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Evaluating the Impact of Advanced Educational Infrastructure on Academic Performance in District Charsadda

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Abstract: *The Performance of the Schools in district Charsadda was studied with the help of secondary data. Gender of school, location, medium of instruction, library in school, building own, basic facilities that is computer lab, science lab, electricity, toilet, office, playground and total number of students in school found as statistically significant. The data was used to compute the School Performance Index (SPI), Percentage of Passing Students (PPS) and Percentage of First Division (PFD) of the students in the schools of district Charsadda. The SPI, PPS and PFD were computed for the government high and higher secondary schools for male and female in district Charssadda. The included factors like gender wise distribution, location wise, level of school, medium of instruction and nature of construction of schools were considered. The factors like gender of school, location, medium of instruction, library in school, building own, and availability of facilities like computer lab, science lab, electricity, toilet, playground office and total number of students in school found as statistically significant for SPI. The regression modeling of PPS and PFD showed factors like location, level of school, library in school, availability of facilities like computer lab, science lab, playground, the total number of students in 9th class, the total number of students in 10th class, the total number of teachers in school, the number of non-teaching staff, total number of SST General, SST-Science, CT-General and Physical education teacher found as statistically significant. The output of logistic regression showed the availability of library in school, science lab and computer lab found as statistically significant factors for the satisfactory performance of male schools in district. Also, the logistic regression model for female schools in district Charsadda showed the availability of library in school, science lab and computer lab found as statistically significant factors for the satisfactory performance. The logistic regression for male and female government schools in district Charsadda found statistically significant.*

Introduction

Statistics can be defined as the technically assembling and evaluating numeric data to find connections between events by applying different methods and techniques, thereby to define, foresee and influence the occurrence of events. The applications of Statistics are in almost every field of research including social sciences, numerical sciences, physical and biological sciences [1]. Education is a multidimensional process that directly affects our society, the people and our world. It is not just about learning. Educationists and economists have declared an important amount of evidence through which the labor force productivity capacity can be enhanced. Thus, in response an attractive life style is achieved by earning more money [2]. Finally, the development of economic growth has been boosted at country level through education and other benefits like improved life style, better health etc. [3]. The importance of providing education to the people of a country is revealed and provides encouragement. It is very important especially for third world countries to invest money on their students. That's why education is recognized locally and internationally a main factor and a large amount of money is spent on education throughout the world. The policymakers in the whole world have acknowledged that enhanced human capital have large benefits and have expressively increased the education funding. Data shows that in Latin America the share of government budget for education has doubled since 1980, tripled in Middle East countries and also in East and South Asian countries, five to eight folds, respectively [4]. Most of the budget is spent in constructing new buildings of schools and the arrangement of teaching and other supervisory staff where schools did not exist before. As we know that when distance from the school is decreased, the enrollment of students in the school increases. While spending more money on the schools which already exist can be more attractive for the students and to provide quality education for the satisfaction of students and teacher requirements which can result in the best academic performance of the schools and students.

In the most recent times, more concentration is given to the performance and quality of schools. It has become possible to trace changes in the performance of student and school by carrying out different tests. Different organizations offer these tests nationally and internationally like Program for National Assessment of Educational Progress (NAEP), International Student Assessment (PISA) etc. But this is not a unique trend; many studies have revealed that the school performance is affected due to the increase in the number of students in that school. One of the reasons may be increasing the enrolment of students who are not able, which lowers the performance of the students. However, in some countries they did not show interest in enrolment of the students. But they focus on increasing the expenditure on providing different resources for both the school and students, which resulted in the provision of quality education [5]. Variables like school organizations, teacher characteristics and other basic facilities are inter-related with each other within the school. To adjust changes in the use of a well-planned structured building will be required, for example, we can change the size of a class room with respect to the size of class room and the available number of class rooms. It is very important to determine the school performance according to these factors. It is very difficult to deliver a quality education to the students without proper school building, poor arrangement and lack of basic facilities. It is very important to identify the school resources that boost the student achievements in Pakistan where the school performance is very poor.

Nepal [6] conducted an analysis in five districts of India. He considered 3125 number of schools for analysis. He used the multiple regressions for the empirical results. The results showed that basic school facilities and its performance have a significant relationship.

Like other studies, Bacold and Lee et al. [7] and Greenwald [8] investigated that schools with availability

of basic facilities show good performance than those with lack of basic facilities. While Hanushek and Angrist et al. [9] analyzed that there was a significant association between organization of basic school facilities and its academic performance. Hoxby [10] investigated that strength of the class and their performance of the school has no association.

The relationship between different variables can be summarized in the figure as:

