

FACTORS ASSOCIATED WITH SCHOOL DROPOUT IN PAKISTAN: AN ASSESSMENT USING SURVIVAL ANALYSIS

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ABSTRACT

A substantially low school completion rate is a major impediment to attaining Sustainable Development Goal 4 of inclusive and equitable education for all. Therefore, education policy must introduce targeted instruments for improvement in terms of school completion rate and successful transition to higher level of education. The scope of this study covers Punjab and Sindh and focuses on examining the factors associated with school dropouts in Pakistan. The first part of the study is based on microlevel analysis by employing cox proportional hazard model to predict the risk of dropping out of school. The study has developed a framework of analysis by focusing on two aspects i.e., the conducive environment at household level representing the demand-side factors and enabling environment at community level reflecting the supply-side factors. The demand-side factors include economic barriers, societal barriers, and personal disabilities. The supply-side factors include schooling attributes, early childhood readiness and beyond-primary readiness. The association of these factors with risk of early dropout from school is examined after controlling for regional differences, gender, and poverty. The second part of this study undertakes a comparative descriptive analysis across different divisions of Punjab and Sindh. The study indicates that the contributing factors for early-stage school dropout are child labour and poverty. The relative parity risks are also found greater in those regions that have higher incidence of poverty. The cognitive and functional difficulties are also found to cause hindrance in successful transition to higher level of schooling. The teaching quality is captured by including input and output measures. The input measures included regularity in homework, teacher's feedback, presence of school governing body and active PTA/SMC and the output indicator is measured as district level learning scores. All these factors are found to have a significant association in reducing school dropout. The role of early childhood readiness (ECE) is also examined which has a significant impact in reducing school dropouts except in case of Punjab the hazard ratio for current year's ECE is higher due of large dropout at Katchi/Pre-school. The study also observes that better school infrastructure, school governing body, parent teacher association, improved school learning, education performance, readiness toward higher level schooling as well as higher level school availability considerably reduce the risk of school dropouts. The study recommends that education policy must be structured with reference to regional and local context keeping in view that needs and requirements of that region.

PREFACE

The epitome of challenges faced in the education sector of Pakistan is an alarmingly high percentage of out-of-school children and the school dropout rate has remained persistent without any improvement. The bill on “Right to Free and Compulsory Education” has also been passed from National Assembly in 2012. The National Educational Policy 2017 has also given importance to early childhood education and a conducive learning environment. Nevertheless, there has not been a noticeable change in school dropouts in Pakistan. Student retention in schools is necessary to achieve SDG4 of achieving universal education as keeping children in school is as important as getting them to the school at first place. Therefore, it is necessary to explore the underlying factors that could possibly be associated with school dropouts which may include the demand-side as well as supply-side factors. The outcome of this research provides some answers for a policy-oriented approach to meet SDG4 target of universal education. By targeting priority areas, the issue of school dropouts can be addressed by fine-tuning specific policy instruments in education policy at provincial level and regional level.

We are thankful to Dr. Naeem uz Zafar and Dr. Durre Nayab for mentoring this research project and their feedback on various occasions has helped in improving our analysis. Special thanks to RASTA-PIDE CGP 4.0 for providing us the opportunity to explore interesting aspects with respect to school dropouts in Pakistan and key differences across regions of Punjab and Sindh.

TABLE OF CONTENTS

1. INTRODUCTION	1
2. LITERATURE REVIEW	2
3. FRAMEWORK	3
4. METHODOLOGY	5
5. FINDINGS AND DISCUSSIONS.....	9
5.1 <i>Household Level Analysis of School Dropout</i>	9
5.2 <i>Divisional Level Analysis of School Dropout in Punjab</i>	13
5.3 <i>Divisional Level Analysis of School Dropout in Sindh</i>	Error! Bookmark not defined.
6. CONCLUSIONS.....	24
7. POLICY RECOMMENDATIONS.....	25
REFERENCES.....	26
APPENDIX.....	28

LIST OF FIGURES

Figure 1: Net attendance and completion rate of school education	1
Figure 2: school entry and attendance by education level	2
Figure 3: schematic representation of the framework on factors associated with school dropout	5
Figure 4: hazard ratio (relative parity risk) of school dropouts by education level	11
Figure 5: Comparison of hazard ratio for school dropouts and school retention scores among nine divisions of Punjab	17
Figure 6: Relative parity risks in terms of income barriers	18
Figure 7: Rural-urban comparison of hazard ratios for paid child labour and unpaid family labour	19
Figure 8: Supply-side factor in terms of school availability	20
Figure 9: Supply-side factor as quality of physical infrastructure	21
Figure 10: Supply-side factors as school attributes (as % total in each Division)	21
Figure 11: Supply-side in terms of educational outcomes and beyond primary readiness	23
Figure 12: Comparison of hazard ratio for school dropouts and school retention scores among six divisions of Sindh	24
Figure 13: Relative parity risks in terms of income barriers	25
Figure 14: Rural-urban comparison of hazard ratios for paid child labour and unpaid family labour	26
Figure 15: Supply-side factor in terms of school availability	26
Figure 16: Supply-side factor as quality of physical infrastructure	27
Figure 17: Supply-side factors as school attributes (as % total in each Division)	27
Figure 18: Supply-side in terms of educational outcomes and beyond primary readiness	28

LIST OF TABLES

Table 1: Identification and description of variables	8
Table 2: An analysis of economic dimensions in determining school dropout	12
Table 3: An analysis of parenting and child's abilities in determining the school dropout.	14
Table 4: An analysis of supply-side dimensions on determining the school dropout	15

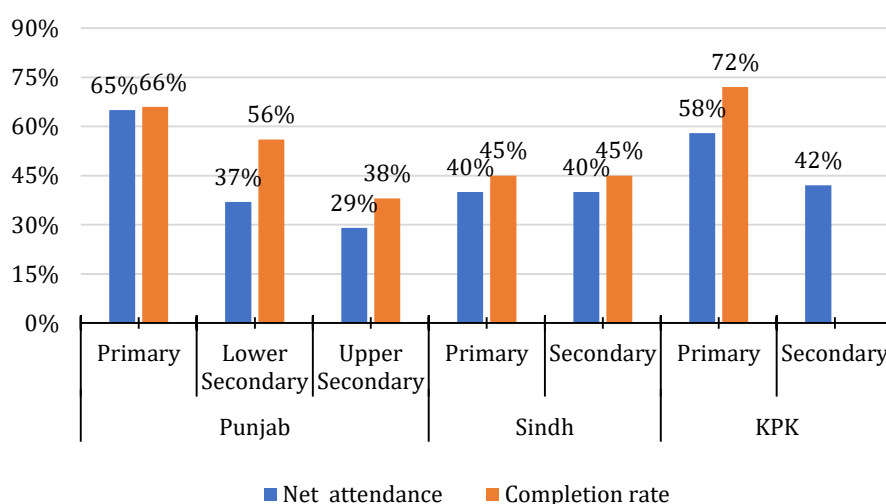
LIST OF ABBREVIATIONS

ASER	Annual Status of Education Report
ECE	Early Childhood Education
MICS	Multiple Indicators Cluster Survey
NEMIS	National Education Management Information System
OSC	Out-of-School Children
PTA	Parent Teacher Association
SDG4	Sustainable Development Goal 4
SMC	School Management Committee

INTRODUCTION

The underlying principle of Sustainable Development Goal 4 (SDG4) is universal and equitable access to education with an active role of the State in service provision and regulatory standards. Goal 4 sets to target free publicly funded education up to grade 12 and effective learning environment for skill development and increased literacy. However, the school dropout ratio tends to persist in Pakistan which is a major hindrance for full realization of SDG4. After the 18th amendment, provinces have been granted legislative and financial autonomy on many social sectors including health and education. According to Article 25A, the State is obligated to provide free and compulsory education to all (children between the age of 5 to 16 years) as it states: “The State shall provide free and compulsory education to all children of the age of five to sixteen years in such a manner as may be determined by law”. The school level education is fully devolved to the provinces but still the performance is not satisfactory to meet the SDG4 targets. The percentage of out-of-school children has remained stagnant during the last decade and there has not been much improvement on student retention in primary and secondary level of education. Many studies use school enrolment as core indicator to analyse the education performance in terms of education access. However, the school dropout rate is an important issue faced in our education system which needs to be tackled by overcoming the causal factors associated with it. The education performance as net attendance and completion rate is provided in Figure 1.

Figure 1: Net Attendance and Completion Rate of School Education



Source: Authors' compilation from MICS6 report. Note: Data for Baluchistan was not available at the time of analysis. The completion rate of secondary level for Sindh is not available.

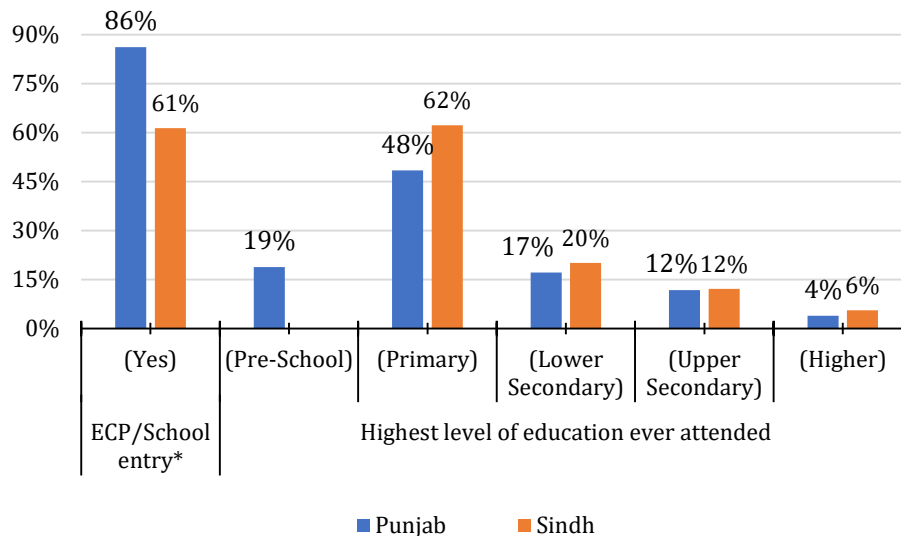
Figure 2 show a comparison of Punjab and Sindh in terms of entry in early childhood programme and highest level of schooling by attendance for different education levels. The attendance in early childhood program is highest in Punjab whereas the school attendance for primary, lower secondary and higher level is comparatively better performing in Sindh.

Pakistan like many other developing countries is facing a high rate of out-of-school children. Although a major part of it refers to children who never attended school, but it also includes considerable proportion of children who fails to complete a certain minimum credential and leave the education. This category of out-of-school children refers to school dropouts and is the main variable of study in current research proposal. Since keeping the children in school is as important as getting them to the school at first place. The student retention in school is necessary to achieve the SDG 4 for achieving universal education. The bill on “Right to Free and Compulsory Education” has also been passed from National Assembly in 2012.

The National Education Policy 2017 is introduced after the 18th amendment and one of its main targets is to reduce the school dropout rate. In the light of State's obligation of free education provision, under Article 25A as mentioned above, the access to education is less of problem in

comparison to the inability of student retention. There are many factors that may contribute to low school survival rate in Pakistan such as teacher’s absenteeism and lack of commitment, harsh treatment, lack of facilities, lack of parental involvement, child’s personal abilities as well as child’s involvement in paid and unpaid work. Therefore, there is a need to identify such factors and their likely impact in terms of raising the risk of a child dropping out of school.

Figure 2: School Entry and Attendance by Education Level



Source: Author’s compilation using MICS6. Note: ECP = Early Childhood Programme; *refers to the children who have ever attended ECP/pre-school or ever enrolled in a school.

The bottom-line of this research is that despite granting autonomy to provinces in running school education (after the 18th Amendment) and State’s obligation to free basic education, the track record has not been very impressive. School participation is an important aspect of education outcome but what is more important is to examine the factors contextual to school retention especially towards higher level of education. The persistency in school dropouts acts as a hurdle in achieving SDG4 objective of universal education for all. Therefore, there is a need to fine-tune the education policy by ascertaining legal and administrative actions towards student retention in schools. For this purpose, there is a need to determine the risk factors that must be contained through strict policy actions and awareness. Since getting a high enrolment is a necessary but not sufficient condition to improve the education outcomes. An improvement needs to be made in terms of completion and successful transition to higher level of education.

