistan. The cost of education, the government's motivational policies, scholarship policies, and types of educational institutions are different in different provinces. Moreover, in terms of the reward to education, these provinces' markets are not equal; therefore, the level of motivation to invest in children's education is different across the provinces. Due to these reasons, we carry out a separate analysis for all four provinces.

The rest of the paper is structured as follows. Section 2 summarises past research on educational mobility. Section 3 sets the empirical model and its methodology. Section 4 describes the data. Section 5 discusses empirical results, while Section 6 concludes the study.

2 Literature

Enormous literature is available on the topic of intergenerational mobility in socio-economic status.[1] Galton (1886), regressing children's heights on parents' heights, is the first to study intergenerational mobility. Ginsberg (1929), Glass (1954), and Goldthorpe (1980) examined occupational mobility for Britain. The US's pioneer studies are Blau and Duncan (1967) and Featherman and Hauser (1978). However, the topic attracted economists after notable work by Becker and Tomes (1979, 1986). They developed a model of intergenerational transmission of earnings, assets, and consumptions. After this, there has been an upsurge of empirical evidence on parental education's role in determining their children's education level. The study by Mare (1980) reveals that the role of parental income and education diminish as children move towards a high education level. Lillard and Wallis (1994) find that educational effects move across the gender line.[2] However, in general, the father's education has a more critical role in the educational attainments of their children as compared to the mother's education (Burns, 2001); that is, a child who has a highly educated father and less educated mother has the same schooling outcomes as having two well-educated parents.

Behrman and Rosenzweig (2002), in a sample of twins, explore the positive impact of a father's education and the negative impact of a mother's education on education level. Hertz et al. (2007), in a sample of 42 countries, find significant differences in educational persistence across the regions, with Latin America displaying the highest intergenerational persistence and the Nordic countries showing more mobility. Jalan and Murgai (2008) document educational mobility in India among the age group 15–19 and show a significant increase in education mobility between 1992–1992 and 1999–2000.

Chevalier et al. (2009), in a sample of European countries and the USA, find that educational mobility is higher in countries where public expenditure on education is high. However, this study also finds more persistence in countries where return to education is higher. Daude (2011), for 18 countries in the Latin America region, finds a relatively low degree of intergenerational educational mobility in the region. Azam and Bhatt (2015) find a strong association between educational mobility and per capita education spending at India's state level. Early enrolment (Bauer and Riphahn, 2009)[3], industrialisation, female participation in the job market and increase in educational expenditure (Van Doorn et al., 2011), urbanisation (Labar, 2011), and supply of public school (Assad and Saleh, 2016) are found to have a significant impact on the intergenerational mobility in education. Nguyen and Getinet (2003) show that an increase in the number of children dilutes parents' resources and thus reduces educational mobility.

To the best of our knowledge, Havinga et al. (1986) is the first study that examines intergenerational income and wealth mobility in a sample of ten major industrialised cities of Pakistan. The study finds that 31% (60%) of the sons have income (wealth) greater than their fathers'. Cheema and Naseer (2013), in their study for rural Sargodha, show that grandfather-father pairs have more rigidity in educational attainments than father-son pairs and thus establish an increase in intergenerational educational mobility. Their results also reveal that the propertied group is more mobile than non-propertied groups and higher mobility among zamindar (landlords) than *artisan* and *historically depressed quoms* (sects). Javed and Irfan (2015) utilise Pakistan panel household survey (2010) and find strong persistence in education. This persistence is stronger in the older cohort as compared to the younger cohorts. They also find immobility at low-status occupations and downward mobility in the high-status occupations. Similarly, high-income persistence is observed at the lowest quintile. Further, they also find high-income mobility in urban regions compared to the rural areas and more income mobility in older cohorts than the younger cohort.

Khawaja et al. (2016) examine the intergenerational mobility of religiosity in district Multan, Pakistan, and find that the parents' religious characteristics positively influence the religiosity of their children. Sharif et al. (2016) for district Multan find a significant role of parental education in their children's educational attainments. In a combined data, the study reports a stronger impact of father's education on their children's education level. However, a mother's education is found to play a more important role in the daughter's education. Shareef et al. (2017) report that children born in rich families have high income levels. Further, the study also reveals upward mobility in income across the generation. It is also found that higher parental income leads to better education of the children, which causes them to find better occupation and get high income. Muhammad and Jamil (2017) utilise data of PSLM-2012-13 and find strong intergenerational persistence in occupational status. In urban regions, persistence is found to be stronger in high-status occupations, while in the rural regions, the study reports more persistence in the lower status occupations.

Though there are countless studies for both developed and underdeveloped countries, this area of research is neglected in Pakistan's economic literature. The above-cited studies for Pakistan lack the representativeness for the whole country. Though Javed and Irfan (2015) is a reasonable effort but suffering from some shortcomings. Their data lacks the representativeness for the entire country as it covers only 16 districts and ignores the big cities. Their sample size, especially in a high level of education and occupation[4], is minimal. Further, they did not incorporate the importance of other relevant variables in

the educational attainments. Similarly, the findings of Havinga et al. (1986) are based on 1,200 individuals from ten major industrialised cities and only focus on intergenerational mobility in income and wealth. The scope of Cheema and Naseer (2013) is limited to rural Sargodha only. Khawaja et al. (2016), Sharif et al. (2016) and Shareef et al. (2017) are confined to only one district, Multan, while the focus of Muhammad and Jamil (2017) is limited to occupational mobility only.

