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Determinants of the Outcomes of a Household's Decision Concerning Child Labor or Child Schooling

Azeem Gul[1] · Sareer Ahmad[2] · Amanat Ali[2] · Asad Ullah Khan[2] · Muhammad Sulaiman[3]

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Abstract

Child labour is an issue of global concern. It assumes more importance when it comes to developing countries like Pakistan. This study attempts to highlight this child labor issue in Mardan District of Khyber Pakhtunkhwa, a province of Pakistan. The analysis collects information through modified questionnaire by randomly interviewing households. Using Multinomial Logit model, the analysis finds that probability of child schooling is high, in case a child is already enrolled in primary school education. Similarly, child schooling is more likely when monthly income of a family head increases. However, with the increase in 'age' and 'monthly income' of a child, the probability of child labour tends to increase. Additionally, Poor financial position of a family also increases the chances for child's labour activities. Furthermore, the analysis finds variables like "initiative of work by child himself" and "working capacity" increase the chance for a child to combine school with labour activities. That is, if a child engages himself in labour work on permanent basis, such a child is more likely to combine school with labour work to finance his educational expenses. On the contrary, a household prefers his child neither to attend school nor labour work in case of increasing family's income. That is, in such a situation a household may prefer his child to engage in homecare activities. Finally, the analysis shows that probability of child schooling is high in case a child is living in rural areas. Based on empirical findings, the study suggests few practicable steps to the government for addressing the child labour issue. Opening more primary schools in remote areas and providing vocational training centers to children whose families cannot afford educational expenses, would be helpful in reducing child labour exclusively.

Keywords Child Labour · Child Schooling · Vocational Training · International Labour Organization · Household

Extended author information available on the last page of the article

1 Introduction

According to International Labour Organization (ILO), child labour is any kind of working activity by an individual below 15 years old, which is physically, mentally, and socially harmful for children and obstructs in the way of their school attendance.

World estimate shows that around 160 million children (97 million boys and 63 million girls) were engaged in labour activities, among these nearly half (79 million) children were engaged in risky and un-safe work. During the period of four years (2016 to 2020), the number of children engaged in labour activities increased by more than 8 million. Similarly, the absolute number of children working in hazardous environment also increased by 6.5 million (ILO & UNICEF, 2021). Child labour adversely affects human capital as it takes children out of school. Moreover, children engagement in labour activities often results in lacking of access to health facilities and other fundamental rights. The issue of child labour and exploitation has remained an important concern for the International Labour Organization (ILO). Therefore, to regulate child labour, several conventions have been adopted including United Nations Convention on the Rights of the Child (UNCRC 1989), International Labour Organization Minimum Age Convention (Convention 138) and Worst Form of Child Labour (Convention 182) (Bhukuth, 2008; ILO & UNICEF, 2021; Khan & Lyon, n.d.; Mavunga, 2014). Despite the fact that due to child labour, laws and regulations, world countries observed, progress on protecting the rights of children, however, still grey areas exist in application and implementation of these convention.

Although child labour prevails worldwide, however, the issue has adopted an alarming state in developing countries. For example, (ILO & UNICEF, 2021) reports that highest prevalence of child labours are in Sub-Saharan Africa (86.6 million) followed by Central and Southern Asia (26.3 million). In Pakistan, there are total 40 million children below age 14, and among these around 3.8 million are working as child labour (Mavunga, 2014). In this line (Akhunzada et al., 2016; Arshad, 2021; Ashraf et al., 2020) reports that about 1.5 million children are working alone in Khyber Pakhtunkhwa (KP), province of Pakistan. To protect the fundamental rights of children, Pakistan has approved the international conventions and therefore, enacted laws and regulations to protect the rights of children. For example, Pakistan notified Employment of children Act in 1991, which restricted labour of children below the ages of 14 years. In this regard, the government of Khyber Pakhtunkhwa has enacted regulations such as Child Protection and Welfare Commission, child Protection Units at districts level, Beggar Homes, Welfare Homes and development of Zamung Kor for the provision of children's basic rights (Khan, 2021). Despite the above mentioned measures, evidence shows that children below age 15 are working in various small businesses in the most populous and economically developed districts of Pakistan. For example, (Burki et al., 1999) reports that Pakistan is one of those Asian countries where highest numbers of children working below the age of 15 years. In the same line, child labour survey conducted in 1996 reveals that 3.3 million children, ages 5–14 years, are working in Pakistan.

Empirical evidence shows that socio-economic factors like poverty, unemployment, parental education, family size and household composition are main

factors that influence household's decision about children to either attend school or work and earn income for alleviating family's financial problems (Arshad, 2021; Ashraf et al., 2020; Bhukuth, 2008; Introduction, 2006; Khan, 2021; Khan & Lyon, n.d.; Lodhi et al., 2021; Study, 2022; Ul-haq et al., 2020). In this line of reasoning, many studies conducted in Pakistan have focused on highlighting the socio-economic determinants of child labour. For instance, (Khan, 2003) finds that parental education and asset ownership both positively influence child schooling while these factors have negative effects on child labor activities. Similarly, (Khan and Ali, 2003) finds socioeconomic factors like parental education, per capita income of households, household's assets, family size and household composition which significantly influence the joint decision of child labour and school attendance. Few researchers have attempted to find determinants of child labour in KP province of Pakistan. For example, findings of the study (Ahmed et al., 2016) shows that education and income of a household negatively influence child labour. Further, the analysis adds that parental education significantly influences child's schooling. Similarly, another qualitative study (Sikandar et al., 2022) conducted in Nowshera and Mardan districts of KP, finds that family size is the most significant factor of child labour. The analysis further shows that number of females, parent's occupation and age of parents are positively associated with child labour, however parental education, household income and number of males negatively influence child labour.

