Excel

PROJECT

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Introduction

In Punjab, Pakistan, there is an urgent need to improve education. An international ed-tech company is giving 3 million US dollars to make this happen. As a junior data analyst, my job is to carefully look at a big dataset of schools in the area. The goal is to find out what the main problems are and come up with smart plans, backed by data, to spend the money wisely. By diving into the dataset, I want to find important information, fix education inequalities, and create plans that make the most of the money. The main goal is to give students a better future and make schools better.

Literature Review

The quality education is an indispensable and inevitable agent for change as education is a process of civilization and development. The issue of deterioration of quality in education in Pakistan, especially decline in quality of secondary education was the slogan of the day. The major purpose of the research was to compare the quality of education in public and private schools of Punjab. All the secondary schools, their heads, secondary school teachers and students of 10th class of public and private sector of the Punjab constituted population of the study. Punjab is generally distributed in three different strati, which are North Punjab, Central Punjab, and South Punjab. Due to limited time and resources, the study was delimited to the nine districts of Punjab namely Rawalpindi, Chakwal, Attock, Lahore, Gujranwala, Dera Ghazi Khan, Bahawalpur, Mianwali and Sargodha. Two hundred and sixteen secondary schools (twenty-four secondary schools from each sample district) were randomly selected. The proportion of public sector schools and private sector schools, boys and girl's schools were equal. All the heads of selected 24 secondary schools of public and private sector from each district (the proportion of public sector schools and private sector schools, boys and girl's schools were equal i.e. fifty fifty) were included in sample. One thousand and eighty teachers (one hundred and twenty from each sample district) constituted the sample of the study. The proportion of the public and private, male and female teachers was fifty fifty. Four thousand, three hundred and twenty students studying in 10th class in public and private high schools of already sampled district of Punjab were randomly selected as the sample of the study. The proportion of public and private and male and female students was fifty fifty. Three questionnaires, one each for heads, secondary school teachers and students, prepared and validated through pilot-testing, were used as the research instruments of the study. The researcher visited the target areas personally, distributed the questionnaires himself, and got filled questionnaires back from respondents. The data obtained was tabulated and analysed by using simple percentage and two-way chi square tests. Main conclusions of the study were: that private sector schools had actually a smaller number of students and teachers at secondary level as compared to public sector schools. The results of 10th class students in boards' examinations of private schools were better than government schools. While with respect to ownership of building, almost 98% public sector schools had their own buildings and majority of private schools was running in rented buildings. In public sector school's student-teacher ratio was higher than private schools. Heads of private sector secondary schools were better than heads of public sector secondary schools regarding involvement of subordinate staff in decision making, keeping themselves as a part of team while leading them and carrying out the well- organized tasks. But the heads of public sector secondary schools were more qualified academically as well as professionally, having more administrative experience as compared to private sector secondary schools' heads. Teachers of public secondary schools were more qualified academically as well as professionally having command over teaching methodology as compared to the teachers of private secondary schools. In public schools, in service training was provided to teachers and their selection was done on merit.

Early Childhood Education (ECE) is an emerging field worldwide as well as in Pakistan. The School Education Department of Punjab is making substantial efforts to spread ECE in its territory through Quaid-e-Azam Academy for Educational Development (QAED). This study was aimed to evaluate the physical facilities of the Early Childhood Education (ECE) program in public schools of province Punjab. It was a quantitative study. A multistage sampling technique was applied for the selection of the sample. District Lahore, Okara, and Toba Tak Singh were selected purposively. These districts were divided into two strata based on the area (urban and rural). Meanwhile, each strata were

further divided into two sub-stratum, i.e., boy's schools and girls schools. Thus 50 schools from urban and 50 schools from rural were selected from each district by the application of simple random sampling techniques. The self-made checklist was applied for measuring the physical facilities of ECE in public schools. The checklist was also pretested in the pilot study. The reliability of the checklist was measured through Cronbach alpha value which was found 0.78. Quantitative data were analysed through descriptive and inferential statistical techniques. Results of this study indicated that there was presence of boundary wall, toilet, one ECE room, one ECE trained teacher, blackboard, chair per child in almost all schools but there was absence of three ECE rooms, three trained ECE teachers, presence of Care-giver, facility of first aid box, presence of ECE kit (provided by QAED) and standard decorated ECE rooms as per criteria of QAED. The results of comparison among districts show that Toba Tak Singh has a good provision of ECE as compared to Lahore and Lahore has more facilities of ECE as compared to Okara.

