Micro-Supply Capacity Assessment and Quality of Education for the Public Sector Schools in Punjab (Pakistan)

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Abstract

Education is an essential input for economic development and is one of the basic human rights. Basically, education provides and contributes to the quality of human assets to achieve all development goals, such as poverty reduction, gender empowerment, improving human capital, and enhances socioeconomic benefits. However, unfortunately, education is the one of the deprived sector and its targets have not been achieved in Pakistan in the past decades. This paper contributes to understanding the micro-supply capacity assessment for the public sector schools of Punjab, using annual school census 2014 and monthly schools reports. It adopts the micro-supply capacity assessment method prepared by the World Bank consulting firm GEDESO (2014). The study shows that 45 percent schools in Punjab are deficient with respect to infrastructure and faculty. Out of 45 percent deficient schools 69 percent are primary schools. Overall, more than 50 percent students are enrolled in the deficient schools. To enroll the 3.2 million school-age children and enhance the quality of education, the government of Punjab should focus on the development of infrastructure and minimizing of lack of faculty, especially in the primary schools.

Keywords: Educational Planning, Micro-supply Capacity Assessment, Quality Education

JEL Classification: I21, I24, I29, R10

1. Background

Education provides the infrastructure and environment for the human capital to be produced and economic growth to be increased. The quality of education depends upon the provision of inputs and basic infrastructure in its system. As for as the better and quality inputs are provided, the quality education is very likely to be better produced. There are many types of educational inputs provided to the education system as quality teachers, basic facilities and infrastructure. The provision and supply of these inputs are very important if the quality education is the target. According to UNICEF (2000), the quality indicators of education include quality learners, quality environment, quality teaching, quality educational process and quality outputs/ outcomes. Human capital enhances the productivity and efficiency of the labour. Furthermore, improved productivity and efficiency of labour push up the economic growth. It is very difficult to boost the production without skilled labour and other resources ((Ali, Chaudhry, & Farooq, 2012); (Burgess, 2016)). Human capital means to develop a mental and physical capability of human beings with education, skills and health care ((Abbas, 2000); (Singh, 1999); (Akram, Padda and Khan, 2008)).

Education and health care are the major components of human capital. At the individual level education affects ones income, social status and increases chances of success. Evidence from the advanced countries show that education is positive related to the socioeconomic status of individuals. It reduces poverty, improves wellbeing, protects and increases awareness of human rights and paves way for democratic process ((Burgess, 2016); (Wilson & Briscoe, 2004); (Griliches, 1996)).

Education is the most important indicator of the Millennium Development Goals (MGD's). According to the MGDs paragraph No.19 that *"children everywhere, boys and girls alike,*

will be able to complete a full course of primary school and the girls and boys will have equal access to all levels of education". In the developing countries, mostly donors and the government just only focusing the more children go to school policy. As the result school enrolment has dramatically increased over the last decade. This rapid growth of enrolment creates massive burden on the existing school system. The shortage of teachers and school facilities are serious issue, the student-teacher ratio in the south Asia is 35:1 as compared to the developed nation where it is 17:1. This crowding directly affects the quality of education (Hewlett Foundation, 2008).

The quality of education is related to the sufficient number of teachers and other school facilities like clean drinking water, toilet, sufficient classroom infrastructure etc. According to the previous studies from the developing nations provide evidence that having roof, wall, floor in a good condition, clean drinking water and toilet facilities improve the student learning (Cuesta, Glewwe, & Krause, 2015).

In Pakistan, the education sector has also been suffering the pathetic problems like other sectors. Where one-half of the adult population is unable to read and write, 7 million school-age children are out of school due to poverty. The education system of Pakistan is divided into the two classes, one is the public sector schools and other is the private sector schools. It generates socioeconomic gap in the country. Most of the population residing in the rural and semi-urban areas attend the public sector schools. These public sector schools provide free of cost education till matriculation level with the shortage of teacher, lack of healthiness infrastructure, lack of facilities and learning materials. On the other side, high class or upper level population residing in the urban locations attend the high cost private schools with trained teachers, well-equipped classrooms and imported learning materials. These all basic inequalities transfer into the inequalities of job opportunities, earning and living standard. The above all situations tend to be the vicious life cycle ((Hussain, Salfi, & Khan, 2011);

(Mukhtar, 2012); (Khan, Azhar, & Shah, 2011); (Memon, 2007); (Joubish & Khurram, 2011); (Douglas, 2007)).

In the province, Punjab, in 2012-13 total formal school enrolment was 14 million (54% males and 46% females), the adjusted net enrolment rate was 70.8 percent (72.9% males and 68.6% females). There are 3.2 million primary school going age children are out of school, with 52 percent boys and 48 percent girls. In Punjab 27.3 million adults (15 years to +) are illiterate, with 40 percent males and 60 percent females and also facing the challenges of lack of access to education, poor quality of education, budgetary constraints, weak governance, poverty, law and order situation and poor management ((Malik, et al, 2015); (Rashid & Mukhtar, 2012); (Farooq, 2016)).

In the previous studies, most authors partially emphasized on the school enrolment rate, dropout rate, student teacher ratio, lack of facilities, lack of management, learning material, education quality, etc. This study contributes in understanding the micro-supply capacity assessment with student, teacher, and school infrastructure and facilities of public sector school in Punjab. It also describes the results at geographic, socioeconomic and school characteristic levels, which will be the most helpful for the policy makers and the local government in the enhancing education for all. This research provides reference for the quality of education and future prospect.

After this introductory section, section 2 describes the materials and methods, section 3 provides the results at district, geographically, gender and school level disaggregation and the last section presents conclusions and the way forward.