Although, we find few studies that have worked on highlighting socio-economic determinants of child labour in some districts of Pakistan, however, empirical results of these studies are inconsistent owing to varied population characteristics in different regions. In this regard, Ray (2000a) finds that child labour's characteristics and determinants varies across regions and therefore, requires different strategy to address the issue faced by the household. In addition, past studies conducted in Pakistan, have mainly focused on highlighting determinants of child labour. However, in reality the decision of a household about children engagement, has four possible outcomes. That is, the child may either attend the school or work only. Second, the child may combine school with working activities. Third, the child may be not working as well as attending school. Therefore, this paper attempts to find determinants of each of the four possible outcomes in districts Mardan of Khyber Pakhtunkhwa. Mardan is the second largest populous and economically developed district of KP. The area of Mardan is 1632 square kilo meters with a total population of 2,373,061, comprising of 51/% male and 49% female (Begum & Iqbal, 2018; Pakistan Bureau of Statistics, 2017). There are a total of five tehsils in this district, however, the paper focuses on three tehsils including Mardan, takht-e- Bhai and Katlang. Mardan is the second largest district of KP, containing a total of 1995 schools, that is, 1009 boys and 906 girls. Statistical data shows that about half the children in district Mardan are not attending any school level. Additionally, gender disparity in getting education is another serious issue in the district indicating 53.50% male literacy rate whereas only 18.38% female literacy rate (Ahmed et al., 2012; Ali & Jan, 2014; Jan, 2021; Rahman & Ali, 2019; Saqib et al., 2022). Children in the fore mentioned districts of Mardan are working in small business, agricultural and tobacco farms, automobile workshops, transport services etc. Therefore, this paper contributes to

the empirical research in the sense that it focuses to examine determinants of each of the four possible outcomes in one of the most populous district of KP, Mardan. Highlighting determinants of each outcome of the household decision could be useful in designing public policy to address the issue of children humiliation through hazardous labour work.

2 Objective of the Study

The prime objective of this paper is to find socio-economic and demographic factors that affect household's decision to engage children in labour activity or schooling. More specifically, the analysis attempts to examine parental characteristics (parental education, monthly income and employment) child characteristics (child's age, monthly earnings, and educational level) and family characteristics (family size and composition) significantly affect household's decision concerning children participation in labour activities or school attendance. Therefore, to achieve the objective, the study attempts to answer the following research questions:

- Whether educational level of both parent and child significantly influence household's decision about child labour or school attendance?
- Whether family and child earnings affect outcomes of household decision concerning child education or schooling?
- Whether age of a child, residential area and family structure influence household's decision about child enrollment in school or labour activity

3 Organization of the Study

The remaining study is organized as follows: In the second section, the study review literature related to child labour in Pakistan as well as in foreign countries of the world. The third section presents econometric methodology to empirically analyze the issue of child labour. Results and discussions are mentioned in section fourth. And section five concludes the analysis and gives policy recommendations at the end.

4 Literature Review

The phenomenon of child labour has been long debated, and therefore, the issue has attracted many researchers to identify its main determinants. Empirical evidence shows that poverty, educational status, employment, and wage-earnings are main factors effecting a household's decision concerning child labour and child schooling (Berman et al., 2021; Boozer & Suri, 2001; De Carvalho Filho, 2012; De Hoop et al., 2020; Gul et al., 2022; Prifti et al., 2021; Rosat & Rossi, 2001; Valero-Gil & Valero, 2022). In this regard (Islam & Hoque, 2022) conducts a qualitative study in to find determinants of child and child schooling. Result of the study shows that

poverty induces especially the female to substitute child labour with child schooling. In addition, high labor demand, parental labor intensive jobs, lack of credit facilities, and conservative cultural characteristics are factors that compel household to engage their children in labour activities. The study suggests that increasing education and schooling opportunities are helpful in reducing child labour.

In the same line of reasoning, (Dar et al., 2002a, b) review empirical studies on household decision of child schooling and labout activities. The study reveals that although significance of variables on household's decision of child labour varies across countries, however, poverty is consistently correlated with child labor. Moreover, child's age is consistently and positively associated with child labour. On the contrary, the analysis finds that children whose parents are educated are more likely prefer school attendance to child labour.

Lire, (2005) using cross-countries data and investigates main factors of child labour and schooling. The study finds that in rural area poverty is the prime cause of child labor while in urban area no significant relationship was found between poverty and child labour services. Similarly, availability of credit in rural areas while childcare options in urban areas increases chances of child schooling. Additionally, encouraging adult education and increasing wage reduces child labor and ensure school attendance.

Recently, (Martey et al., 2022) examines the association between time poverty and child labour, school attendance and time allocated to school and from school. The study defines 'time poverty' as where people allocates greater hours to work than are desirable. The result find shows positive association between time poverty and time allocated to and from school, number of working children, and attendance at private school. Additionally, the study finds negative influence of time poverty on the number of children in public school.

Moreover, using a quality data of children ages 7–15 and probit estimation techniques, (Haile & Haile, 2008) examines the determinants of child labour and child schooling in Ethiopia. The analysis finds male children relatively more inclined towards schooling, showing gender discrimination. Additionally, the study finds joint family, dependency, and large live stocks increases the chances for combining school with labour activities. However, education of the family head increases the probability of child schooling only. On the contrary, working more than desirable time reduces the likelihood of school attendance.

The joint decision of a household about child labour and school attendance has also been empirically examined in Pakistan. For example, (Ranj Ray, 2000a, b, c) tests the hypothesis whether, in the context of Pakistan Peru, poverty leads to child labour; and reduces the likelihood of school attendance. The results confirms validity of both hypothesis in the case of Pakistan but not in the context of Peru. However, the study finds consistent result the adult education improves welfare of children both in Peru and Pakistan.