This report is comprised of three main research questions i.e., i) What are the individual, collective and social factors that are a cause of concern for early dropout from schools at household level? ii) Does education performance, readiness and schooling attributes matter in determining school dropouts? iii) What differences are observed across regions of Punjab and Sindh? The answers to these questions are found by calculating hazard ratios using MICS6 data on children between the age of 5 to 17 years. Furthermore, the narrative is developed by undertaking situational analysis using data from Public and Private School Census and Alif Ailaan Scores.

LITERATURE REVIEW

Plank, DeLuca & Estacion (2008) applied Cox hazard model on US National Longitudinal Survey of Youth (NLSY) and found that parents’ education, Urban residence, and math knowledge increased the chance of school dropout whereas career and technical courses has a u-shaped relation with age. Valdivieso (2015) and Bualaphet, & Goto (2020) employed non-parametric and semi-parametric survival analysis on Peru’s Household and Child Survey, and Lao People’s

Democratic Republic Expenditure and Cluster Survey, respectively. Along with household's socioeconomic status and child's traits (ethnicity, vocabulary, stunting, life satisfaction), it is found that gender, mother's education, and perceived returns from schooling also play a significant role in determining school dropout. Mikkonen, Moustgaard, Remes & Martikainen (2018) applied Poisson regression and found that mental disorder is a major contributory factor in school dropouts followed by physical injuries. No, Taniguchi & Hirakawa (2016) examined that single parent and late schooling have significant impact on school dropout whereas child labour, economic status and parent's aspiration showed insignificant result. Cox regression survival analysis was applied on rural public-school data collected from Kampong Cham province of Cambodia.

Using multinomial logistic regression on India's National Family Health Survey, (Gouda & Sekher, 2014) and Nepal's Multiple Indicator Cluster Survey (Sekine & Hodgkin, 2017), the studies found that family size, parent's education and work status, standard of living, mass media exposure and child marriage had significant role in school dropout. By applying a linear regression on Gender and Adolescence Global Evidence survey of Ethiopia (Woldehanna et al., 2021), Pakistan Social and Living Standards Measurement Survey (Satti & Jamil, 2021), and longitudinal data on rural Honduras (Murphy-Graham, Montoya, Cohen & Lopez, 2021), it is concluded that reduced child work, absence of violence, decision-making power, parent's education, reduced travel distance and improved economic condition has a positive impact on education attainment. On the other hand, poverty, low academic achievement, and lack of appropriate opportunities associated with higher education is the main cause of school dropouts.

The qualitative analysis by Mughal & Aldridge (2017), Shah, Haider & Taj (2019) and Mughal (2020) observed that poverty, child labour, parent's illiteracy, large family size, distance, school and teaching quality, and poor academic performance are major factors in determining school dropouts. Farah & Upadhyay (2017) and Pezzulo (2022) applied logistic regression model on Demographic Health Survey of Bangladesh and Tanzania, respectively. The analysis found that household size and income, gender, poverty, travel costs, and parent's education are significant determinants of school dropout. On the other hand, positive relation with teachers and peers reduces the risk of school dropout as found by Choe (2021) by examining Multicultural Adolescents Panel Data by National Youth Policy Institute of South Korea. Marlow & Rehman (2021) undertook quantitative synthesis of 33 studies which concluded that parental support and higher expectations reduce while harsh treatment and conflict increase the likelihood of student absenteeism and dropout.

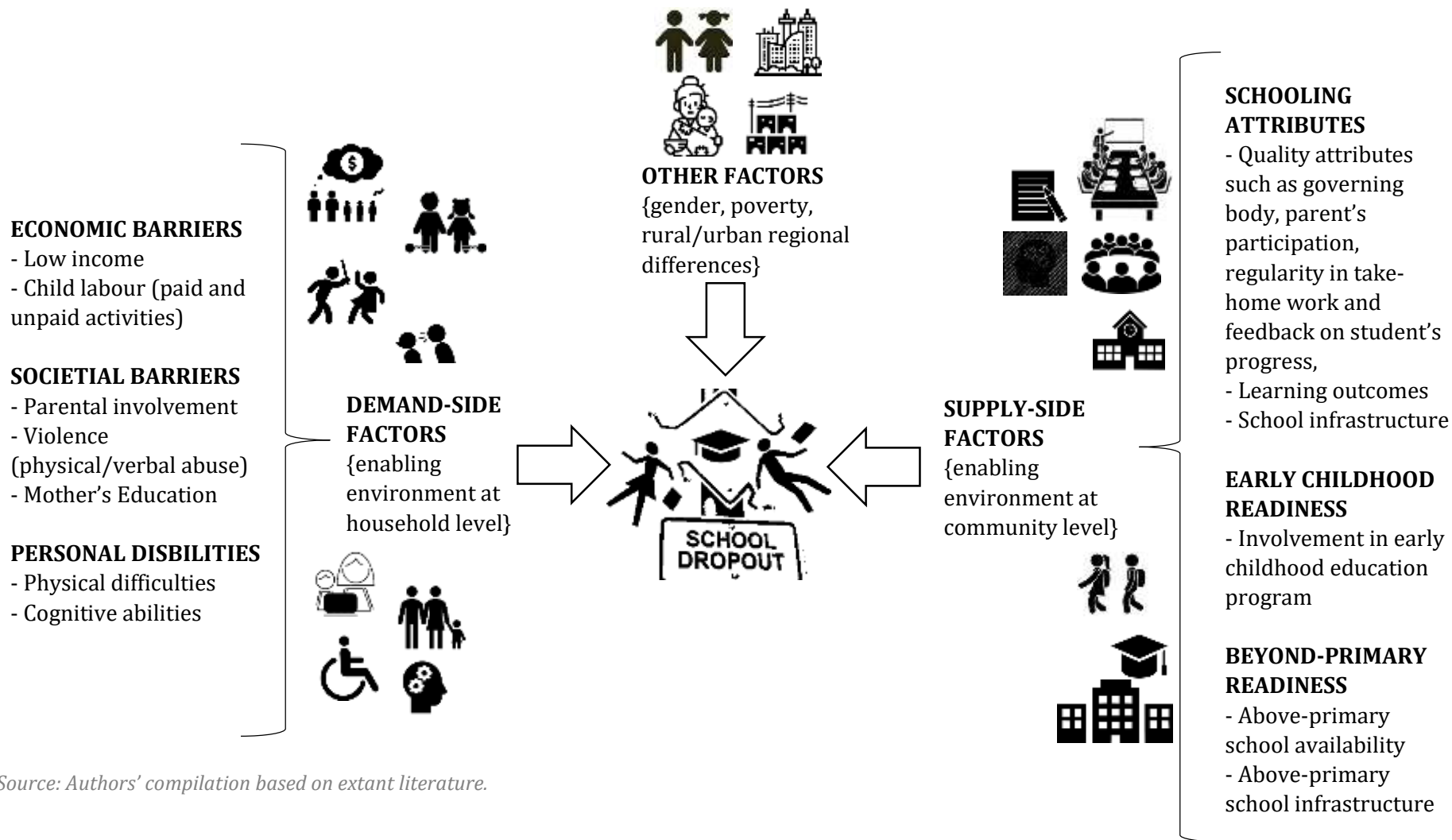
FRAMEWORK

The theoretical framework of our analysis is based on the factors being segregated into demand side, supply side and control variables. The analysis is based on household data¹ and data extracted from school census². The demand side factors are further categorized into economic barriers, societal barriers, and personal disabilities. These are the impediments faced at the household level that may hinder continuing schooling. On the other hand, supply side factors include schooling attributes which reflect the quality of education as experienced by current students as well as the readiness of education system in terms of early education and beyond primary readiness, both in terms of availability and capacity. The control variables include gender differences, the incidence of poverty in different regions, and rural urban differences. The framework is illustrated in Figure 3.

¹ MICS6

² Alif Ailaan Education Rankings

Figure 3: Schematic Representation of the Framework on Factors Associated with School Dropout



Source: Authors' compilation based on extant literature.

4. METHODOLOGY

The current study utilized Round 6 database of Multiple Indicators Cluster Survey (MICS) by UNICEF. The cohort used for analysis is children between the age of 5 to 17 years who have ever attended school.³ The dependent variable is duration it takes for dropping out of the highest level of grade ever attended i.e., a student has attended the school but did not complete a particular grade. The levels of education are divided into pre-school, primary, secondary, and higher. The analysis is done for Punjab and Sindh.⁴ In addition, the study further contributes to the analysis by adding comparative descriptive analysis across different divisions of Punjab and Sindh. The analysis is supported by extracting data from various secondary data sources such as Alif Ailaan Reports, Punjab School Census, Punjab Economic Profile and Sindh Education Statistics.

The out-of-school children consist of two categories; i) who never entered school (category 1) and ii) who dropped out of school (category 2). This study focuses on category 2 of 'out-of-school' children i.e., the school dropouts. The extant literature using econometric approaches on examining school dropouts have used multinomial logistic regression, logit model, beta regression, linear OLS regression, Poisson regression model, two-level random intercept logistic regression model along with qualitative approach using systematic meta-analysis and structured questionnaires to determine perceptions on school dropouts (Gouda & Sekher, 2014; Farah & Upadhyay, 2017; Sekine & Hodgkin, 2017; Mughal & Aldridge, 2017; Mikkonen, Moustgaard, Remes & Martikainen, 2018; Shah, Haider & Taj, 2019; Mughal, 2020; Satti & Jamil, 2021; Woldehanna et al., 2021; Murphy-Graham, Montoya, Cohen, & Lopez, 2021; Marlow & Rehman, 2021; Pezzulo; 2022).

Since the response variable is binary i.e., a child completes or does not complete the grade (categorical as yes and no), Therefore linear regression cannot be applied, and logistic regression is more appropriate to handle the binary variable. However, the major drawback of logistic regression is that it does not handle the censored data i.e., children who do not drop out of school in time t in comparison to those who dropped out in time t . Those who do not drop out is defined as censored. Tobit regression is a liner regression that handles the censored data but uses the assumption of normal distribution. On the other hand, the survival analysis, such as, cox proportional hazard model does not require the underlying assumption of normal distribution. Since the response variable in the current scenario is binary and it is extremely rare that binary variable is normally distributed. In addition, another drawback of Tobit regression is that it does not handle cases when there is different time length of event to occur which is school dropout in the current case. Using the Tobit regression model, without treating the different length of time, all cases will be mistakenly treated as same i.e., ignoring the differences among individuals who dropout at different levels/grades of schooling. Therefore, such estimates might be misleading as it might not be useful to interpret how school dropout at later time is different from school dropout at earlier time. So, there is loss of precision due to huge loss of information.

Therefore, the estimation technique used in current study is survival analysis. The survival analysis estimates the probability of an event, i.e., school dropout, by considering many different times that event will occur. Thus, the prediction of response variable (school dropout), under survival analysis, will include the time to exposed risk (school dropout) along with other explanatory variables. This will provide a better analysis of examining the risk factors and the extent to which these factors influence the event to occur i.e., school dropout. The survival analysis retains the information of both categories i.e., first who dropped out from school and second who completed a grade (censored).

The extant literature that utilized the survival analysis on school dropouts include Plank, DeLuca & Estacion (2008), Valdivieso (2015), Ameri, Fard, Chinnam and Reddy (2016), No, Taniguchi &

³ The school going age, as defined under Article 25A, is 5 to 16 years.

⁴ KPK and Balochistan is not included in the current study due to data limitations. At the time of analysis, the data for Balochistan was not available, as the latest was under round 4. The data on KPK for MICS6 does not include the cohort aged 5 to 17 years to be used for analysis.

Hirakawa (2016) and Boualaphet, & Goto (2020). The benefit of survival analysis is that it enables us to capture the dynamic nature of an event or incident. The incident in the current case is non-completion of grade in which a student is enrolled. The occurrence of an event is identified by two or more explanatory variables and the model predicts the risk of event to occur (i.e., school dropout or incomplete grade) or its non-occurrence (i.e., a child does not dropout from school and completes the grade). The survival analysis helps to locate the risk factors (or stimulants) that significantly determine (or lessen) the dropout rate at different levels of schooling. There are three main aspects of a survival analysis as under:

- i. The response variable is the time for an event to occur i.e., a student drops out of school.
- ii. The censored subjects i.e., children who did not drop out of school till the highest level of grade completion. This is called right censored observation.
- iii. Predictor variables which will affect the occurrence of an event.

