

HEREDITARY BURDEN OR BLESSING? EDUCATIONAL ATTAINMENT OF MOTHERS TO DAUGHTERS IN PAKISTAN

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Abstract. Persistence in educational status across generations creates underdevelopment, and misallocation of skills and talents. It decreases attraction and desire for education, contributing to slowing economic growth and increasing poverty and inequality. The current study aims to determine the strength of educational mobility in Pakistan using data of mothers and daughters generation. The study uses "Pakistan Social and Living Standards Measurement (PSLM-2014-15)" survey data. The results revealed strong persistence in educational achievement between daughters and mothers generations. The OLS estimates demonstrate a positive role of father and mother education in achieving daughter education. The rural regions show more persistence in educational status than the urban areas. The results of transition matrices and multinomial logit models corroborate that the chances for daughters to attain high levels of education increase with the increase in their mothers' level of education.

Keywords: Educational attainments, intergenerational mobility, daughters-mothers

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I. INTRODUCTION

Intergenerational mobility is a change in socioeconomic status between different generations within a family. It relates the socioeconomic position of offspring to the socioeconomic position of their parents. If this relationship is strong, society is supposed to be less mobile. Opportunities are unequal for the poor and rich in a less mobile society. It results in underdevelopment, deprivation, and misallocation of talents and skills. Desire for getting education decreases, which results into increase in poverty and inequality, and slow economic growth. However, if the socioeconomic status link is weak between the children and their parents, society will be more mobile. Mobility increases the equality of opportunities, efforts, productivity, innovations, and economic growth and reduces inequalities (Muhammad and Jamil 2017).

Majority of the world economies experience rise in education, income, and wealth inequality along with their fast economic growth. Inequality of opportunities, especially in the form of education, results into unequal income, wealth, and occupation distribution over different groups of people in society. On the one hand, due to their weak financial condition, the poor are excluded from a number of activities that generate income. On the other hand, the poor are deprived of the chance to develop their capabilities due to their low income, which leaves them with inadequate human capital and lowers the income of the children generation as well.

The attention toward the equality of opportunities is rising in emerging nations. Equality of opportunity is a significant concern and an ultimate goal for any society to ensure equal distribution (Minello & Blossfeld, 2014). Education is a better instrument for policymakers to ensure equal societal distribution and opportunity is shaped by access to education more than anything else (Stiglitz, 2012). Inequality channel originates from intergenerational mobility, especially in educational attainments. Persistence in intergenerational educational attainments can weaken the equality of opportunity (Azam & Bhatt, 2015).

The education of women contributes significantly to the poverty reduction and society's sustainable growth. However in developing

countries like Pakistan, the traditional attitude towards women's education is one of the major hurdle. The condition of education, especially of female, is very critical. Average years of schooling in Pakistan is only 4.5 years. The same figures for male and female are 5 years and 3.9 years, respectively (UNDP, 2022). Situation of the children education in Pakistan is far below the developed world as well as the neighboring nations. According to PSLM-2019-20 survey data, 32 percent (20 million) of the children between ages of 5 to 16 years in Pakistan are out of school¹. Among these, 54 percent or 10.8 million are girls.

Family plays important role in determining the intergenerational mobility in social status and inequality. The available economic literature highlights mostly on the mobility of income. Due to the numerous issues with income, such as measurement error, life cycle biasness, transitory fluctuation, etc., studies have recently turned their attention to the use of educational attainment as surrogates for socioeconomic position. Not only is higher education linked to higher level of incomes, but it also improves health and other economic outcomes. However, the most empirical literature in both developed and under developed countries has predominantly relied on the mobility of a son's education². Some studies also examine mobility between fathers' and daughters' education³. The present study will examine educational mobility using mothers-daughters data in Pakistan. None of the study, so far, examines educational mobility using mothers-daughters data in Pakistan. The study will also consider the impact of other socioeconomic variables like family income, and family size along with parental educational attainments on the level of education of daughters. Moreover, the study explains how mothers' and fathers' socioeconomic positions affect daughters' educational levels. Specifically, this study answers the queries related to intergenerational mobility. For instance, do the structure and distribution of educational attainment of mothers' and daughters' generations differ? Second, can less educated mothers help their daughters get a high level of education,

¹ According to current report of UNDP this figures increased to 22.8 million children.

² Javed and Irfan (2014), Muhammad and Jamil (2020), and Muhammad et al (2022) use father-son data to find educational mobility in Pakistan.

³ See DiPrete and Grusky (1990) and Chadwick and Solon (2002).

and more educated mothers transmit the same education to their daughters? Third, are there any significant impacts of socioeconomic variables on the educational attainment of daughters?