Description of Dataset

The dataset comprises comprehensive information about schools in a particular region, encompassing details such as school identification, location, administrative particulars, infrastructure, educational aspects, and enrolment statistics. It includes data on school ownership, establishment years, building conditions, and facilities like drinking water and electricity. Additionally, the dataset records key personnel information, including head teachers and teachers, as well as their availability and the number of seats. This dataset is a valuable resource for gaining insights into the educational landscape and infrastructure of schools in the region, facilitating data-driven decision-making and educational improvements.

Following are some of the steps that are taken to clean the data:

1. No duplicates were found in the dataset.
2. Corrected the moza column. Removed dates from this column.
3. Removed time, date and null values from street_name column.
4. Replace time with correct uc_name in uc_name column.
5. Removed NULL from head_name and also removed NULL from head_type whose head_name was NULL.
6. Removed NULL from drink_water_type_other.
7. Corrected drinking water and electricity column.
8. Cleaned the data that was further required in the analysis.

Then created pivot table for further data analysis.

Analysis and Visual aids

● **Determine the total number of schools present in the dataset.**

The total number of schools found in the dataset are 48192.

Solution: Distinct count on emiscode. As there can be same school names in different districts.

● **Identify the lowest students of school_Gender(male & female) by school level of schools established in the 2000s.**

School_level	Female	Male
H.Sec.	9	3
Middle	136	46
Primary	1159	702
Secondary	89	40
sMosque		19

Solution: Selected school_gender, school_level and est_year and then filter out est_year and selected years 2000 onwards.

● **Determine the top 5 districts with the highest number of teachers and non-teachers in schools.**

The top 5 districts with highest number of teachers are:

1. RAHIMYAR KHAN
2. FAISALABAD
3. BAHAWALNAGAR
4. SARGODHA
5. RAWALPINDI

The top 5 districts with highest number of non-teachers are:

1. FAISALABAD
2. ATTOCK
3. BAHAWALNAGAR
4. RAHIMYAR KHAN
5. SARGODHA

Solution: Select District and count of Teachers and then select count of NonTeachers.

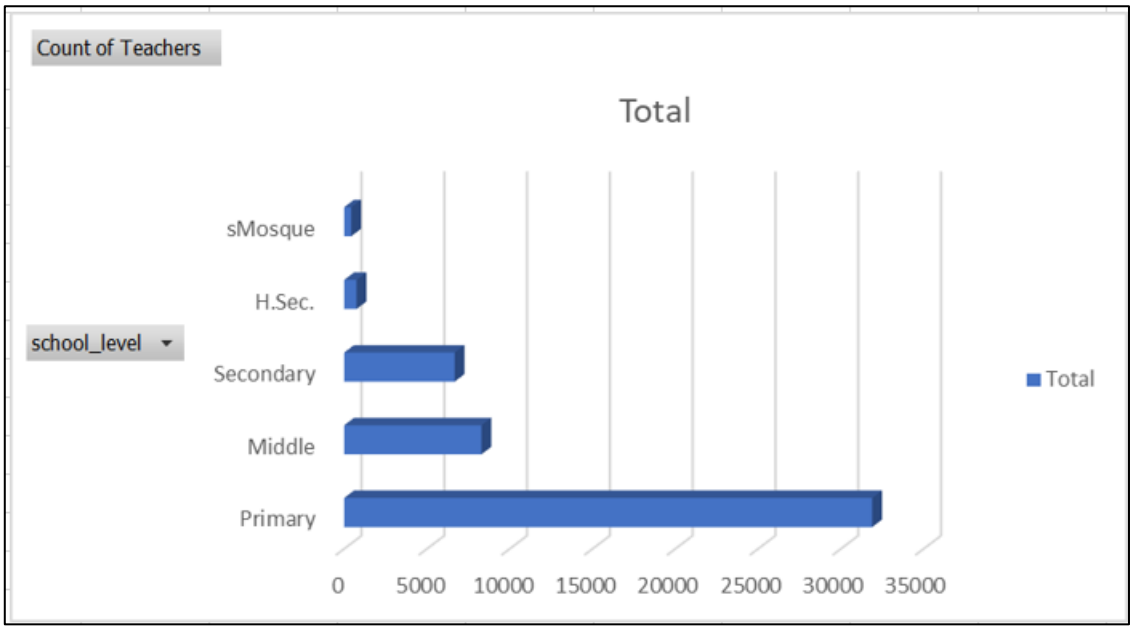
● **Explore the school level and medium that have the lowest number of functional classrooms.**

The school level and medium that have lowest number of functional classrooms is sMosque.