There are two functional components of survival analysis: first, the survival function which represents the survival probability i.e., the school dropout has not occurred in time 't'; and second, the hazard function which provides the possibility that dropout will occur in time 't'. There are two main approaches to survival analysis which are widely used in literature. The non-parametric approach (Kaplan-Meier survival analysis) which is a univariate analysis and provides descriptive statistics on survival data. This method represents the probability of event in terms of survival curves. The survival probability is calculated as $S_t = (1 - d_{i(t)}/n_{i(t)})$ where d_i is the number of school dropouts by time 't' and n_i is the number of individuals who completed the grade (did not drop out) and not the censored subjects. The second approach is semi-parametric approach; the Cox Proportional Hazard Model. This method includes more than one predictor variable and estimates the probability of event. The general representation of the survival function is given below:

$$\lambda_{i(t)} = \lambda_{0(t)} e^{x_i(t)\beta} \dots\dots\dots (1)$$

Where $\lambda_{i(t)}$ is the corresponding hazard of dropout to individual 'i' for the time interval 't', $\lambda_{0(t)}$ is the baseline hazard for the time interval 't' and $e^{x_i(t)\beta}$ is the relative risk of dropout for an individual with predictor x_i in time 't' compared to the baseline hazard/risk. The outcome variable is called hazard ratio/or parity risk of dropping out of school. It is calculated by dividing the regression coefficient of any category by the coefficient of the reference category. The representation of the hazard function is given as follows:

$$\frac{\lambda_{i(t)}}{\lambda_{j(t)}} = \frac{\lambda_{0(t)} e^{x_i(t)\beta}}{\lambda_{0(t)} e^{x_j(t)\beta}} = \frac{e^{x_i(t)\beta}}{e^{x_j(t)\beta}} \dots\dots\dots (2)$$

The legal and constitutional provision binds the State for free education to all between the age of 5 to 16 years.⁵ The core objective of National Education Policy 2017⁶ is to set up some minimum standards for quality improvement in education and access of education to all. The major efforts to be made towards universal education is student retention by overcoming the school dropouts and avoiding repetition. Despite the supply-side efforts by the government, the out-of-school children (consisting of two categories i.e., the one who never entered school and others who dropped out of school) are major impediments to reach the goal of education for all. The study on school dropouts is predominantly a demand side analysis by considering child's personal traits, social skills, and household characteristics. On the other hand, the supply side factors majorly

⁵ Article 25A binds right to education and Article 38(d) binds education as a basic necessity of life along with medical care. The bill on "Right to free and Compulsory Education" has also been passed from National Assembly in 2012.

⁶ After 18th amendment, the school education policy and planning has become a provincial jurisdiction. However, the federating units continue to look up to the center in terms of following the National Education Policy 2017 and implementation of Single National Curriculum.

affect the school entry. However, some of the supply side factors that may affect school dropouts (or school retention) is the early childhood education and schooling attributes. Both these factors are also included in the policy objectives of National Education Policy 2017. All these factors (the relevant supply and demand side) will be evaluated to determine their significant impact towards school dropouts. The analysis will provide some answers for a policy-oriented approach to meet SDG 4 target of universal education. Table 1 provides the variable selection and its description.

Table 1: Identification and description of variables

Variable	MICS Indicators and Measurement
RESPONSE VARIABLE	
Time to event	A new variable is generated to take account of the time factor which is a necessary element in survival analysis i.e., how many years it takes a student to drop out of school. The MICS dataset identifies five level of schooling as pre-school (<i>Katchi</i>), primary, lower secondary/middle, upper secondary and higher. These education levels are expanded over a time span of 12 years where 0 is considered as reference for pre-school/ <i>Katchi</i> . The primary level consists of 5 years, lower secondary/middle is 3 years, upper secondary is 2 years and higher is 2 years. Hence, for survival analysis a time factor variable is generated by converting the education grades in each school level into continuous time factor from 1 to 12 years. For example, a student who is enrolled in <i>Katchi</i> and does not complete the level 1 of primary then he is considered to drop out in first year of schooling.
PREDICTOR VARIABLES	
Income barriers	Two indicators are used as explained below: 1) This indicator is measured by Combined Wealth Index Score. MICS dataset contains a composite indicator of wealth based on weighted scores of different items to reflect household's wealth characteristics such as ownership of consumer goods, water and sanitation and household dwelling. 2) Besides using the overall wealth index score, the study also utilizes the different wealth quintiles as described in MICS data. These wealth quintiles rank the household in five parts from lowest to highest such as poorest (lowest quintile), second, middle, fourth and richest (highest quintile). These ranking assumes long-term ownership of assets and not based on current income/expenditure levels.
Child labour	This dimension includes paid and non-paid activities as measured in MICS data. These are as follows: 1) The indicator of paid work is measure as being engaged in any activity for income. 2) The indicator of unpaid work is measured as being involved in family business for providing a helping hand. 3) There is a possibility that the child may not be involved in labour work but engaged in household activities. The MICS data has seven indicators of household chores i.e., shopping, cooking, dish washing/cleaning, washing clothes/ironing, caring for children, caring for old/sick or any other household tasks. A cumulative measure is taken based on child involvement in one or more household activities to measure the overall engagement in household chores.
Violence	The presence of violence is captured under the category of child

	<p>discipline, as explained below:</p> <ol style="list-style-type: none"> 1) A composite indicator is generated to capture verbal abuse such as shouted/screamed/yelled at the child or name calling such as dumb, lazy or any other abusive language. 2) A composite indicator is generated to capture physical abuse such as hit/slapped/spanked on bottom with bare hand, hit/slapped on the face, hit/slapped on arm, hand, or leg.
Child functioning	<p>A composite indicator is formulated to measure physical difficulties i.e., a child faces some difficulty, a lot of difficulty or complete inabilities in the following aspects:</p> <ol style="list-style-type: none"> 1) Difficulty in self-care such as dressing or feeding. 2) Difficulty in learning things in comparison to other children of same age. 3) Difficulty in remembering things in comparison to other children of same age. 4) Difficulty in concentrating on activities that he/she gets involved.
Cognitive abilities	<p>This variable captures the foundational learning skills of a child such as:</p> <ol style="list-style-type: none"> 1) Child's ability to read which is categorised as correct reading, incorrect reading, and inability to read. 2) Child's comprehension skill is the cognitive attribute of understanding which is measured by generating a single response variable through adding the correct responses of a set of five comprehension questions. A higher value will indicate improved cognitive skills. 3) Another indicator of cognitive skills is the recognition of numeric. A single response variable is generated by adding the correct responses on a set of five questions.
Parental Involvement	<p>This variable reflects parental involvement specifically in child's education such as:</p> <ol style="list-style-type: none"> 1) Parent's visit to the school to attend some school event such as sports/celebrations. 2) Parent's visit to school to discuss child's progress with the teacher.
Mother's education	<p>The five levels of mother's education are: uneducated/or pre-primary, primary, middle, secondary and higher.</p>
Schooling attributes	<p>The indicator considers the presence or absence of following attributes of schooling:</p> <ol style="list-style-type: none"> 1) Presence of School Governing Body (such as PTA/SMC, or school council) in which parents can participate. 2) Regular participation of parents in school meeting. 3) School assigns regular homework to the students. 4) School shares regular report on student's progress.
Readiness	<p>The indicator measures the involvement of child in attending the early childhood programme such as <i>Katchi</i> or preschool in current year or the previous year.</p>
Region	<p>Two separate indicators are used as explained as below:</p> <ol style="list-style-type: none"> 1) The first indicator separates the area among divisions i.e., nine divisions of Punjab (Rawalpindi, Lahore, Bahawalpur, Sargodha, Faisalabad, Sahiwal, Multan, D.G Khan and Gujranwala) and six divisions of Sindh (Sukkur, Karachi, Shaheed Benazirabad, Larkana, Mirpurkhas, Hyderabad). 2) The second indicator is used as a control variable to capture

	rural/urban differences in school dropout.
Gender	Gender is taken as control variable to consider the male-female differences in school dropouts. MICS6 data for Punjab has male and female ratio as 51.9% and 48.1%, respectively. For Sindh, the ratio of male and female is 52.8% and 47.2%, respectively.

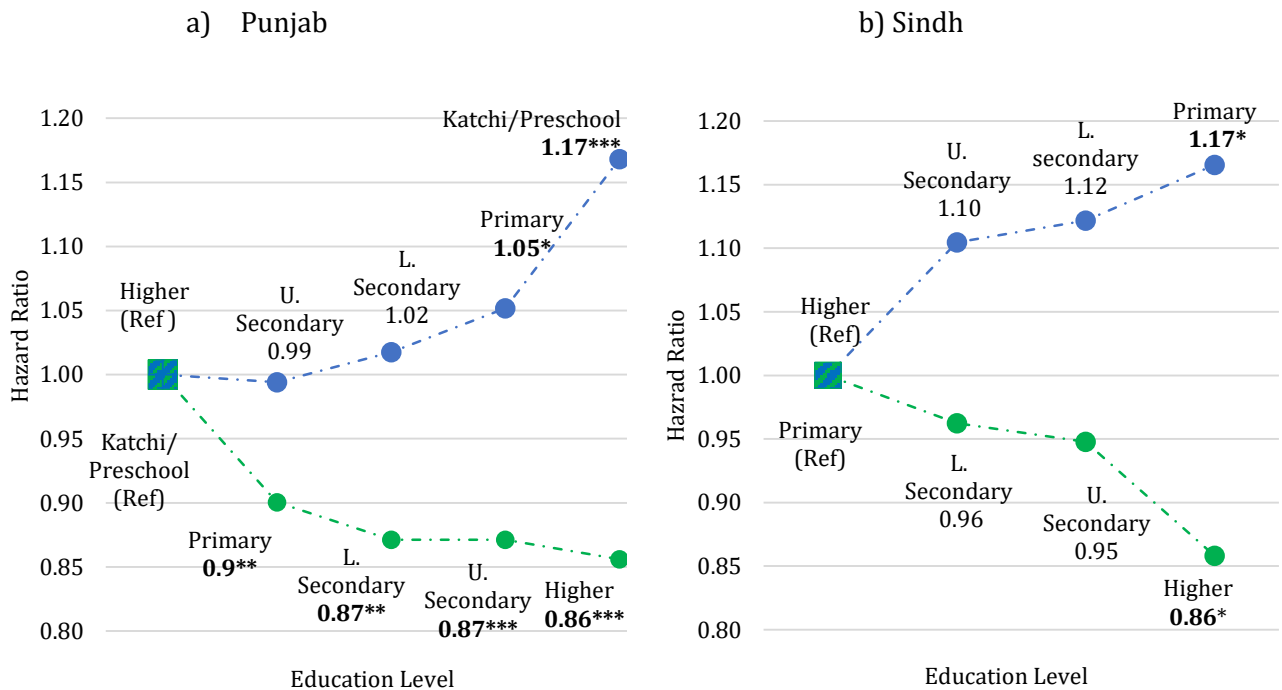
Source: Authors' extraction from MICS6 dataset.

5. FINDINGS AND DISCUSSIONS

5.1 Household Level Analysis Of School Dropout

This section provides estimated results of Cox Proportional Hazard model, using MICS6 household data for children between the age of 5 to 17 years. The hazard ratios are calculated by modeling income barriers, child labour, parenting, child's attributes, schooling attributes and readiness along with some covariates that are used as control variables.

Figure 4: Hazard ratio (relative parity risk) of school dropouts by education level



Source: Authors' calculations using MICS6 dataset of Punjab and Sindh. Note: Ref = Reference Category; U = Upper; L = Lower; ***, **, * indicates the hazard ratios at 1%, 5%, and 10% significance level.

