# Impact of public-private-partnership programs on students' learning outcomes: Evidence from a Quasi-Experiment

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5 December 2015

# Impact of public-private-partnership programs on students' learning outcomes: Evidence from a Quasi-Experiment

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August 15, 2016

ABSTRACT

Learning outcomes refer to the performance of the students in academic tests pertaining to the respective grade level. In Pakistan, survey evidences from Annual Status of Education Report (ASER) show a significant dispersion in learning outcomes of public schools as compared with private sector counterpart. The perceived results of learning outcomes in private schools very clear but less evidence is found for educational outcome of schools run under public-private partnership programs. This becomes especially relevant when status of curricular, co-curricular, and extra-curricular activities is compared between public school, private schools, and schools run under public private partnership. In recent literature, it is found that schools taken up by public-private partnership have been providing a better learning environment - Infrastructure Rehabilitation and Development, Administrative changes, Academic Innovation and Planning, Teacher Reform and Student Affairs - is perceived to have a positive impact on learning outcomes. It is to investigate and document that the investments in these areas are justifiable. To promote this fact, we conduct a quasi-experiment to examine the profiles of students in a public-private partnership school at Karachi (running under Zindagi Trust program) and a public school (as counterfactual) in the same neighbourhood. We also recorded the household and socioeconomic characteristics to create a good set of control variables. The propensity-score results show that public-private school is performing better than that of comparison group in attaining learning outcomes thus showing positive effects of PPP. Finally, the study probed into household and parental covariates of student's educational outcomes to enhance internal validity of results.

*Keywords*: educational learning outcomes, public-private partnership, quasi-experiment.
*JEL Classification Numbers*: I21, C21, L32.

*Education is the preparation of children to assume their adult roles in society as loving parents, as engaged citizens, as contributors to society and their communities, and as productive workers. The premise is that schooling and education are linked: a child who spends more years in school is thereby expected to acquire more education—more skills, more capabilities, more competencies. Yet, tragically, it has been demonstrated again and again that this is not always the case. Schoolin' ain't learnin'*

Sir Lant Pritchett (2013)

1. Introduction

In 2012, the National Assembly of Pakistan received assent of the President on an Act to provide free compulsory education to all children of the age of five to sixteen[1]. This is indicative of a consensus that every child has a basic right to education; it may be because of perceived multiple gains to education on all levels. However, there is no consensus over the right means to provide this basic facility. It becomes more relevant when the global adult literacy rate is 86.1 percent in 2015 while Pakistan still remains at lower rank with 59.9 percent on average (UNESCO, 2015)[1]. Due to substantial efforts by the Federal government have led to an increase in adult literacy rate from 43.1 percent in 2000 to 59.9 percent in 2015. But still the average performance in improving literacy rate is much lower as compared with the neighbour countries and other regional counterpart (see, Figure 1 for a comparison).

Figure 1: Adult literacy rate
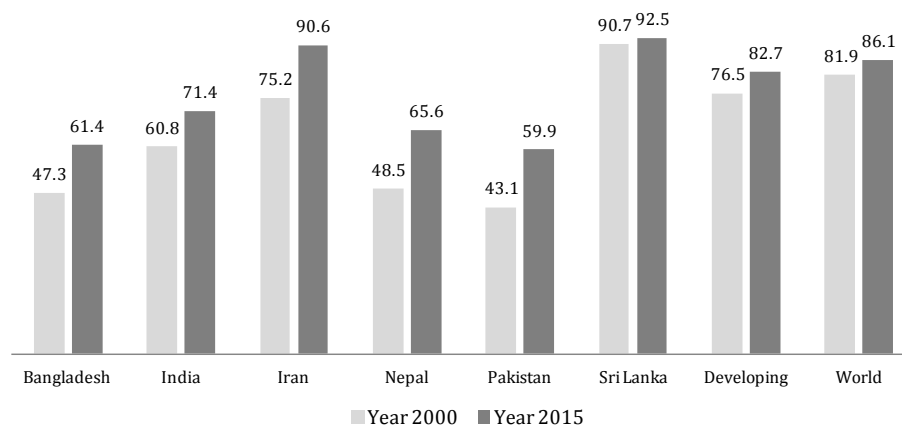


Source: UNESCO, Institute for statistics, 2015

There are many socio-economic and political reasons which restrain the adult literacy rate in Pakistan. Among these, literature has identified five major bottlenecks to piecemeal improvements in literacy numbers which are income poverty, gender inequality, high population growth, feudalistic system