Similarly, (Jafri & Raishad, 1997) argued that child labour issue (ages 5–14) is widespread in Pakistan, however, no reliable data is available to resolve this issue. Therefore, the author conducts a qualitative survey covering the period 1990–91 to 1992–93 and analyzes the phenomenon of child labour issue. The result find shows that child labour (ages 10–14 years) substantially increased from 1.8 million to 2

million during the study periods. Further, agriculture sector absorbs most of the child labour in rural areas where majority of them are engaged in farms production activities. In urban areas, children are mostly working in services sector. The analysis further adds that three-fourth of the child labour in Pakistan are working beyond 8 h a day. The study suggests that household survey at country level is imperative for comprehensive analysis of the child labour phenomenon in Pakistan.

Burki et al., (1999) analyzes the outcomes of a household's decision concerning child labour and schooling. The analysis finds age and gender significantly affect household decision for combining child schooling with labour activities. Young children and female were found as having more probability of neither working nor attending school. Among parental characteristics, mother's education induces the habit of school attendance. On the contrary, mother's employment negatively influence child schooling while positively associated with child labour. Further, young children ages below four years decreases the likelihood of school attendance. However, children ages 10–14 years are more likely to attend school and less likely to engage in child labour.

Few researchers have analyzed the issue of child labour in Khyber Pakhtunkhwa province of Pakistan. For example, (Lodhi et al., 2021) explores the determinants of child labor and child welfare in districts Mardan, Swat and Peshawar of Khyber Pakhtunkhwa, Pakistan. The result find shows household characteristics such as income level, family head's education and employment, joint family and children living in urban areas are less likely to participate in labor activities. On the contrary, age of the family's head, household's size, debt on family and financial shock increase the chances for labour activities. Moreover, the analysis finds that non-labour child welfare is high than child engaged in labour activities. Additionally, the study explores wages, children working in safe environment, rest or ease, age and educational attainment are factors that promotes child's welfare. Ali (2011) examined the major determinants of child labour in the Swabi District of the Khyber Pakhtunkhwa province. The study finds that 73 percent of the children engaged in labour in the district are from nuclear families and 86 percent of the children are illiterate. The analysis further discovered that more than half of the working children are underpaid. Similarly, Akhtar (1998) investigates the phenomenon of child labour in the Peshawar district. He too found that low levels of family income and education had a close link with child labour. Awan et al. (2012) explores the socioeconomic causes of child labour in the Mingora area of the Swat District of the province. They too concluded that parents' income and education level play important roles in pushing children toward labour. The researchers suggested vigorous media campaigns, strict implementation of relevant laws, and enrolment in schools with free education as important factors to curb this social evil.

Similarly, (Begum & Iqbal, 2018) explores the child labour's determinants in districts of Mardan and Nowshera of Khyber Pakhtunkhwa, Pakistan. The findings of the study show that family size and children's age positively while education negatively influence the decision of a household to participate their children in labour activities. Moreover, the analysis finds that with the increase in household's income and family size, the likelihood of child labour increases. The study suggests that education for small family be encouraged to reduce the prevalence of child labour.

Finally, (Jabeen & Akhunzada, 2017) assess the implementation of the Khyber Pakhtunkhwa's Child Protection and Welfare Act 2010. The analysis finds the Act as not at par value of United Nations Convention on the Right of the Child (UNCRC 1989). First, the local Act is lacking in its legislation, legal interpretation, and management of protecting child rights in the court proceedings. Further, the analysis finds the local Act as deficient in SOPs and other administrative failures in its effort of protecting child's fundamental rights. The study suggests revision of the local Act along with other administrative reforms so as to make it more efficient in the fight of protecting child's right in Khyber Pakhtunkhwa. Although, we find rich empirical evidence concerning evaluation of the child labour phenomenon. Though, the child labour issue has also been empirically analyzed in Pakistan, especially in some districts of Khyber Pakhtunkhwa. However, these studies identifies varying determinants of the child labour owing to differences in their data sampling, functional form of the model and estimation methodology. Additionally, studies conducted in some districts of KP focuses on exploring the determinants of child labour only. These studies lacks highlighting factors associated with other possible outcomes of a household decision. For instance, it is possible that a household decision about child labor or schooling may not be necessarily inverse. That is, it is possible that a household may decide for his child to combine schooling with labor activities. In another case it is also possible that a child neither work nor attend school. We therefore, attempts to examine determinants of each outcomes of a household's decision concerning child and schooling in Mardan districts of Khyber Pakhtunkhwa. The next section of the study presents data definition, data sampling and estimation methodology to empirically analyze the child labour and child schooling decision of a household.

5 Data and Methodology

5.1 Nature of Data and Study Area

The study collects primary data purposely from three (3) most populous tehsils (purposely selected on the basis of availability of target population) of districts Mardan namely Mardan, Takht-e-Bhai and Katlang. The mode of the data collection is through interviewing head of the household. The local administration helps in identifying village councils and sub-councils, where chances of target population is high. These councils served as primary sampling unit (PSU). Further, streets were selected in two steps. First, proportion of streets were identified based on total number of streets in each village councils. Second to show randomness in data, the author interviewed household of every third street. Finally, households were randomly interviewed within the selected streets. Thus, household interviewed served as secondary sampling unit (SSU). Since the selection of household were randomly, we therefore, have attempted to include both child labour and school going children in our analysis. The analysis uses a modified questionnaire which asks relevant information about children, households and family characteristics. The researchers divided the children of the three tehsils into four groups: (a) those who attend school

only (b) those who combine school with child labour (c) those who only work (d) those who neither work nor attend school.

5.2 Sampling Technique and Size

The study uses random sampling techniques for data collection and analysis. The sampling area and sampling technique is purposely selected to show characteristics of the average sample. The study uses pretest questionnaire in order to ensure that the study has collected meaningful data. In the regard following information were focused. First, it was ensured that the household interviewed has a permanent residency in any of the three selected districts. Second, the household being interviewed must have children of ages 5–15 years. Finally before formal survey, willingness of the household for participating in this research was ensured. In order to obtain suitable sample, the study uses an online calculator for the analysis household decision about child labour and schooling. Therefore, out of total 20,000 children among three tehsils, the study selects total 200 samples based on the number of children in each tehsil. This gives rise to 105 questionnaires from tehsil Mardan, 50 from tehsil Takht-e-Bhai, and 45 from tehsil Katlang. The study uses following formula for deciding suitable sample:

$$NI = \frac{n}{N} * N_i$$

NI = No of respondents in each Tehsil.
n = Total sample size.
Ni = No of total respondents in each Tehsil.