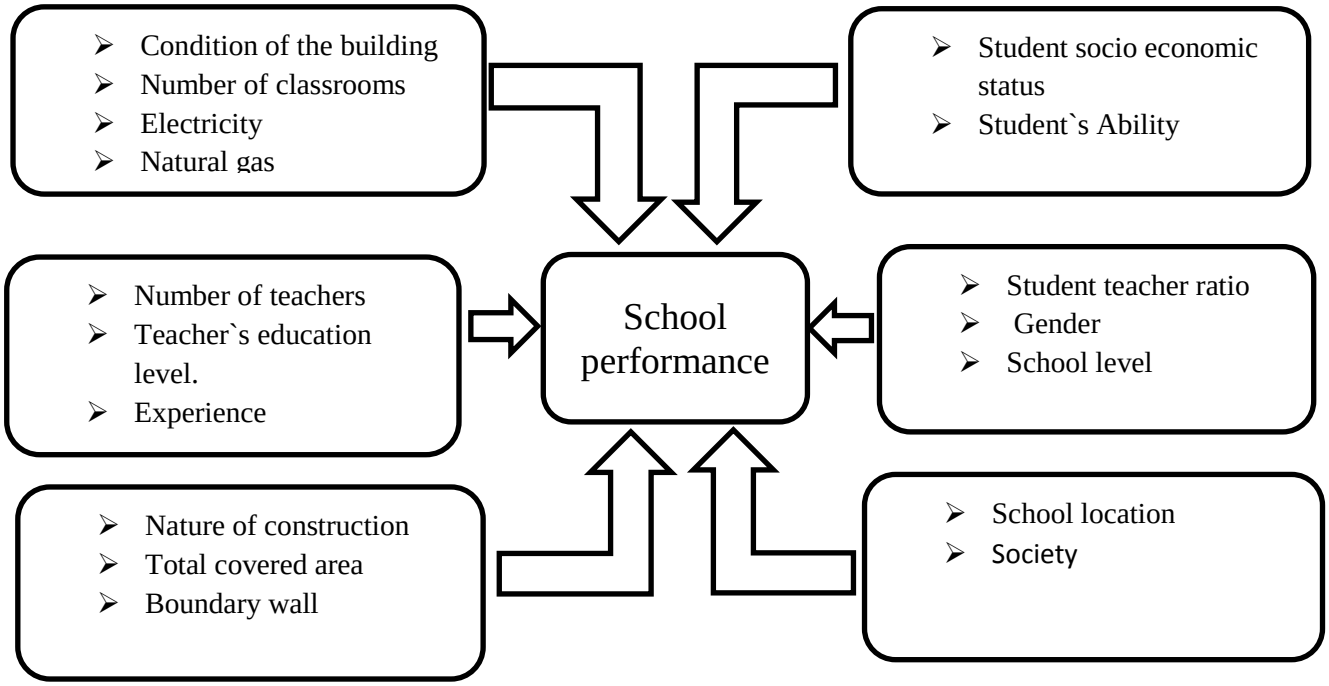

Figure 2.1: Determinants of school's performance

Source: (Greene, Huert, & Richards, 2007)

To provide quality education to students, one of the main factors is to provide a favorable environment to the students for learning i.e. without disapproving environment quality education is not possible. Therefore, the availability of basic facilities and well-structured building improve the school's performance but as well as attract those students which are able towards them to increase the school's performance.

Need of the study

In Pakistan, a very slight attention is given to this problem. Moreover, the Percentage of Passing Students (PPS) is an indicator used for measuring the performance of school. Therefore, the current study has explored this issue with the help of using other characteristics for a sample of 95 schools and in this study three different types of performance indicators like School Percentage of Passing Students (PPS), Performance Index (SPI) and Percentage of First Division Student (PFS) have been used.

Aims and Objective

The aims and objectives of this study are as under:

1) To examine factors responsible for the high school's performance in district Charsadda.
2) To study the effect of availability of basic facilities in the schools.
3) To study the overall performance of schools.

Methodology

Examination score is one of the ways to analyze the student and school's performance. These exams are conducted either by schools or any other educational authorities and also need a careful examination Aslam [11]. Further, it is very important to find the inputs of the school which are helpful in improving

the student's performance and obviously the school's performance.

Analytical framework

A series of determinants are identified by educationists and economists that affect the performance of students in the school. The initial studies show that SES is one of the most important determinants of the student performance in the school, known as "status-attainment research". Which states that students belong to high SES family show better performance than student of low SES families.

There is another series of studies called "effective-school research" which is a reply to status-attainment research. In effective-school research, different schools show high performance coming from low SES families. These studies identified that such schools have the same characteristics as compare to high performance among students belong to low SES families. These characteristics are like the school environment, the relationship of students with teachers and principal etc. The ability of these characteristics to affect student's achievement implies that schools can make a difference.

The third possibility occurs that however, researchers on "effective schools" assert that school makes a difference. But in an area that researcher on both effective schools and status attainment, have assumed unimportant is the economic resources of the schools. If this is the case, then schools make a difference obviously, as to provide such resources are not the same in all the schools. If there is a strong relation between school's performance and such economic resources, then schools in high SES area and having the availability of basic resources will be more favorable for high performance than school in low SES area with lacking the availability of such resources. The conceptual framework guiding the present study is based on the economic perspective of school effect research Rumberger et al. [12].

Description of Schools

This section includes the statistical description of the factors related to schools. It contains the frequency presentation of various factors like gender wise distribution, location wise, level of school, medium of instruction and nature of construction of schools in district Charsadda, Khyber Pakhtunkhwa.

Frequency Distribution of Various Factors

The table 4.1 describes the frequency distribution of the various factors related to schools in district Charsadda. The table defines that there are total 92 public sector schools in district Charsadda. Out of these 92 schools, there are 61 schools are of female and 31 schools are of males. The percentage of the male and female schools in Khyber Pakhtunkhwa found as 33.7 and 66.3 respectively. Similarly, the table 4.1 explains that 19 schools of district Charsadda are located in urban areas with the percentage of 20.7 while 73 schools are located in rural areas of district Charsadda with a percentage of79.30. Also, out of 92 schools in district Charsadda, 57 schools with a percentage of 62.0 are higher schools in level while 35 schools with a percentage of 38 are higher secondary in level. Table 4.1 explains the medium of instruction in the schools of district Charsadda. Most of the schools in district Charsadda have the medium instruction in national language i.e. Urdu. There found about 91 public sectors in Khyber Pakhtunkhwa having the medium of instruction as Urdu with a percentage of 98.9 while only 1.1 percent of the schools have the medium of instruction as English i.e. only 1 public sector school teaches in English. The nature of the school construction being discussed in the table. The construction's structure categorized as Kaccha mixed and Pakka. Out of 92 public sector schools in district Charsadda, there are 4 public sector schools are Kaccha mixed with the percentage of 4.30 while 88 public sector schools have Pakka nature of construction with the percentage of 95.70.