Figure 4 depicts relative risk of student dropout at each level of education compared to the baseline risk⁷. It shows that survival probability of student retention rises towards higher education level with each additional year of schooling as compared to the school entry at pre-school level (commonly known as *Katchi*) i.e., a decrease in hazard ratio even though the proportion of children falls at each higher level of education level. So those students who get promoted to the next grade tend to have a greater chance of successfully completing that grade with each successive higher grade. On the other hand, the possibility of student retention is lesser at lower education level. As the hazard ratio depicts that children tend to drop out of school more at preschool/*Katchi*, primary and lower secondary as compared to upper secondary and high schools. This is one of the main reasons that Pakistan faces a greater challenge in skill development. The probability of dropout is highest at the pre-school level followed by primary

⁷ Reference category takes the value of 1

education which results in educational wastage as the successful transition to secondary and higher level tends to get low.

Table 2: An Analysis of Economic Dimensions in Determining School Dropout

MODEL 1: INCOME BARRIER				
Indicator	Hazard Ratio			
	PUNJAB		SINDH	
Area (Urban) ^a	1.034**		1.042	
Gender (Female)	1.024		0.995	
Wealth Quintile				
Poorest	1.77***		1.357***	
Second	1.34***		1.262***	
Middle	1.19***		1.021	
Fourth	1.10**		0.987	
Richest (Reference)	1		1	
MODEL 2: CHILD LABOUR				
Indicator	Hazard ratio		Hazard ratio conditioned on time	
	PUNJAB	SINDH	PUNJAB	SINDH
Combined Wealth Score	0.861***	0.938***		
Area (Urban) ^a	1.026	1.079**		
Gender (Female)	1.217***	1.135***		
Work activity in family business (unpaid)	1.470***	1.575***	0.903***	0.891***
Work activity with paid income	1.467***	1.157	0.884***	0.922***
Involvement in household chores	1.625***	1.503***	0.912***	0.922***

Source: Authors' calculations. Note: ***, ** indicates the hazard ratios at 1% and 5% significance level. ^a Reference category = rural

Table 2 shows that economic barriers play a significant role in school dropouts. The economic dimensions are categorized into household wealth status and child's involvement in paid or unpaid labour⁸. Area, gender, and child's involvement in household chores⁹ are taken as control variables. Children belonging to less privileged households are at greater risk of early dropout from school as depicted by greater hazard ratio for poorest and second lowest quintiles as compared to the richest. Thus, household income is the main determinant of child retention in school. For poorer and less privileged households, children are considered a source of income at present rather than an asset for earning higher future income through education. The higher opportunity cost results in an earlier dropout from schools. The results show that child labour, in the form of any paid work activity or involvement in family business without pay vis-à-vis child's involvement in household chores significantly increases the parity risk of school dropouts. This implies that schooling hours are traded-off with work due to the opportunity cost of forgone income and family labour. On the other hand, child work activity in any form conditioned on time, significantly decreases hazard ratio i.e., school survival increases at higher levels of school grades despite child's involvement in work. This shows that children who are involved in paid/unpaid work are at higher risk of dropping out of school at an early stage of schooling in comparison to higher levels of schooling. Whereas those who successfully transition to higher grades are less likely to leave school despite being associated with child labour.

⁸ The unpaid labour reflects child's involvement in family business that includes activities such as producing/selling articles and handicrafts or involvement in family agriculture/or farm activities.

⁹ These include tasks such as shopping, washing/ironing, cleaning, cooking, caring for sick/old/or minor.

According to the Punjab Child Labour Survey (2019-20)¹⁰, 80% children between 5-9 years are attending school who are working as child labour under hazardous work and the percentage falls to 58% for children between 10-14 years. There is a prevalence of 54% child labour between the age of 15-17 years who were previously attending school but have dropped out of school. On the other hand, the school attendance rate is higher among children not involved in labour which is 87.9%, 88% and 72.2% among age groups of 5-9 years, 10-14 years, and 15-17 years, respectively. Similarly, the survey indicates that in the poorest quintile 72.1% children are attending school who are not working but school attendance declines to 47.5% for those involved in child labour. Among the richest quintile, 95.8% of children are attending school and not in child labour whereas the school attendance is higher despite those involved in child labour. These statistics support the findings of this study in terms of higher propensity of school dropout at earlier stage due to involvement in child labour and impoverishment. Strong legislation is required to discourage child labour. The consequences of higher dropout rate at lower education tier are the prevailing poverty and rise of informal economy as a large proportion of population are unable to acquire even the most basic skills. Thus, these households get trapped in the vicious circle of poverty. Similarly, MICS6 report for Sindh shows that 10% children between the age of 5-17 years are involved in child labour. In addition, children from rural areas belonging to poor households are more prone to child labour and unpaid family labour is a significant contributor to school dropouts as compared to paid labour in Sindh.

Table 3 models the role of parental involvement in child development and child's cognitive abilities towards school dropouts. Harsh treatment at home in terms of verbal and physical abuse is a contributing factor in increasing the parity risk of school dropout. Parent's regular visit to school has a significant and higher hazard ratio but comparatively less to their non-participation. The hazard ratios for Sindh are higher in comparison to Punjab. Mother's education also plays an important role in school retention in Punjab but insignificant in the case of Sindh. In the presence of these factors, the impact of early childhood education becomes largely insignificant.

Table 3: An Analysis of Parenting and Child's Abilities in Determining the School Dropout.

MODEL 1: PARENTAL INVOLVEMENT IN CHILD DEVELOPMENT

Indicator	Hazard ratio	
	PUNJAB	SINDH
Verbal Abuse	1.254***	1.308***
Physical Abuse	1.137***	1.112***
Parent Visit to School ^a (Yes)	1.169***	1.378***
Parent Visit to School ^a (No)	1.370***	1.531***
Mother's Education ^b	0.885***	0.994
Attended Early Childhood Education	0.918	1.058

MODEL 2: PHYSICAL AND COGNITIVE ABILITIES

Indicator	Hazard Ratio	
	PUNJAB	SINDH
Physical Difficulty in Child Functioning	1.04**	1.043
Cognitive Skills (Reading)		
Correct Reading	1	1
Incorrect reading	1.342	1.549
Inability to read	1.549**	1.756
Cognitive Skills (Comprehension-Yes)	0.861***	0.949
Cognitive Skills (Comprehension-No)	1.054	1.117
Cognitive Skills (Numeric-Yes)	0.903*	-
Cognitive Skills (Numeric-No)	0.939	-

¹⁰ Punjab Child Labour Survey 2019-20 Report, Labour and Human Resource Department, Government of Punjab, Pakistan.

Source: Authors' calculations.

Note: ***, **and * indicates the hazard ratios at 1%, 5% and 10% significance level.

^a Parent's visit to school measures their participation/non-participation in school celebration/sport event and to discuss child's progress with the teachers. ^b Reference Category: Uneducated.

Out of the total sample size in Punjab, 16% children experienced functional difficulties, 8% could not read/or did incorrect reading, 24% showed at least some level of comprehension skills, 8% failed to demonstrate any comprehension skills at all and 39% had some basic skills of numeric. Children with functional difficulties and inability to acquire reading skills have greater chances of dropping out of school at an earlier stage. On the other hand, an improvement in cognitive skills leads to successive transition to higher grades. So, there is a need to focus on re-designing the curriculum at earlier levels of schooling by making it student-centric to build capabilities in terms of cognitive skills. The active involvement of parents is also required in terms of providing an enabling environment at home and their active participation in school consultative meetings. In the case of Sindh, the role of a child's physical and cognitive difficulties shows insignificant results. The possible reason could be poor performance in learning score (see appendix, Figure A)

Table 4 analyzed the supply side dimensions of school dropouts which are categorized into schooling attributes and readiness. Area and mother's education is taken as control variables. It is found that absence of school governing body and parent's non-participation in school events and meetings significantly increases the chances of school dropouts. On the other hand, regular feedback on child's progress report tends to decline the hazard ratio. In case of Sindh, contrasting results are observed i.e., the presence of school governing body failed to reduce dropouts despite major efforts by School Education & Literacy Department of Sindh. It is observed that such intervention has caused more deprivation as compared to its absence which shows inability of such policy action to get the fruitful deliverability in case of Sindh. However, parental involvement in terms of regular school visits significantly lessens the risk of school dropouts. The hazard ratio for urban area is lesser as compared to rural area. This is contrary to the results provided in Table 2 which indicates that by considering the wealth quintile, the hazard ratio of school dropout is higher in urban areas due to the high cost of living.

Table 4: An Analysis of Supply-Side Dimensions on Determining the School Dropout

MODEL 1: SCHOOLING ATTRIBUTES				
Indicator	Hazard Ratio			
	YES (School Attribute Present)		NO (School Attribute Absent)	
	PUNJAB	SINDH	PUNJAB	SINDH
Presence of School Governing Body ^a	0.944***	1.254***	1.059**	0.681***
Received progress report	0.960**	0.918	1.044**	1.082
Parents' Regular Visit to School ^b	0.993	0.912**	1.038**	1.088
Received regular homework	0.990	0.754***	1.013	1.324***
Area ^c (Urban)	0.917***	0.655***	0.915***	0.582***
MODEL 2: READINESS AS EARLY CHILDHOOD EDUCATION ^d				
Indicator	Hazard Ratio			
	PUNJAB		SINDH	
ECE current year	2.579***		0.575***	
ECE previous year	0.830***		0.706***	
Mother's education ^e				
Higher	1		1	
Secondary	1.008		1.016	
Middle	1.041		1.102	
Primary	1.065**		1.277***	
Uneducated/Pre-primary	1.148***		1.434***	

Area ^c (Urban)	0.874***	0.688***
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Source: Authors' calculations. *** and ** indicates the hazard ratios at 1% and 5% significance level. ECE = Early Childhood Education

^a Governing body may include any SMC/PTA or School Council in which parents could participate and/or have attended the meeting. ^b It includes parent's participation in school celebration/sport event and discussing child's progress with the teachers. ^c Reference category is rural. ^d Promotion of early childhood education is one of the objectives of National Education Policy 2017 as an instrument of readiness for formal education. ^e Mother's education is taken as control variable to reflect child's readiness at home.

The role of readiness in the form of early childhood education (ECE) is determined by including mother's education as control variable in the estimated model. In case of Punjab, successful completion of ECE in previous year has a significant impact on reducing the school dropouts whereas a higher value of hazard ratio for current year's ECE indicate higher cases of early dropouts at *Katchi*/Pre-school. The early childhood education, current and past, significantly contributes to reducing school dropouts in Sindh which shows that readiness tool in terms of early childhood programmes is proving successful in reducing the chances of early dropout from school. With reference to higher level of mother's education, the school dropout risk rises in case the mother is uneducated or has attained minimal level of primary. The results are more noteworthy for Sindh as compared to Punjab.

5.2 Divisional Level Analysis of School Dropout in Punjab

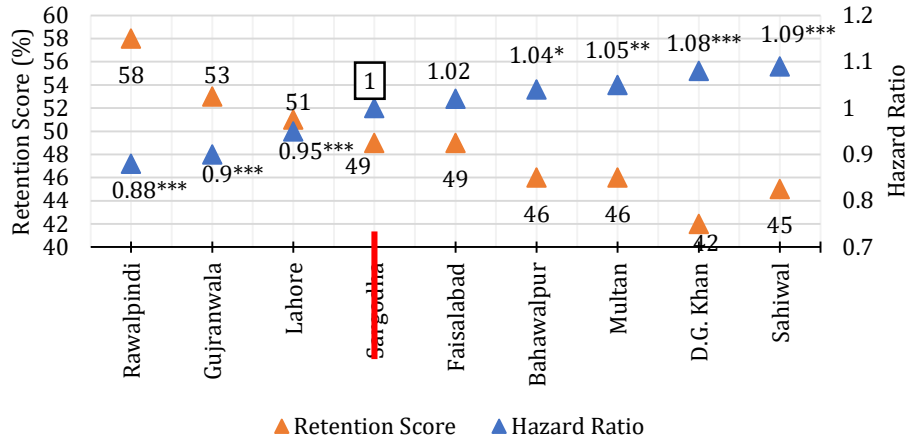
This section provides a comparative analysis across nine divisions of Punjab. Figure 5 illustrates that our estimates of hazard ratios calculated from MICS6 household data are analogous to the Alif Ailaan retention scores which are estimated using enrolment data from National Education Management Information System (NEMIS). Retention score is a sub-component of the education index that measures student retention from primary to middle and from middle to higher level schooling. Sargodha¹¹ is chosen as a reference category to calculate hazard ratio. It is selected based on the highest proportion in terms of school attendance i.e., primary (18%), lower and upper secondary (23%) and higher education (19%) as well as highest percentage of grade completion (21%) among all the nine divisions of Punjab.