The remaining section of the study consists of section II, the literature review related to intergenerational educational mobility. Section III presents the theoretical framework and methodology. Section IV discusses data as well as descriptive analysis. Section V deals with regression results and discussions, and section VI concludes the paper.

II. LITERATURE REVIEW

The first research work on intergenerational mobility was Galton (1886), who looked at the relationship between parents' and children's heights. Ginsberg (1929) examined occupational mobility in detail. Leading economists who began to evaluate income mobility include Soltow (1965), Wolff and Slijpe (1973), and Hauser (1975). However, the study of Becker and Tomes (1979, 1986) well documented intergenerational mobility in income and education.

Children's educational attainment is largely influenced by their parents' education. For instance, Assaad and Saleh (2016), Lillard and Willis, (1994); and Schneebaum et al., (2014), among others, find significant impacts of fathers and mothers levels of education on the educational attainments of their children. Spielauer (2004) finds a strong impact of parental education on educational and occupational mobility in Austrian households. Minello and Blossfeld (2017) argue that both fathers and mothers have an "optimistic effect" on their children's, both daughters and sons, educational achievements. In some cases, children have the same education degree as their parents.

Among UK, US, West Germany, and Canada, Blanden (2005) finds that educational mobility is higher in Canada, followed by West Germany, the US, and the UK. The author argues that higher persistence in the UK and the US can be attributed to differences in returns to education and the link between the parent's income and educational attainments. Likewise, Sanroman (2010) finds that in the US, the degree of intergenerational educational mobility continues to increase over the period. Study also reveals that Brazilian and Chilean governments have improved teenagers' schooling and intergenerational mobility compared

with the countries of Latin America. The condition of Uruguay remained worst in almost all dimensions over the period. Majumder (2010) analyzes that upward educational mobility is moderate while occupational mobility is significantly low in India. On average, the children generation's education level is higher than that of their parents. However, people are trapped in their parental class. There is strong persistence in the socially excluded classes. Van Doorn et al. (2011) find in the case of 28 European countries that educational mobility is higher in highly industrialized countries compared with developing countries. Study further finds that link between children and parental education decreases with the increase in female participation in labor. Azam (2016) finds that over the time intergenerational education persistence among daughters declined in India. The study also reveals that sons are more likely to achieve higher level of education in each cohort compared to daughters. Niknam (2016) reveals that the intergenerational educational persistence is decreasing between daughters of overseas-born mothers relative to native daughters in Sweden. Further, less persistence is found in the daughters of less educated mothers.

Comparing the influence of father's and mother's level of educations, Pronzato (2009) confirms that the father's education has more significant effect on the children educational attainments compared with the mother's. Similarly, Fessler et al. (2012) not only find a strong persistence in the educational attainment of fathers and their children but their results also depict that father's education has a larger effect than the mother's on education outcomes of the children. On the other hand, Sutor (1987) unveils that well-educated mothers have more favorable attitudes toward their daughters' schooling and give them higher instrumental support than less-educated mothers. Similarly, Johnston et al. (2005) also find that the mother's education is more significant than the father's if she is highly educated. This influence is more significant upon the daughter than on her sons. For twenty European nations, Schneebaum et al. (2014) find that mothers' education is the best determining factor of daughters' education and education of father is the best determining factor of the sons' education.

Among the existing literature related to Pakistan on intergenerational mobility, Havinga et al. (1986) focus on income and wealth mobility for

ten cities. Cheema and Naseer (2013) examine educational mobility in grandfather, father and son generations in only one district, Sargodha. Javed and Irfan (2014) examine intergenerational occupational, educational and income mobility using Pakistan Panel Household Survey which is confined to only 16 districts of Pakistan. The recent research by Muhammad and Jamil (2020) and Muhammad et al. (2022) also examine the intergenerational education mobility for sons and fathers. None of the existing literature incorporates the intergenerational education mobility for mother-daughter. The current study attempts to fill the gap by analyzing intergenerational education mobility for mother-daughter in Pakistan. Our analysis comprises on descriptive statistics, transition matrix, and regression analysis.

III. METHODOLOGY AND THEORETICAL FRAMEWORK

To predict educational mobility, two theoretical models are used in the literature. The first model, proposed by Becker and Tomes (1979; 1986), explains the mother's role in labor force participation for the intergenerational transfer of human capital through the family production model. This model is further augmented by Chiswick (1988), Gang and Zimmermann (1999), and Becker et al. (2018). At a very conventional level of a household production model, it is asserted that only the mother is responsible for producing children's education. It is equivalent to the reality that mother spent more time educating her children than the father (Leibowitz, 1974; Zick et al., 2001). The second is The "Role Model" (Manski, 1993; Streufert, 2000) which postulates that information revealed by parental choices can influence their children choices through their effects on the conditional distribution of income. Further, there is also gender dimension in role model effects. For a daughter (son), mother (father) acts as a natural role model and learn more from her (his) mother (father) by doing and observing as she (he) sees and hears primarily what her (his) mother (father) does and says (Emran & Shilpi, 2011).