Our study intends to fill this gap and investigates intergenerational educational mobility in all four provinces of Pakistan. We use the most comprehensive and representative dataset of the Pakistan Social and Living Standards Measurement (PSLM) survey of 2012–2013. PSLM covers almost all districts of all four provinces. We will use categorical regression analysis and the transition matrices and check the contributions of all relevant variables and father's education in educational mobility.

3 Theoretical framework

We utilise models of intergenerational mobility developed by Becker and Tomes (1979), Loury (1981), and Becker et al. (2015). Parents are assumed to be altruistic and care about their children's 'economic success' (Becker and Tomes, 1979). They influence the income of their children through investment in the human and non-human capital of their children. Parents can increase utility by consuming more at the expense of not investing in children (Becker et al., 2015). However, they are not doing so as they are altruistic and care about their children's utility. Children accumulate human and non-human capital in the first period of their life and then work, consume, and produce their children in the second period of their life.

Parental education may influence the education of children in different ways. First, educated parents are more useful in child-enhancing activities that help them attain a high level of education. Second, compared to uneducated parents, educated parents have more significant concern over children's education.[5] They are more likely to help children solve their homework and better guide their children in the school system (Becker et al., 2015). Third, a child's education level is influenced by the role model effects as children emulate parental education (Emran and Shilpi, 2011). Fourth, children of highly educated parents have more ability to get a higher level of education.

Based on the above explanation, we can write the model of educational attainment as:

$$Ed_{ij}^{C} = f\left(Ed_{ij}^{P}, I_{i}^{P}, Z\right) \tag{1}$$

where Ed_{ij}^{C} is the j^{th} level of education of an i^{th} child, Ed_{ij}^{P} and I_{i}^{P} are j^{th} level of education and income of the parent of an i^{th} child and Z is the vector of other control variables, including wealth, household size, age of a son, and geographic location. The rationale for the inclusion of control variables in the model are discussed below.

A wealth of family influences the education of children through different channels. Higher wealth in the form of durables means that the family has already met its needs and can allocate more income to children's education. Moreover, a family with high wealth can quickly liquidate its wealth and efficiently meet the children's educational cost in financial constraints. Wealth, especially land, can be used as collateral for getting loans to finance children's education if parents cannot finance children's educational expenses with the current income level.

Parents make the optimal child-rearing decision based on the child's quality and quantity (Becker, 1960). While quantity refers to the number of children, the quality may be in the form of human capital, education, well-being, and social status. According to the 'resource dilution hypothesis', the amount of money, time, and patience that each child receives from his parent is diluted with the increase in children's number. This causes a reduction in investment per child. The chances of children to achieve a higher level of education and thereby, higher social status are reduced (Desai, 1995; Maralani, 2008).

We expect an increase in the level of education of a child with an increase in his age. If a child leaves education at some stage of his life and enters the job market, even then, there is a chance that he may improve his level of education in the later stage of his life. Further, different levels of education are completed at some specific age beyond which an increase in an individual's age leads to a decreased chance of that level of education. Therefore, we also include age square along with the age of a child as an independent variable.

The geographic location captures the peer as well as the environmental effects. This may also capture the availability and quality of schools across different regions. Qualities, number of schools, teachers, and other stock availability are different in rural and urban regions. Generally, distance from residence to schools and colleges is greater in rural areas than in urban regions. With this background, we can write equation (1) as:

$$Ed_{ij}^{C} = f\left(Ed_{ij}^{P}, I_i^{P}, W_i^{P}, HS_i, A_i^{C}, \left(A_i^{C}\right)^2, R_R\right) \tag{2}$$

where W_i^P, HS_i, A_i^C and $(A_i^C)^2$ are a wealth of parent, household size, age, and the square of the age of an i^{th} child, respectively. R_R equal to '1' if a child belongs to a rural region and equal to '0' otherwise. In stochastic form, equation (2) can be written as:

$$Ed_{ij}^{C} = \beta_0 + \beta_1 Ed_{ij}^{P} + \beta_2 I_i^{P} + \beta_3 W_i^{P} + \beta_4 HS_i + \beta_5 A_i^{C} + \beta_6 \left(A_i^{C}\right)^2 + \beta_7 R_R + e_i \tag{3}$$

where 'e_i' is the stochastic error term.

4 Data source and construction of variables

We use PSLM-2012-13 data for our analysis. It is a more representative survey which covers the urban and rural regions of all the districts of all four provinces of Pakistan. This survey contains information on different variables collected from 75,516 households. Out of these, 31,916 households are selected from Punjab, 19,480 from Sindh, 12,473 from KPK, and 11,647 from Balochistan. Education information is available for 445,169 individuals with age equal to four years and above. After dropping females[6], individuals with age less than 16 years, those currently enrolled in educational institutions, and the education category with option 'other', we left with 39,989 co-resident fathers-sons. Out of these, 39,989, 6,444, 15,981, 9,971, and 7,593 belong to KPK, Punjab, Sindh, and Balochistan, respectively. PSLM data is not directly fit for our analysis. We construct variables according to the requirement of our study. Definitions and constructions of relevant variables are discussed below.