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[1]United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for statistics.

and lack of quality education services. In the presence of these constraints, Pakistan is facing two key challenges – basic access to primary schooling especially in rural areas and the long lasting effects it has on the educational outcomes of a child. Figure 2 provides information about primary enrollment across different income quantiles of Pakistan. Bottom income quantile is considered as a poorest group which shows net enrollment around 31% on average. This also implies, around 69 % of children belong to extremely poor families are out-of-school in rural Pakistan. In contrast to these numbers, 52% of the children from the upper income quantile group are enrolled in pre-schooling. However, still 48% of the children of this richest group are out-of-schools. Furthermore, the enrollment trend across different income quantiles also indicates a highest percentage of children from poorest families are attending government schools. Whereas, around 65% of children belong to richest group are mainly enrolled in private schools in Pakistan. It is due to the fact that public schools in Pakistan especially in rural areas are working in a bad condition. Annual Status of Education Report (hence after, ASER) 2014 data shows that most public schools do not have basic facilities of clean drinking water, electricity, boundary wall and toilets, as compare to private schools. And so is true for the infrastructure as library, playground, labs and the students are seated outside classrooms with multi grade education.

Figure 2: Primary School enrollment – A Quantile view
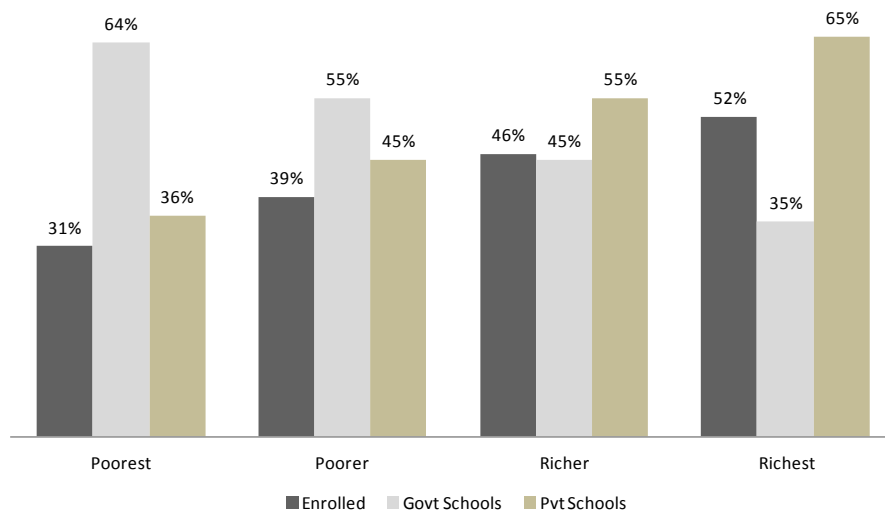


Data Source: ASER, 2014.

With the least of resources, books and computer, the public school has more teachers who are more educated than the private school teachers (see, Figure 3). But it is evident that while having less educated teachers including more females with less average age experiences, private schools still provide

relatively better facilities in terms of physical infrastructures and even produce better academic outcomes than government schools (see, Amjad (2012) and Amjad and MacLeod (2012)). Sindh is not exceptional in this regard, which is the second most developed province in Pakistan with a population of 42 million and a literacy rate of 59 percent. There are 47,557 registered schools in the province, yet 73 percent of school-age children are still out of school. A recent survey report by ASER[2] establishes that Sindh scores worst on education than any other indicator; student's basic literacy and numeracy results are not more than 20 percent and there is hardly any presence of basic learning environment in public schools. Karachi is a cosmopolitan city in Sindh with a huge immigrant population. Home to over 23.5 million people, 38 percent of it is under the age of 15 years[3]. It has the highest school enrolment relative to the 22 districts of Pakistan according to the Sindh Education Management Information System (SEMIS) census 2013. Educational sector in Karachi faces a number of problems including the students' learning outcomes. Which may be because of an increasing corruption in the respective sector, possible existence of ghost schools and ghost teachers or the socioeconomic factors may be influencing the educational outcomes. There are many such hypotheses that what could be the determinants. But nothing is established in case of Karachi in particular and Singh in general that what factors may be affecting.