2 Materials and Methodology

2.1 Data Source

This paper used annual school census and monthly school reports of the public sector primary, elementary, secondary and higher secondary of Punjab province of 2014 for the micro-supply capacity assessment and quality of education. The paper used 49,957 out of 53,079 schools data while and 3122 schools data were not used due to lake of required information.

2.2 Methodology

Micro-supply capacity assessment method is used which presented by the World Bank consulting firm GEDESO, 2014 for the Benazir Income Support Programme for assessment of on-going project Waseela-e-Taleem in Pakistan. This method assesses two main indicators, one is the Capacity Classification (CC) and another is the Infrastructure Capacity (IC).

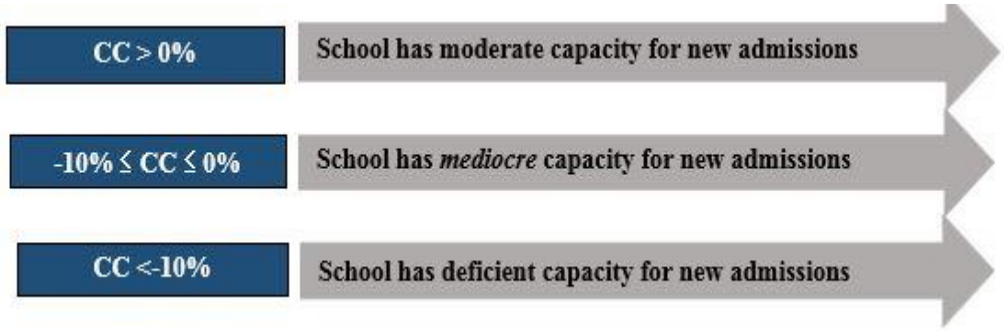
2.2.1 Capacity Classification

Capacity Classification asserts whether the school has the capacity to accommodate the new enrolment in the existing system or not. It is measured through the Maximum School Capacity (MSC) and the Available School Capacity (ASC) Assessments. The MSC and ASC are calculated through the following formulas;

$$MSC = MSFC(1) + MSFC(2) \ldots\ldots (1)$$
$$SE = SFE(1) + SFE(2) \ldots\ldots\ldots\ldots (2)$$
$$ASC = MSC - SE \ldots\ldots\ldots\ldots\ldots (3)$$
$$CC\% = (ASC \div MSC) * 100 \ldots\ldots (4)$$

In equation (1) MSC is equal to the number of maximum shift capacity (MSFC) which calculates the total number of the teachers in the shift and multiplied by a student teacher

ratio standard ratio of Pakistan which is 40:1, equation (2) shows the School Enrollment (SE) which is the total enrolment in the given school. Furthermore, ASC is calculated by subtracting MSC from total enrolment. The CC is calculated dividing ASC by MSC and multiplied by 100. Following are the cutoff points for the CC;



For example if CC is 20% it means that the school is utilizing 80% of its maximum capacity.

2.2.2 Infrastructure Capacity

Infrastructure capacity means whether the school has minimum infrastructure for the accommodation of the new enrolment with the existing system or not. It is calculated with the number of rooms for the students and toilet facility. The cut-off points for the IC are given in the Table 1.

Table 1: Cut-off point for the Infrastructure Capacity

School Construction	# of Classrooms	Latrine	IC
Yes	At least 3	Yes	Satisfactory
Yes	At least 2	Yes	Moderate
Yes	At least 1	Yes	Mediocre
Yes	At least 1	No	Deficient
No	Nil	No	Deficient

2.2.3 School Classification

The above results of the CC and IC are combined to classify a school. For this purpose, the two indicators are given equal weights to classify each school as having sufficient capacity, limited capacity, or deficient capacity. Table 2 presents describes the school combined classification.

Table 2: School Classification as Per the CC and IC Cut-off point

School	CC	IC	School Classification
H	Moderate	Moderate	Sufficient
Y	Moderate	Mediocre	Sufficient
T	Moderate	Deficient	Deficient
N	Mediocre	Moderate	Limited
M	Mediocre	Mediocre	Limited
L	Mediocre	Deficient	Deficient
W	Deficient	Moderate	Deficient
E	Deficient	Mediocre	Deficient
R	Deficient	Deficient	Deficient

2.3 Limitations of the GEDESO Methodology

In the GEDESO methodology infrastructure capacity classification has lack of student/classroom and student/toilet ratios. In the school infrastructure, class size and toilet size are more important for the evaluating school effectiveness like the quality of teacher, school environment and the quality of the curriculum. Many studies show that small class size boosts the academic performance, as well as, change the student behaviour. Generally, studies purposed 20 to 30 students per class as a tough group size ((Finn, Gerber, & Zaharias, 2005); (Finn & Achilles,1999); (Finn, Pannozzo, & Achilles, 2003); (Cuesta, Glewwe, & Krause, 2015)). The class size of 25 to 40 student[1] per class for developing nations like Pakistan which are facing financial constraints is suggested ((UNESCO, 2014); (GreatSchools, 2015)).

The poor sanitation and lack of clean drinking water produce a large number of diseases. This is also harmful to the health of school going children. The physical and cleanliness conditions also affect the health and well-being of the children. As per World Health Organization, one toilet for 25 girls and a female teacher and 1 toilet plus urinal per 50 boys and a male staff available within the 30 meters of users (UNICEF, 2012). In different developing countries

[1] http://www.pec.org.pk/downloadables/accreditation/manual_accreditation.pdf

like India and Bangladesh one toilet is available for every 50 to 75[2] students (Snehalatha et al, 2015). Pakistan has the poorest access to sanitation like other developing nations, where 40 % rural households don't have a toilet facility ((Hameed & Padda, 2016); (Hameed,Padda & Karim,2016)). Almost 48 percent of schools in Pakistan don't have toilets and other facilities (AlifAilaan & SDPI, 2016). Due to aforementioned limitations of GEDESO method this study revised the infrastructure capacity as follows;

2.3.1 Building Condition and Classroom Status

Table 3 shows the building condition and the classroom status.