Out of the total sample size, the division-wise distribution of respondents is as follows: 6% Gujranwala; 9% Sahiwal, 9% D.G Khan; 10% Sargodha, 12% Faisalabad, 12% Multan, 12% Rawalpindi, 13% Bahawalpur, and 17% Lahore. The hazard ratio for Faisalabad division is insignificant. The regions with higher retention scores have also shown a decreasing hazard ratio and vice versa. It can be observed in case of Rawalpindi, Gujranwala, and Lahore divisions that the risk of early school dropout is lower i.e., a higher survival rate vis-a-vis these regions have also shown higher retention scores compared to the rest of the divisions. Similarly, the hazard ratios are higher for Bahawalpur, Multan, D.G. Khan, and Sahiwal which is corresponding to the lower percentage of retention scores. So, there is a need to find reasons/barriers that play a determinate role in reducing or causing the school dropouts.

The comparison of hazard ratio with divisional poverty profile and household's combined wealth scores is provided in Figure 6. The wealth index has a significant impact in increasing the school survival rate (also represented earlier in Table 2). The size of the circle in Figure 6a depicts the incidence of poverty. Rawalpindi, Gujranwala, and Lahore are less poverty afflicted divisions as compared to rest of the Punjab and the parity risk of school dropout is also lowered in these regions. It is clearly shown that incidence of poverty is higher in areas that have hazard ratio greater than 1. Bahawalpur and D.G. Khan division have the highest poverty incidence, and poverty eradication policies can considerably reduce the school dropouts as revealed by relatively smaller wealth hazard ratio for these two regions i.e., 0.778 and 0.773 (Figure 6b).

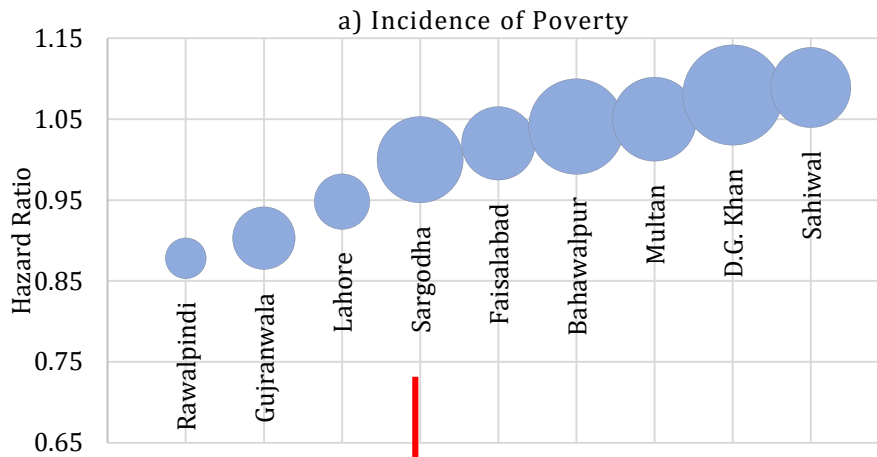
Figure 5: Comparison of Hazard Ratio for School Dropouts and School Retention Scores among Nine Divisions of Punjab

¹¹ The hazard ratio for reference category takes the value of 1.

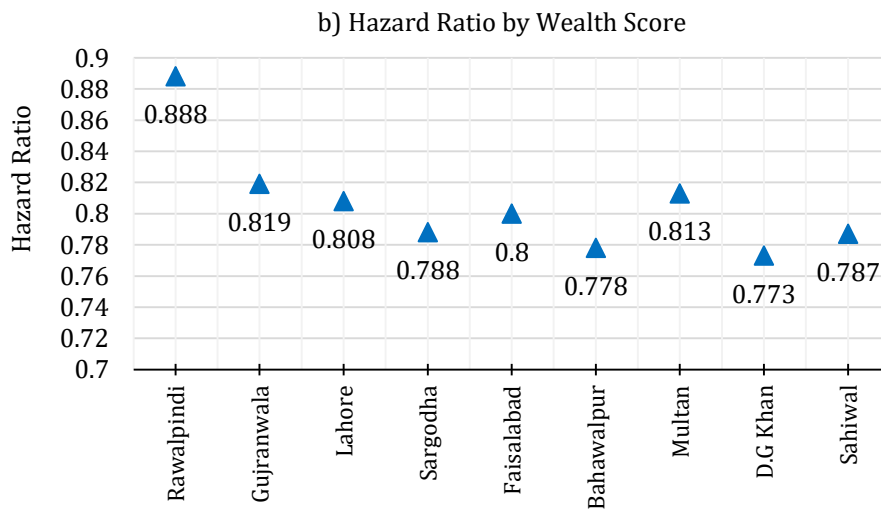


Source: The hazard ratios are calculated by authors using MICS6 dataset and data on school retention score is extracted from Alif Ailaan Education Rankings 2017. The hazard ratio for Urban Area is 0.870 ***. Note: Sargodha is used as reference category (1). ***, **, * indicates the hazard ratios at 1%, 5%, and 10% significance level.

Figure 6: Relative Parity Risks in Terms of Income Barriers



Source: Authors' compilation. The data on poverty is extracted from Punjab Economic Report 2016. The incidence of poverty measures the proportion of people experiencing multiple deprivations.



Source: Authors' calculations. The hazard ratios are statistically significant at 5% level.

In continuation of Table 2, the analysis on child labour with school dropouts is further elaborated in Figure 7 by undertaking rural-urban comparison for nine divisions of Punjab. Only those values are quoted in the given figure that are statistically significant. The parity risk of school dropout resulting from paid labour in urban areas is highest in case of Bahawalpur followed by Multan. Whereas rural unpaid family labour in D. G. Khan is a significant contributor for dropping out of school. On the other hand, paid labour in rural areas of Rawalpindi and Sahiwal have the highest hazard ratio associated with discontinuation of school education at earlier grades. In case of urban regions of Rawalpindi, Lahore, Sargodha, D.G. Khan, and Sahiwal the paid child labour has no significant association with school dropouts in addition to rural regions of Lahore, Faisalabad, and D.G. Khan.

Figure 7: Rural-Urban Comparison of Hazard Ratios for Paid Child Labour and Unpaid Family Labour

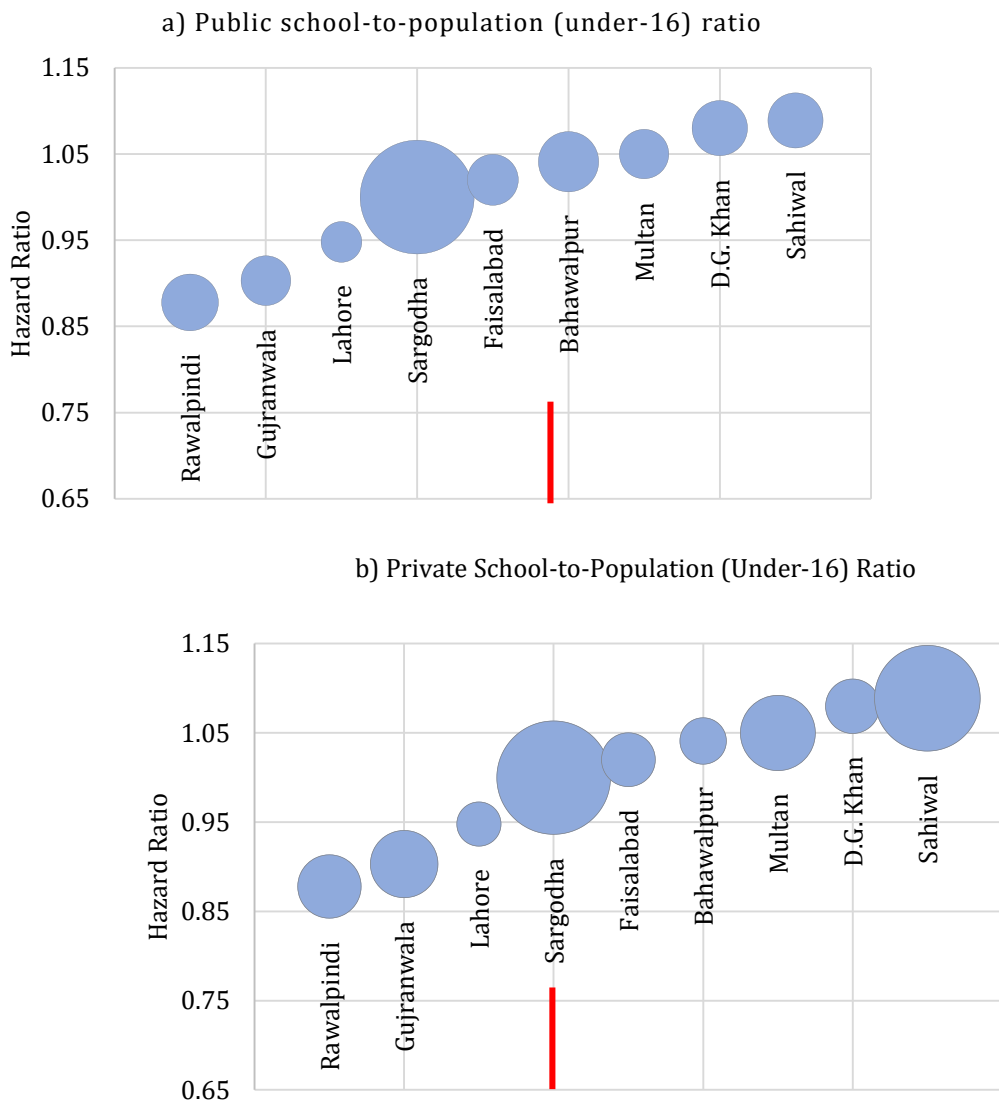


Source: Authors' calculations using MICS6. Note: The values are labelled that are statistically significant at 5% level.

Figure 8, Figure 9 and Figure 10 illustrate the supply-sides factors that might be associated with school dropout across nine divisions of Punjab. The size of bubbles in Figure 8 represents the ratio of public and private schools to population under the age of 16 years. Sargodha¹² has the highest number of public and private-school ratio but there are no substantial differences in the public-school ratio among the remaining eight divisions. On the other hand, Multan and Sahiwal have comparatively higher private-school ratio despite having greater risk of school dropouts. The school survival rate is higher in Lahore but lower in Multan and considerably less in D.G. Khan, however the private-school ratio does not vary much among these three divisions.

¹² Sargodha is taken as reference category, for calculating the hazard ratio for each division, based on highest percentage of school attendance and grade completion.

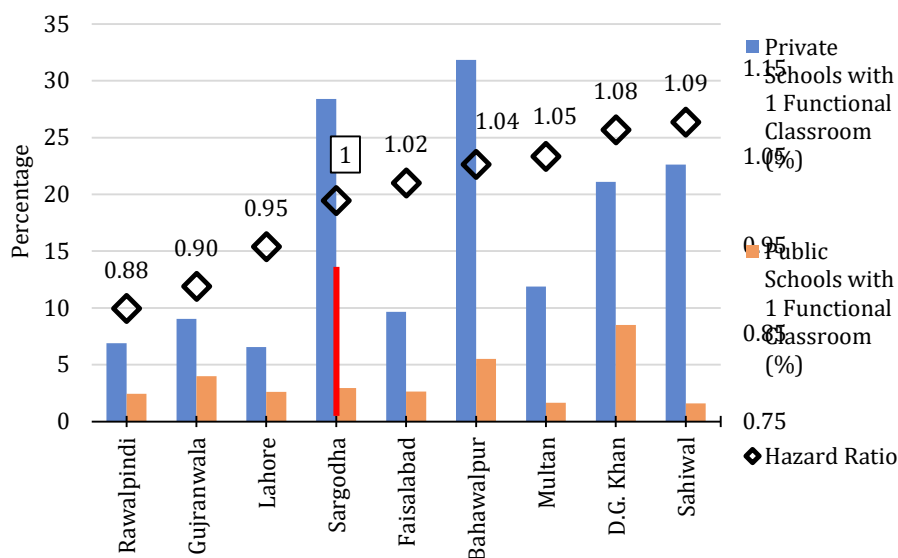
Figure 8: Supple-Side Factor in Terms of School Availability



Source: Author's compilation using data from population census 2017, Pakistan Bureau of Statistics and Punjab Annual School Census Report 2017-18.