Figure 3: Teachers characteristics (Public vs. Private schools)
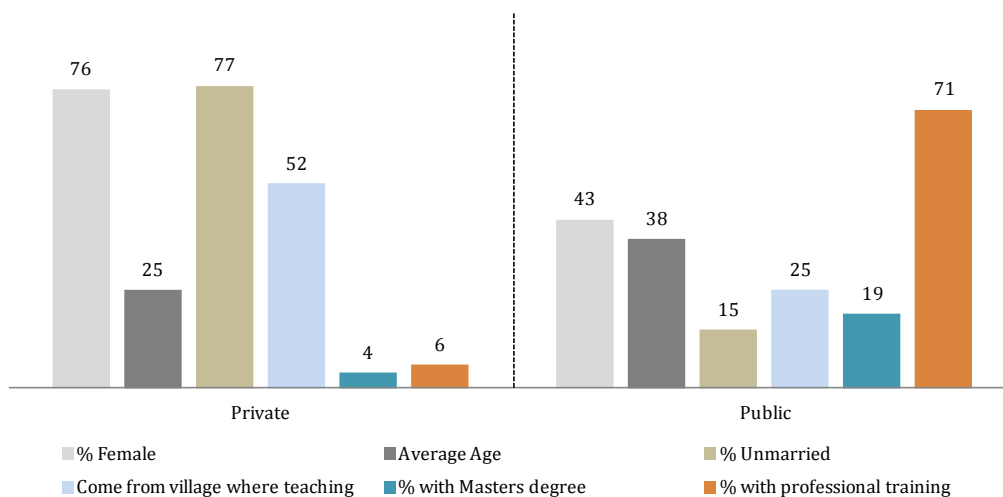


Data Source: Andrabi et al., (2007 & 2008)

The students from same class, same home or the same community may have different learning outcomes. Motivating from this fact, this study explores the factors influencing the differences in learning

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outcomes while considering a number of control factors. The matter is important to understand as the educational situation of Sindh may be attributed to the schools and variant education standards among schools. UNESCO pointed that the existence of different types of schooling is raising concerns of inequitable social divide (NEP, 2009)[4]. Thus one of the options which may be considered to get hold of the deteriorating educational situation in Sindh is the joint effort by the two key stake holders, Public Private Partnership (PPP). There are 2,139 schools operating under the PPP mechanism in Sindh. There are different kinds of Public private partnerships where responsibilities between private and public would vary from school to school. In some cases, private partners are limited to providing infrastructure while in others their responsibility would extend to administration and more.

The existence of such an intervention under Zindagi Trust Administration is SMB Fatima School. The Trust was registered in 2002 and adopted the school under Sindh Government's Adopt a School Policy with the prime motive of quality education. Its aim is to utilize the already governments allocated resources for the betterment of the students. One of the few basic steps was the consolidation of 13 schools operating in the same building and eradicating the use of school playground for the public use. Throughout these years the focus remained on training public school teachers, administration and extracurricular activities.

The Chairman of ruling party of Sindh, Bilawal Bhutto Zardari has announced the establishment of 23 more Public Private Partnership schools; one in every district. The private sector has been given an elaborate set of responsibilities; which will be supported by the public sector. The setup requires not just a big amount of public infrastructure but also determines the future of the province's children. The success of the model has as yet not been established. Thus this paper is an effort to evaluate whether the initiative by the Government of Sindh to partner with the private sector has beneficial results.

Box-1 shows the details of intervention the current school is providing and are expected to be in the 23 new schools. There are a number of rigorous done of Public Private Partnership in education sector and a number of them are underway. But there is no evidence of rigorous evaluation of specifically such a program found so far. If any research done to find the effect would be of immense importance for the welfare of the society. This paper is an effort to contribute to the pool of data base about public private partnership in education. The prime role of the paper would be finding the differences among the Public Schools and the Private schools and the evaluation of such a school underway since a decade. The detailed set of responsibilities private sector providing in a public private partnership are **be** Infrastructure Rehabilitation and Development, Administrative changes, Academic Innovation and Planning, Teacher Reform and Student Affairs. The detail set of interventions made by the Trust are given in Box-1. Finding

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[4] National Education Policy, 2009

the effect of each in isolation won't be fruitful thus the effect of all the factors are observed simultaneously. For the purpose of this study we will compare the educational outcomes of the public schools and private schools students all over Pakistan, among four major provinces and then four major cities. Key hypothesis under consideration at this stage would be, do private schools produce better academic outcomes than public schools? Once the difference is established we will look for how the public schools differ from the public private partnership school. Thus in the second stage, we would like to test a similar hypothesis but with different treatment group such as, do public-private partnership schools produce better academic outcomes than public schools? The causation would be assessed while controlling a number of control variables under consideration.