Table 3: Building Condition and Classroom Status

Building Status	Building Condition	Classroom Status
Yes	Satisfactory	Yes
Yes	Needs Minor Repair	Yes
Yes	Needs Major Repair	Yes
Yes	Dangerous	Nil
Yes	Few Block dangerous	Yes
Nil	Nil	Nil

2.3.2 Student-Classroom and Student-Toilet Ratio

Table 4 shows the student-classroom and student-toilet ratio with classroom and toilet capacity combination. The classroom capacity disaggregated as per the Table 3 instructions with student ratio and toilet capacity disaggregated as per the toilet functional condition with student ratio.

Table 4: Student-Classroom and Student-Toilet Ratio

Student/classroom ratio	Classroom Capacity	Student/toilet ratio	Toilet Capacity
40:1	Satisfactory	50:1	Satisfactory
60:1	Moderate	70:1	Moderate
80:1	Mediocre	90:1	Mediocre

[2] http://www.minglebox.com/article/cbse/cbse-issues-guidelines-for-sanitation-in-schools

Above 80:1	Deficient	Above 90:1	Deficient
Nil	Deficient	Nil	Deficient

2.3.3 Revised Infrastructure Capacity

Table 5 shows the cut-point of revised infrastructure capacity with the combination of student–classroom ratio and student-toilet ratio (see Table 4 and 3).

Table 5: Revised Infrastructure Capacity

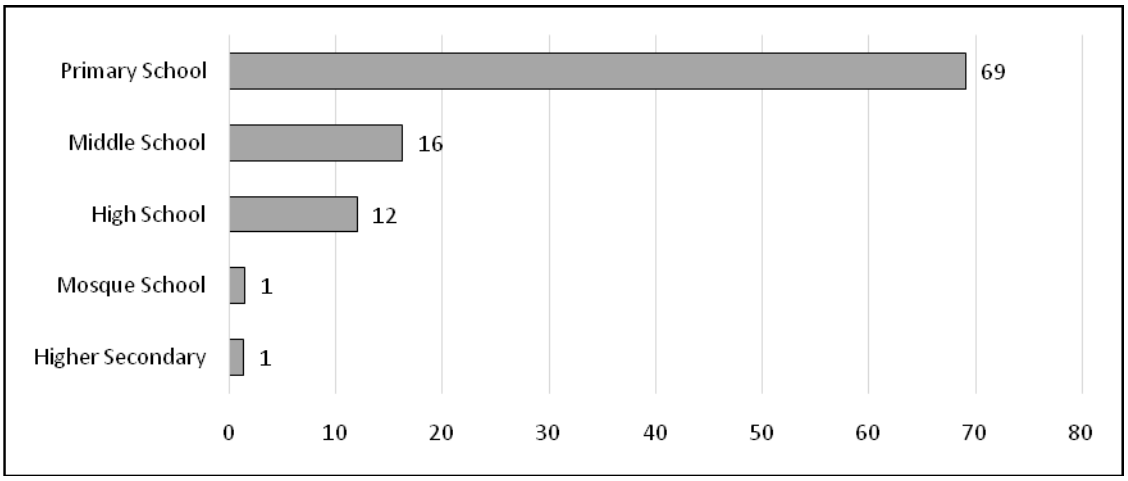
Classroom Capacity	Toilet Capacity	Infrastructure capacity
Satisfactory	Satisfactory	Satisfactory
Moderate	Moderate	Moderate
Mediocre	Mediocre	Mediocre
Deficient	Deficient	Deficient
Satisfactory	Moderate	Satisfactory
Satisfactory	Mediocre	Moderate
Satisfactory	Deficient	Deficient
Moderate	Mediocre	Mediocre
Moderate	Deficient	Deficient
Mediocre	Deficient	Deficient

3 Results

3.1 Descriptive Statistics

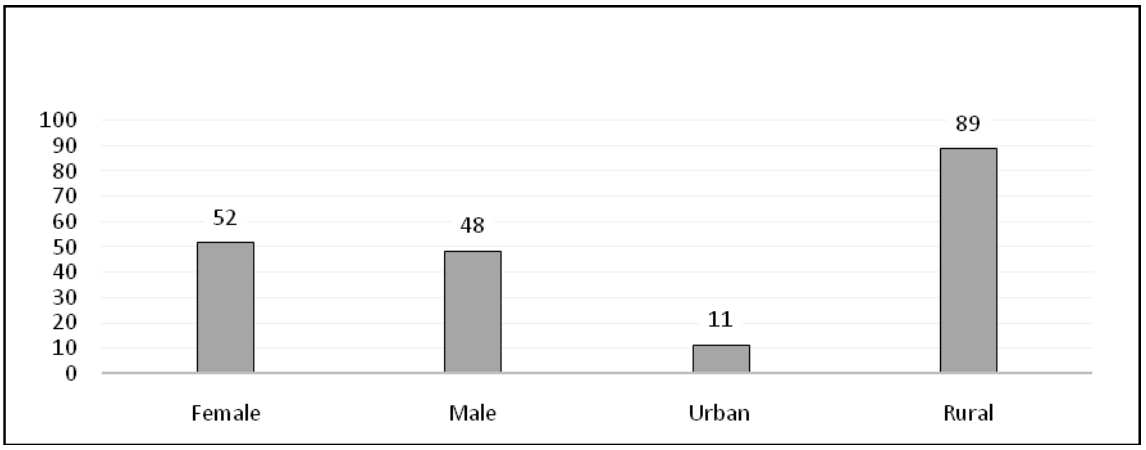
Punjab is the richest province by industry, agriculture, education, health and other economic sectors and has lowest poverty status amongst other provinces. The descriptive statistics show the virtually of the quantitative analysis. It means that what is or what show the data. There are 69 percent primary, 16 percent Middle, 12 percent high, 1 percent Mosque and 1 percent higher secondary schools in Punjab (See Figure 1).