Table 4.1: Frequency Distribution of Demographic Factors of Schools

Factor	Categories	Frequency	Percentages
Gender of school	Female	61	66.3
	Male	31	33.7
Location of school	Rural	19	20.70
	Urban	73	79.30
Level of school	Higher	57	62.0
	Higher Secondary	35	38.0
Medium of instruction at school	Urdu	91	98.9
	English	01	1.1
Nature of school construction	Kaccha Mixed	4	4.30
	Pakka	88	95.70

The table 4.2 defines the cross table of various demographic and gender wise distribution of public schools in district Charsadda. The table 4.2 depict that there are 60 Urdu medium schools for males and only 1 English medium school for male in the district Charsadda. Also, the table defines that there are 31 Urdu medium and no English medium schools for female students in the district Charsadda. There are 2 kaccha mixed and 59 pakka nature of school's construction for male schools and 2 kaccha mixed and 29 pakka schools for females respectively in district Charsadda. There are 51 male public sector schools in rural areas and 10 schools in urban areas of district while 22 female schools in rural area and 9 female schools are located in urban areas of district Charsadda. Similarly, there are 29 higher schools and 32 higher secondary schools for male while 28 higher schools and 3 higher secondary schools for females in district Charsadda. Also, there are 39 male schools having library facility while 22 schools for female having no library facility. Also 13 female public sector schools having library facility while 18 schools have no as such facility in district Charsadda.

Table 4.2: Frequency Distribution of Demographic Factors of Schools

		Gender of the students		
Factors	Categories	Male	Female	Total
medium of instruction at school	Urdu	60	31	91
	English	1	0	1
nature of school construction	Kaccha mixed	2	2	4
	Pakka	59	29	88
location of school	Rural	51	22	73
	Urban	10	9	19
level of school	Higher	29	28	57
	higher secondary	32	3	35
Library facility	Yes	39	13	52
	No	22	18	40

The table 4.3 describes the descriptive statistics of the schools and school performance index (SPI) gender of students, location of the school and level of school wise. The descriptive statistics includes the number of schools, mean SPI and standard deviation in the values of SPI. The table indicates that there are 25 government higher schools for boys in the rural areas of district Charsadda with the mean SPI as 0.4766 and standard deviation of 0.12539. Also, there are 4 higher secondary boys' public schools in the rural areas of district Charsadda with the mean SPI as 0.4449 and standard deviation of 0.0854. There are 26 government higher schools for boys in the urban localities of district Charsadda with the average SPI as 0.4431 and standard deviation of 0.1125. Similarly, there are 6 higher secondary boys' schools in the urban locations of district Charsadda with the mean SPI as 0.5069 and standard deviation of

0.12454. There are 21 government higher schools for girls in the rural areas of district Charsadda having mean SPI as 0.5433 and standard deviation of 0.09403. Also, there are 7 higher secondary girls' public schools in the rural areas of district Charsadda having mean SPI as 0.4927 and standard deviation of 0.11632. There is 1 government higher school for girls in the urban locality of district Charsadda with the average SPI as 0.5317 and standard deviation of 0. Similarly, there are 2 higher secondary girls' schools in the urban locations of district Charsadda with the mean performance index as 0.5750 and standard deviation of 0. 01389. The table indicates that the average performance of schools for the boys in both locality of district is almost identical with a very little difference. Whereas for the school performance of the girls in the urban and rural areas of district Charsadda is almost identical.-

Table 4.3: Descriptive statistics of Schools performance index Gender, location and level of school wise.

Gender	Location of	Level of School	Number of	Mean	Standard
Boys	Rural	Higher	25	0.4766	0.12539
		Higher Secondary	4	0.4449	0.08540
	Urban	Higher	26	0.4431	0.11250
		Higher Secondary	6	0.5069	0.12454
Girls	Rural	Higher	21	0.5433	0.09403
		Higher Secondary	7	0.4927	0.11632
	Urban	Higher	1	0.5317	0.0000
		Higher Secondary	2	0.5750	0.01389

The table 4.4 describes the descriptive statistics of the schools and Passing Percentage of Students (PPS), gender of students, location of the school and level of school wise. The descriptive statistics includes the number of schools, mean PPS and standard deviation in the values of PPS. The table indicates that there are 25 government higher schools for boys in the rural areas of district Charsadda with the mean PPS as 79.58 and standard deviation of 17.15. Also, there are 4 higher secondary boys' public schools in the rural areas of district Charsadda with the mean PPS as 86.077 and standard deviation of 8.0647. There are 26 government higher schools for boys in the urban localities of district Charsadda with the average PPS as 82.431 and standard deviation of 17.7864. Similarly, there are 6 higher secondary boys' schools in the urban locations of district Charsadda with the mean PPS as 80.153 and standard deviation of 22.623. There are 21 government higher schools for girls in the rural areas of district Charsadda having mean PPS as 86.365 and standard deviation of 15.447. Also, there are 7 higher secondary girls' public schools in the rural areas of district Charsadda having mean PPS as 88.296 and standard deviation of 14.281. There is 1 government higher school for girls in the urban locality of district Charsadda with the average PPS as 78.947 and standard deviation of 0. Similarly, there are 2 higher secondary girl's schools in the urban locations of district Charsadda with the average PPS as 81.0354 and standard deviation of 19.8189. The table indicates that the average passing percentage of students (PPS) for the boys in both locality of district Charsadda is almost identical. Whereas for the school performance of the girls in the urban and rural areas of district Charsadda is almost identical.-

Table 4.4: Descriptive statistics of Passing Percentage of Students Gender, location and level of school wise.