To evaluate the intergenerational education mobility among mothers-daughters, we follow the model proposed by Becker and Tomes(1979) and further extended by Becker and Tomes (1986) and Becker et al. (2018), which emphasizes on human capital formation. The model assumes that each individual maximizes utility by consuming goods and investing in the children's human and non-human capital subject to

income constraints. Apart from parental income, a parent's education also contributes to the human capital. The children of highly educated parents may also be highly educated due to a relaxation in budgetary constraints in the household. A highly educated parent might be more prosperous in guiding expenditure towards family-friendly activities, events, and investments. They have more significant potential to guide children in resolving their assigned tasks and can be a more effective leader of their children in overcoming obstacles at school (Becker et al., 2018). Moreover, as the children imitate their parents' education, their educational level is motivated by the role model properties (Emran & Shilpi, 2011; Muhammad & Syed, 2019).

In light of this, the following general model of a child's human capital formation is provided as:

$$E_{ik}^D = f(E_{ik}^M, Y_i^P, X) \quad (1)$$

Where E_{ik}^D and E_{ik}^M are the k^{th} level of education of an i^{th} daughter and her mother, respectively Y_i^P is the parental income of an i^{th} daughter, and X is the vector of other control variables like father education (E_{ik}^F), household size (HS_i), the age of a daughter (A_i^D), and geographic location.

With such context, equation (1) can be written in a stochastic form as:

$$E_{ik}^D = \beta_0 + \beta_1 E_{ik}^M + \beta_2 E_{ik}^F + \beta_3 Y_i^P + \beta_4 HS_i + \beta_5 A_i^D + \beta_6 (A_i^D)^2 + \beta_7 R_u + \beta_8 P_P + \beta_9 P_S + \beta_{10} P_B + e_i \quad (2)$$

Where R_u equal to "1" if a daughter belongs to urban region and equal to "0" if she belongs to the rural region. $P_P, P_S,$ and P_B are dummies for provinces Punjab, Sindh, and Balochistan, respectively. Province Khyber Pakhtunkhwa (KP) is a reference province, and " e_i " is the stochastic error term.

IV. DATA AND DESCRIPTIVE ANALYSIS

The study uses "Pakistan Social and Living Standards Measurement (PSLM 2014-2015)" survey data. PSLM provides information at the National/ Provincial and District level of 78,635 households based on

5326 urban and rural primary sampling units (PSUs). For educational mobility, the relevant variables were extracted for mother-daughter and father-daughter. The study considers only daughters who are 16 and above years old. Further, only those individuals are selected in the study who have finished their education careers and are not currently enrolled in any educational institution. After these restrictions our sample comprises on 17620 co-resident mothers and daughters. The definition of the variables used in the study is given in Table 1.

TABLE 1
Definition of the Variable Used

Explanatory variables	Measures	Characteristics
Educational status (E)	Years of Schooling Completed ⁴	Continuous
Income of parents (Y)	Sum of income received from all sources	Continuous
Household size (HS)	Sum of individuals living in the household	Continuous
Age (A)	Age of a daughter in years.	Continuous
Region (U)	We use a dummy variable that takes “1” for urban and “0” for rural.	Binary
Province	The study uses three dummy variables for Punjab, Sindh, and Balochistan. KP is used as a reference province.	Binary

The descriptive statistics in Table 2 show the percentage distribution of mothers and daughters at various educational levels.

In the sample, most mothers have a lower level of education, and fewer mothers have a higher level of education across the regions. For instance, 28.4% of daughters have matric or above educational level, while the exact figure for mothers is only 4.78%. The distribution of “never attending school” of the mother is lower in Punjab (both urban and rural) and higher in Balochistan (both urban and rural). A similar pattern can be observed for the daughter; however, the percentage of daughters in “never attending school” is less than the mother’s. It confirms that educational achievements are lower in the mothers

⁴ For descriptive statistics and Multinomial logit model we take six categories of education: (1) Never attended school, (2) Up to Primary, (3) Up to Middle, (4) Matriculation, (5) Intermediate plus associate diploma., and (6) Graduation (BA, MA, B.Ed. M.Ed., M.Phil., Ph.D)

compared with the daughters. In a nutshell, data on overall Pakistan, provinces, and rural-urban areas reveal that the percentage of daughters and mothers is more at the lower educational level. At the same time, the proportions of daughters are relatively higher than that of mothers at a higher educational levels and smaller at lower levels in all regions of Pakistan.