Figure 1: Public School Levels in Punjab



Among the 49,957 schools, there are 52 percent female and 48 percent male schools. The percentage of urban schools are 11 percent and rural schools are 89 percent, almost as per the national urban/rural locality and population ratio (See Figure 2).

Figure 2: School Gender and Location



3.2 Micro-Supply Capacity at Punjab Level

The micro-supply capacity assessment is the guideline for the future enrolment in the Punjab public schools. It depicts the gap between the enrolment and school capacity as per the student-teacher and infrastructure capacity to entertain the new enrolment. Micro-supply capacity/school classification is estimated based on class classification and infrastructure capacity indicators. Figure 3 describes the infrastructure capacity of Punjab public schools and reveals that 53 percent are sufficient, 12 percent are moderate, 8 percent are mediocre

and 27 percent are deficient schools. The 27 percent deficient schools mean that there is no extra space for the new enrolment with respect to the classroom and toilet facility wise in these schools. Same as the class classification of Punjab public schools shows that 65 percent moderate, 8 percent mediocre and 27 percent deficient schools. It means that in the 27 percent schools there is no extra teacher for the new enrolment (See Figure 4).

The school classification is the overall micro-supply capacity with the combination of infrastructure capacity and class classification. It depicts that 50 percent are sufficient, 5 percent are limited and 45 percent are deficient schools in the overall Punjab public schools. It also shows that 45 percent schools in Punjab don't have extra teacher, classroom and toilet facility for the new enrolment (See Figure 5).

Figure 3: Infrastructure Capacity

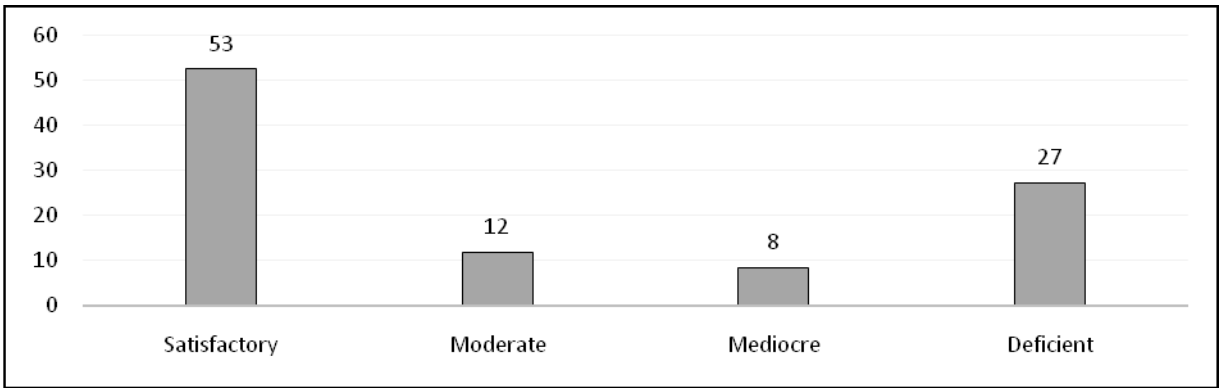


Figure 4: Capacity Classification

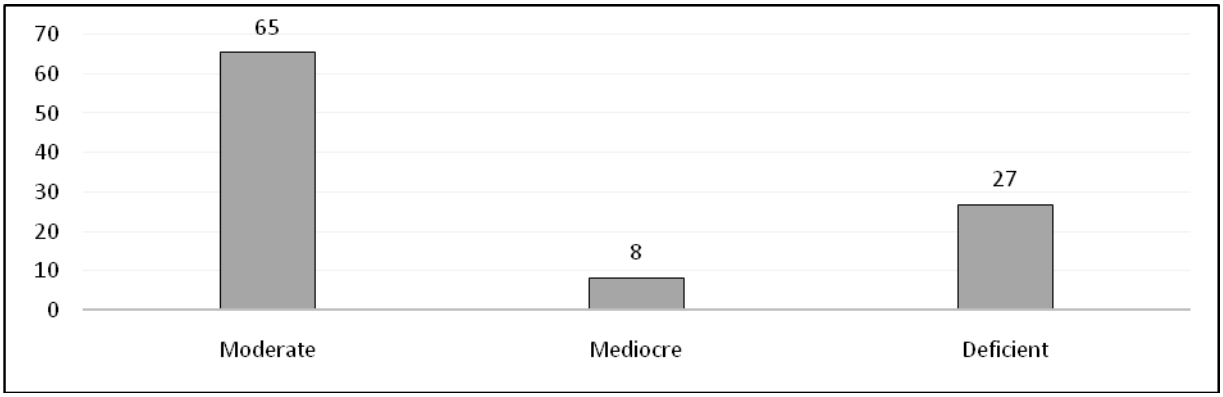
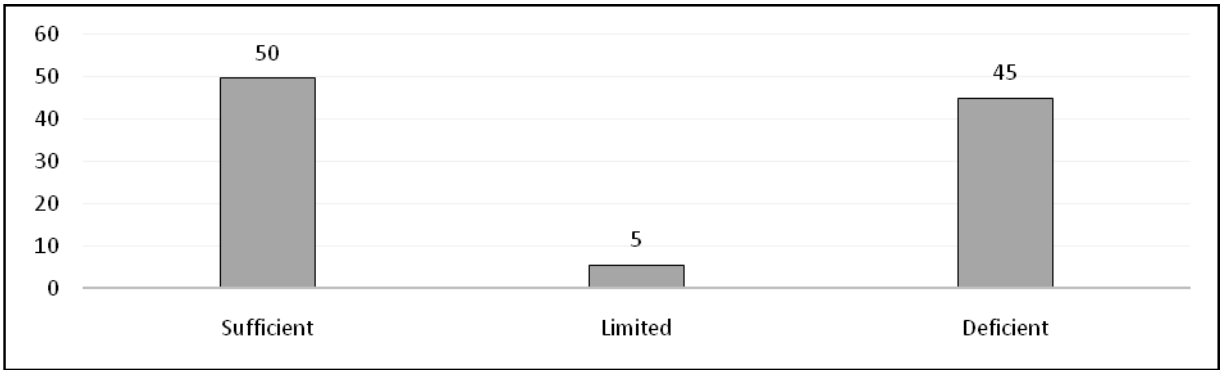