Gender	Location of School	Level of School	Number of School	Mean PPS	SD PPS
Boys	Rural	Higher	25	79.58	17.15
		Higher Secondary	4	86.077	8.0647

	Urban	Higher	26	82.431	17.7864
		Higher Secondary	6	80.153	22.623
Girls	Rural	Higher	21	86.365	15.447
		Higher Secondary	7	88.296	14.281
	Urban	Higher	1	78.947	0
		Higher Secondary	2	81.0354	19.8189

The table 4.5 describes the descriptive statistics of the schools and Percentage of First Division (PFD), gender of students, location of the school and level of school wise. The descriptive statistics includes the number of schools, mean PFD and standard deviation in the values of PFD. The table indicates that there are 25 government higher schools for boys in the rural areas of district Charsadda with the mean PFD as 31.19 and standard deviation of 19.5417. Also, there are 4 higher secondary boys' public schools in the rural areas of district Charsadda with the mean PFD as 27.232 and standard deviation of 17.8731. There are 26 government higher schools for boys in the urban localities of district Charsadda with the average PFD as 20.941 and standard deviation of 16.816. Similarly, there are 6 higher secondary boys' schools in the urban locations of district Charsadda with the mean PFD as 39.347 and standard deviation of 26.716.

There are 21 government higher schools for girls in the rural areas of district Charsadda having mean PFD as 29.757 and standard deviation of 15.2734. Also, there are 7 higher secondary girl's public schools in the rural areas of district Charsadda having mean PFD as 27.872 and standard deviation of 25.5747. There is 1 government higher school for girls in the urban locality of district Charsadda with the average PFD as 5.263. Similarly, there are 2 higher secondary girls' schools in the urban locations of district Charsadda with the average PFD as 35.654 and standard deviation of 19.891. The table indicates that the average PFD for male schools in both locality of district is almost identical. Whereas for female schools in the urban and rural area of Charsadda is almost identical.-

Table 4.5: Descriptive statistics of Percentage of First Division Gender, location and level of school wise.

Gender	Location of School	Level of School	Number of School	Mean PFD	SD PFD
Boys	Rural	Higher	25	31.19	19.5417
		Higher Secondary	4	27.232	17.8731
	Urban	Higher	26	20.941	16.8163
		Higher Secondary	6	39.347	26.716
Girls	Rural	Higher	21	29.757	15.2734
		Higher Secondary	7	27.872	25.5747
	Urban	Higher	1	5.263	0
		Higher Secondary	2	35.654	19.891

The figure 4.1 and 4.2 are the scattered diagram between the number of classrooms and SPI for boys and girls public sector schools in Khyber Pakhtunkhwa. The figures are used to determine the relationship between the number of classes in the school and the performance score for boys and girls respectively. The figures indicate that there is a positive relationship between the school performance

score and the number of classrooms is school. This means that the increase in the number of classrooms will distribute the load of students in the schools, will decrease the noise pollution and uplift the performance of school.

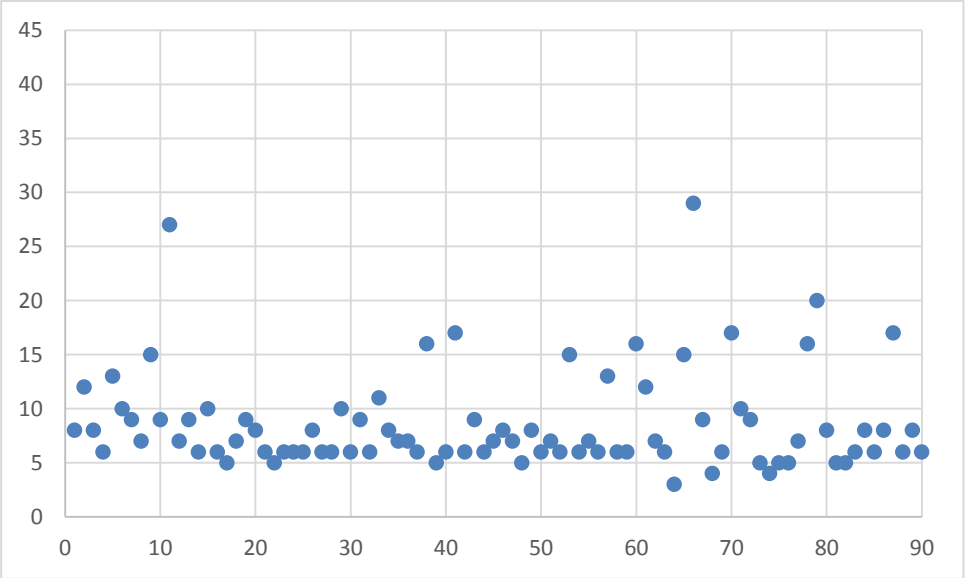

Figure 4.1: scattered diagram between the no: of classrooms for girls and performance Score

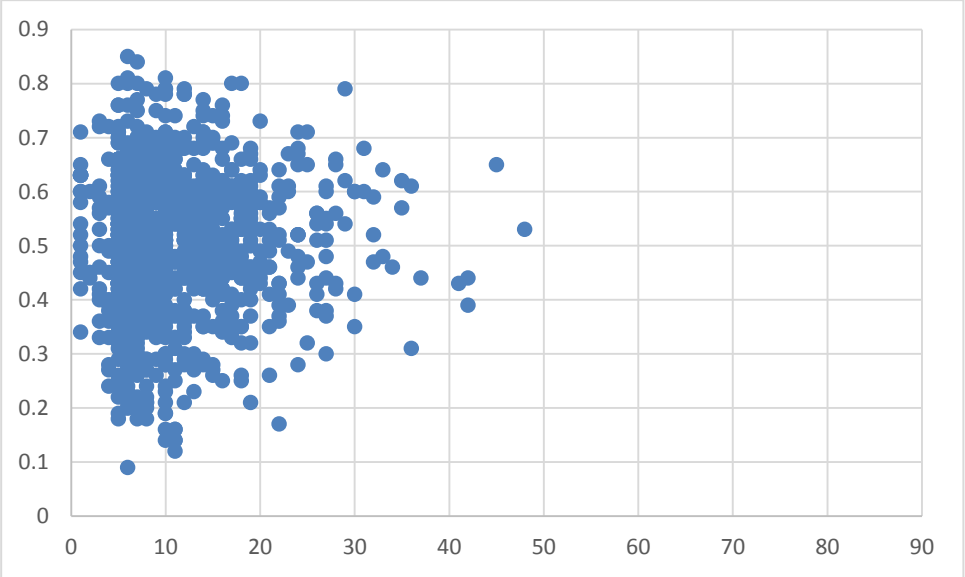

Figure 4.2: scattered diagram between the no: of classrooms for boys and performance Score