School_level	Both	English	Urdu
sMosque	66	26	343
H.Sec.	339	165	247
Secondary	2345	972	3354
Middle	1595	1113	5581
Primary	5071	3212	23762

Solution: Select school_level as rows, medium as columns and count functional_classrooms.

● Create a bar chart showcasing the distribution of teachers across different schools.



Solution: Select school_level and teachers and then in Pivot table analyzer select bar chart.

● Calculate the number of male and female students (School_Gender)

The total number of male students are 22921 and the total number of female students are 25270.

Solution: Select school_gender and count of school_gender.

● Count the number of schools in rural and urban areas and calculate the percentage of schools offering Urdu and English medium education or both in each category.

school_location	Count of school_location
Rural	42416
Urban	5775
Grand Total	48191

medium	Count of medium
Urdu	69%
Both	20%
English	11%
Grand Total	100%

Solution: Select school_location, first count the school_location and then select medium and then calaculate the percentage.

● Identify the district with the highest enrollment in primary schools since their establishment.

The district with the highest enrolment in primary school since their establishment is Rahimyar Khan

Solution: Select district in rows, est_year in column and count school_level and also filter out school_level to primary.

● Determine the district with the highest enrolment in secondary schools since their establishment.

The district with the highest enrolment in secondary school since their establishment is Faisalabad.

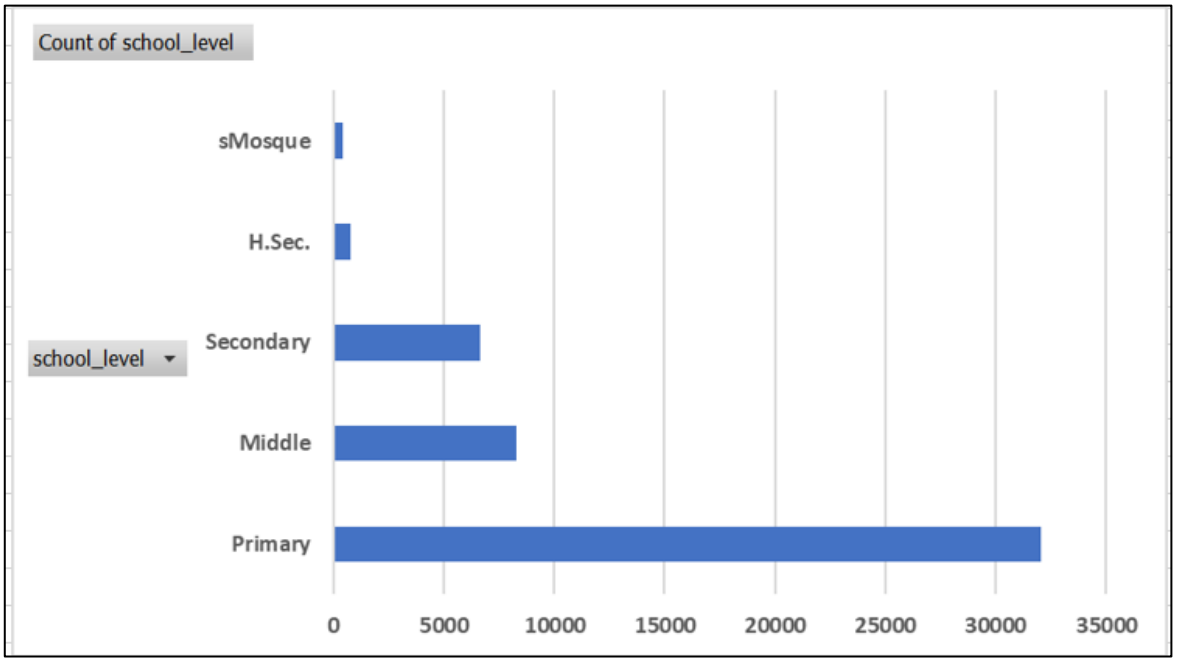
Solution: Select district in rows, est_year in column and count school_level and also filter out school_level to secondary.

● Find the district with the highest enrolment in higher secondary schools since their establishment.