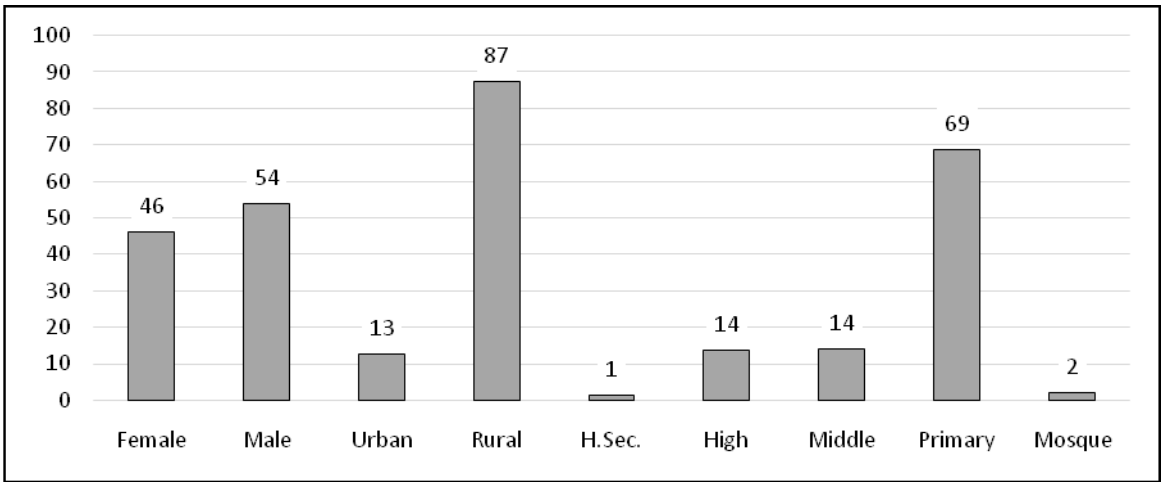
Figure 5: School Classification



On the other side, there are 3.2 million primary school children out of school, with 52 percent boys and 48 percent girls. The adult illiteracy rate in Punjab is higher with respect to the higher population, 27.3 million adults (15 years to +) illiterates, with 40 percent males and 60 percent females (Rashid & Mukhtar, 2012). Most social worker organizations and government of Punjab are only focusing on higher school enrolment policy without focusing on the provision of proper infrastructure. Studies show that student crowding with the lack of sufficient facilities directly affect the quality of education ((Cuesta, Glewwe, & Krause, 2015); (Hewlett Foundation, 2008)).

Figure 6 presents the deficient school distribution by gender, location and level wise. It presents that out of 45 percent deficient schools 46 percent are from female and 54 percent are from male schools. It also can be seen that 13 percent are from urban and 87 percent are from rural locality. It is vital to note that 69 percent are primary, 14 percent are middle, 14 percent are high, 2 percent are mosque and 1 percent are higher secondary schools.

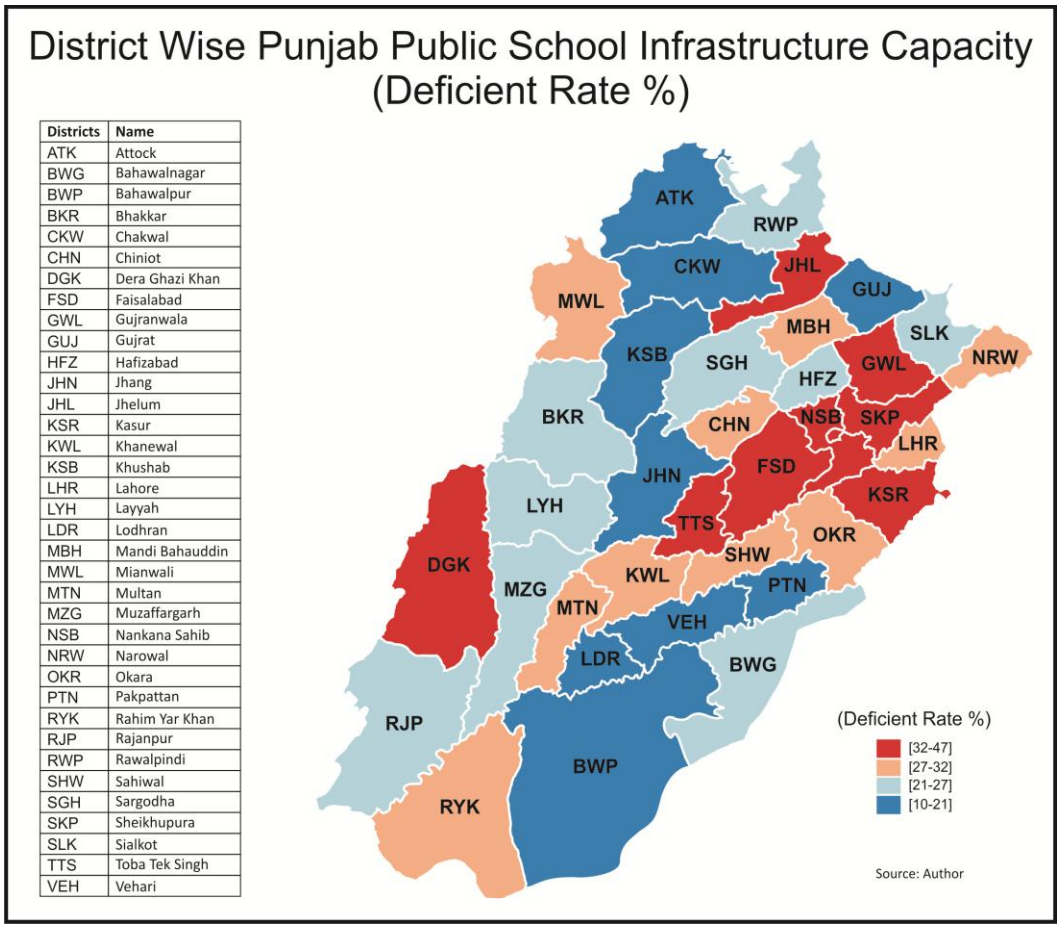
Figure 6: Deficient School Distribution by Gender, Location and Level Wise