Figure 8 does not show any sizeable differences in terms of school availability except some disparity is seen in case of Multan and Sahiwal with higher numbers of private schools despite having greater hazard ratio of school dropout. To explore the school dropout factors, other than the school availability in terms of numbers, it is necessary to consider the quality-of-service provision of school education. The quality depends upon school infrastructure, schooling attributes, school learning, readiness toward higher level schooling as well as availability. These factors are explored to make a comparison with the hazard ratio of school dropouts. Figure 9 shows that there are not large differences in terms number of public schools with one functional classroom except Bahawalpur and D.G. Khan. On the other hand, the divisional areas that have significant higher risks of school dropouts (Bahawalpur, Multan, D.G. Khan, and Sahiwal) have larger number of one classroom private schools in comparison to areas with smaller parity risks (Rawalpindi, Gujranwala, and Lahore). So, the quality of physical infrastructure is an important factor for school retention and successful transition to higher grades.

Figure 9: Supply-Side Factor as Quality of Physical Infrastructure



Source: Authors' compilation using data from Punjab Annual School Census Report 2017-18 by Programme Monitoring & Implementation Unit, Punjab Education Sector Reform Programme. The percentages are calculated in proportion to the total number of schools in each division.
Figure 10: Supply-Side Factors as School Attributes (as % Total in Each Division)

	Governing Body	Report Card	PTA/SMC Meeting	Hazard Ratio
Rawalpindi	31.3%	51.3%	80.5%	0.88***
Gujranwala	27.5%	69.1%	75.6%	0.9***
Lahore	32.7%	67.7%	83.5%	0.95***
Sargodha	11.9%	44.7%	58.6%	1
Faisalabad	11.7%	57.2%	69.6%	1.02
Bahawalpur	6.4%	44.5%	57.7%	1.04*
Multan	10.5%	51.3%	59.1%	1.05**
D.G. Khan	5.7%	28.6%	55.4%	1.08***
Sahiwal	9.7%	54.4%	57.6%	1.09***

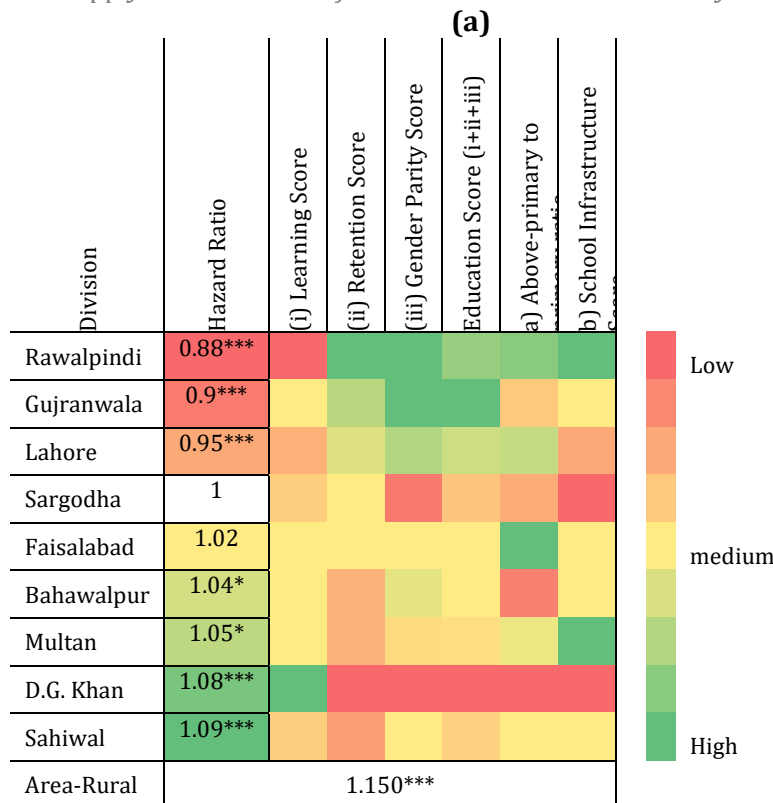
Source: Author's calculation using MICS6. ***, ** and * indicate the hazard ratios at 1%, 5% and 10% significance level.

Figure 10 provides a comparison of schooling attributes in terms governance, feedback, and parental involvement for nine divisions of Punjab. These factors reflect the quality of school education other than the physical infrastructure. It can be clearly seen that schools in those regions that have lesser risk of school dropout (Rawalpindi, Gujranwala, and Lahore), also have greater prevalence of school governing body, regularity in students' performance as well as parental involvement with school management committee/ parent-teacher association. Thus, Figures 8 and 9 visibly infer that an improvement in school quality can significantly reduce the student dropout ratio.

Figure 11 provides a comparison of education score and beyond-primary school readiness. Education score is a comprehensive measure of education outcome, which is sub-categorized into

i) learning score¹³, ii) retention score¹⁴ and iii) gender parity score¹⁵. The beyond-primary school readiness comprises of two components as a) above-primary to primary-schools ratio¹⁶ and b) school infrastructure score¹⁷. The infrastructure score is an input measure that constitutes the availability of basic facilities as electricity, drinking water, toilet, boundary wall and satisfactory building condition. The data shows that the learning score is highest in case of D. G. Khan, but this division has inability to address higher incidence of student dropouts due to lack of capabilities for beyond-primary readiness. This is observed in terms of poor school infrastructure and lesser number of middle and high schools to cater the successful transition from primary to higher level of schooling. Furthermore, the inadequate number of above-primary schools is a greater impediment than the poor infrastructure for school retention. For Multan division, school infrastructure as an indicator of readiness is better performing followed by the availability of beyond primary schooling.

Figure 11: Supply-Side in Terms of Educational Outcomes and Beyond Primary Readiness



(b)

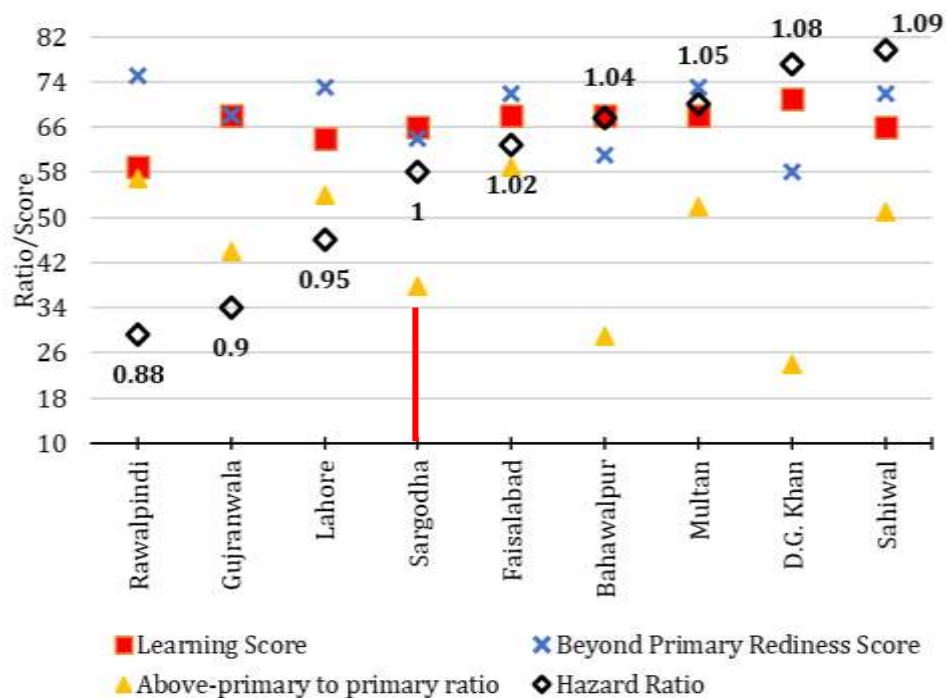
¹³ The learning score is used as proxy to reflect the quality of school education. It measures the percentage score in Urdu and English for class 3 and 8. Alif Ailaan has compiled the ranking using the test score data from Annual Status of Education Report (ASER) 2016.

¹⁴ Alif Ailaan has estimated the scores using enrolment data from National Education Management Information System (NEMIS) 2016-17. It measures the enrolment in middle and higher levels as a percentage of primary level enrolment.

¹⁵ Alif Ailaan has estimated the scores using data on proportion of enrolment and retention between girls and boys from National Education Management Information System (NEMIS) 2016-17

¹⁶ The above primary includes two groups as middle and high schools. Alif Ailaan has compiled the data from National Education Management Information System (NEMIS) 2016-17

¹⁷ This measures the provision of basic facilities in government middle schools, and Alif Ailaan has compiled the data from National Education Management Information System (NEMIS) 2016-17



Source: The hazard ratios are calculated from MICS6 which are compared with the sub-indicators of Alif Ailaan District Education Rankings/Scores. ***, **, * indicates the hazard ratios at 1%, 5%, and 10% significance level.

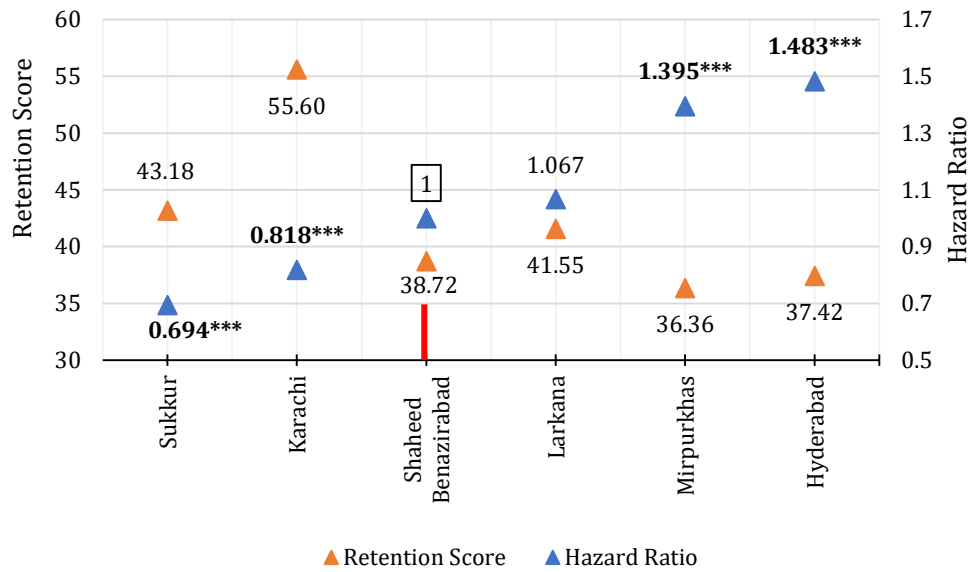
Nevertheless, the school dropout might be the result of low gender parity score due to greater dropout of female students and comparatively lower learning score. The education performance indicators are average in case of Faisalabad but the above-primary to primary school ratio is the highest. Rawalpindi has the highest scores for all indicators except the learning score which is amongst one of the lowest. Similarly, Gujranwala and Lahore are also better performing in terms of education score, gender parity in school education and above primary to primary schools ratio except the learning score and school infrastructure to some extent. The comparative analysis across division reveals that there cannot be one and the same policy to be adopted across Punjab. Though there is need to fine-tune the specific factors for each region separately to address the issue of school dropout.

5.3 Divisional Level Analysis of School Dropout in Sindh

This section provides a comparative analysis across six divisions of Sindh. Shaheed Benazirabad¹⁸ is chosen as a reference category to calculate hazard ratio. Among the six divisions of Sindh, Shaheed Benazirabad has the lowest level of education attainment in middle, secondary and higher level. Figure 12 shows that higher hazard ratios for Mirpurkhas and Hyderabad are consistent with lower retention scores as reported by Alif Ailaan Education Rankings. Similarly, Sukkur and Karachi report higher retention scores and correspondingly significantly lower risks of school dropouts. The parity risk is insignificant for Larkana division. The divisional distribution of respondents is 10% Shaheed Benazirabad, 27% Hyderabad, 17% Larkana, 27% Karachi, 9% Mirpurkhas and 10% Sukkur.