The figure 4.3 is the scattered diagram between the number of students and SPI of public sector schools in Khyber Pakhtunkhwa. The figure is used to determine the relationship between the number of students in the public sector schools and the performance score of school respectively. The figure indicates that there is a positive relationship between the school performance score and the number of total students in school. This means that the increase in the number of students will affect the performance of the schools positively.

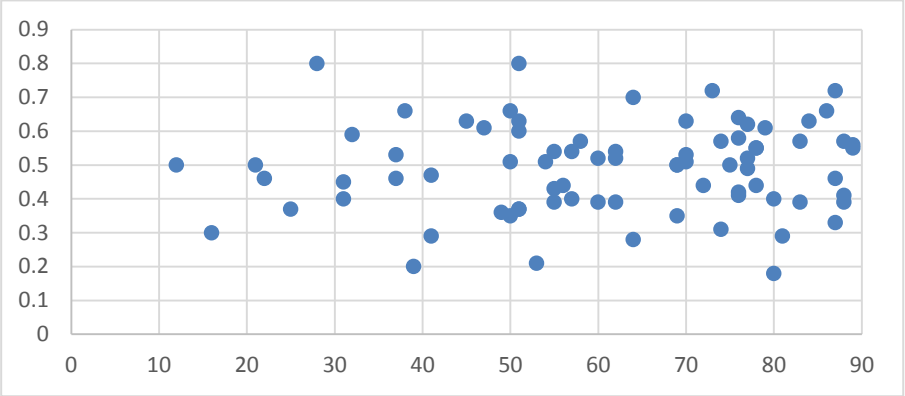

Figure 4.3: scattered diagram between the total no: of students in School and performance Score

The table 4.6 indicates the descriptive statistics of the SPI, percentage of the passing students (PPS) and the PFD of students, gender and having library facility in the school. The table defines there are 39 public sector schools in district Charsadda having library services. The average value of the SPI for the boy's schools in Khyber Pakhtunkhwa having a library facility found as 0.4662 with standard deviation of 0.1087 with the average PPS found as 82.389 along with the standard deviation as 16.264. Also, average the PFD of students as 28.962 with the standard deviation of 20.405 in the public sector schools for boys in the district having library facility.

The table defines there are 22 public sector schools in district Charsadda having no library facility. The average value of the SPI for the boy's schools in district Charsadda having no library facility found as 0.4579 with standard deviation of 0.1328 with the average PPS found as 79.317 with standard deviation as 19.226. Also, average value of the PFD of students found as 24.539 with the standard deviation of 18.202 in the public sector schools for boys in the district having no library facility.

The table defines there are 13 public sector schools for girls in district Charsadda having library facility. The average value of the SPI for the girl's schools in district with library facility found as 0.5521 with standard deviation of 0.1145 with the average PPS found as 849.621 with standard deviation as 12.383. Also, average value of the PFD of students found as 28.112 with the standard deviation of 18.554in the public sector schools for girls in the district with library facility.

The table defines there are 18 public sector schools for girls in district Charsadda having no library facility. The average value of the SPI for the girl's schools in district with no library facility found as 0.5201 with standard deviation of 0.0805 with the average PPS found as 83.76 with standard deviation as 16.137. Also, average value of the PFD of students found as 29.506 with the standard deviation of 19.864 in the public sector schools for girls in the district with no library facility.

Table 4.6: Descriptive statistics of SPI, PPS and FDS Gender and library facility wise.

Gender	Library	SPI			PPS		PFD	
		Freq	Mean	SD	Mean	SD	Mean	SD
Boys=1	Yes=1	39	.4662	.1087	82.389	16.264	28.962	20.405
	No=0	22	.4579	.1328	79.317	19.226	24.539	18.202
Girls=0	Yes=1	13	.5521	.1145	89.621	12.383	28.112	18.554
	No=0	18	.5201	.0805	83.76	16.137	29.506	19.864

Multiple Regression Model

In order to determine the impact of the various related factors and covariates on the performance of the school, the multiple regression model being fitted. The multiple regression models being fitted

because the response variable is the performance of the model measured numerically. The following summary table indicates the model summary for the performance of public sector schools in district Charsadda. The table 4.7 indicates that the multiple correlation of the performance of school in relationship to the factors considered in the analysis found as 57.2%. The analysis showed that there is a positive relationship between the performance of school and variables related to school infrastructure, total number of students in school, gender of school, availably of various facilities in schools, location of school etc. The table also defines that 32.7% of the variations in the performance of the school being explained by the variations in the factors being considered in the model.

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.572[a]	.327	.125	.10730

The table 4.8 defines the output of the ANOVA used to determine the overall significance of the regression model. The output revealed that the value of the F-statistics found as 16.21 with the p-value as 0.0069. As P-value is less than 0.005, therefore the null hypothesis is rejected and concluded that the regression model is statistically significant. The model is statistically significant in explain the performance of the schools in district Charsadda based on the various factors related to infrastructure, facilities and the number of students.