Now to obtain the appropriate sample size at the rate of 5 percent of the total sample size (n = 200) from each selected tehsils proportional allocation sampling technique is used:

N1 = 200/20,000*10,500 = 105.
N2 = 200/20,000*5000 = 50.
N3 = 200/20,000*4500 = 45.

The data collected through the survey was first tabulated and then formally coded on a computer and finally analyzed through SPSS software.

5.3 Theoretical Model

Literature uses several econometric methods for modeling the decision of a household about child labour and child schooling. For instance, (Das, 2012; Psacharopoulos, 1997; Ranjan Ray, 2000a) have used Univariate Logit and Probit methods for analyzing child labour and schooling choice. However, these methods of estimation do not take into account the possible interdependence between the choice of child labour and schooling. Therefore, many studies have used Bivariate Probit, Sequential Probit, and Multinomial Logit, allowing for mutual interdependence of the two choices (Amit Dar et al., 2002a, 2002b; Grootaert & Patrinos, 1999; Liu, 1998; Nielsen, 1998; Patrinos & Psacharopoulos, 1995;

Sakellariou, 2014; Tunali, 1997). Which model is preferable to others depends on the process of the decision-making process of a household. If the decision-making process is simultaneous then Multinomial Logit is preferable for the analysis. However, if the decision-making process assumes a continuous order, then the sequential Probit model is useful for modeling child labour analysis.

As this paper focuses on all choices, that is, schooling only, child labour only, and simultaneous decision of both schooling and child labour. Therefore, the study uses Multinomial Logit method for the analysis of child labour and schooling which allows for interdependence of multiple choices. The Multinomial Logit model assumes "S" categories for the dependent variable; however, these categories are not in any continuous order. This study focuses on the following four categories.

1) Going to school only or otherwise,
2) Neither going to school nor working labour or otherwise,
3) Labour work only or otherwise,
4) Both attending school and labour activity or otherwise,

Denoting the child characteristic by a vector "z", the Multinomial Logit specification is shown as: For S not equal to 1.

$P(Y=1)=\frac{1}{1+\sum_{j-2}^{s} e^{\beta jZ}}$ The empirical models will be estimated using an iterative maximum likelihood technique to produce asymptotically effective parameter estimates (Greene, 1992).

According to Greene (1992; P, 484) the Multinomial Logit model's log-likelihood function is as follows:

$$InL=\sum i \sum j d_{ij} InP_{ij}$$

where P_{ij} is the probability of individual i in state "j". d_{ij}= 1 if y_i=j, 0 otherwise, j=0, 1, 2,,,,JThe first derivative are: $\partial nL/\partial \beta_j=\sum i\left(d_{ij}-P_{ij}\right)X_i$

The Hessian is $\frac{\partial InL}{\partial \beta_i \beta_m}=-\left[1(1=3)P_1P_1P_m\right]X'X$

The study estimates four different equations, one for each choice category. In the first step, coefficients estimate of the model with the dependent variable "child education only or otherwise" are obtained. In the second step, the study estimates models with dependent variable "child labour work only or otherwise". Finally, estimates are obtained for the model having dependent variable with "both child labour and education or otherwise" category.

The general econometric model is given below:

$$Y_j=\alpha_i+\varphi_i X_i+u_i$$

And the model for "child education only or otherwise" is given as

$$Y_1=\alpha+\varphi_1X_1+\varphi_2X_2+\varphi_3X_3+\varphi_4X_4+\varphi_5X_5+\varphi_6X_6 \quad (1)$$

where,

Y_1 = Child schooling only or otherwise.

X_1 = Age of the child.
X_2 = Residential area of the child.
X_3 = Educational status of the child.
X_4 = Child is studying or not.
X_5 = Family monthly income.
X_6 = Income of the family's head

$$Y_2 = \alpha + \varphi_1 X_1 + \varphi_2 X_2 + \varphi_3 X_3 \tag{2}$$

where,
Y_2 = neither schooling nor labour work or otherwise.
X_1 = Educational status of the child.
X_2 = Child is studying or not.
X_3 = Family monthly income

$$Y_3 = \alpha + \varphi_1 X_1 + \varphi_2 X_2 + \varphi_3 X_3 + \varphi_4 X_4 \tag{3}$$

where,
Y_3 = Child labour work only or otherwise.
X_1 = Age of the child.
X_2 = Child is still studying or not.
X_3 = Reason of child labour work.
X_4 = Monthly income of the child

$$Y_4 = \alpha + \varphi_1 X_1 + \varphi_2 X_2 + \varphi_3 X_3 + \varphi_4 X_4 + \varphi_5 X_5 \tag{4}$$

where,
Y_4 = Combining both child labour and child schooling or otherwise.
X_1 = Child still is studying or otherwise.
X_2 = Working capacity of a child.
X_3 = Reason behind a child work.
X_4 = Initiation of a child work.
X_5 = Monthly income of a child.

6 Result and Discussion

Below in Table 1, the study gives mean, standard deviation, t-statistics and the associated probability at 1%, 5% and 10% level of significance respectively Table 2.