Originally, the level of education is divided into 21 categories. After dropping the category 'other', we merge the remaining 20 into seven categories as:

1 never attended school

2 up to primary

3 up to middle

4 matriculation

5 intermediate

6 graduate

7 post-graduate.

A parent's income is the sum of income a parent receives from all sources, including income from occupation, remittances, pension, selling the kinds received as wages, and rent form property. As *wealth* is a multi-dimensional variable, therefore we construct a wealth index using principal component analysis. It includes 20 consumer durables[7], possessions of personal agricultural land, non-agriculture land, residential building and shop, property or plot, commercial building, livestock, chickens and poultry, and animals for milking and transportation. It also includes access to four housing characteristics[8] and two public utilities[9], the type of phone used for communication, and the source of cooking fuel. *Household size* is the number of members living in the household. *A son's age is the reported age incomplete year and for regions we introduce a dummy variable that* takes value '1' if rural and '0' otherwise.

5 Results and discussion

To understand the structure and distribution of education in all four provinces, we first summarise the percentages of fathers and sons in different levels of education in Table 1.

Results depict that percentages of sons are smaller in lower levels of education than the percentages of fathers in the same low levels in all four provinces. However, as a whole, a larger proportion of sons and their fathers' generations are in lower levels of education than their proportions in higher levels of education. The distributions are more concentrated towards lower education (below matric) in Balochistan (92.9%) followed by KPK (85.5%), Sindh (83.4%), and Punjab (83%) in the case of fathers' generation and Balochistan (78.4%) followed by Punjab (71.8%), Sindh (66.9%) and KPK (64%) in case of sons' generation. Similarly, the average year of schooling of sons is larger than their fathers. The fathers' average year of schooling is largest in Punjab (4.13), followed by Sindh (3.98), KPK (3.19), and Balochistan (1.89). The same is largest in KPK (7), followed by Punjab (6.58), Sindh (6.13), and Balochistan (4.93) for the sons. These results indicate an improvement in the sons' generation's average year of schooling relative to fathers' generation.

Table 1 Percentage distribution of educational attainments

Level of edu.	*Father*				*Son*			
	KPK	*Punjab*	*Sindh*	*Balochistan*	*KPK*	*Punjab*	*Sindh*	*Balochistan*
NAS	65.6	50.5	52.9	77.5	22.0	20.8	32.5	38.5
PMY	11.8	18.8	23.6	10.6	18.6	22.3	21.7	26.8
MDL	7.8	13.7	6.9	4.8	23.4	28.7	12.7	13.1
MTC	10.2	11.6	8.4	3.9	21.2	16.9	15.5	14.9
INT	2.7	2.8	3.6	1.5	7.8	5.9	10.1	4.0
GRD	1.1	1.3	2.1	0.9	3.7	2.9	4.4	1.7
PGR	1.0	1.4	2.5	0.8	3.4	2.5	3.1	1.1
AYS	*3.19*	*4.13*	*3.98*	*1.89*	*7.00*	*6.58*	*6.13*	*4.93*

Notes: AYS = average years of schooling NAS = never attend school, PMY = primary school, MDL = middle, MTC = matric, INT = intermediate, GRD = graduate, PG = post graduate.

Source: Authors' own calculations based on PSLM-2012-13

The upshot of the above discussion is that most of the population is stuck to a low education level in all provinces. However, the frequencies of the sons in the higher levels of education are more than their fathers. Further, the sons' average year of schooling is greater than the fathers' average year of schooling. This gives some insights into the improvement in the sons' level of education in all the regions.

Descriptive statistics do not report a son's position relative to his father, i.e., whether a son falls in the father's category (immobility) or off the father's category (mobility). The transition matrix computes the proportions of sons in different levels of education given their fathers' levels of education. Figures in diagonal represent the proportions of sons and fathers fall in the same levels of education (immobility). Off diagonal figures are the proportions of sons whose education levels are different from their fathers (mobility). Table 2 summarises 7 × 7 figures matrices into three figures representing downward mobility, immobility, and upward mobility.

Table 2 Educational mobility – summary of transition matrices

Province	*Son-father*		
	Downward mobility	*Immobility*	*Upward mobility*
KPK	9	29	62
Punjab	13	32	55
Sindh	14	39	47
Balochistan	6	44	50