The district with the highest enrolment in higher secondary school since their establishment is Faisalabad.

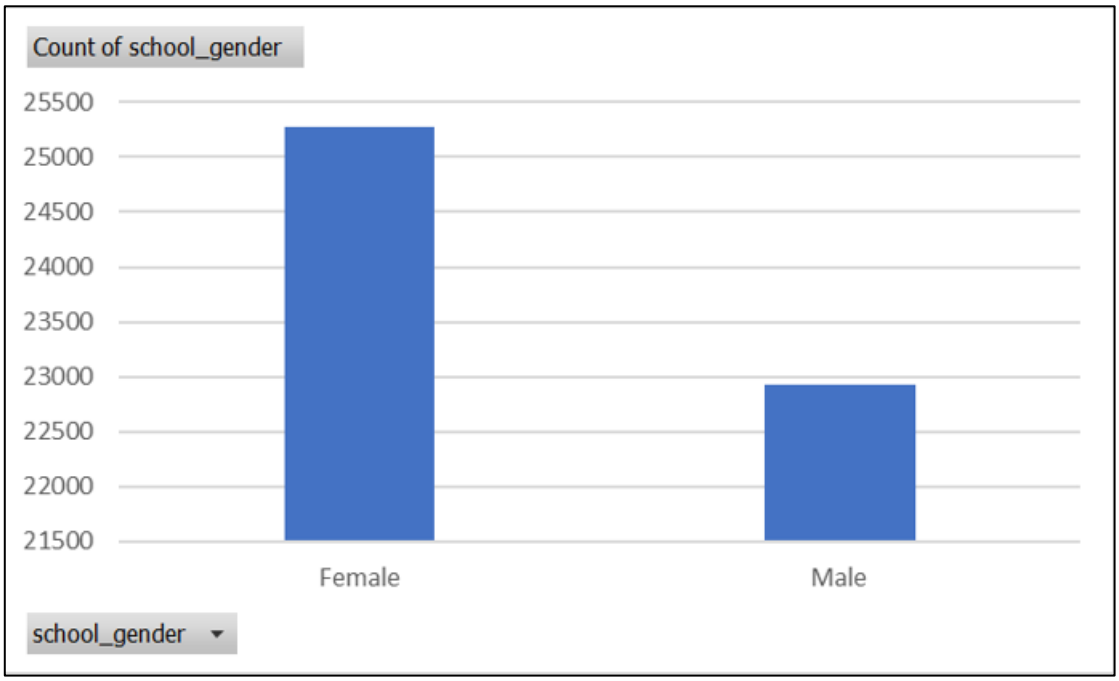
Solution: Select district in rows, est_year in column and count school_level and also filter out school_level to higher secondary.

● **Create a bar chart displaying the distribution of schools according to school_level**



Solution: Select school_level, count of school and then select bar chart.

● **Generate a bar chart representing the number of students categorized by gender(School_Gender).**



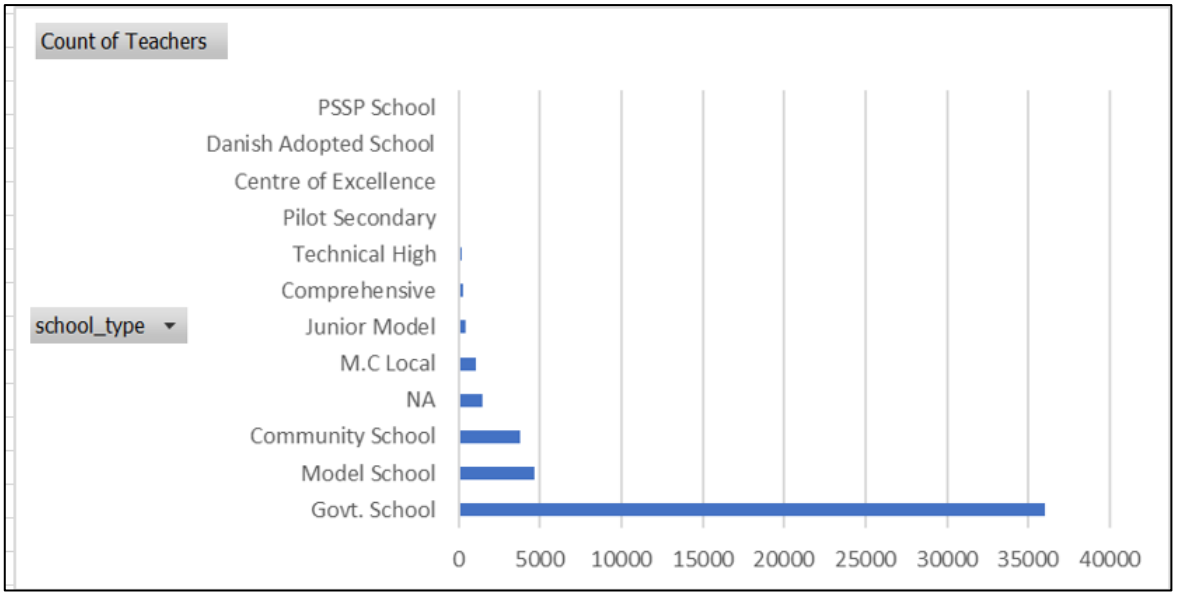
Solution: Select school_gender, count of school_gender and then select bar chart.