TABLE 2
Educational Attainments - Mother-Daughter(%)

Level of Edu.	Mother					Daughter				
	PAK	KP	Panjab	Sindh	Baloch	PAK	KP	Punjab	Sindh	Baloch
OVERALL										
NAS	87.30	94.60	83.14	86.21	96.53	48.92	58.31	36.91	55.98	72.2
PMY	1.71	0.96	2.10	1.88	0.83	5.21	4.51	6.58	3.78	3.19
MDL	6.21	2.59	8.27	6.96	1.25	17.47	12.64	20.09	17.85	12.53
MTC	1.94	0.78	2.98	1.17	0.65	8.34	5.15	11.7	5.51	4.12
INT	2.36	0.89	3.00	2.94	0.60	15.03	14.31	18.11	13.33	6.66
GRD	0.48	0.18	0.51	0.84	0.14	5.03	5.08	6.61	3.55	1.30
PAK Urban										
NAS	70.44	84.07	64.22	68.98	93.49	27.02	45.20	16.44	30.82	54.45
PMY	2.79	1.48	2.76	3.95	0.01	4.51	2.96	4.77	4.62	4.11
MDL	12.05	8.15	12.76	12.62	3.77	15.65	10.74	17.25	14.74	14.73
MTC	4.88	2.59	9.50	3.56	0.34	10.90	4.07	14.43	8.29	7.19
INT	7.76	3.33	8.56	8.29	1.71	27.96	22.96	29.55	30.64	14.38
GRD	2.08	0.38	2.60	2.60	0.68	13.96	14.07	17.57	10.89	5.14
PAK Rural										
NAS	91.04	95.72	87.24	92.38	97.01	53.77	59.72	41.5	64.98	74.96
PMY	1.48	0.9	1.96	1.14	0.95	5.37	4.67	6.99	3.48	3.05
MDL	4.91	2.00	7.02	4.93	0.86	17.87	12.84	20.72	18.96	12.19
MTC	1.28	0.59	2.08	0.31	0.70	7.77	5.26	11.09	4.52	3.64
INT	1.16	0.63	1.59	1.03	0.43	12.17	13.39	15.55	7.14	5.45
GRD	0.13	0.16	0.11	0.21	0.05	3.05	4.12	4.15	0.93	0.70

Note: NAS= Never attend school, PMY= Up to primary, MDL=Middle, MTC= Matric, INT= Intermediate GRD= Graduation.

V. EMPIRICAL RESULTS

This section discusses educational mobility by utilizing transition matrices and regression analysis.

TRANSITION MATRIX

The study aims to determine a daughter's educational achievement relative to her mother. If answer to the question “Does a daughter fall in the educational category of her mother?” is “yes”, then the educational status describes as persistence. If a response is “no”, then there is educational mobility, either upward or downward. The transition matrix gives information on the percentage of daughters in various education levels provided their mothers' educational levels. We summarize 6x6 figures matrices into three figures portraying downward mobility, immobility or persistence, and upward mobility. The results are summarized below in Table 3.

TABLE 3
Educational Mobility - Summary of Transition Matrices

Region	Daughter-Mother		
	Downward Mobility	Immobility	Upward Mobility
Pakistan – Overall	2.05	50.95	47.00
KP – Overall	0.82	58.68	40.50
Punjab – Overall	2.28	39.65	58.07
Sindh – Overall	2.95	58.10	38.95
Balochistan - Overall	1.03	72.39	26.58
Pakistan – Urban	4.13	32.48	63.39
KP – Urban	2.59	45.55	51.86
Punjab – Urban	3.90	24.22	71.88
Sindh – Urban	5.60	35.64	58.76
Balochistan – Urban	1.70	54.12	44.18
Pakistan – Rural	1.62	54.89	43.49
KP – Rural	0.64	60.05	39.31
Punjab – Rural	1.91	43.13	54.96
Sindh – Rural	2.41	66.01	31.58
Balochistan – Rural	0.90	75.26	23.84

Source: Author's Calculations

Persistence and upward mobility in education can be observed in all regions. Only a smaller percentage of daughters attained lower level of education compared to their mothers. Overall urban regions demonstrates higher mobility (63.39) while more immobility (persistence) can be observed in overall rural regions (54.89). At the province level, the highest persistence can be found in Balochistan (72.39%), followed by KP (58.68%), Sindh (58.04%), and Punjab (39.66%). On the other hand,

highest upward mobility can be observed in Punjab urban (71.88%) and Punjab rural (54.96%) regions. Results of Table 3 propose a strong persistence and some upward mobility in the daughter's educational status.