The result indicates that the categorical variable "child age" with given means and standard deviations has a significant role in influencing child labour work or schooling decision. Similarly, many other variables like family or head monthly income, child earnings and experience have significant role in effecting child labour activity or decision to get education. Moreover, poverty-a reason behind child working is also significant. This indicates that parents engage their children in labour activity to support their poor economic status. Furthermore, the study has analyzed

Table 1 Area-Wise Distribution of Sample Respondents

District	Tehsil	No of children	Sample Size
Mardan	Mardan	10,500	105
	Takht-e-Bhai	5000	50
	Katlang	4500	45
Total	3	20,000	200

SPARC, 2014

Table 2 Variable Construction

Variables	Description	Measurement
X1	Age of Child	Above 11 Years = 1, Otherwise (-) = 0
X2	Child Living Area	Rural = 1, Otherwise (-) = 0
X3	Education Level of Child	Primary Education = 1, Otherwise = 0
X4	Either Child studying /not	Lack of interest in edu = 1, Otherwise (-) = 0
X5	Child's Mother education status	Illiterate = 1, Otherwise (-) = 0
X6	Education Level of Father of the Child	Primary Education = 1, Otherwise (-) = 0
X7	Income of Child's Father	Above Rs. 8000 = 1, Otherwise (-) = 0
X8	Monthly Income[family]	Above Rs. 10,000 = 1, Otherwise (-) = 0
X9	Father's age	Below 45 Years = 1, Otherwise (-) = 0
X10	Either Father/family head on job	Yes = 1, Otherwise (-) = 0
X11	Family members [total no.]	1 to 5 Persons = 1, Otherwise (-) = 0
X12	Either joint family	No = 1, Otherwise (-) = 0
X13	Child working Capacity	Permanent work = 1, Otherwise (-) = 0
X14	Major reason of work	Poverty = 1, Otherwise (-) = 0
X15	Work initiative	Own desire = 1, Otherwise (-) = 0
X16	Income [monthly] of child	Rs. 1500 to 3000 = 1, Otherwise (-) = 0

Table 3 Descriptive Analysis of Variables

Var. Name	Classifications	Mean	Std. Deviation	T	P
Age of the child	Above 11 years	2.62	1.09	2.50**	0.013
	Otherwise	2.18	1.14		
Residing area	Rural	2.32	1.27	-2.11	0.22
	Otherwise	2.71	1.15		
Chils's education level	Primary Education	2.56	1.26	0.61	0.61
	Otherwise	2.28	0.89		
Current Edu.status	Lack of interest in edu	2.37	1.35	-0.43	0.61
	Otherwise	2.68	0.56		
Mothers' Education level	Illiterate	2.32	1.76	-2.75	0.23
	Otherwise	2.56	1.07		
Edu. Head of the family	Primary Education	2.67	1.54	1.59	0.34
	Otherwise	2.39	1.25		
Age FH	Below 45 years	2.52	1.21	-0.95	0.42
	Otherwise	2.49	1.13		
Income FH	Above Rs.8000	2.28	1.09	-3.12*	0.05
	Otherwise	2.64	1.65		
Family income [monthly]	Above Rs.10000	2.72	1.10	7.23**	0.04
	Otherwise	1.0	0.00		
Either on job/ working [FH]	Yes	2.49	1.23	0.86	0.89
	Otherwise	2.38	1.43		
Total Family Members	1 to 5 persons	237	1.28	-0.57	0.97
	Otherwise	2.64	1.23		
Either family joint	No	2.67	1.32	0.86	0.98
	Otherwise	2.38	1.58		
Child's capacity of working	Permanent work	3.49	0.64	14.56**	0.02
	Otherwise	1.89	0.89		
Major reasons for work	Poverty	3.48	0.79	8.98**	0.04
	Otherwise	2.26	1.43		
Child's work initiatives	Own desire	3.66	0.67	12.64**	0.03
	Otherwise	2.15	0.89		
Income [monthly of child	Rs.1500 to 3000	3.63	0.67	13.49***	0.00
	Otherwise	1.86	0.89		
Experience [work]	1 to 3 years	3.38	0.64	16.85***	0.00
	Otherwise	1.89	0.74		

the role household's head and family income in influencing child labour and schooling decision.

The results of Multinomial Logit models are shown in Tables 3, 4, 5 and 6 respectively for each model separately. In each table, we have screened only those variables which significantly influence a household's decision concerning child labour and child schooling. The dependent variable is categorical, showing each of the four outcomes of a household's decision about child labour and schooling. The four outcomes are: child's school only, combining school with child labour, child labour only, and neither child labour nor schooling. In this regard, Table 3, shows result of our first model indicating household decision's outcome, "child going to school

Table 4 Multinomial Logit Model 1 Results

Variable	Coefficients	Std. Error	T
(Constant)	0.565	0.144	3.928
Child Age	-0.136	0.056	-2.420**
Area of living	0.121	0.053	2.294**
Education Status	0.188	0.052	3.617***
Child still studying or not	0.229	0.063	3.614***
Monthly income of the family	-0.759	0.089	-8.539***
Family's head income	0.093	0.050	1.842*
R^2	0.436		
Adjusted R^2	0.399		

Dependent Variable Choice: Child schooling only

Table 5 Multinomial Logit Model 2 Results

Variable	Coefficients	Std. Error	T
(Constant)	0.867	0.313	2.766
Education Status	-0.923	0.113	-8.154***
Child still studying or not	-0.458	0.138	-3.315***
Monthly income of the family	0.386	0.194	1.991**
R^2	0.330		
Adjusted R^2	0.287		

Dependent Variable choice: Neither working nor schooling or otherwise

Table 6 Multinomial Logit Model 3 Results

Variable	Coefficients	Std. Error	T
(Constant)	1.189	0.457	2.603
Child Age	0.334	0.180	1.852*
The child still studying or not	-1.467	0.210	-6.986***
Main reasons for child work	0.735	0.211	3.483***
Child's monthly income	0.518	0.213	2.429**
R^2	0.387		
Adjusted R^2	0.333		

Dependent Variable: Child Labour only

only or otherwise". In model 1, variables like child age, residential area, and educational status, family's head monthly income and family's total income significantly influence the dependent variable with a choice outcome school only or otherwise. More specifically, coefficient of the variable "age of the child" 0.136 is significant at 5% level. The coefficient value is less than 1 but negative, indicating that as age of children increases by a year, the household is more likely to engage his children in labour activity instead of enrolling them in school. The finding reveal that 'age' is an

important factor that significantly affect household's decision about child labour and child schooling. Alternatively, this finding implies that chances of attending school decreases as children are getting older by a year. Our finding is consistent with (Burki et al., 1999) showing that attending school decreases with increasing age. However (Ali & Khan, 2003) finds contradictory result indicating that likelihood of school attendance decrease at a decreasing rate.