Source: Authors' calculations based on PSLM-2012-13

Table 3 Educational mobility-conditional probabilities

	Level of educational of sons						
	NAS_S	*PMY_S*	*MDL_S*	*MTC_S*	*INT_S*	*GRD_S*	*PGR_S*
				KPK			
NAS_F	29.62*	18.73*	22.28*	19.29*	5.9*	1.85*	2.33*
PMY_F	12.24*	18.36*	25.31*	26.01*	9.87*	4.17*	4.03*
MDL_F	7.46*	11.77*	28.69*	28.36*	12.6*	5.8*	5.31*
MTC_F	5.95*	6.90*	20.3*	28.69*	15.56*	9.2*	13.4*
INT_F	4.37*	5.34*	12.14*	25.73*	20.87*	15.05*	16.5*
GRD_F	0.00	3.33**	8.33*	24.17*	15*	22.5*	26.67*
PGR_F	3.74**	1.87	3.74**	14.02*	26.17*	16.82*	33.64*
				Punjab			
NAS_F	32.43*	26.19*	25.08*	11.8*	2.98*	0.97*	0.55*
PMY_F	12.88*	25.4*	34.12*	18.35*	5.69*	2.09*	1.47*
MDL_F	9.65*	16.3*	36.13*	22.78*	8.7*	3.74*	2.7*
MTC_F	4.93*	9.46*	27.33*	32.11*	12.02*	8.16*	5.99*
INT_F	2.06*	4.49*	19.07*	26.92*	18.13*	14.39*	14.95*
GRD_F	3.18*	2.55*	7.96*	21.02*	14.65*	21.02*	29.62*
PGR_F	2.52*	1.08***	9.35*	14.03*	14.03*	17.99*	41.01*
				Sindh			
NAS_F	48.48*	21.21*	11.59*	11.31*	5.18*	1.57*	0.66*
PMY_F	22.12*	25.91*	14.94*	19.23*	11.87*	4.11*	1.81*
MDL_F	10.48*	16.4*	20.43*	28.49*	16.13*	4.7*	3.36*
MTC_F	7.42*	11.86*	13.03*	26.38*	19.49*	13.56*	8.26*
INT_F	6.27*	7.77*	9.27*	21.05*	26.07*	19.3*	10.28*
GRD_F	4.5*	6.31*	6.31*	13.81*	21.62*	23.72*	23.72*
PGR_F	1.96*	2.52*	2.52*	7.56*	21.57*	22.41*	41.46*
				Balochistan			
NAS_F	45.59*	26.8*	11.72*	11.18*	2.97*	1.18*	0.56*
PMY_F	11.1*	26.55*	22.99*	28.14*	5.94*	3.3*	1.98*
MDL_F	7.03*	18.38*	20.27*	34.32*	9.73*	6.49*	3.78*
MTC_F	3.73*	12.53*	15.2*	42.13*	14.93*	8*	3.47*
INT_F	3.31*	9.93*	15.23*	46.36*	17.88*	4.64*	2.65**
GRD_F	3.26*	1.09	10.87*	34.78*	14.13*	17.39*	18.48*
PGR_F	0.01	3.33***	3.33***	17.78*	20*	24.44*	31.11*

Notes: Where *p < 0.01, **p < 0.05, ***p < 0.1. NAS = never attend school, PMY = primary school, MDL = middle, MTC = matric, INT = intermediate, GRD = graduate, PG = post graduate, _F = father, _S = son.

Along-with strong persistence in educational attainment, upward mobility can be observed in all provinces. A greater proportion of sons achieved higher levels of education as compared to their fathers. The highest upward mobility can be found in

KPK (62%), followed by Punjab (55%), Balochistan (50%), and Sindh (47%). Persistence in educational attainments is strong in Balochistan (44%), followed by Sindh (39%), Punjab (32%), and KPK (29%).

These results suggest upward mobility in educational attainments along with persistence. On average, the level of education of a son is higher than his father's. Similar results are found by Girdwood and Leibbrandt (2009) for South Africa. Our results are also consistent with Majumder's (2010) findings and Azam and Bhatt (2015), who found upward mobility in India's educational status.

Next, we would like to answer the questions like what is the probability that a son will get high education levels given that his father is at a low level of education? Conversely, what is the probability of a son moving towards low education levels given that his father is in a high level of education? Or what is the chance for a son to attain the same level of education as his father attained? To answer these questions, we compute conditional probabilities; that is, a son's probabilities of falling in different education levels given his father's education level. The results are summarised below in Table 3.

Results reveal high rigidity in both left and right tails of the distribution in the case of all four provinces. Consistent with the literature, persistence in educational attainment is much higher in 'never attend school' and 'postgraduate' level. We observe the 'education trap' that is highly educated (and less educated) people are more likely to pass on the same level of educational status to their sons. For example, results show that a son whose father never attended school (attained highest level of education) has 29.62% (36.64%), 34.43% (41.01%), 48.48% (41.46%), and 45.5% (31.11%) chance to fall in the same 'never attend school' (highest level of education) category in case of KPK, Punjab, Sindh, and Balochistan, respectively. The chance of a son to attain the highest level of education (never attend school) given that his father falls in the category of 'never attend school' (postgraduate) is only 2.33% (2.52%), 0.55% (3.74%), 0.66% (1.96%) and 0.56% (0.01%) in KPK, Punjab, Sindh, and Balochistan, respectively. Our findings comply with the earlier findings by Javed and Irfan (2015) for overall Pakistan. Results of labour (2011) for China also depict a similar pattern, but relatively more mobility is observed in his study for the lowest category (primary level of education).

A panoramic view of Table 3 suggests that though there is persistence in educational attainment but, on average, a son's chance to achieve the same level of education as his father did or more is higher than his chance to lag behind the father's educational level. Further, a son's chances to fall in maximum education levels increase with the increase in father's education. On the other hand, a son's chances to attain low education levels increase when a father is also at a low education level. This shows that chances are not the same for all the sons in their respective provinces. Those born in families with high educated fathers are more likely to reach and attain high education levels than those born in families where fathers are uneducated or less educated.