● **Create a table showcasing the school_ownership with respect to schools.**

school_ownership	Count of school_ownership
Education Department	45671
Building Provided By Local Residents	1029
Municipal Building	537
On Rent	184
Some Other Govt. School	149
Property Of Any Other Institution Besides The Municipal Institution	132
Running In The Mosque	128
School Council provided building	84
Grand Total	47914

Solution: Select school_ownership, school_name and then show data in tabular form and repeated values. Also displayed school_ownership and count of school ownership. Also displayed school_ownership and school_level.(Done in excel)

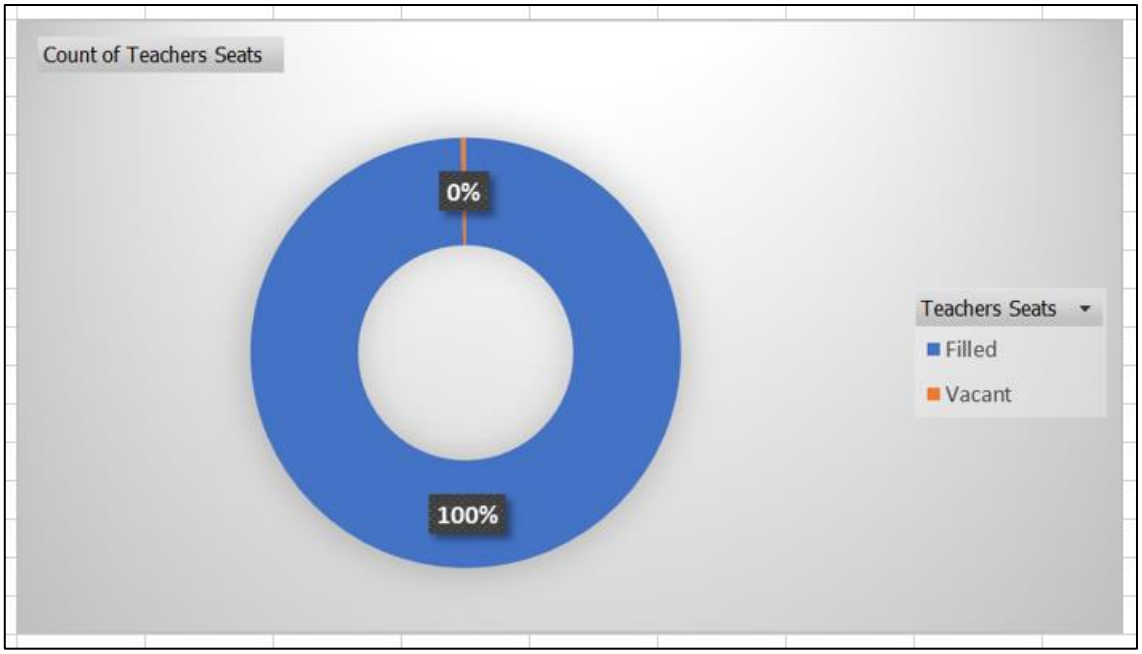
● **Visualize the distribution of teachers based on their respective job posts using a bar chart.**