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Box 1: Detail of Intervention made by Private sector

1) Infrastructure Rehabilitation and Development
   - Repair and re-installation of broken electric wiring
   - Replacement of dysfunctional blackboards or desks
   - Conversion of abandoned rooms to student activity rooms (e.g. art room)
   - Rebuilding cramped, blocked toilets
   - Repairing water/sewage lines
   - Building a Health Room, staffed with a full-time nurse
   - Building an Art Room, a Library, an A/V Room, two Computer Labs and a Science Lab
2) Administrative changes
   - Merging the multiple schools running in one campus into one school under one administration
   - Maintaining teacher and student records for attendance, performance, etc.
   - Disallowing private use of school grounds
   - Hiring custodial staff for maintenance and cleanliness of the existing or refurbished premises
     Detailing staff responsibilities in job descriptions
   - Formulating a detailed admissions policy describing admissions criteria, responsibilities and deadlines
3) Academic Innovation and Planning
   - Introduction of modern, thought-provoking textbooks in Urdu, English, Mathematics.
   - Teaching a video-based science curriculum in our well-equipped A/V Room
   - Hiring academic coordinators for English, Mathematics and Science to plan syllabi with learning outcomes and timelines, design tests, monitor progress, observe and train teachers
4) Teacher Reform
   - Monitoring teacher attendance
   - Penalizing staff for unreported absences, lateness and shirking duty
   - Regularizing general and subject-specific training for teachers, ongoing through academic coordinators and targeted through external trainers
   - Evaluating teacher performance through regular teaching demos, lesson plan reviews as well as in-class monitoring by academic coordinators throughout the term.
5) Student Affairs
   - Art
   - Chess
   - Sports (netball, basketball, football, hockey, throw ball, taekwondo, rowing, cricket)
   - Public speaking
   - Sexual health and abuse awareness

Source: Zindagi Trust, 2015

The rest of the paper organizes itself as section 2 reports the existing work done in the field of finding differences among the public, private and public private partnership schools and section 3 shows its empirical methodology involved in finding the results. Section 4 shows the final results and section 5 concludes the paper.

2. Review of Literature

The demand for education in the developing countries is far more pressing than that in the developed countries. The excess demand leads to a rise in private sector education to cater to the demands of the ones who have the means to pursue it. This leads to a gap between public schools and the private schools; the former lagging behind and the latter performing better. Broadly defined the education is parted in the developing country in the four major ways - Public Schools, Public Private Partnership Schools, Low Cost Private Schools and Private Schools. The perceived and major differences among them are shown in Table-1.

Table 1: Major Differences among School Types

|  | Public school | PPP school | Low cost private schools | Private schools |
|---|---|---|---|---|
| Infrastructure | Good space but not maintained | Good and maintained space | Not much and maintained space | Moderate maintained space |
| Administration | Poor | Good | Moderate | Good |
| Academic innovation | No Innovation | Good | Poor | Good |
| Teachers pay | Very good | Good | Poor | Good |
| Teacher absenteeism | High | Low | Low | Low |
| Extracurricular activities | No | Yes | No | Yes |

The educational market in the developed country varies to that of the developing countries. The inception of the Private schools in the Developed Countries is welcomed, as it is perceived to bring in competition to the Educational Sector (Andersen, 2008). On the other hand it is taken as a threat in the Developing Countries. It is expected that the Public sector will completely banish from performing as its job

is taken up by the Private Sector. ASER India annual report 2009 on rural area clearly shows the difference in educational outcomes among the two sector schools (Wadhwa, 2009). Similarly when the government school students in Colombia were provided school fee vouchers by the government, they can opt for either school, the students were 15 percent more likely to be in private schools. Other than this they were in a higher grade than the government school counterfactuals, had better score in standardized tests and were less likely to dropout from school or cohabit (Angrist, Bettinger, Bloom, King and Kremer, 2002).