Next, we answer the question: “What is the probability that a daughter will get a different level of education given the education level of her mother?” For this purpose, we compute the conditional probability of a daughter falling into different education levels, given her mother's education level. The results are summarized below in Table 4.

TABLE 4
Conditional Probability

Mother Education	Daughter Education					
Pakistan Overall						
	NAS_D	PMY_D	MDL_D	MTC_D	INT_D	GRD_D
NAS_M	54.87	5.53	17.56	7.45	11.94	2.65
PMY_M	17.55	6.62	24.83	16.56	29.14	5.30
MDL_M	7.68	3.20	20.38	16.36	37.11	15.27
MTC_M	5.87	1.76	11.72	16.72	41.06	22.87
INT_M	4.34	1.45	9.16	8.67	37.83	38.55
GRD_M	5.88	0.00	2.35	1.18	23.53	67.06
Pakistan Urban						
	NAS_D	PMY_D	PMY_D	MTC_D	INT_D	GRD_D
NAS_M	58.15	5.60	17.55	6.82	9.89	1.99
PMY_M	17.37	4.69	26.29	16.9	31.46	3.29
MDL_M	9.03	3.25	23.13	18.19	34.13	12.27
MTC_M	5.95	1.62	13.51	20.54	42.16	16.22
INT_M	4.19	1.80	15.57	12.57	37.13	28.74
GRD_M	10.53	0.00	10.53	5.26	36.84	36.84
Pakistan Rural						
	NAS_D	PMY_D	PMY_D	MTC_D	INT_D	GRD_D
NAS_M	35.73	5.16	17.56	11.11	23.91	6.53
PMY_M	17.98	11.24	21.35	15.72	23.60	10.11
MDL_M	5.19	3.12	15.32	12.99	42.60	20.78
MTC_M	5.77	1.92	9.62	12.18	39.74	30.77
INT_M	4.44	1.21	4.83	6.05	38.31	45.16
GRD_M	4.54	0.00	0.00	0.00	19.70	75.76

Note: _M = Mother and _D = Daughter

Results show that the chance of a daughter falling in the "never attend school" category is 54.87%, given that her mother is also in the "never attend school" category. This chance is higher in urban areas

(58.15%) than in rural (35.73%). Likewise, the probability of a daughter getting the highest level of education, given that her mother is in the “never attend school” category, is very low, ranging between 1.99% - 6.53% across the areas. Similarly, high rigidity can be observed in the upper tail of the educational distribution. A daughter’s likelihood of getting the highest level of education, given that her mother is also in the same level of education is 67.06% in overall Pakistan. In a nutshell, as a mother gets a higher level of education, the likelihood of a daughter falling into “never attend school” decreases, and the likelihood of getting a higher education level increases.

A panoramic view of Table 4 suggests that opportunities are not the same for all daughters in Pakistan. Those born in families with highly educated mothers are more likely to reach and attain high levels of education than those born in families where mothers are uneducated or less educated. It implies that there is persistence in the education level in Pakistan. The results also show that it is more likely a daughter gets higher education levels compared with her mother. It reflects the status of the daughters' increase in educational attainments compared to their mothers.

OLS ESTIMATES OF EDUCATIONAL MOBILITY

In Table 5, the findings of the Ordinary Least Square (OLS) depict that the father and mother's education levels positively impact the daughter's education. The above results are in line with Lillard and Willis (1994), Hausman and Szekely (1999), Labar (2011), and Minello and Blossfeld (2017). It implies that if the fathers and mothers are more educated, they can understand the importance of education to respond to their children positively. Furthermore, consistent with Lillard and Willis (1994), results also reveal that the impact of the mother’s education (0.407) is more substantial than that of the father’s (0.315) on the daughter's education. This shows that the mother’s education plays a better role in the educational achievement of a daughter than the father’s education. It also supports the role model hypothesis that the daughter considers the mother a role model and intimate.