On the other hand, the probability of child schooling increases with the residential area, educational status, and residential area. This further explains that it is more likely that a child will continue education if he is already enrolled in primary education. Similar findings were obtained by (Amin et al., 2004), showing positive association of child's enrollment in education with household decision of a child's schooling. Moreover, if a child reside in rural area, the probability of schooling is high. This reason for this outcome could be that there are opportunities of earning income through child's labour in urban centers. Second, private schools which are highly expensive are more available in urban areas. Therefore, education in urban areas are relatively more expensive. On the contrary, private schools and opportunities of income earnings are scarce in rural area. Consequently, children residing in rural area will have more tendency to attend government school. Similarly, with the increase in income of the family head above 8000 per month, the probability of child schooling increases. Since, head of the family is mainly responsible for all affairs of the home and thus contribute more to finance all the expenses. Therefore, as income of the head of family increases, the probability of child schooling increases and it became less likely to engage children in labout activities.

However, if the monthly income of child's family increase above 10,000, it is likely that the child will tend towards labour activity instead of getting education. This result contradict the general theory, explaining that increasing family's income reduces the likelihood of child labour. The logic behind negative association of child's labour and family income may be the tendency of all family members towards labout activity so as to further increase income or wealth. In other words, it is possible that if family's income increase, the household may decide their children to combine school with labour activities.

The study finds few important variable like household's head education, employment status, number of family members etc. are not significantly related with household's decision about child labour or schooling. Therefore, the effects of insignificant variables are reported in the appendices A and B of the analysis. (Fig. 1).

The "Normal Probability Plot" is another name for the P-P Plot. Any distribution's normality is demonstrated using it. If the data are typically distributed around a straight line, it may be shown on this graph. Values will lie on or very near the straight line if the data is regularly distributed. Data observations are not normally distributed if there is a significant variation from the straight line. The produced P-P plot demonstrates that although some values of all independent variables are above or below the line, most values are close to the straight line. So the graph's normalcy is rather obvious.

In the above Table 4, the study has screened those variables which significantly influence a household's decision outcome "neither going to school nor working or otherwise. That is many children are neither attending school nor engaged in

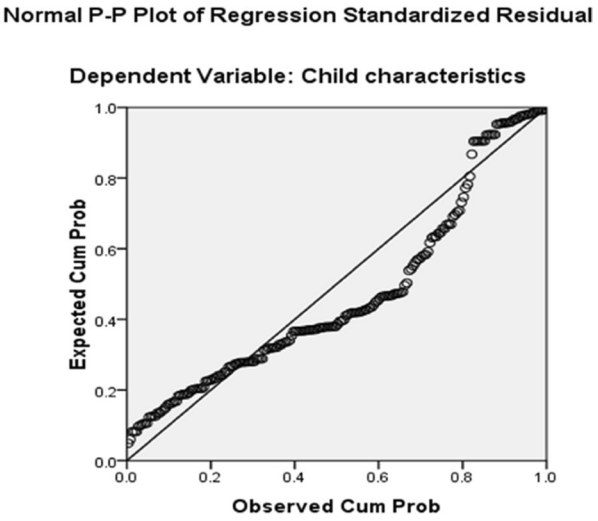

Fig. 1 Normal P-P Plot of Regression Standardized Residual (Dependent Variable: Child Characteristics)

labor activities but instead prefer to do homecare. The result obtained shows that variables like educational status of the child, child interest in the continuation of education and monthly income of the family significantly influences household's choice of "neither school nor work". More specifically, variables like educational status" and "interest in education" are negatively associated with no-school no-work "decision. This explains the fact that both these variables increase the chances for either school exclusively, work exclusively and or combination of both school and work. However, variable like "monthly income of the family" is positively associated and increases the probability of no-school and no-labour decision. This explains the fact that when family income increases, the household prefer to spare few children for homecare activities. To see, fitness of the model, the study below shows the normal probability plot (Fig. 2).

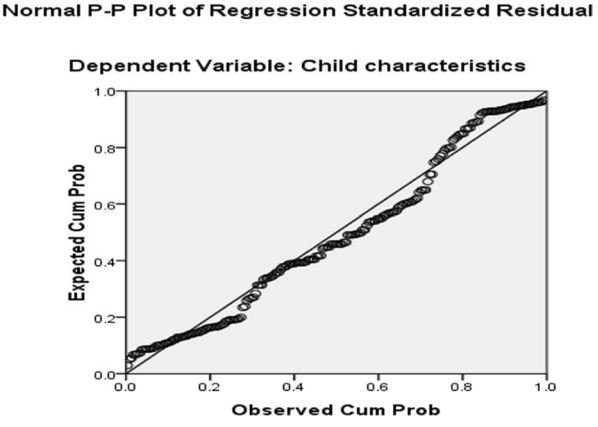

Fig. 2 Normal P-P Plot of Regression Standardized Residual (Dependent Variable: Child Characteristics)

The P-P Plot indicates that most of the observations lie on the straight line except few above or below the line. Therefore, it is an evident of the fact that the data set follow the normal distribution.