To cater to this unending demand of quality education, in the wake of perceived better future returns at all levels, has given rise to low cost private schools and private schools. Private sector schools are widely prevalent not only among the urban elite but the rural areas as well. The educational outcomes are found to be better in areas with better educated females, takes role as teachers. Despite they are co-educational girl's enrolment is high in rural Pakistan (Andrabi, Das and Khawja, 2002).

The group which can afford low cost private schools is comparatively smaller with positive but statistically insignificant impact on child learning in India (Chudgar and Quin, 2012). And it is noted that a simple intervention in the public school is expected to raise results twice as of the low cost private schools (Tooley and Dixon 2005). The test scores of Math, Urdu and General Knowledge are compared among the Public, Private and NGO schools, in Pakistan, there is no significant difference found between the public and NGO school. Though there is a significant difference between the public school and private school. The major difference is explained by the variation in the household factors and the teacher related factors (Arif and Saqib, 2003).

Within the public school educational outcomes variation is found to be linked with better student teacher ratio and teachers education (Andrabi, Khan, Khan and Naseer, 2012). Private school teachers are less paid and less trained but are expected to be involved in teaching or teaching related activities with a low absenteeism rate and better students learning outcomes (Muralidharan and Kremer, 2006). It is also established in context of Pakistan (Andrabi, Das and Khawja, 2002).

Thus the private schools are inclined to hire a better set of teachers and a slightly better set of facilities to attract a good bunch of students. And it is successful in showing results better than those of the public school (Amjad and MacLeod, 2012). The public school benchmark is so low that the private school is not inclined to do anything more than a few things showing better result. Therefore a slight intervention in the public school of such a nature will improve grades and the underutilized public school resources can be utilized. To provide quality education free of cost the two key stake holders from the demand side, private sector, and the supply side, public sector, are combined together. In the private sector remained social workers and non-governmental organizations. Public sector's role is to providing grants, subsidies or vouchers (Angrist, Bettinger, Bloom, King and Kremer, 2002). Or letting  the private sector operate in a

public building, taking decisions about infrastructure rehabilitation and development, administrative changes, academic innovation and planning, teacher reform and student affairs (SMB Fatima Jinnah School).

The schools run under the private sector, NGO's, are reported to be performing better than the regular public schools at a lesser cost in Pakistan. According to ASER 2011 data PPP schools on average are performing better than the Public as well as Private schools for Reading, Math and English. Though the difference in scores is not mainly associated to the school type; it is found that PPP school students are 5 times more likely to be attending private tuitions than the public school students (Amjad and MacLeod, 2012).

World Bank made an effort to summarize the assumed effect of the most common types of PPP; vouchers, subsidies, contracting of private management and private finance initiatives. The objective was to show its impact on four key school indicators – increasing enrolment, improving education outcomes, reducing inequality and reducing costs. The effects are shown in the Table 2. The benefits of public private partnership are perceived to be creation of competition in education sector which would lead to efficient use of resources and increased consumer welfare (Pessoa, 2008). It may also increase risk sharing between the stakes holders, public as well as the private players will show ownership to the problem faced. There are a number of such projects underway in Pakistan with a set of perceived outcomes.

Learning environment if paired in parting education may increase educational outcomes. The environment may sum up to text books, work books, teacher's books and resources, and the material used in the better learning of the concept. It is true in context of Slovenian (Irena, Samo and Branka, 2014). PPP may be private sector's intervention of motivating students to participate actively in class at public school through provision of proper learning environment in which the child feels confident enough. Such an intervention when taken up in a public school in Pakistan showed significant change in the student's educational outcomes (Naseer, Patnam and Raza, 2010). The environment may also be the infrastructure and motivated teachers. It is established in Indonesia that more school construction will lead to increase in average years of education and average wages (Duflo, 2001). Similarly if teachers are provided with better environment may reduce absenteeism (Chaudhury, et al., 2006). The students scores increases if their teachers are provided with incentives (Muralidharan, K., and Sundararaman, 2013).

Another aspect of certain PPPs is imparting extracurricular activities. While effect of extracurricular activities on welfare of student has been established, its impact on educational outcomes is still debatable. In turnkey schools, with provisions of extracurricular activities which are not related to the curricular shows improvement in students' social and academic achievements (Kahyaogullari, 2013).