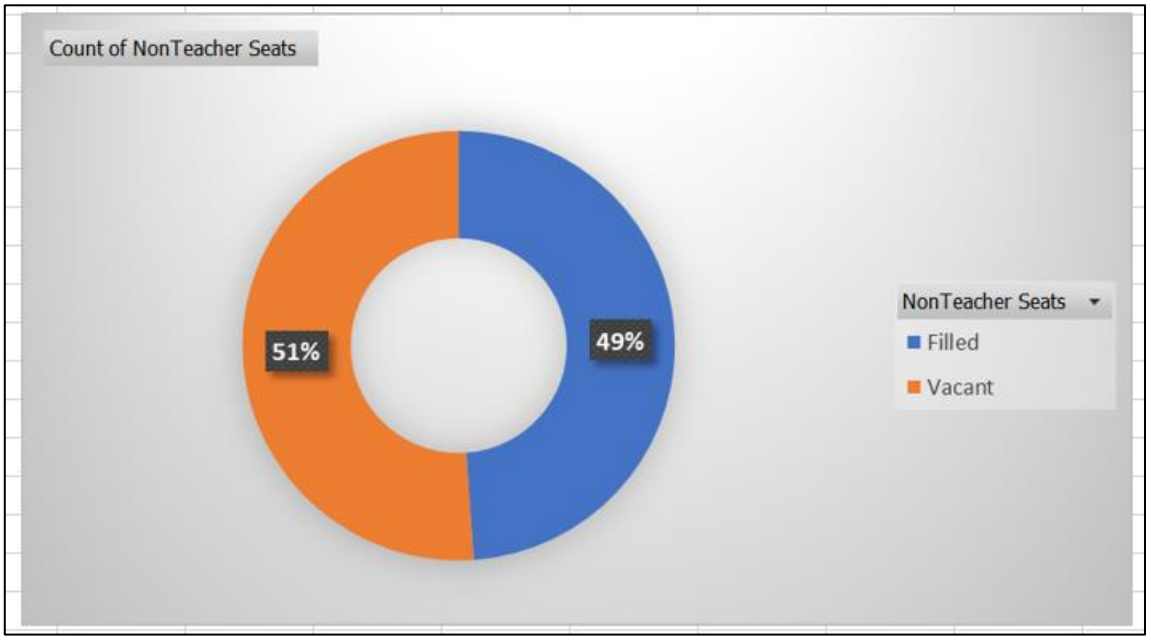
Solution: Select school_type and count of teachers and then displayed it in a bar chart.

● Create a pie chart to show the percentage of vacant and filled teaching and non-teaching posts.

Count of teachers:



Count of Non-teachers:



Solution: Create a new column of vacant and filled for Teachers and Non-Teachers. Placed filled where teachers and non teachers are there and placed vacant where teacher and non teachers are not there. Then displayed the pie chart.

● **Determine the percentage of schools with satisfactory building conditions (bldg_condition).**

School_type	Count of bldg_condition
Govt. School	76%
Model School	9%
Community School	8%
NA	3%
M.C Local	2%
Junior Model	1%
Comprehensive	1%
Technical High	0%
Pilot Secondary	0%
Centre of Excellence	0%
Danish Adopted School	0%
PSSP School	0%
Grand Total	100%

Solution: Select school_type in rows, count of bldg_condition and filter bldg_condition to satisfying.

● **Calculate the number of schools with satisfactory security measures.**

Count of security satisfying
33871

school_type	Count of security
Govt. School	24915
Model School	3334
Community School	2681
NA	1215
M.C Local	884
Junior Model	290
Comprehensive	256
Technical High	164
Pilot Secondary	97
Centre of Excellence	21
Danish Adopted School	13
PSSP School	1
Grand Total	33871

Solution: Select school_type and count of security and filter security to satisfying. Or select count of security and filter security to satisfying.

● List the names of the 5 districts with the lowest availability of drinking water facilities in schools.

Districts	Count of drinking water
D.G. KHAN	48
BAHAWALNAGAR	14
RAJANPUR	13
RAWALPINDI	12
MIANWALI	12

Solution: Select district in rows and count of drinking water and filter out drinking water to 0.

● Identify the names of the 5 districts with the lowest availability of electricity in schools.

District	count of electricity
RAHIMYAR KHAN	104
BAHAWALPUR	75
BAHAWALNAGAR	70
MUZAFFARGARH	67
D.G. KHAN	52

Solution: Select district and count of electricity and filter out electricity to 0.

● Determine the names of the/ 5 districts with the lowest presence of boundary walls in schools.