Figure 12: Comparison of Hazard Ratio for School Dropouts and School Retention Scores among Six Divisions of Sindh

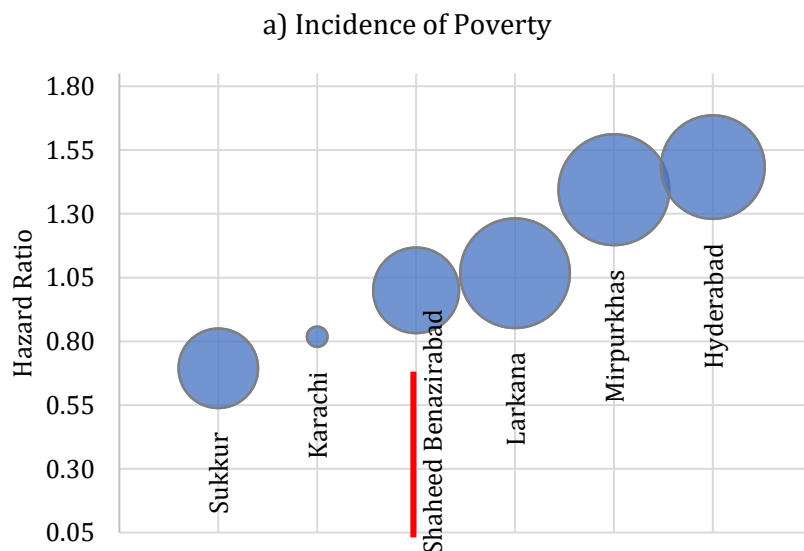
¹⁸ The hazard ratio for reference category takes the value of 1.



Source: The hazard ratios are calculated by authors using MICS6 dataset and data on school retention score is extracted from Alif Ailaan Education Rankings 2017. The hazard ratio for Urban Area is 0.565***. Note: Sargodha is used as reference category (1). *** indicates the hazard ratios at 1%, significance level.

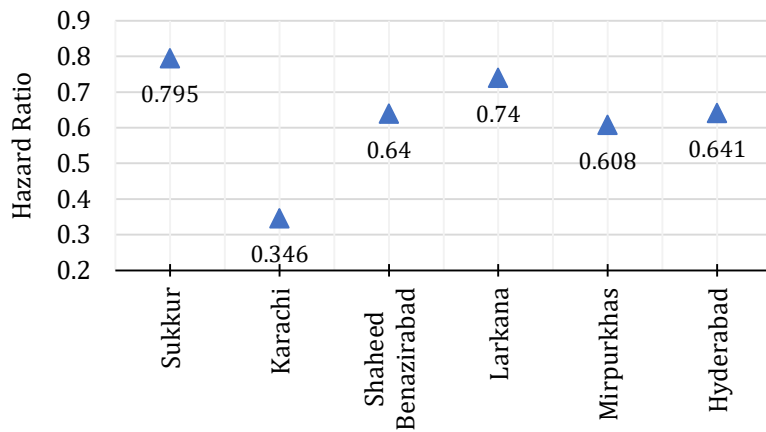
Figure 13 provides a glimpse of school dropout risk associated with divisional poverty profile and household's combined wealth scores. The size of circle (part a) represents the multidimensional poverty index. Larkana, Mirpurkhas and Hyderabad divisions experience an early school dropout and have higher poverty incidence. On the other hand, the less impoverished regions such as the division of Karachi and Sukkur show better performance in terms of lower risk of school dropouts. The wealth hazard ratio with school dropouts is also small and statistically significant (part b).

Figure 13: Relative Parity Risks in Terms of Income Barriers



Source: Authors' compilation. The data on poverty is extracted from Multidimensional Poverty Index, Research and Training Wing Planning and Development Department, Government of Sindh. The incidence of poverty measures the proportion of people experiencing multiple deprivations.

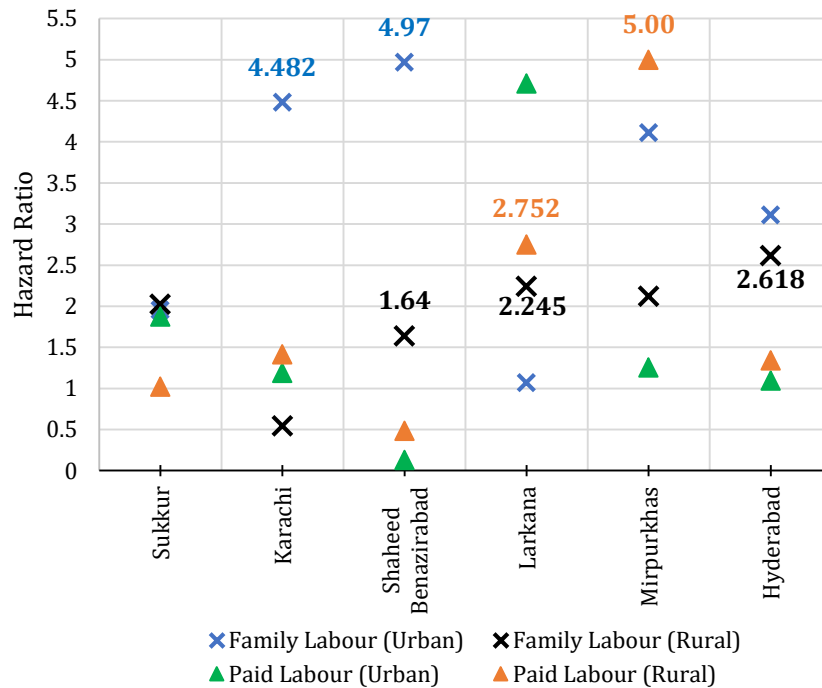
b) Hazard Ratio by Wealth Score



Source: Authors' calculations using MICS6. The hazard ratios are statistically significant at 5% level.

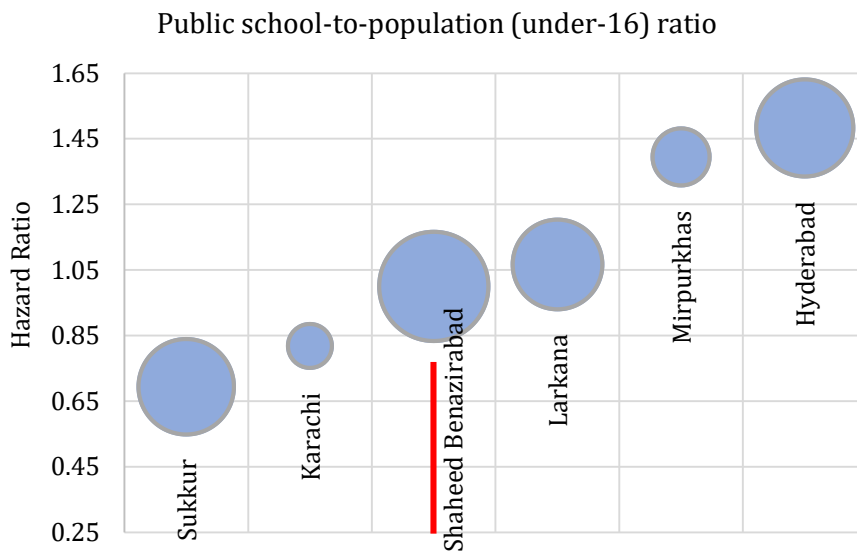
The rural-urban comparison of school dropout hazard ratios in association with child labour, across six divisions of Sindh, is provided in Figure 14. The involvement of children as unpaid family labour in rural areas of Larkana and Hyderabad divisions is a significant contributor towards early dropout from school whereas this relationship is substantially stronger in urban areas of Karachi. In the case of Shaheed Benazirabad, the risk of school dropout is much higher in urban than rural areas. Child labour in the form of paid activities is significant only in rural areas of Larkana and Mirpurkhas with much higher impact in the latter. Sukkur is at an advantage where child labour is largely insignificant, and this region also has the lowest risk of school dropout. The analysis shows that paid labour in urban has no significant role in Sindh but a contributor factor in Punjab.

Figure 14: Rural-Urban Comparison of Hazard Ratios for Paid Child Labour and Unpaid Family Labour



Source: Authors' calculations using MICS6. Note: The values are labelled as statistically significant at 5% level.

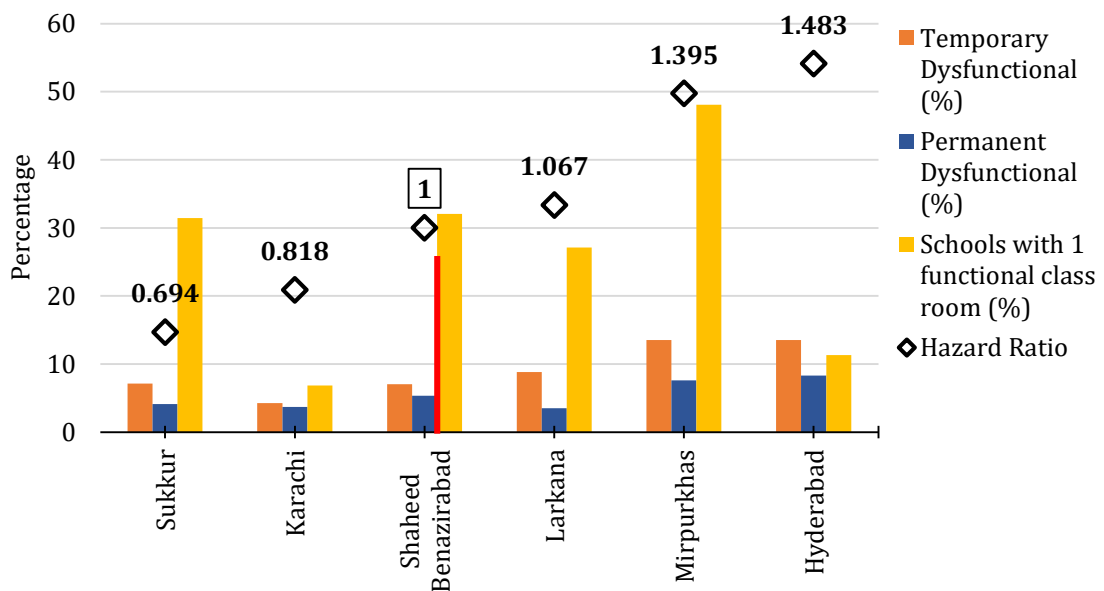
Figure 15: Supple-Side Factor in Terms of School Availability



Source: Author's compilation using data from population census 2017, Pakistan Bureau of Statistics and Sindh Education Statistics 2019, School Education & Literacy Department, Government of Sindh.

Figure 15 provides a comparison of school availability with school dropout risks. The hazard ratio of Karachi is low regardless of the smallest public school to population ratio. Conversely, the public-school availability in Hyderabad and Larkana is comparable to that of Sukkur but has greater risks of school dropout whereas Sukkur has the lowest hazard ratio. The reason for such variations is based on differences in quality of school infrastructure, schooling attributes, gender parity, and beyond primary readiness as highlighted in Figure 16 to 18.

Figure 16: Supply-Side Factor as Quality of Physical Infrastructure



Source: Authors' compilation using data from Profiling for Government Schools 2019, School Education & Literacy Department, Government of Sindh. The percentages are calculated in proportion to the total number of schools in each division.