In Table 5, the study shows multinomial logit result of model 3 showing household's decision outcome "child labour exclusively". The results obtained show that variables like child's age, child's monthly income and poverty are significantly and positively influence the outcome children's working activity exclusively. More specifically, the findings show that with increasing age, the probability of child involvement in labour activity increases. With growing age, it is more likely for a child to work only instead of attending school. Similar findings were obtained by (Amin et al., 2004; Rosat & Rossi, 2001). Consistent to our result (Durrant & Arif, 1998; Ranjan Ray, 2002) also finds that age of a child reduces the likelihood for child's schooling. Reason behind such an inverse relationship could be explained with children's drop out as age and grades of schooling increases. That is, at higher age and higher grades the cost of education and schooling increases, and therefore, the chances for child's labour increases. Moreover, the variable "interest in education" although significant but has inverse relationship with the decision of child's labour only. That is, others things remaining the same, a child' interest in the continuation of education reduces the probability of child's labour. Further, main reason behind child's labour (poverty) significantly and positively influence child's labour activity exclusively. That is, children from poor background are less likely to attend school. Due to poor financial position, parents cannot afford educational expenses and most probably engage their children in labour activities to finance their family expenses. Consistent to our findings (Blunch & Verner, 2001; Edmonds & Schady, 2012; Naeem et al., 2011; Ranjan Ray, 2000b) finds that poverty mainly contribute to child's labour (Fig. 3).

The scatter plot indicates that most of the observations lie on the straight line and very few deviate above or below the line. Therefore, the scatter plot shows that data set assumes the normal distribution.

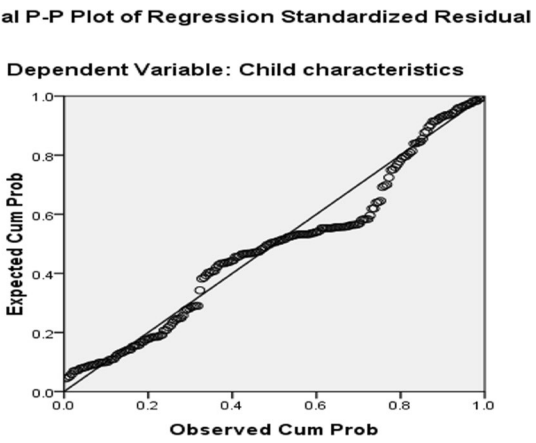

Fig. 3 Normal P-P Plot of Regression Standardized Residual (Dependent Variable: Child Characteristics)

Table 7 Multinomial Logit Model 4 Results

Variables	Coefficients	Std. Error	t-values
(Constant)	-1.415	0.571	-2.477
The child still studying or not	1.231	0.263	4.688***
Working capacity of the child	0.859	0.290	2.956***
Main reasons for child work	0.448	0.264	1.697*
An initiative of child work	0.860	0.293	2.933***
Child's monthly income	0.605	0.267	2.268**
R^2	0.460		
Adjusted R^2	0.413		

Dependent Variable: Household's decision outcome "combining child labour with schooling

Table 7 of the study presents empirical results of household decision's outcome "combining child's schooling with labour activities". As evident from the results, all the variables positively and significantly influence the choice outcome of combining school and work of a child. The study finds that variables like interest of education, reason behind work and child's monthly income increases the probability of a household's preferences to combine child's schooling with child labour. Child's interest in education significantly influence decision outcome of a household explain the fact that many children participate in labour activities to support his educational expenses. Similar result are obtained by (Bhalotra, 2007; Ejaz Ali Khan & Ali, 2003). In addition, the study finds variables like "initiative of work by child himself" and "working capacity" also increase the chance for a child to combine school with labour activities. That is, if a child engage himself in labour work on permanent basis, such a child is more likely to combine school with labour work to finance his educational expenses (Fig. 4).

The plot showing plotting of residual indicates that most of the observations are on the straight line or very close to the line, which is an evident of residual normal distribution.

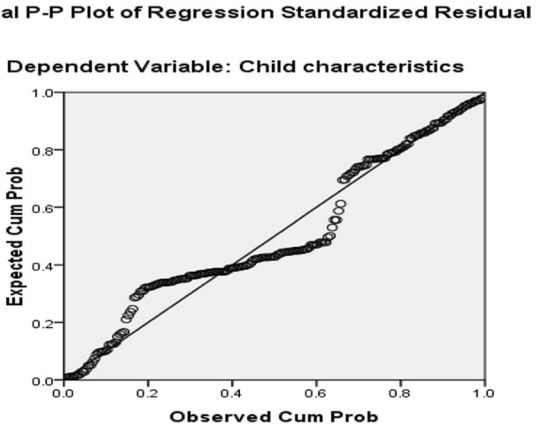

Fig. 4 Normal P-P Plot of Regression Standardized Residual (Dependent Variable: Child Characteristics)

7 Conclusions and Policy Implications

The study attempts to find determinants of the decision of a household in district Mardan of Khyber Pakhtunkhwa, Pakistan. The study analyzes household utility maximization behavior by deciding to send their children to school exclusively, child's labour exclusively, combing school with child's labour, and neither school nor labour activities. To this end, the study conducted survey in district Mardan and applies multinomial logit estimation method to the primary data. Empirical results of the study show that with the increase in income of the household head, the likelihood of child's schooling increases. Similarly, if a child is currently enrolled in education, in such a case the likelihood for the continuation of child's education is high. That is, households having children who have completed or enrolled in primary education are more likely to attends school instead of labour work.

On the contrary, however, variables like "age of a child and poverty, increase the likelihood for a child to be engaged in labour activity exclusively. That is, with increasing additional year of a child age, the household is less likely to decide child's schooling. In the same manner, poor family cannot afford child's educational expenses and therefore, prefer child labour to finance family expenditures. Additionally, with the increase in monthly income of the family, the likelihood of engaging a child in homecare activities increases. That is, in such a case it is more likely that a child neither attend school nor engage in any earning activities through labour work. Finally, the analysis finds variables like "initiative of work by child himself" and "working capacity" increase the chance for a child to combine school with labour activities. That is, if a child engage himself in labour work on permanent basis, such a child is more likely to combine school with labour work to finance his educational expenses. This is a very interesting result showing that children from poor financial status wish to work and support their family's expenditure, however, at the same time they also do not compromises on getting education.