District	Count of boundary_wall_state
CHINIOT	674
HAFIZABAD	684
NANKANA SAHIB	688
MANDI BAHA UD DIN	727
LODHRAN	731

Solution: Select district and count of boundary_wall_stated and then filter out not completed.

● **List the names of the 5 districts with the lowest availability of toilets in schools.**

District	Count of total_toilets
CHINIOT	697
HAFIZABAD	733
NANKANA SAHIB	746
LODHRAN	755
MANDI BAHA UD DIN	778

Solution: Select district and count of total_toilets.

Recommendations

10 million RS for School Upgradation

school_level	Count of school_level
Primary	32045
Middle	8289
Secondary	6671
H.Sec.	751
sMosque	435

We are having too much primary schools, so we will spend 10 million RS for school upgradation.

District	Count of upgrade_primary_yea	Count of upgrade_high_sec_yea	Count of upgrade_middle_yea	Count of upgrade_high_year
RAHIMYAR KHAN	2774	2774	2774	2774
FAISALABAD	2208	2208	2208	2208
BAHAWALNAGAR	2142	2142	2142	2142
SARGODHA	1925	1925	1925	1925
RAWALPINDI	1806	1806	1806	1806
SIALKOT	1797	1797	1797	1797
MUZAFFARGARH	1756	1756	1756	1756
BAHAWALPUR	1659	1659	1659	1659
D.G. KHAN	1602	1602	1602	1602
GUJRANWALA	1553	1553	1553	1553
LAYYAH	1515	1515	1515	1515
JHANG	1479	1479	1479	1479
VEHARI	1424	1424	1424	1424
OKARA	1404	1404	1404	1404
GUJRAT	1398	1398	1398	1398
KASUR	1358	1358	1358	1358
MULTAN	1313	1313	1313	1313
BHAKKAR	1262	1262	1262	1262
KHANEWAL	1242	1242	1242	1242
MIANWALI	1232	1232	1232	1232
ATTOCK	1204	1204	1204	1204
T.T.SINGH	1181	1181	1181	1181
SHEIKHUPURA	1160	1160	1160	1160
SAHIWAL	1158	1158	1158	1158
CHAKWAL	1139	1139	1139	1139
LAHORE	1138	1138	1138	1138
NAROWAL	1096	1096	1096	1096
KHUSHAB	953	953	953	953
RAJANPUR	951	951	951	951
PAKPATTAN	858	858	858	858
JHELUM	791	791	791	791
MANDI BAHA UD DIN	778	778	778	778
LODHRAN	755	755	755	755
NANKANA SAHIB	748	748	748	748
HAFIZABAD	733	733	733	733
CHINIOT	697	697	697	697

Districts according to the upgradation.

5 million RS for Infrastructure

Districts	Count of bldg_condition
RAHIMYAR KHAN	212
BAHAWALPUR	123
BAHAWALNAGAR	122
D.G. KHAN	118
GUJRANWALA	87
RAWALPINDI	85
MUZAFFARGARH	84
SIALKOT	77
SARGODHA	76
FAISALABAD	70
LAHORE	64
NAROWAL	60
RAJANPUR	57
OKARA	56
SHEIKHUPURA	50
JHANG	47
KASUR	42
MULTAN	41
GUJRAT	40
NANKANA SAHIB	36
SAHIWAL	33
T.T.SINGH	33
MIANWALI	33
VEHARI	29
KHANEWAL	28
HAFIZABAD	27
LODHRAN	27
CHAKWAL	25
LAYYAH	25
BHAKKAR	23
ATTOCK	23
KHUSHAB	21
CHINIOT	20
MANDI BAHA UD DIN	19
JHELUM	15
PAKPATTAN	14

We have a budget of 5 million RS for this so first we need to work on these districts where the building condition is dangerous, complete building needs repairing and partial building is dangerous. Before any tragedy happens, we need to repair these building.

Districts	Count of total_toilets
BAHAWALNAGAR	131
D.G. KHAN	111
RAWALPINDI	93
BAHAWALPUR	47
RAHIMYAR KHAN	37
MUZAFFARGARH	25
RAJANPUR	24
FAISALABAD	24
SARGODHA	21
SIALKOT	21
SHEIKHUPURA	20
GUJRANWALA	19
MIANWALI	17
JHANG	17
KHUSHAB	16
MULTAN	13
LAYYAH	13
CHAKWAL	12
JHELUM	11
HAFIZABAD	11
ATTOCK	10
LAHORE	9
SAHIWAL	9
GUJRAT	8
CHINIOT	7
NAROWAL	6
MANDI BAHA UD DIN	5
OKARA	5
NANKANA SAHIB	4
T.T.SINGH	4
BHAKKAR	4
VEHARI	3
KHANEWAL	3
KASUR	1
LODHRAN	1

We should spend money in these districts as the schools in these districts have 0 or only 1 toilet.