3.3 Micro-Supply Capacity at District Level

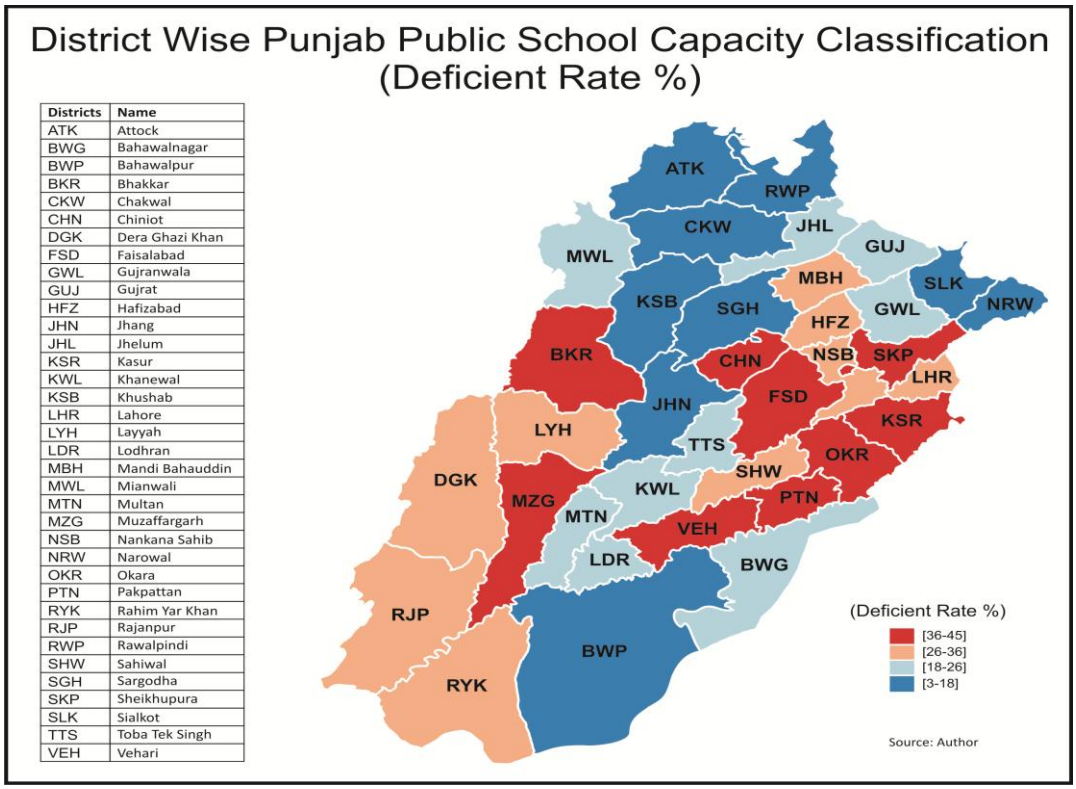
The district level micro-supply capacity is the most important guideline for the district level education policies. Table A1 in Annexure and Map 1 presents regional level infrastructure deficient rate. The infrastructure deficient breakdown analysis shows that 9 districts are the lowest level (10% up to 21%) schools. It is interesting to note that 9 districts have a moderate level (21% up to 27%) of the infrastructure deficient, 9 districts have a mediocre level (27% up to 32 %) of the infrastructure deficient. While 8 districts have the worst level (32% up to 47%) of the infrastructure deficient.

Map 1: District Wise Infrastructure Capacity



Capacity classification is the second important component of micro-supply capacity. Table A2 in Annexure and Map 2 describes the capacity classification deficient level at district level. The analysis depicts that there are 9 districts with extreme level of student crowding. There is no additional space for out-going/ or new school-going children. The districts with dark blue, light blue and light brown colour are showing the lowest level, moderate level and the mediocre level, crowding with respect to the student and teacher comparison (See Map 2)