Table 2: PPP's Impact on key indicators

| Contract | Effect on increasing enrolment | Effect on increasing educational outcome | Effect on reducing education inequality | Effect on reducing cost |
|---|---|---|---|---|
| Vouchers | Strong: number of students who receive voucher. | Strong: school choice | Strong: when targeted | Strong: when private sector is more efficient |
| Subsidies | Strong: use of already built private infrastructure | Moderate: limited by available places and quality of service delivered in private sector | Strong: when targeted | Moderate |
| Private management and operations | Moderate: limited by the supply of private school operators | Moderate: limited by available places in private sector | Strong: when targeted | Moderate |
| Private finance initiatives | Moderate: limited by financial constraints | Low | Strong when targeted | Strong |

Source: Patrinos et al. (2009).

We will be interested in looking into a more detailed form of PPP in context of Karachi and its applicability in Sindh with the effect on increase in educational outcome. The PPP would be inclusive of Private management and operation and private finance initiatives. The programs of PPP nature underway in Pakistan and their desired objectives are given in Table 3.

IDEAS-PAK (2015)[5] report lead by Dr. Faisal Bari shows that the PPP schools are provided with better infrastructure, teacher training and support to the head teacher than the counterfactual, public school. The outcome is better increased enrolment and scores; though test scores are high in context of Punjab though ambiguous for Sindh. The results are getting more favourable for PPP school as the span of time increases. One's decision whether or not to teach their child is influenced by a number of factors. It may be their informed decision for the wellbeing of the family in long run or the peer pressure they face. On the other hand, the family had no other option than to send the child to school or the conditions are so bad, the family has nothing to eat, it is perceived that sending the child to school will not yield any benefits. These are the demand side factors that influence the demand of school. Once the child steps into school these demand side factors plays a pivotal role in determining what the child scores in an academic exam. These factors may be personal, household and on the community level.

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[5] Institute of Development and Economic Alternatives (IDEAS), Pakistan, 2015

A family's socio economic status (SES) has a significant impact on a child's academic achievements. Children from higher SES are reported to have higher learning outcomes at primary level in USA ( DaGLi and Jones, 2012). The results are consistent in Pakistan as well at the matriculation exam level (Akhtar, 2011), while the findings are contrary in case of Turkey, study conducted at under graduate level. It is reported that the students from low SES are reported to academically perform better than the students from high SES (CILasun, 2013).

Table 3: Educational services

| Province | Program | Objectives |
|---|---|---|
| Educational services | | |
| Baluchistan | Urban girl fellowship | Increase girls enrolment in schools |
| Baluchistan | Basic education support project | |
| Punjab | Financial assistance per child basis | Improve quality and increase productivity |
| Punjab | Pilot education voucher scheme | Improve quality of education and encourage girls enrolment in schools |
| Supplement and support service | | |
| | Quality enhancement and institutional development in private schools | Improve quality |
| Punjab | Computer based training of teachers | Improve quality |
| Sindh | Quality assurance resource centre | Improve quality and the academic achievement of low performing students |
| Operations management services | | |
| | Adopt a school | Improve quality of education |
| | Pakistan railway schools | Improve school management |
| | Management of government schools in Lahore city and Sargodha | Improve management of schools and quality of education |
| Punjab | Quality education for all | Improve quality of education in primary schools, reduce number of dropouts and increase enrolment |
| Infrastructure services/education services | | |
| | Leasing public school building for private operations | Leasing public school building to private operators |

Source: World Bank, (2009)

The age at which a student joins the school also determines educational outcomes. The students from higher SES if sent late to school are expected to perform better than those taken at the right age. It is contrary for the students from lower SES and other than white racial class, established in USA (DaGLi and Jones, 2012). The family income is a significant factor in determining the learning outcomes of the students. A study in USA signifies that $1,000 increase in income raises combined math and reading test scores by 6 percent. And the gains are larger for the disadvantaged families than for those already having a higher income (Dahl and Lochner, 2012).

Parents leaves an important impact on the child's learning outcome (Jesson, McNaughton, and Kolose, 2014). The way parents help the child to read assisting and giving time to the child have a considerable influence on the child's performance in New Zealand. The household resources, parents educational level, parents ability to support the child and the level of support child is getting is found to be highly correlated with the learning outcomes in Australia (Geelan, Louden, and Wildy, 2013). It is also found that the bigger family size signifies a smaller share of resources for each one of the family member. Thus it is negatively correlated with the child's academic outcomes. Similarly single parent signifies a smaller endowment of resources to start with thus it also have a negative impact on the learning (Marks, 2006).