Table 4.8: ANOVA table for overall statistical significance.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.392	21	.019	16.21	.0069[b]
	Residual	.806	70	.012		
	Total	1.198	91			

The table 4.9 indicates the output of the regression model of the school performance index for public sector schools in district Charsadda. The performance of the school being model with different factors and covariates including gender of school i.e. government school for boys and for girls, location of the school i.e. urban and rural, level of school i.e. higher and higher secondary schools, medium of instruction i.e. Urdu and English medium, factors related to infrastructure of schools, facilities available in schools and the number of students in schools. The table depict that the factors like level of school, nature of school construction, number of pakka classes, number of kacha classes, number of rooms in school and availability of sui gas in school found statistically insignificant while gender of school, location, medium of instruction, library in school, building own, availability of facilities like computer lab, science lab, electricity, toilet, playground office and total number of students in school found as statistically significant at 5 percent level of significance.

The table defines that gender of the school has positive impact on the performance of the school. The change in school i.e. if the school changes from female to male students, the performance index of school will increase by 0.095 units in district Charsadda and found statistically significant as the p-value observed as .010 which is less than 5 % level of significance. The location of the school also found as statistically significant. The locality of the school changes from urban to rural areas will increase the performance index of school by 0.045 units and showed a positive relation to the SPI. The medium of instruction in school showed a positive relation to SPI i.e. as the medium of instruction changes to Urdu

form English, SPI will increase by 0.159 units. The p-value of the medium of instruction found statistically significant at 5% level of significance. The availability of various facilities in school like library, owning a school building, science lab in school, computer lab in school, electricity, water and toilet facility found statistically significant at 5% level of significance. The presence of library in the school is positively related with the SPI i.e. the school with library facility will increase the SPI by 0.381 units. The school owning its own building showed a positive impact on the SPI in district Charsadda. The school with its own building will increase its performance by 0.145 units. The availability of science and computer lab in schools are positively related with SPI. The school with science and computer lab will increase SPI by 0.073 and 0.651 units respectively. The availability of water and electricity and toilet facilities found statistically positive related to SPI respectively in district Charsadda. The school with water facility, the school with water facility will increase the SPI by 0.721 units while the school with electricity will increase the performance index by 0.128 units. The school with toilet facility will increase the performance index by 0.299. Also, the facilities like availability of hall in school, playground and school's office showed a positive relation with the SPI in district Charsadda. The table showed that school with hall will increase the performance of school by 0.027 units whereas the school with the facility of playground will increase the performance index by 0.180 units also the school office found statistically significant at 5% level of significance. There found a positive relation between the school office and school performance in district Charsadda. The school with office facility will increase the SPI by 0.506 units. The number of total students in school is positively associated with the SPI. For the unit increase in the number of students in the school the school performance index will increase by 2.23 units in district Charsadda.

Table 4.9: Coefficients of regression model

Model		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	(Constant)	.473	.206	2.296	.025
	gender of school	.095	.036	2.664	.010
	location of school	.091	.032	2.87	.005
	level of school	.045	.035	1.303	.197
	medium of instruction at school	.159	.021	13.16	.000
	nature of school construction	-.074	.075	-.986	.327
	library in school	.381	.130	2.931	.009
	number of pacca classes in school	.001	.002	0.340	.735
	number of kacha classes in school	.005	.009	0.580	.563
	number of rooms in school	.004	.003	1.398	.167
	building owner	.145	.043	3.372	.004
	science lab in school	.073	.033	2.189	.032
	electricity in school	.128	.064	2.010	.048
	water facility in school	.721	.090	8.01	.000
	toilet in school	.299	.114	2.622	.002
	computer lab in school	.651	.036	18.05	.000
	natural gas facility in school	.023	.051	.442	.660
	hall facility in school	.027	.009	3.01	.000
	playground in school	.18	.027	6.65	.000
	office in school	.506	.153	3.307	.000
	total number of students in school	2.230	.108	20.64	.000

Modeling of Passing Percentage of Students

In order to determine the impact of the various related factors and covariates on Passing Percentage of students in district Charsadda, the multiple regression model being fitted. The multiple regression model being fitted because the response variable i.e. Passing Percentage of students is being measured numerically. The following summary table indicates the model summary for the Passing Percentage of students of public sector schools in district Charsadda. The table 4.10 indicates that the multiple correlation of the Passing Percentage of students in schools of district Charsadda in relationship to the factors considered in the analysis. It is found as 58.75% showing that there is a positive relationship between Passing Percentage of students of school and variables related to school infrastructure, total number of students in school, gender of school, availably of various facilities in schools, location of school etc. The table also defines that 34.5% of the variations in Passing Percentage of students of the school being explained by the variations in the factors being considered in the model.

Table 4.10: Model Summary of Passing Percentage of students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.587[a]	.345	.110	15.62531

The table 4.11 defines the output of the ANOVA used to determine the overall significance of the regression model. The output revealed that the value of the F-statistics found as 14.21 with the p-value as 0.0069. As P-value is less than 0.005, therefore the null hypothesis is rejected and concluded that the regression model is statistically significant. The model is statistically significant in explain the Passing Percentage of Students in schools at district Charsadda based on the various factors related to infrastructure, facilities and the number of students.

Table 4.11: ANOVA output for Passing Percentage of Students

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8604.830	24	358.535	14.68	.001
	Residual	1635.8068	67	24.4150		
	Total	10240.6368	91			

The table 4.12 indicates the output of the regression model the Passing Percentage of students for public sector schools in district Charsadda. The Passing Percentage of Students in schools at district Charsadda being model with different factors and covariates. The table depict that the factors like location, level of school, library in school, availability of facilities like computer lab, science lab, playground, total number of students in grade 9, total number of students in grade 10, total number of teachers in school, total number of non-teaching staff, total number of secondary school teacher (General), Secondary school teacher (Science), certified teacher (General) and Physical education teacher found as statistically significant at 5 percent level of significance. Whereas gender of school, water facility, electricity, natural gas and hall facility in school found statistically insignificant at 5% level of significance.