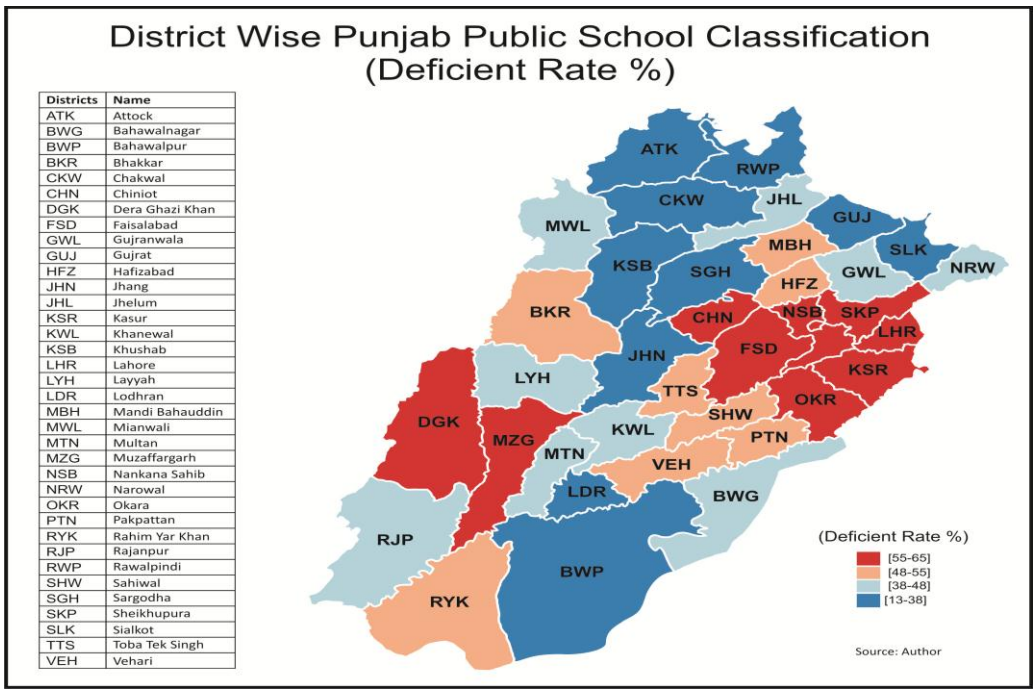
Map 2: District Wise Capacity Classification



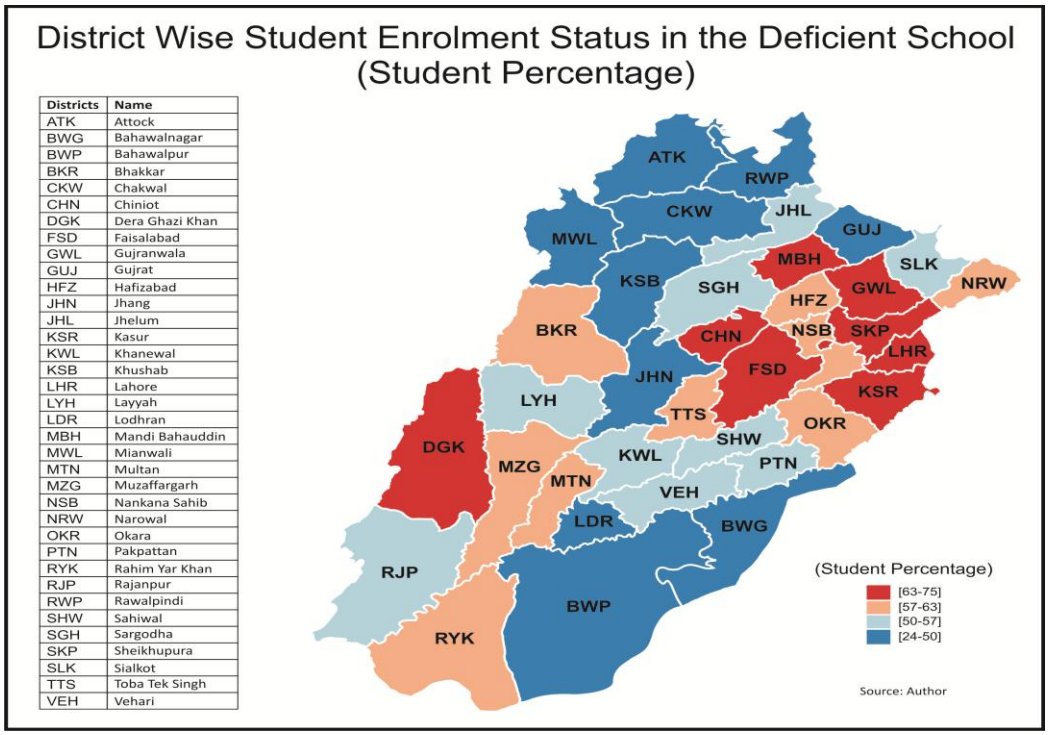
The school classification shows the overall deficient level with the combination of Infrastructure capacity and class classification. It means that there is no more space for the new enrolment with respect to infrastructure and teacher wise capacity. The Table A3 in Annexure and Map 3 reveals that 9 schools are extremely deficient (55% to 65%) with the combination of IC and CC while 10 districts are less deficient than other Punjab. The overall statistics suggest that 13 percent to 65 percent schools at district level of Punjab have no more space for the new enrolment with respect to CC and IC.

Table A4 in Annexure and Map 4 presents the enrolment situation in the deficient schools. The results show that in 27 districts more than 50 percent students are enrolled in the deficient schools. It is a most pathetic situation of the quality education in Punjab.

Map 3: District Wise School Classification



Map 4: District wise student enrolment status in the deficient schools



4 Conclusions and the way forward

Education is the main indicator to decline the socially, economically and politically exploitation among the urban and rural population. There is no doubt that the government of Punjab has initiated a number of efforts to improve the primary and higher education.