5.1 Regression analysis

To bring the role of other variables along with the father's educational level, we estimate equation (3) by a multinomial logit model in the determination of educational attainments of a son. Results are summarised in Tables A1, A2, A3, and A4 in Appendix. These tables report both the odds ratios as well as marginal effects.[10]

Results show that in all four provinces, a son's probability of falling in 'never attend school' decreases when a father moves from 'never attend school' to any high level of

education, as indicated by the negative values of marginal effects in the first columns of the tables. Similarly, when we read along with the columns, values of marginal effects suggest that a son's chances increase to attain high education levels when the father switches to high education levels. Further, we can see that when a father moves to 'primary' or 'middle' levels of education, the probabilities of a son increase more to attain the same level of education ('primary' and 'middle') or to attain the high level of education than his father. This shows persistence and somewhat upward mobility up to the middle level of education in all four provinces.[11] When a father's education level switches to 'Matric', the increase in the probability of a son to attain 'matric' is highest in all four provinces, indicating persistence at the matric level of education. This persistence is highest in Balochistan, followed by Punjab, Sindh, and KPK. A little manipulation of the results reveals more upward mobility in Sindh followed by KPK and Punjabup up to matric level of education. At college and university levels of education, we observe Sindh's persistence, followed by KPK and Punjab. Further, results also show that when a father attains the highest level of education (postgraduate), his son's probability of achieving below the college level of education decreases or is insignificant in Punjab, KPK, and Sindh. With a little manipulation, results also reveal more upward than downward mobility at the intermediate level and vice versa at the graduate level in Punjab, KPK, and Sindh. In Balochistan, we observe strong persistence at matric and above education levels and upward mobility at below matric level of education.

Our results are consistent with Azam and Bhatt's (2015) findings for India and Sharif et al. (2016) for Multan, Pakistan. However, they use education as a continuous variable in their analyses. Our findings are different from Nguyen and Getinet (2003) because they find higher mobility up to an intermediate level of education for the US and show more persistence and downward mobility at graduate and postgraduate levels. Findings by Girdwood and Leibbrandt (2009) for South Africa contradict our findings. They find relatively more mobility except at the highest level of education, where they find downward mobility.

Signs of the marginal effects of parents' income show that the probabilities of achieving higher levels of education are increasing with the increase in parental income, and probabilities of attaining low level of education or remaining in never attend school are decreasing. This shows that the sons belong to rich families' have greater chances to move to higher education levels than those who belong to poor families. This finding is consistent with Shareef et al. (2017), who report a positive impact of parental income on the children's educational levels. Apart from parental income, the family's wealth also increases the chance of getting a high education level.

The sign of household size is negative for matric and above education in KPK, Punjab, and Balochistan. For middle and above education in Sindh's case, indicate a decrease in probabilities of getting higher education levels with the increase in household size confirming the resource dilute hypothesis. With the rise in household size, parents' time and money spent per child decrease, which causes them to stay at a low level of education. As money does not matter very much at the primary level of education, therefore with the increase in the number of children, the probability of children to attain a primary level of education increases in all four provinces as evident from the positive sign of the marginal effect with the variable of family size against the primary level of education of son. Similarly, the probability of never attend school also increases with the increase in household size. However, education is expensive at higher levels. Therefore, it becomes harder for parents to finance their children's educational expenditure,

especially when they are more in number, so their chances to get a higher education level to reduce. Similar findings are found by Nguyen and Getinet (2003) for the USA. However, our results contradict Sharif et al. (2016), who report the family size's insignificant impact on the children's educational attainments.

The age variable results depict that the probability of a son increases to reach a higher level of education and reduces to attain a low level of education with the increase in the age of a son in KPK, Punjab, and Sindh. The net effect of age and its square remains the same as the probability of low levels of education decrease. The probability of attaining matric and above levels of education increases with the increase in a son's age.[12] However, in the case of Balochistan, the impact of age is insignificant.

6 Conclusions

Intergenerational mobility of socio-economic status represents the degree of equality of opportunities available to the citizens. Using the level of education as a proxy of socio-economic status, we investigated its mobility across the co-resident sons and fathers' generation at the province level. The majority of the sons and fathers never attend school in all four provinces – Balochistan leading with the highest percentages in never attend school for both sons and fathers. The majority of those who started education discontinue their education before reaching colleges and universities.

We observed somewhat improvement in sons' level of education over fathers as the sons' proportions were higher in high levels of education and smaller in low levels of education than their fathers in all four provinces. The sons' average year of schooling was also greater than the fathers' average in all the provinces. However, the chances of attaining high levels of education are not equal for all the sons. The sons of less-educated fathers have a smaller chance of reaching high education levels than the sons of highly educated fathers and vice versa, showing persistence in all provinces. As a result, backwardness, deprivation, inequality, and poverty continue in both fathers' and sons' generations. The persistence was found largest in Balochistan, followed by Sindh, Punjab, and KPK. However, at college and university levels of education, we found more persistence in Balochistan, followed by Sindh, KPK, and Punjab. We also observed mobility in sons who were more likely to attain a higher level of education than their fathers. This mobility was larger in Sindh followed by KPK and Punjab up to matric education level and was larger in KPK, Sindh, and Punjab at intermediate and graduate levels.