The table defines that location of the school also found as statistically significant. The locality of the school changes from urban to rural areas will increase the passing percentage of students in school by 9.674 units. The availability of various facilities in school like library, science lab in school and computer lab are found statistically significant at 5% level of significance. The presence of library in the school is

positively related with the passing percentage of students in school at district Charsadda i.e. the school with library facility, passing percentage of students will increase by 4.245 units. The school with computer and science lab, passing percentage of students will increase by 4.278 and 4.869 units respectively. The availability of school playground showed a positive impact on the passing percentage of students (PPS) in the Schools at District. The presence of playground in school will help to increase the PPS in school by 1.901 units. The total number of students in grade 9 and grade 10 found statistically significant and showed a positive impact on the PPS in school at Charsadda. The total number of teachers is positively related to PPS in school. For the unit increase in the number of teachers, the PPS in school will increase by 2.664 units. The total number of secondary school teacher (SST) general and science found positively related to PPS in school at district Charsadda. If the number of SST general and science increase by one unit, the PPS in school at Charsadda will increase by 3.513 and 6.828 respectively. The certified teacher (CT) and Physical education teachers also found statistically significant at 5% and showed a positive contribution toward the PPS of students in district Charsadda. Foe the increase in number of CT general and physical education teacher by one unit, the PPS in school at Charsadda will increase by 3.321 and 7.417 respectively.

Table 4.12: Coefficient for Passing Percentage of Students

Model	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
1 (Constant)	69.215	17.958	6.638	.000
gender of school	-2.870	8.200	-.350	.727
location of school	9.674	2.816	3.435	.001
level of school	3.988	.409	9.751	.000
library in school	4.245	1.480	2.868	.007
science lab in school	4.278	1.147	3.729	.001
electricity in school	-1.272	9.576	-.133	.895
water facility in school	-22.318	13.947	-1.600	.114
computer lab in school	4.869	1.400	3.478	.001
natural gas facility in school	9.413	8.454	1.113	.270
hall facility in school	3.479	4.741	.734	.466
playground in school	1.901	0.455	4.718	.000
total number of students in class 9	.130	.052	2.493	.015
total number of students in class 10	.154	.039	.3948	.000
total number of teachers	2.664	.602	4.425	.000
number of secondary school teacher (General)	3.513	0.404	8.645	.000
number of secondary school teacher (science)	6.828	3.080	2.216	.041
certified teacher (general)	3.231	1.038	3.113	.001
physical education teacher	7.147	2.977	2.401	.045

Modeling of Percentage of First Division

In order to determine the impact of the various related factors and covariates on Percentage of First Division (PFD) of students in district Charsadda, the multiple regression model being fitted. The multiple

regression model being fitted because the response variable i.e. PFD of students is being measured numerically. The table 4.11 indicates the model summary for the PFD of students of public sector schools in district Charsadda. The table 4.13 indicates that the multiple correlation of the PFD of students in schools of district Charsadda in relationship to the factors considered in the analysis. It is found as 37.5% showing that there is a positive relationship between PFD of students of school and variables related to school infrastructure, total number of students in school, gender of school, availably of various facilities in schools, location of school etc. The table also defines that 13.7 % of the variations in PFD of students of the school being explained by the variations in the factors being considered in the model.

Table 4.13: Model Summary for PFD of students

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.375	.137	.070	22.33254

To determine the overall significance of the regression model, analysis of variance (ANOVA) performed. The table 4.14 defines the output of the ANOVA used to determine the overall significance of the regression model for PFD of students in District Charsadda. The output revealed that the value of the F-statistics found as 4.21 with the p-value as 0.000. As P-value is less than 0.005, therefore the null hypothesis is rejected and concluded that the regression model is statistically significant. The model is statistically significant in explain the PFD of Students in schools at district Charsadda based on the various factors related to infrastructure, facilities and the number of students.

Table 4.14: ANOVA output for modelling of PFD

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40059.315	17	2356.430	4.725	.000[b]
	Residual	809957.714	1624	498.742		
	Total	850017.029	1641			

The table 4.15 indicates the output of the regression model the PFD of students for public sector schools in district Charsadda. The PFD of Students in schools at district Charsadda being model with different factors and covariates. The table depict that the factors like level of school, library in school, availability of facilities like computer lab, science lab, playground, total number of students, total number of teachers in school, total number of secondary school teacher (General) and Secondary school teacher (Science) found as statistically significant at 5percent level of significance. Whereas location of school, number of rooms, Physical education teachers and hall facility in school found statistically insignificant at 5% level of significance.

The availability of various facilities in school like library, science lab in school and computer lab are found statistically significant at 5% level of significance. The presence of library in the school is positively related with the PFD of students in school at district Charsadda i.e. the school with library facility, PFD of students will increase by 12.65 units. The school with computer and science lab, PFD of students will increase by 3.019 and 8.87 units respectively. The total number of students in school found statistically significant and showed a positive impact on the PFD in schools at Charsadda. The total number of teachers is positively related to PFD in school. For the unit increase in the number of teachers, the PFD

School will increase by 2.22 units. The total number of secondary school teacher (SST) general and science found positively related to PFD in school at district Charsadda. If the number of SST general and science increase by one unit, the PFD in school at Charsadda will increase by 10.26 and 8.93 respectively.