Figure 17: Supply-Side Factors as School Attributes (as % Total in Each Division)

	Governing Body	Report Card	PTA/SMC Meeting	Hazard Ratio
Sukkur	20.30%	38.90%	73.70%	0.694***
Karachi	28.40%	78.30%	80.40%	0.818***
Shaheed Benazirabad	16.00%	32.90%	68.80%	1
Larkana	18.60%	26.50%	75.40%	1.067
Mirpurkhas	35.70%	40.70%	83.90%	1.395***
Hyderabad	20.30%	38.90%	75.50%	1.483***

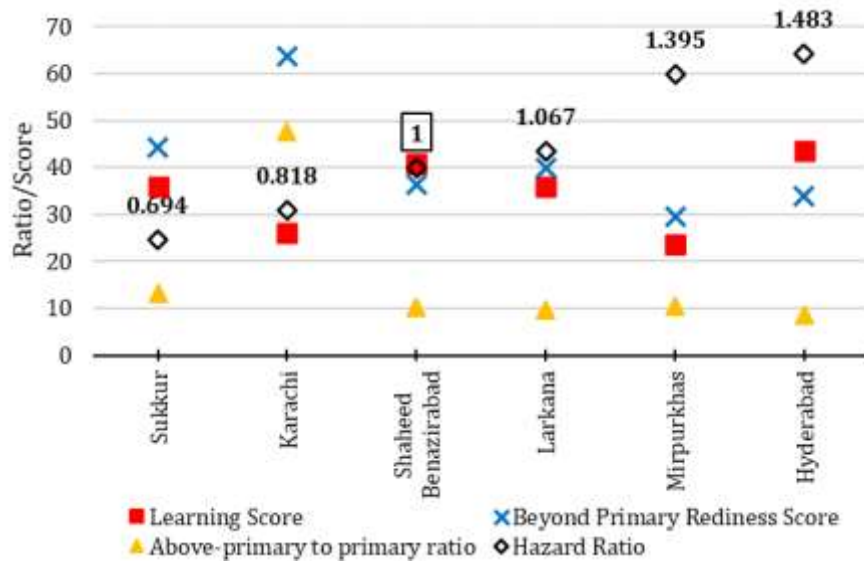
Source: Author's calculation using MICS6. *** indicates the hazard ratios at 1% significance level.

Figure 18: Supply-Side in Terms of Educational Outcomes and Beyond Primary Readiness

(a)

Division	Hazard Ratio	(i) Learning Score	(ii) Retention Score	(iii) Gender Parity Score	Education Score (i+ii+iii)	a) Above-primary to primary ratio	b) School Infrastructure Score
Sukkur	0.694***	High	High	High	High	High	High
Karachi	0.818***	Low	High	High	High	High	High
Shaheed Benazirabad	1	High	Medium	High	High	High	Medium
Larkana	1.067	High	High	Medium	High	Medium	High
Mirpurkhas	1.395***	Low	Low	Medium	Low	High	Low
Hyderabad	1.483***	High	Medium	Low	High	Low	Medium
Area-Rural	1.525***						

(b)



Source: The hazard ratios are calculated from MICS6 which are compared with the sub-indicators of Alif Ailaan District Education Rankings/Scores. *** indicates the hazard ratios at 1% significance level.

Figure 17 does not show considerable variations in schooling attributes that could possibly be associated with school dropouts. In fact, some indicators are better in areas that have higher risks of school dropouts which supports our previous findings (Table 4) i.e., an improvement in schooling attributes such as governance and feedback has not reaped fruitful outcomes in case of Sindh.

Though the public-school ratio is relatively smaller in Karachi but the number of permanent/temporary dysfunctional schools and schools with one functional classroom is also small. The improved quality of school infrastructure has contributed towards reducing the chance of school dropouts. Mirpurkhas has a higher risk of school dropout where the school availability is less as well as the proportion of dysfunctional schools and schools with only one functional classroom is also high. Hyderabad division has a higher public-school ratio along with comparatively better school infrastructure but still this region corresponds to the highest school dropout risk. The possible reasons could be poor performance in educational outcomes, gender parity and beyond primary readiness as shown in Figure 18. Interestingly, Hyderabad has the highest learning score in terms of education outcome, but such performance proves to be inadequate for school retention towards higher grade which is mainly due to inadequacy in beyond primary school availability and poor infrastructure of existing schools. Similarly, Mirpurkhas is under performing in all the categories which also has a higher hazard ratio of school dropout. Sukkur and Karachi divisions do not have a better learning outcome, but retention score is higher and correspondingly lower hazard ratio. In addition, the gender parity score and beyond primary readiness in terms of school availability and infrastructure is better in Sukkur and Karachi as compared to the rest of the regions.

6. CONCLUSIONS

The present study examines the risk factors associated with school dropout in Pakistan by employing survival analysis. This methodology determines the hazard ratio, often called the parity risk, of dropping out of school by considering the time to event. The study indicates that higher risk of dropout at earlier level of schooling results in educational wastage as successful transition to secondary and higher level gets low. The contributing factor for early-stage dropout

is child labour and poverty which is comparable to the findings of Punjab Child Labour Survey.¹⁹ The overall results find that the chances of school dropout are higher in rural areas but, more likely, tend to get higher in urban areas when poverty and child labour is taken into account. The relative parity risks are also found greater in those regions that have higher incidence of poverty.

The enabling environment at home and school is also important along with active involvement of parents in schooling. Similarly, cognitive and functional difficulties are also found to cause hindrance in successful transition to higher level of schooling. An aspect of teaching quality was also taken in this study by including the input and output measures. The input side was included in terms of regularity in homework, teacher's feedback on student performance, presence of school governing body and active PTA/SMC. The output indicator is measured as district level learning scores. All these factors are found to have a significant association in reducing school dropout. The role of early childhood readiness (ECE) is also examined. Successful completion of ECE in previous year has a significant impact on reducing the school dropouts whereas in case of Punjab the hazard ratio for current year's ECE indicates higher cases of early dropouts at Katchi/Pre-school. The study also explores the association of school dropouts with quality of education service provision. It is observed that presence of better school infrastructure, school governing body, parent-teacher association, improved school learning, education performance, readiness toward higher level schooling as well as higher level school availability considerably reduce the risk of school dropouts. However, the comparative analysis across different regions reveals that need-based education policy must be designed, specifically to the requirement of each region.

7. POLICY RECOMMENDATIONS

Based on our analysis, some key issues to be addressed are given below:

- i) Strong legal system must be enacted to deter child labour.
- ii) Poverty is also one of the reasons for school dropouts. Hence, an in-cash payment scheme for education attainment specifically in impoverished regions could play an important role in improving school retention. Scholarship rewards could incentivize students for successful transition towards higher level of schooling. 'Education voucher scheme'²⁰ through public-private partnership needs to be expanded for affordable access to education.
- iii) Parental involvement and the school governance system must be strengthened. In addition, parental involvement must also include conducive household environment for child development. The PTAs can play an important role for awareness in this regard.
- iv) The schools must focus on improving the educational outcomes in terms of learning outcomes, development of cognitive abilities and regular feedback mechanism. The general principle of access to 'education' must be prioritized towards 'quality education'. Such course of action must start from primary and pre-school (Katchi) level for successful transition to higher levels since the school dropout risk is highest at these two levels of education. This can ultimately also bring fruitful results in early childhood programmes.
- v) Beyond-primary school readiness needs to be improved, both in terms of school availability and school infrastructure, by considering the differences and resource deficiencies across regions.

¹⁹ The Punjab Child Labour Survey (2019-20) indicates that 80% child labour between age 5-9 years are attending school and but later leaves the school as 54% child labour between age 15-17 years are the school dropouts.

²⁰ The voucher scheme is currently in introduced in 36 districts of Punjab with high concentration in Lahore and Rawalpindi. These two regions also depict lower hazard ratios for school dropouts.

vi) Above all, each province needs to structure and fine-tune the education policies with reference to regional and local context, catering to its specific needs by involving the local bodies instead of a single policy action at provincial level. Since the National Education Policy 2017 continues to guide the federating units due to absence of comprehensive policy drafts of their own and such policy becomes somewhat shallow in regional context.

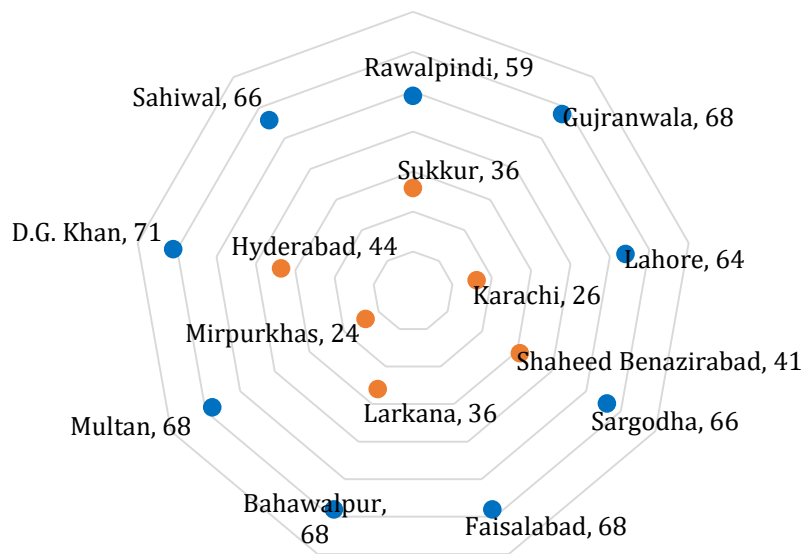
REFERENCES

- Boualaphet, K., & Goto, H. (2020). Determinants of school dropout in Lao People's Democratic Republic: A survival analysis. *Journal of International Development, 32*(6), 961-975.
- Choe, D. (2021). Longitudinal relationships amongst child neglect, social relationships, and school dropout risk for culturally and linguistically diverse adolescents. *Child Abuse & Neglect, 112*, 104891.
- Farah, N., & Upadhyay, M. P. (2017). How are school dropouts related to household characteristics? Analysis of survey data from Bangladesh. *Cogent Economics & Finance, 5*(1), 1268746.
- Gouda, S., & Sekher, T. V. (2014). Factors leading to school dropouts in India: An analysis of national family health survey-3 data. *IOSR Journal of Research & Method in Education, 4*(6), 75-83.
- Marlow, S. A., & Rehman, N. (2021). The relationship between family processes and school absenteeism and dropout: a meta-analysis. *The Educational and Developmental Psychologist, 38*(1), 3-23.
- Mikkonen, J., Moustgaard, H., Remes, H., & Martikainen, P. (2018). The population impact of childhood health conditions on dropout from upper-secondary education. *The Journal of Pediatrics, 196*, 283-290.
- Mughal, A. W. (2020). Secondary school students who drop out of school in rural Pakistan: The perspectives of fathers. *Educational Research, 62*(2), 199-215.
- Mughal, A. W., & Aldridge, J. (2017). Head teachers' perspectives on school drop-out in secondary schools in rural Punjab, Pakistan. *Educational Studies, 53*(4), 3, 59-376.
- Murphy-Graham, E., Montoya, D. P., Cohen, A. K., & Lopez, E. V. (2021). Examining school dropout among rural youth in Honduras: Evidence from a mixed-methods longitudinal study. *International Journal of Educational Development, 82*, 102329.
- No, F., Taniguchi, K., & Hirakawa, Y. (2016). School dropout at the basic education level in rural Cambodia: Identifying its causes through longitudinal survival analysis. *International Journal of Educational Development, 49*, 215-224.
- Pezzulo, C., Alegana, V. A., Christensen, A., Bakari, O., & Tatem, A. J. (2022). Understanding factors associated with attending secondary school in Tanzania using household survey data. *PloS One, 17*(2), e0263734.
- Plank, S. B., DeLuca, S., & Estacion, A. (2008). High school dropout and the role of career and technical education: A survival analysis of surviving high school. *Sociology of Education, 81*(4), 345-370.
- Satti, R. A., & Jamil, M. (2021). Socio-economic determinants of school dropouts: An evidence from households in Pakistan. *iRASD Journal of Economics, 3*(3), 388-401.
- Sekine, K., & Hodgkin, M. E. (2017). Effect of child marriage on girls' school dropout in Nepal: Analysis of data from the Multiple Indicator Cluster Survey 2014. *PloS one, 12*(7), e0180176.
- Shah, D., Haider, G., & Taj, T. (2019). Causes of dropout rate at primary level in Pakistan. *International Journal of Curriculum and Instruction, 11*(2), 38-74.

- Valdivieso, P. (2015). *Survival Analysis: Exploring the dropout motives in a panel of Peruvian children, using the Young Lives program dataset*. MSc Dissertation, The University of Edinburgh, Scotland.
- Woldehanna, T., Endale, K., Hamory, J., & Baird, S. (2021). Absenteeism, dropout, and on-time school completion of vulnerable primary school students in Ethiopia: Exploring the role of adolescent decision-making power in the household, exposure to violence, and paid and unpaid work. *The European Journal of Development Research*, 33(5), 1349-1389.

APPENDIX

Figure A: Education Performance (Learning Score) among Different Regions of Punjab and Sindh



Source: Authors' compilation using AlifAilaan Education Rankings 2017