TABLE 5
Daughter Educational Mobility: OLS

Independent Variables	Education of daughter	
	Coefficients	Standard Errors
Observation	=17,620	F (10, 17609) = 1208.03
R-squared	= 0.359	Prob > F = 0.000
Edu. Of mother	0.407*	(0.013)
Edu. Of father	0.315*	(0.008)
Family income	0.062*	(0.017)
Household size	-0.076*	(0.010)
Age of daughter	0.794*	(0.044)
Age squared	-0.015*	(0.001)
Urban	1.810*	(0.083)
Punjab	0.910*	(0.088)
Sindh	-0.708*	(0.095)
Balochistan	-1.225*	(0.099)
Constant	-7.270*	(0.517)

Note: *p < 0.01, ** p < 0.05, *** p < 0.1

Results also reveal that family income significantly impacts the daughter's education level. Similar positive impact of income is found by Labar (2011) for China. Since only a small part of the family income goes toward females' education, the coefficient value of family income is also relatively low. Further, income is less significant at lower levels of education because primary to matric level education in public institutions is almost subsidized. Because most women are at these lower levels of education, the income coefficient is smaller. The family size is negatively associated with the education level of a daughter. It follows that an increase in family size may increase family expenditure, making it difficult for most families to finance the educational expenditures of their daughters. This causes a reduction in parental investment per child. The chances of children to achieve higher level of education are reduced (Desai, 1995; Maralani, 2008). These results also support the quality and quantity trade-off hypothesis proposed by Becker (1960).

The urban region shows a highly positive impact on the level of education. Similar results are found by Lillard and Willis (1994). This may be due to awareness about the importance of a daughter's education and the availability of educational facilities at the doorsteps in the urban regions compared to the rural areas. Finally, the coefficient of Punjab

shows that the daughters' education in Punjab is more than in other provinces. This may be due to the cultural differences and availability of resources. Moreover, the other three provinces are less developed and lack awareness about their daughter's education.

Results also confirm a non-linear impact of the daughter's age on her level of education. The non-linear relationship between education age and daughters' education suggests a threshold age of 26.5 years⁵. It indicates that after the age of 26.5 years, the increase in age will not increase the level of education. One possible justification for this would be that females get married at that age, and the education level of daughters stops after marriage.

We also find the association between the father and mother's educational attainment and the daughter's in rural and urban regions⁶. Results show that the rigidity is higher in urban areas than in rural areas, which means daughters are less mobile in the urban region than in the rural region⁷. Results based at province level reveal that Punjab is more mobile in provinces than the other provinces⁸. Further, result also reveal that mother's education impacts more than the father's education on the daughter's educational attainment in the rural-urban regions and in all four provinces.

REGRESSION-BASED ON CATEGORICAL DEPENDENT VARIABLE

The results of OLS regression suggest that the impact of the one-year increase in the mother's education is the same on the educational level of the daughter, whether this increase in the mother's education is at a lower level or a higher level. The impact of mother education on daughter education may be non-linear. To capture the no-linearity, we use the categorical method of estimation. We divide the educational attainment variable into six categories and use the Multinomial logit model (MLM) to test the intergenerational mobility of daughter education. Before

⁵ $\left(\frac{0.794}{2 \cdot 0.015}\right) \approx 26.5$

⁶ Results are given in Table A1 of the Appendix.

⁷ The coefficient of mother education in urban region (0.490) is greater than the coefficient of mother education in rural region (0.307)

⁸ Results are given in Table A2 of the Appendix

presenting the results of MLM, the results of two LR tests are given in Table 6.

TABLE 6
LR Tests – Testing Significance of the Model

LR Test for Independent Variables			
Independent variables	χ^2	df	P>chi2
Education of mother	925.083	5	0.000
Income	19.993	5	0.001
Household. Size	165.392	5	0.000
Age	648.502	5	0.000
Age. Square	549.922	5	0.000
Urban	108.352	5	0.000
Punjab	353.712	5	0.000
Sindh	92.646	5	0.000
Balochistan	45.659	5	0.000
LR Test of Overall Significance of the Model			
LR chi2	=	9240.200	
P>chi2	=	00.000	

The LR test in the upper panel of Table 6 tests the hypothesis that all the coefficients of a particular independent variable across all the outcome categories of the dependent variable are equal to zero. Results of the LR test show that all the variables have statistically significant effects on all outcome categories of the daughter's education level. The result of the LR test, given in the lower panel of the table, shows that the overall model is statistically significant. We reject the null hypothesis that all the coefficients, except intercept, associated with independent variables for all outcome categories of daughter education are simultaneously equal to zero.

After confirming that our model is statistically significant, the estimates of marginal effects derived from the multinomial logit model are presented in Table 7.

Results show that an increase in a mother's education from “never attending school” to “primary school” is associated with a decrease in the probability of 25 percent of the daughter being in never attending school. Likewise, an increment in a mother's education to “graduation” relative to “never attend school” is associated with a decreased probability of

daughter's remaining at a lower education level⁹. Moreover, an uplift in the education level of mothers to graduation level compared to never attend school the daughters' probabilities of getting intermediate and graduation level increase by 0.142 and 0.262, respectively.