Count of boundary_wall_state
6436

We should spend money in boundary walls that are not completed or need repairing.

District	Count of construct_type
BAHAWALNAGAR	413
RAHIMYAR KHAN	408
RAWALPINDI	397
SIALKOT	350
GUJRANWALA	315
BAHAWALPUR	287
SAHIWAL	245
D.G. KHAN	242
NAROWAL	238
FAISALABAD	228
SARGODHA	228
SHEIKHUPURA	219
GUJRAT	216
KASUR	214
MUZAFFARGARH	184
MULTAN	176
LAHORE	174
ATTOCK	169
KHANEWAL	159
OKARA	156
JHANG	148
RAJANPUR	131
LAYYAH	127
VEHARI	124
NANKANA SAHIB	117
CHAKWAL	114
BHAKKAR	112
MIANWALI	106
HAFIZABAD	106
T.T.SINGH	100
MANDI BAHA UD DIN	96
JHELUM	94
LODHRAN	81
KHUSHAB	80
CHINIOT	59
PAKPATTAN	30

Districts where construction type is completely rough or partial solid / partial rough. We can spend money in making the construction completely solid.

3 million RS for drinking water, playgrounds and labs

Districts	Count of drinking water
D.G. KHAN	48
BAHAWALNAGAR	14
RAJANPUR	13
RAWALPINDI	12
MIANWALI	12
RAHIMYAR KHAN	7
GUJRAT	5
SIALKOT	4
GUJRANWALA	3
BAHAWALPUR	3
JHELUM	3
OKARA	2
SARGODHA	2
MULTAN	2
MUZAFFARGARH	2
CHAKWAL	1
HAFIZABAD	1
SHEIKHUPURA	1
FAISALABAD	1
CHINIOT	1
SAHIWAL	1

These are the districts where the school don't have water to drink. We should spend money in these schools so that children can drink water.

Districts	Count of electricity
RAHIMYAR KHAN	104
BAHAWALPUR	75
BAHAWALNAGAR	70
MUZAFFARGARH	67
D.G. KHAN	52
LAYYAH	47
RAJANPUR	43
RAWALPINDI	41
MIANWALI	37
NAROWAL	26
OKARA	21
CHAKWAL	19
MULTAN	19
SARGODHA	16
SIALKOT	16
SHEIKHUPURA	16
BHAKKAR	15
JHANG	12
KHUSHAB	10
LODHRAN	7
KASUR	7
GUJRAT	7
KHANEWAL	6
HAFIZABAD	6
SAHIWAL	6
ATTOCK	5
JHELUM	5
NANKANA SAHIB	5
GUJRANWALA	4
FAISALABAD	3
LAHORE	3
T.T.SINGH	2
PAKPATTAN	2
CHINIOT	1
MANDI BAHA UD DIN	1

We should spend money in these districts where the schools do not have the electricity.

- Further we can spend money in technology infrastructure to enhance the quality of education.
- Well-equipped laboratories for science and computer studies to enhance practical learning.

20 million RS to build middle and high school in rural areas

school_level	Rural	Urban
Primary	28938	3107
Middle	7298	991
Secondary	5257	1414
H.Sec.	530	221
sMosque	393	42

We need to build more middle and higher secondary schools in rural areas separate schools for both the genders male and female.

10 million RS for New Primary level school

We can build more primary level schools in urban areas as there are less primary level schools in urban areas.

Conclusion

In conclusion, the dataset offers a wealth of information about schools in Punjab, Pakistan, serving as a valuable resource for our mission to transform the region's education landscape. By leveraging a substantial investment of 3 million US dollars, we have the opportunity to address critical educational constraints, bridge gaps, and ensure equitable access to quality education for all students. Through data-driven analysis, we can strategically allocate funds to improve school infrastructure, enhance teacher training, expand educational facilities, and foster community engagement. The holistic approach presented in this report combines educational insight with practical initiatives, promising a brighter future for students and the advancement of educational standards in Punjab.

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