However, in terms of quality education, school facilities, the student learning environment and reduction in student crowding has not made revolution yet. It is evident that 45 percent schools in the Punjab are deficient in infrastructure and faculty. Out of 45 percent deficient schools 69 percent are of primary level schools. Overall, more than 50 percent students are enrolled in the deficient schools. Therefore, the government of Punjab needs to show the gravity for the educational development, especially in the rural areas. To enrol 3.2 million school-ages, out of school, children and enhance the quality of education, the government of Punjab should focus on the development of school infrastructure and appointment of highly skilled and qualified teachers, especially in primary schools. The focus should be on reduction in student teacher ratio and provision of technology oriented syllabus which ensures student practical participation in study.

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Annexure

Table A1: District Wise Infrastructure Capacity

	Satisfactory	Moderate	Mediocre	Deficient	N
	%	%	%	%	
ATTOCK	67	10	6	16	1,266
BAHAWALNA	57	11	7	24	2,231
BAHAWALPU	73	8	5	13	1,920
BHAKKAR	57	12	9	23	1,329
CHAKWAL	81	6	3	10	1,193
CHINIOT	44	15	11	30	671
D.G. KHAN	38	8	6	47	1,232
FAISALABA	30	13	13	44	2,294
GUJRANWAL	51	10	7	32	1,681

	Satisfactory	Moderate	Mediocre	Deficient	N
GUJRAT	60	12	8	20	1,439
HAFIZABAD	59	12	6	23	706
JEHLUM	70	8	5	16	822
JHANG	45	10	9	36	1,420
KASUR	34	14	15	38	1,440
KHANEWAL	48	15	10	27	1,279
KHUSHAB	65	10	5	19	812
LAHORE	35	13	10	42	1,217
LAYYAH	59	13	6	21	1,633
LODHRAN	71	11	5	12	820
MANDI BAH	49	13	7	31	836
MIANWALI	55	9	5	31	1,383
MULTAN	46	14	10	30	1,381
MUZAFFARG	48	14	12	26	2,018
NANKANA S	48	12	8	32	717
NAROWAL	53	11	8	29	1,251
OKARA	45	13	13	28	1,513
PAKPATTAN	55	14	12	19	887
RAHIMYAR	53	11	8	27	3,075
RAJANPUR	60	11	6	23	1,102
RAWALPIND	62	10	3	24	1,939
SAHIWAL	45	15	9	31	1,177
SARGODHA	52	13	9	26	1,529
SHEIKHUPU	41	12	10	38	1,193
SIALKOT	56	13	8	23	1,953
T.T.SINGH	36	14	13	37	1,124
VEHARI	55	16	10	19	1,474

Table A2: District Wise Capacity Classification

	Moderate	Mediocre	Deficient	N
	%	%	%	
ATTOCK	85	5	10	1,266
BAHAWALNA	71	7	23	2,231
BAHAWALPU	78	6	16	1,920
BHAKKAR	56	7	37	1,329
CHAKWAL	95	2	3	1,193
CHINIOT	48	12	40	671
D.G. KHAN	66	9	26	1,232

	Moderate	Mediocre	Deficient	N
FAISALABA	51	11	38	2,294
GUJRANWAL	70	9	21	1,681
GUJRAT	67	10	23	1,439
HAFIZABAD	55	10	35	706
JEHLUM	82	5	12	822
JHANG	72	6	22	1,420
KASUR	43	12	45	1,440
KHANEWAL	70	9	22	1,279
KHUSHAB	81	6	13	812
LAHORE	60	10	30	1,217
LAYYAH	56	10	34	1,633
LODHRAN	71	8	21	820
MANDI BAH	56	9	35	836
MIANWALI	74	7	19	1,383
MULTAN	66	8	25	1,381
MUZAFFARG	47	8	45	2,018
NANKANA S	56	8	35	717
NAROWAL	79	6	15	1,251
OKARA	48	10	41	1,513
PAKPATTAN	51	10	39	887
RAHIMYAR	56	9	35	3,075
RAJANPUR	59	10	31	1,102
RAWALPIND	93	3	5	1,939
SAHIWAL	64	9	27	1,177
SARGODHA	76	7	17	1,529
SHEIKHUPU	54	9	37	1,193
SIALKOT	76	7	17	1,953
T.T.SINGH	66	9	25	1,124
VEHARI	53	8	38	1,474

Table A3: District Wise School Classification

	Sufficient	Limited	Deficient	N
	%	%	%	
ATTOCK	73	3	23	1,266
BAHAWALNA	56	5	40	2,231
BAHAWALPU	69	5	26	1,920
BHAKKAR	45	5	49	1,329
CHAKWAL	85	1	13	1,193
CHINIOT	35	8	57	671
D.G. KHAN	37	3	60	1,232
FAISALABA	32	6	62	2,294

	Sufficient	Limited	Deficient	N
GUJRANWAL	51	5	44	1,681
GUJRAT	55	7	38	1,439
HAFIZABAD	43	7	50	706
JEHLUM	70	4	26	822
JHANG	50	4	46	1,420
KASUR	28	7	65	1,440
KHANEWAL	51	6	43	1,279
KHUSHAB	65	6	29	812
LAHORE	40	4	56	1,217
LAYYAH	44	8	48	1,633
LODHRAN	64	7	29	820
MANDI BAH	40	6	54	836
MIANWALI	54	4	42	1,383
MULTAN	47	5	48	1,381
MUZAFFARG	38	6	56	2,018
NANKANA S	39	6	56	717
NAROWAL	55	4	40	1,251
OKARA	36	7	57	1,513
PAKPATTAN	42	8	50	887
RAHIMYAR	43	7	50	3,075
RAJANPUR	48	7	44	1,102
RAWALPIND	71	2	28	1,939
SAHIWAL	44	7	49	1,177
SARGODHA	57	5	38	1,529
SHEIKHUPU	37	6	57	1,193
SIALKOT	60	5	35	1,953
T.T.SINGH	41	6	54	1,124
VEHARI	42	7	51	1,474