A large proportion of the sons' generation is still not going to school, most likely, because of their poor financial position. The government should finance the education of these poor citizens. Redistributive policies (taxation and transfer payments) should be educationally focused to remove financial hurdles in achieving higher education levels. Minimum education laws should be implemented and enforced. Early enrolment and the presence of a child in educational institutions should be ensured within the prescribed age because once a child is in educational institutions, income is less important in determining high levels of education. Policies related to family size should focus more on the middle-income group. These policies are not effective in poor families because they have no resources to be diluted, and in the case of rich families, family size is not an issue for them.

Our results show that the children's opportunities are based in and transmitted from the home, so reliance upon the education system or job market to increase mobility may be an overly optimistic strategy. Therefore, there is a need for institutional reforms and behavioural changes to improve the current generation's socio-economic status. For example, a son of an uneducated sweeper remains an uneducated sweeper because he finds it challenging to get a job in other occupations. His interest in getting an education is limited. So there is a need to change such type of thinking and behaviour.

Though parental income indeed helps in human capital formation, which determines the socio-economic status of a child. Any parental credit constraint impedes investment in children's human capital; parenting and mentoring comparatively play a more critical role in children's human capital formation. Spending more time with children and helping solve their home assignments are keys to a child's educational success and thereby help the children achieve high status and high paid jobs.

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Notes

1 Black and Devereux (2011) present a comprehensive survey on the literature of intergenerational mobility.

2 Father's (mother's) education has relatively stronger impact on the level of education of a son (daughter).

3 Because once children are enrolled in schools; inequalities in family background have less impact on children education.

4 For the post graduate fathers, there are only 11 (3) sons in the rural (urban) sample.

5 Guryan et al. (2008) in American Time Survey find that average time spent by educated parents with their children is larger than the uneducated parents.

6 Once women are married, they leave the houses of their parents and start to live in the houses of their husband. Information regarding parents of these married women are not reported in the PSLM survey. Further, most of the female, 84.36% of the mothers have never attended schools and their frequency is '0' in 'post graduate' category. Due to these problems, we limited our analysis to co-resident fathers-sons pairs only.

7 Possession of Iron, sewing machine, fan, chair/table, TV, radio or cassette player, VCR/VCP/VCD, watch, air cooler, refrigerator/freezer, air conditioner, phone or mobile, computer/laptop, bicycle, car, motor cycle, tractor/ truck, stove, cooking range and washing machine.

8 Number of sleeping rooms, quality of wall material, quality of floor material, and toilet facility.

9 Electricity and water.

10 Likelihood ratio (LR) tests given at the top left of the tables show that overall models fit significantly better than a model with no explanatory variable in the case of all four provinces. Further, we interpret marginal effect only because it provides more meaningful interpretation. It shows the impact of a unit change in the value of a regressor on the probabilities of different categories of dependent variable. Sign and size of the marginal effect indicates the direction and strength of this impact.

11 Results of Balochistan are not directly comparable with other provinces because educational variable constructed for Baluchistan is different from other three provinces. Due to smaller number of observations in higher levels of education, we merge education into four categories; 'never attend school', 'below matric', 'matric' and 'above matric' for Balochistan.

12 Net effect of age variable is computed as $\frac{\partial ed\_sn}{\partial Age} = \beta_5 + 2\beta_6 \overline{Age}$, where $\overline{Age}$ is the average years of sons in different levels of education.

Appendix

Table A1 Multinomial logit regression (odd ratios and marginal effects): (KPK)

	LR χ^2 (72) = 2,623 prob. > χ^2 = 0.0000		*Pseudo R^2 = 0.1131 log likelihood = –10,290*			*N = 6,444*	
	NAS_S	*PMY_S*	*MDL_S*	*MTC_S*	*INT_S*	*GRD_S*	*PGR_S*
PMY_F		0.760*	0.764*	0.859*	0.994*	1.191*	0.807*
	*–0.118**	*0.024***	*0.0219*	*0.0362***	*0.022***	*0.014****	*0.0009*
MDL_F		0.796*	1.363*	1.468*	1.748*	2.059*	1.682*
	*–0.165**	*–0.0395***	*0.0563**	*0.064**	*0.045**	*0.0267**	*0.0123*
MTC_F		0.438**	1.119*	1.535*	1.950*	2.424*	2.471*
	*–0.160**	*–0.0752**	*–0.0030*	*0.076**	*0.065**	*0.042**	*0.0556**
INT_F		0.455	0.749***	1.507*	2.252*	2.872*	2.550*
	*–0.158**	*–0.0714***	*–0.072***	*0.064****	*0.107**	*0.074**	*0.0563**
GRD_F		14.95	15.21	16.16	16.61	17.84	17.56
	*–0.258**	*–0.0618*	*–0.073****	*0.1063***	*0.076***	*0.115**	*0.0958**
PGR_F		–0.586	–0.406	0.939	2.518*	2.972*	3.246*
	*–0.123***	*–0.1246**	*–0.166**	*–0.0232*	*0.198**	*0.0899**	*0.1491**
Income		0.00541	0.0544**	0.0902*	0.111*	0.129*	0.0997*
	*–0.008***	*–0.006***	*0.0004*	*0.0067**	*0.0039**	*0.0021**	*0.001***
Wealth		0.0313*	0.0653*	0.0842*	0.104*	0.129*	0.159*
	*–0.01**	*–0.003**	*0.0013***	*0.0038**	*0.0025**	*0.0017**	*0.0035**
H. Size		0.0215**	–0.017***	–0.0358*	–0.0439*	–0.0611*	–0.0926*
	*0.0023**	*0.0054**	*0.0002*	*–0.0028***	*–0.0013****	*–0.001****	*–0.0028**
Age		–0.0147	0.0737**	0.268*	0.305*	0.571*	0.675*
	*–0.021**	*–0.0199**	*–0.0164**	*0.0187***	*0.0071**	*0.0119**	*0.0192**
Age sq.		–0.000297	–0.0013**	–0.00411*	–0.00458*	–0.00806*	–0.00966*
	*0.0003**	*0.0002**	*0.0002**	*–0.0003**	*–0.0001****	*–0.0002**	*–0.0003**
Rural		0.311*	0.311*	0.767*	0.598*	0.513*	0.864*
	*–0.069**	*–0.0038*	*–0.0176*	*0.0669**	*0.0099*	*–0.0017*	*0.0153**
Constant		–1.311**	–3.367*	–7.376*	–9.710*	–16.20*	–18.64*
	*0.211**	*0.157**	*0.221**	*0.222**	*0.091**	*0.044**	*0.055**