8 Limitation of the Study

Although, this analysis has comprehensively focused on analyzing the child labour and child schooling issue, however, there are certain limitations of the study as well. For example, this analysis focuses on male child only in district Mardan of Khyber Pakhtunkhwa, Pakistan. The reason behind selective gender is that majority Pashtun community is residing in Mardan. Consequently, conservative rural Pashtun community might explains the lower school and labour activities among female children. Furthermore, it is culturally inconvenient to collect information from female children in Pashtun's area. Therefore, future research that includes both male and female children in all district of Khyber Pakhtunkhwa will be more helpful for accurately analyzing the phenomenon of child labour in detail.

Based on the empirical results of this study, following recommendations are suggested to the government to avoid human capital loss as a result of child labour activities in Pakistan.

1) The government should open more primary schools free of cost particularly in rural areas of Pakistan. That is, subsidizing at least primary education will do a great job increasing enrollment at primary level.
2) Beside primary school, the government should open training or skill learning centers and provide incentive in the form of scholarships. This way children will have the opportunity to promote their skill and earning income to financially support their families.

Appendix 1 Multinomial logit Result

		B	Std. Error	t	Sig
1	(Constant)	0.565	0.144	3.928	0.000
	Child Age	-0.136	0.056	-2.420	0.016
	Area of living	0.121	0.053	2.294	0.023
	Education Status	0.188	0.052	3.617	0.000
	Child still studying or not	0.229	0.063	3.614	0.000
	Child's mother education status	0.081	0.056	1.450	0.149
	Family head education	-0.083	0.052	-1.606	0.110
	Family head age	0.087	0.054	1.593	0.113
	Monthly income of the family	-0.759	0.089	-8.539	0.000
	Family head income	0.093	0.050	1.842	0.067
	Is child family head working	-0.001	0.047	-0.024	0.981
	Number of persons in family	0.038	0.053	0.722	0.471
	Is child's family is joint family	0.000	0.044	-0.010	0.992

Dependent Variable: Child Schooling only

Appendix B

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig
		B	Std. Error	Beta		
1	(Constant)	0.867	0.313		2.766	0.006
	Child Age	-0.197	0.122	-0.101	-1.609	0.109
	Area of living	0.093	0.115	0.053	0.811	0.418
	Education Status	-0.923	0.113	-0.526	-8.154	0.000
	Child still studying or not	-0.458	0.138	-0.214	-3.315	0.001
	Child's mother education status	0.109	0.122	0.056	0.894	0.373
	Family head education	0.077	0.112	0.044	0.684	0.495
	Family head age	0.068	0.119	0.036	0.571	0.569
	Monthly income of the family	0.386	0.194	0.125	1.991	0.048
	Family head income	0.073	0.110	0.041	0.668	0.505
	Is child family head working	-0.093	0.102	-0.057	-0.909	0.364
	Number of persons in family	-0.123	0.115	-0.069	-1.070	0.286
	Is child's family is joint family	0.081	0.096	0.053	0.842	0.401

Dependent Variable: Child characteristics

Appendix C Correlation Matrix

	Child characteristics	Child Age	Area of living	Education Status	The child still studying or not	Child's mother's education status	Family head educated	Family head age	Monthly income of the family	Family head income	Is child family head working	Number of persons in the family	Is child's family is a joint family
Child characteristic	1.000												
Child Age	-0.162	1.000											
Area of living	0.136	-0.085	1.000										
Education Status	0.257	-0.088	0.252	1.000									
Child still studying or not	0.293	-0.035	0.096	0.006	1.000								
Child's mother education status	0.071	-0.028	-0.062	-0.043	0.159	1.000							
Family head education	-0.047	-0.208	0.087	0.183	0.049	-0.027	1.000						
Family head age	0.132	-0.140	-0.069	0.014	0.013	0.200	-0.040	1.000					
Monthly income of the family	-0.502	-0.045	0.112	-0.025	-0.135	0.114	0.086	-0.022	1.000				
Family head income	0.065	-0.062	-0.046	0.087	-0.106	0.029	-0.016	-0.069	0.075	1.000			
Is child family head working	-0.011	-0.088	0.018	0.071	-0.129	-0.003	0.000	0.141	0.069	0.134	1.00		
Number of persons in family	-0.012	-0.079	-0.185	-0.150	-0.127	-0.010	0.179	-0.018	-0.067	0.046	-0.111	1.000	
Is child's family is a joint family	-0.031	0.136	-0.124	0.009	0.159	0.076	-0.083	-0.045	0.064	-0.034	-0.050	-0.115	1.000

The above Table 7, shows Pearson correlation matrix of all the independent variables. The result finds indicates that none of the single variable have correlation greater than 0.75 with all other independent variables. Therefore, the correlation matrix obtained, is an evident of no high collinearity among independent variables. The 'Rule of Thumb' is that If correlation between two independent variable is either greater than + 0.75 or less than -0.75, then sever collinearity exist between the two variables. In this case the variance or standard error of the coefficients are no longer reliable (inflated variance of the coefficient). To remove the collinearity drop the variable having weaker correlation with the dependent variable.

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Data Availability All the data is available in the manuscript. And the data sets used and or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing Interests There is no potential conflict of interest among authors in this study.

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Authors and Affiliations

Azeem Gul[1] · Sareer Ahmad[2] · Amanat Ali[2] · Asad Ullah Khan[2] · Muhammad Sulaiman[3]

✉ Azeem Gul
azeemgul@asc.qau.edu.pk

Sareer Ahmad
sareer@eco.qau.edu.pk

Amanat Ali
amanat@qau.edu.pk

Asad Ullah Khan
asadwazir82@yahoo.com

Muhammad Sulaiman
Sulaiman13309@gmail.com

[1] Lecturer in the Department of International Relations, National University of Modern Languages, Islamabad and PhD Candidate at Quaid-I-Azam University in Area Study Centre for Africa, North and South America, Islamabad, United Kingdom

[2] School of Economics, Quaid-I-Azam University, Islamabad, United Kingdom

[3] Department of Economics, Hazara University Mansehra, Mansehra, Pakistan