TABLE 7
Model Marginal Effects Overall Pakistan

VARIABLES	NAS_D	PMY_D	MDL_D	MTC_D	INT_D	GRD_D
PMY_M	-0.250* (0.0265)	0.018* (0.016)	0.07* (0.03)	0.063* (0.019)	0.092* (0.022)	0.006* (0.0009)
MDL_M	-0.324* (0.0159)	-0.006* (0.0008)	0.072* (0.0152)	0.075* (0.0114)	0.138* (0.013)	0.045* (0.006)
MTC_M	-0.282* (0.0344)	-0.020* (0.0140)	0.0009 (0.026)	0.087* (0.02115)	0.1531* (0.023)	0.061* (0.0106)
INT_M	-0.354* (0.0344)	-0.015* (0.0157)	0.0606* (0.0266)	0.0244* (0.0106)	0.168* (0.024)	0.116* (0.0134)
GRD_M	-0.192* (0.0314)	-0.0587* (0.0018)	-0.1003* (0.053)	-0.053* (0.0266)	0.142* (0.058)	0.262* (0.037)
Income	-0.005* (0.001)	-0.0029* (0.0009)	0.0012* (0.0008)	0.001* (0.0004)	0.0009* (0.0002)	0.0048* (0.0002)
Household size	0.009* (0.0011)	0.002* (0.0006)	-0.0007* (0.0002)	-0.0013* (0.0007)	-0.007* (0.0009)	-0.002* (0.0007)
Age	-0.042* (0.0048)	-0.015* (0.0021)	-0.0216* (0.004)	-0.0018* (0.00049)	0.0344* (0.005)	0.046* (0.003)
Age. Square	0.0009* (0.0001)	0.0003* (0.00004)	0.0003* (0.00009)	-0.00002* (0.00001)	-0.0007* (0.00009)	-0.0008* (0.00006)
Urban	-0.048* (0.0096)	-0.007* (0.0053)	-0.028* (0.0075)	0.012* (0.0056)	0.043* (0.0067)	0.028* (0.0036)
Punjab	-0.164* (0.009)	0.026* (0.0048)	0.076* (0.0073)	0.056* (0.0054)	0.0101* (0.007)	0.004* (0.001)
Sindh	-0.069* (0.0109)	-0.007* (0.005)	0.077* (0.0091)	0.009* (0.0059)	0.006* (0.0008)	-0.017* (0.005)
Balochistan	0.0507* (0.0128)	-0.013* (0.0054)	0.018* (0.009)	0.0012* (0.007)	-0.039* (0.009)	-0.018* (0.006)

Note: *p<0.01, ** p<0.05, *** p<0.1. Standard errors are in parentheses

The above findings exhibit the elements of persistence and upward mobility in education. From the results, we can see that up to the middle level of education, the increase in probabilities is greater for the daughter in the education levels higher than the mothers' education. It means upward mobility when the mother is at a lower level of education. However, in matric and above level of education, the increase in

⁹ Matric and below matric.

probabilities is more in magnitude for the levels of education where both daughter and mother fall. This show that at higher levels of education, there is more persistence.

The coefficient of family income suggests that the probability of higher education levels increases when family income increases. The coefficients of marginal effects of income for “never attended school” and “Upto Primary” level of education are negative indicating that the chances of a daughter to remain in these two categories decrease with the increase in income. This shows that the daughters of high-income families have more opportunities to move to higher education levels compared with the daughters of low-income families. The coefficient of household size is negative for the middle and above categories. It followed the resources dilute hypothesis and the child quality-quantity trade-off. The negative sign for middle and above education shows that with the increase in household size, the probability of getting higher levels of education is decreasing. Education is expensive at higher levels; therefore, it becomes harder for parents to finance the educational expenses of their children, especially when they are more in number, so their chances of getting higher levels of education are reduced. However, the probability of “never attended school” increases with the increase in household size. Similarly, the probability of primary school also increases with the household size, possibly due to the zero or low cost of education at that level. The coefficient of age suggests that an increase in a daughter’s age increases the probability of moving to a higher level of education and reduces the probability of staying at a low level of education.

VI. CONCLUSION

Our findings reveal strong persistence in the daughters-mothers educational level and upward mobility. The results illustrate that a few people achieved higher education, and many never attended school in their whole life. After completing a matric degree, most individuals left their education and never went to colleges and universities. Rural areas are even worse, where many daughters and mothers cannot attain higher education. The condition of the province of Balochistan is worse, and it is the least uneducated region of individuals. Although the remaining

provinces are not that satisfactory, they are better than Balochistan in some ways.