Notes: *p < 0.01, **p < 0.05, ***p < 0.1. Roman numbers are log odd ratios and italics are marginal effects. Standard errors are omitted in order to save the space. PMY = primary school, MDL = middle, MTC = matric, INT = intermediate, GRD = graduate, PGR= post graduate, _F = father, _S = son.

Table A2 Multinomial logit regression (odd ratios and marginal effects): (Punjab)

LR χ^2 (72) = 8050.75 *prob. > χ^2 = 0.0000*		*Pseudo R^2 = 0.146* *Log likelihood = –23,553*			*N = 15,981*	
NAS_S	*PMY_S*	*MDL_S*	*MTC_S*	*INT_S*	*GRD_S*	*PGR_S*
PMY_F	0.749*	0.967*	0.999*	1.131*	1.166*	1.246*
*–0.122**	*0.01****	*0.0589**	*0.029**	*0.0140**	*0.0055*	*0.0050*
MDL_F	0.479*	1.086*	1.193*	1.484*	1.629*	1.680*
*–0.124**	*–0.0552**	*0.0777**	*0.0473**	*0.0296**	*0.0142*	*0.0104**
MTC_F	0.532*	1.314*	1.940*	2.145*	2.660*	2.609*
*–0.155**	*–0.0977**	*0.0312***	*0.1212**	*0.0449**	*0.0354*	*0.0205**
INT_F	0.648***	1.722*	2.433*	3.159*	3.735*	3.938*
*–0.187**	*–0.1344**	*0.0105*	*0.1063**	*0.0922**	*0.0631*	*0.0490**
GRD_F	–0.607	0.00740	1.218*	1.888*	2.956*	3.290*
–0.064	*–0.1519**	*–0.1164**	*0.0835**	*0.0730**	*0.0937*	*0.0818**
PGR_F	–1.111	0.545	1.198*	2.203*	3.090*	3.797*
*–0.084****	*–0.1928**	*–0.0457*	*0.0397*	*0.0877**	*0.0845*	*0.1108**
Income	0.00419	0.0374*	0.0373*	0.0357*	0.0349*	0.0389*
*–0.0031***	*–0.0032**	*0.0038**	*0.0018**	*0.0004****	*0.0001****	*0.0002**
Wealth	0.0420*	0.0824*	0.117*	0.142*	0.166*	0.203*
*–0.01**	*–0.0039**	*0.0022**	*0.0050**	*0.0026**	*0.0017**	*0.0023**
H. Size	–0.0118	–0.0316*	–0.0719*	–0.0864*	–0.124*	–0.146*
*0.005**	*0.0035**	*0.0017****	*–0.0041**	*–0.0018**	*–0.0018**	*–0.0020**
Age	–0.0118	0.0786*	0.191*	0.261*	0.489*	0.605*
*–0.01**	*–0.0170**	*–0.0060***	*0.0089**	*0.0052**	*0.0089**	*0.0101**
Age sq.	0.00007	–0.00133*	–0.00262*	–0.00356*	–0.00682*	–0.00840*
*0.0002**	*0.0002**	*0.00004*	*–0.0001***	*–0.0001***	*–0.0001**	*–0.0001**
Rural	0.159**	0.377*	0.395*	0.434*	0.326*	0.341**
*–0.038**	*–0.0138***	*0.0295**	*0.0164***	*0.0072****	*–0.0005*	*–0.0003*
Constant	–1.257*	–3.997*	–7.670*	–11.07*	–16.46*	–20.45*
*0.20**	*0.21**	*0.28**	*0.18**	*0.064**	*0.063**	*0.039**

Notes: *p < 0.01, **p < 0.05,***p < 0.1. Roman numbers are log odd ratios and italics are marginal effects. Standard errors are omitted in order to save the space. PMY = primary school, MDL = middle, MTC = matric, INT = intermediate, GRD = graduate, PGR = post graduate, _F = father, _S = son.