Table 4.15: Coefficient of Regression model PFD

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	41.512	2.846	14.584	.000
	location of school	.233	1.649	.141	.888
	level of school	3.651	1.969	1.855	.064
	library in school	12.65	1.172	10.80	.000
	number of rooms in school	.040	.156	.254	.799
	science lab in school	8.78	1.346	6.52	.000
	electricity in school	3.983	1.140	3.49	.003
	computer lab in school	3.019	.529	5.71	.000
	hall facility in school	-1.709	1.335	-1.280	.201
	total number of students in school	2.48	.200	12.43	.000
	total number of teachers	2.22	.55	4.036	.001
	number of secondary school teacher (General)	10.26	.605	16.96	.000
	number of secondary school teacher (science)	8.93	2.42	3.690	.003
	physical education teacher	1.568	1.886	.832	.406

Logistic Regression Modeling

The performance of the school was determined by the school performance index (SPI). The performance of the school than categorized into two groups i.e. satisfactory and not-satisfactory based on the score of SPI. The performance of the school in district Charsadda considered as satisfactory if the SPI ≥ 0.50 while the performance is un-satisfactory for the school having SPI less than 0.50. The school with SPI greater than 0.50 coded as 1 while the schools with SPI < 0.50 coded as 2, in order to perform the logistic regression model in SPSS. The following table is the output of logistic regression model for male schools in district Charsadda. The table 4.16 defines the coefficient of the models, the value of the chi-square statistics, p-value, cox & snell R^2 and Negalkerkey R^2. The availability of library in school, science lab and computer lab found as statistically significant factors for the satisfactory performance of male schools in district Charsadda as the p-value of these variables are less than 5% level of significance. The log odds of the school performance will increase by 0.444 units for increase in library resources. Differently, public sector male schools in district Charsadda with library resources shows more satisfactory performance than schools with least library resources by .5588 times. Also, log odds of the school performance will increase by 0.546 units for availability in science laboratory. In other words, public male schools in district Charsadda with science laboratory shows more satisfactory performance by .7265 times than male schools at district Charsadda with no science laboratory. Similarly, log odds of the school performance will increase by 0.489 units for availability in Computer laboratory. In other words, public male schools in district Charsadda with computer laboratory shows more satisfactory performance as compare to un-satisfactory school by .6310 times than male schools at district Charsadda. The value of the chi-square statistic found as 129.3 with the p-value as 0.000. As the p-value is less than 5%, so the logistic regression is statistically significant. The table also, defines the Cox & Snell

R^2 and Negelherky R^2 for the goodness of fit of logistic regression model. These are the statistics use for the explaining the amount of variations in response variable due to variations in the set of explanatory variables. The value of these statistics defines that from 21% to 34% of the variations in performance of male schools in being explained by variations in the set of explanatory variables considered in regression model.

Table 4.16: Output of logistic regression model for male school

		B	Wald	Sig.	Exp(B)
Step 1[a]	School library	.444	4.538	.046	1.558852
	Building	.710	.574	.449	2.034397
	Science lab	.546	6.332	.026	1.726596
	electricity	0.252	1.129	.999	1.286265
	Water	-1.896	-.314	.999	0.15018
	Toilet	-2.311	-.811	.577	0.099114
	Computer lab	.489	4.196	.027	1.631005
	Natural gas	1.809	1.639	.240	6.102367
	playground	1.193	1.777	.183	3.29696
	No of teacher	-.486	1.618	.203	0.615243
	Constant	1.158	5.975	.004	3.181973
χ^2					129.3
$P - value$					0.000
$Cox\ \&\ Snell\ R^2$					0.21
$Negalkerkey\ R^2$					0.34

The table 4.17 is the output of logistic regression model for female schools in district Charsadda. The table defines the coefficient of the models, the value of the chi-square statistics, p-value, cox & snell R^2 and Negalkerkey R^2. The availability of library in school, science lab and computer lab found as statistically significant factors for the satisfactory performance of male schools in district Charsadda as the p-value of these variables are less than 5% level of significance. The log odds of the school performance will increase by 0.850 units for increase in library resources. Differently, public sector male schools in district Charsadda with library resources shows more satisfactory performance than female public schools with least library resources by 2.339 times. Also, log odds of female public-school performance will increase by .346 units for availability in science laboratory. In other words, public female schools in district Charsadda with science laboratory shows more satisfactory performance by .4136 times than female schools at district Charsadda with no science laboratory.

Similarly, log odds of the school performance will increase by 0.892 units for availability in Computer laboratory in female public-schools in district Charsadda. In other words, public female schools in district Charsadda with computer laboratory shows more satisfactory performance as compare to un-satisfactory school by 2.439 times than male schools at district Charsadda. The value of the chi-square statistic found as 17.169 with the p-value as 0.046. As the p-value is less than 5%, so the logistic regression is statistically significant. The table also, defines the Cox & Snell R^2 and Negelherky R^2 for the goodness of fit of logistic regression model. These are the statistics use for the explaining the amount of variations in response variable due to variations in the set of explanatory variables. The value of these statistics defines that from 42.5% to 55.7% of the variations in performance of male schools in being explained by variations in the set of explanatory variables considered in regression model.

Table 4.17: Output of logistic regression model for female school

		B	Wald	Sig.	Exp(B)
Step 1[a]	School library	.850	5.538	.033	2.339647
	Science lab	.346	4.478	.064	1.413618
	Electricity	0.425	1.976	.709	1.52959
	Water	-1.987	-.139	.366	0.137106
	Toilet	-1.578	-.433	.577	0.206387
	Computer lab	.892	3.968	.032	2.43992
	Natural gas	0.875	1.103	.324	2.398396
	Playground	1.234	1.245	.339	3.434942
	No of Teacher	-1.486	1.753	.437	0.226335
	Constant	1.987	4.257	.000	7.29362
χ^2					17.169
$P - value$					0.046
$Cox\ \&\ Snell\ R^2$					.425
$Negalkerkey\ R^2$					.557

Discussion and Conclusion

This chapter describes the discussion and conclusion of the statistical analysis regarding the factors which affected the performance of the schools in District Charsadda. The secondary data regarding the various factors related to schools was obtained from the Annual School`s Census conducted by Education Management and Information System (EMIS), a cell of elementary and secondary education department, KHYBER PAKHTUNKHWA. The study conducted with the objective to determine the factors affecting the performance of the school using SPI.

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