In provinces, Punjab is more mobile than the remaining provinces. After that, Sindh and KPK are more mobile, with significant persistence in the daughter generation. Despite the education, the parents' family income also positively influences a daughter's education level. Larger household sizes decrease the chances of continuing the daughters' higher education level. Our result identifies that achievement in education declines with the rise in family size. By using the OLS estimator, we found the positive role of mother and father education in the achievement of daughter education.

The study's results confirmed the strong persistence in educational achievements and indicated that we are far behind developed nations' education levels in a poor financial situation. To improve the socioeconomic position of people, the government should take action to finance the poor to soften their financial constraints and make strategies to attain a higher level of education. Moreover, it is also required to improve the educational infrastructure, and providing economic incentives to females may encourage parents to send their daughters to school. It may help in reducing the dropout ratio. It is also required to focus on redistributive policies of the government in the form of taxation. Transfer schemes may mitigate financial and other hurdles to accessing higher education. The government should implement and enforce minimum education laws. This study also confirms the regional heterogeneity in the educational achievement of the daughter. It suggests that provincial and regional education attainment policies are more critical than country-level education. Finally, opportunities for daughters depend on the ideology of their families. Therefore, only relying on the education system to increase mobility would not be sufficient. There is a need for institutional reforms and behavioral changes to enhance educational mobility and improve the daughter generation's socioeconomic status.

Finally, our analysis is based on the co-resident daughters-mothers data. We excluded all married daughters as PSLM survey does not report information on their parents. They are reported as wives if living with husbands in nuclear families or daughters in-law if living in joint families

with their in-laws. More accurate results of educational mobility can be found out if data on married daughters are also matched with their parents.

STATEMENT/ DECLARATION OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

DATA AVAILABILITY

Data is available at <https://www.pbs.gov.pk/content/pakistan-social-and-living-standards-measurement>.

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APPENDIX

TABLE A1

OLS Results (Dependent Variable: Education of Daughter)

VARIABLES	Urban Region		Rural Region	
N =14,426 R ² =0.295	F (9, 14416) = 670.24 Prob > F = 0.0000		N = 3,194 R ² = 0.358	F (9, 3184) = 197.28 Prob > F = 0.0000
Education of mother	0.490*	(0.0183)	0.307*	(0.0198)
Education of father	0.316*	(0.0083)	0.286	(0.0173)
Family income	0.0854*	(0.0202)	0.0372**	(0.0185)
Household size	-0.0776*	(0.0110)	-0.107*	(0.0249)
Age of daughter	0.699*	(0.0450)	1.220*	(0.1310)
Age square	-0.0132*	(0.0009)	-0.022*	(0.0027)
Punjab	0.812*	(0.0920)	1.634*	(0.3000)
Sindh	-0.897*	(0.0991)	0.389*	(0.3150)
Balochistan	-1.225*	(0.1020)	-0.940*	(0.3640)
Constant	-6.008*	(0.5280)	-11.20*	(1.5590)

TABLE A2

OLS Results (Dependent Variable: Education of Daughter)

VARIABLES	KPK		Punjab	
N =2,817 R ² =0.256	F (7, 2809) = 138.08 Prob > F = 0.0000		N =8,702 R ² =0.3329	F (7, 8694) = 619.22 Prob > F = 0.0000
Education o mother	0.556*	(0.0453)	0.373*	(0.0166)
Education of father	0.303*	(0.0186)	0.343*	(0.0112)
Family income	0.199*	(0.0319)	0.0502*	(0.0191)
Household size	-0.168*	(0.0213)	-0.087*	(0.0157)
Age of daughter	0.685*	(0.118)	0.862*	(0.0606)
Age square	-0.0128*	(0.0024)	-0.016*	(0.0012)
Urban	0.979*	(0.2950)	1.841*	(0.1130)
Constant	-5.443*	(1.3670)	-7.110*	(0.7100)
	Sindh		Balochistan	
N =3,939 R ² =0.378	F (7, 3931) = 341.28 Prob > F = 0.0000		N =2,162 R ² =0.301	F (7, 2154) = 132.50 Prob > F = 0.0000
Education o mother	0.403*	(0.0283)	0.515*	(0.0621)
Education of father	0.272*	(0.0151)	0.275*	(0.0188)
Family income	0.0438***	(0.0237)	0.153*	(0.0322)
Household size	-0.0229*	(0.0195)	0.0021	(0.0234)
Age of daughter	0.707*	(0.101)	0.523*	(0.122)
Age square	-0.0132*	(0.0022)	-0.0089*	(0.0027)
Urban	2.408*	(0.163)	1.208*	(0.240)
Constant	-7.216*	(1.138)	-6.322*	(1.325)