Table A3 Multinomial logit regression (odd ratios and marginal effects): (Sindh)

	LR χ^2 (72) = 6,397.3 *prob. > χ^2 = 0.0000*		*Pseudo R^2 =0.1805* *Log likelihood = –14,525.089*			*N = 9,971*	
	NAS_S	*PMY_S*	*MDL_S*	*MTC_S*	*INT_S*	*GRD_S*	*PGR_S*
PMY_F		0.919*	0.895*	1.171*	1.442*	1.531*	1.505*
	*–0.187**	*0.0519**	*0.0103*	*0.0499**	*0.0495**	*0.0178**	*0.007****
MDL_F		1.017*	1.299*	1.607*	1.786*	1.622*	2.076*
	*–0.224**	*0.0257*	*0.034***	*0.0851**	*0.0571**	*0.0090*	*0.0131***
MTC_F		1.057*	1.277*	2.002*	2.437*	3.143*	3.328*
	*–0.257**	*–0.0132*	*–0.016***	*0.0905**	*0.09**	*0.0692**	*0.0361**
INT_F		0.840*	1.113*	1.922*	2.816*	3.518*	3.433*
	*–0.254**	*–0.0483**	*–0.038***	*0.0613**	*0.1479**	*0.0976**	*0.0338**
GRD_F		0.864**	1.009*	1.748*	2.802*	3.896*	4.457*
	*–0.255**	*–0.047****	*–0.0521**	*0.0161*	*0.1236**	*0.1253**	*0.0896**
PGR_F		0.799	0.910***	1.973*	3.573*	4.650*	5.892*
	*–0.290**	*–0.0937**	*–0.0871**	*–0.0197*	*0.1746**	*0.1367**	*0.1795**
Income		–0.041***	–0.0469**	–0.0544*	–0.00751	–0.00967	–0.0161
	*0.0065**	*–0.0032*	*–0.0024*	*–0.0042***	*0.0022***	*0.0009*	*0.0002*
Wealth		0.0335*	0.0721*	0.0854*	0.100*	0.123*	0.162*
	–0.01	*–0.0017**	*0.0020**	*0.0033**	*0.0026**	*0.0016**	*0.0022**
H. Size		0.00348	–0.0218**	–0.0291*	–0.0264**	–0.00885	–0.0175
	0.002	*0.0023***	*–0.0012*	*–0.0024***	*–0.0012*	*0.0005*	*0.00001*
Age		0.0509**	0.218*	0.320*	0.443*	0.682*	0.961*
	*–0.033**	*–0.0189**	*0.0007*	*0.0095**	*0.0119**	*0.0129**	*0.0169**
Age Sq.		–0.00103**	–0.0038*	–0.00483*	–0.00646*	–0.00951*	–0.0134*
	*0.0005**	*0.0002**	*–0.0001*	*–0.0001**	*–0.0002**	*–0.0002**	*–0.0002**
Rural		0.280*	–0.0577	0.199**	0.541*	0.502*	0.869*
	*–0.036**	*0.0240***	*–0.0303**	*–0.0056*	*0.0257**	*0.0053*	*0.0169**
Constant		–2.385*	–5.906*	–8.259*	–11.83*	–18.14*	–25.29*
	*0.31**	*0.19**	*0.125**	*0.16**	*0.11**	*0.057**	*0.045**

Notes: *p < 0.01, **p < 0.05, ***p < 0.1. Roman numbers are LOG odd ratios and italics are marginal effects. Standard errors are omitted in order to save the space. PMY = primary school, MDL = middle, MTC = Matric, INT = intermediate, GRD = graduate, PGR = post graduate, _F = father, _S = son.

Table A4 Multinomial logit regression (odd ratios and marginal effects): (Balochistan)

LR $\chi^2(27)$ = 3,412 *prob. > χ^2 = 0.0000*		*Pseudo R^2 = 0.1798* *log likelihood = –7,784*		*N = 7,593*
	NAS_S	*BMTC_S*	*MTC_S*	*AMTC_S*
BMTC_F		1.476*	2.130*	2.144*
	*–0.278**	*0.1037**	*0.1312**	*0.0433**
MTC_F		1.792*	3.155*	3.306*
	*–0.332**	*–0.0023*	*0.2438**	*0.0908**
AMTC_F		1.643*	3.275*	4.258*
	*–0.338**	*–0.0915**	*0.2132**	*0.2160**
Income		0.0550*	0.104*	0.0933*
	*–0.012**	*0.0035*	*0.0069**	*0.002***
Wealth		0.0436*	0.0889*	0.126*
	*–0.010**	*0.0011***	*0.0049**	*0.0044**
H. Size		0.0004	–0.0126	–0.0137
	0.0005	*0.0012*	*–0.0012*	*–0.0005*
Age		0.0601**	0.314***	0.718***
	*–0.027**	*–0.0238**	*0.0158**	*0.0346**
Age sq.		–0.0013**	–0.0054*	–0.0113*
	*0.0005**	*0.0003**	*–0.0003**	*–0.0005**
Rural		–0.0650	0.0434	–0.349*
	*0.0116**	*–0.0082*	*0.0186***	*–0.022**
Constant	*0.36**	*0.38**	*0.168**	*0.09**

Notes: *p < 0.01, **p < 0.05, ***p < 0.1. Roman numbers are log odd ratios and italics are marginal effects. Standard errors are omitted in order to save the space. MTC = matric, BMTC = below matric, AMTC = above matric, _F = father, _S = son.