It may also be supported by a study in Uruguay that girls with both parents are reported to be performing better than those with single parents (Cid, 2008). The birth order is also reported to be a significant indicator of child educational outcomes in Pakistan. A study conducted in KPK reports that the expenditure on eldest child is more than that of the next child thus the educational outcomes are better of the first child than that of the second child (Atta, Jamil, Baloch, and Ayaz, 2011).

3.  Experimental Methodology

Extracurricular activities and a number of other activities, along with education plays very important role in child education and development. NGO took over public school with a view to consolidate and do an intervention of giving extracurricular and co-curriculum activities to students. These activities are part of education system in many private schools but do not exist in public schools. This means that initiative taken by the NGO may be taken as an intervention done for the first time in public sector education. We planned to probe into impact of this initiative in students' academic performance. To estimate the impact of this intervention, we have to form a comparison group (counterfactual). We chose another school from public sector with similar characteristics for control group. The only difference is, in the control group, PPP intervention is absent. It is possible that choice of PPP school and hence all students interviewed from PPP school may suffer with self selection bias. To overcome this problem one possible strategy is matching

technique. This approach compared observations from treatment group with equivalent observations from control group thus enabling us to create a treated individual as a controlled individual counterfactually. Once counterfactual groups are created, then descriptive statistics were used in estimating the impact of this intervention on academic outcome of students.

A number of recent empirical studies proposed Propensity Score Matching (PSM) as a way of testing when pure randomization is difficult to implement or in a case where intervention has already been done. This method has also been used by Krueger and Zhu (2004) in its study of New York City school choice program, by Barrera- Osorio (2007) in Colombia effects of school construction, by Barrera- Osorio and Patrinos (2009) in evaluation of school voucher program in Chile and more recently by Naseer, Patnam and Raza, (2010) for CRI intervention assessment in the case of Pakistan. The method is illustrated as:

Consider our aim is to estimate the "treatment effect" of an intervention in a quasi-experimental setup, where a binary treatment variable $D$ is defined by:

$$D: \begin{matrix} = 0 & treated \\ = 1 & untreated \end{matrix}$$

If intervention affects an outcome variable $Y$ than we can write treatment effect for some unit $i$ as:

$$\Delta_i = Y_{i1} - Y_{i0}$$

If we consider the whole sample rather an individual effect, then in expectation terms, the treatment effect can be written as:

$$E(\Delta_i) = E(Y_{i1}) - E(Y_{i0})$$

This expression is also called, average treatment effect (ATE). Using binary treatment variable, we can further classify ATE into its two forms:

ATET:   $E(\Delta_i|D = 1) = E(Y_{i1}|D = 1) - E(Y_{i0}|D = 1) = E(Y_{i1} - Y_{i0}|D = 1)$

ATENT:   $E(\Delta_i|D = 0) = E(Y_{i1}|D = 0) - E(Y_{i0}|D = 0) = E(Y_{i1} - Y_{i0}|D = 0)$

Let, program is conditioning upon vector of co-variates, then, ATE expression can be written as:

$$E(\Delta_i|X) = E(Y_{i1}|X) - E(Y_{i0}|X)$$

In a case, where program intervention has already taken place, the method must settle for estimates of the average impact of the program on the participants treatment group with D=1, compared with a credible counterfactual. It is important to note that ATE expression given above between program participants and the comparison group fails to give us an unbiased estimate for $E(\Delta_i|X)$ as shown in the equation below:

$$E(\Delta_i|X) = E(Y_{i1}|X, D = 1) - E(Y_{i0}|X, D = 0)$$

Add and subtract, $E(Y_{i0}|X, D = 1)$, we get:

$$E(\Delta_i|X) = E(Y_{i1}|X, D = 1) - E(Y_{i0}|X, D = 1) + E(Y_{i0}|X, D = 1) - E(Y_{i0}|X, D = 0)$$
$$ATE = E(\Delta_i|X) = E(Y_{i1} - Y_{i0}|X, D = 1) + E(Y_{i0}|X, D = 1) - E(Y_{i0}|X, D = 0)$$
$$ATE = ATET + Selection\ bias$$

The above expression shows that in the absence of pure randomization, some sort of selection bias may be occurred in estimating ATE. In order to control this bias, on possibility could be the use of PSM algorithms. This method requires an assumption of conditional independence of treatment for recovering an unbiased estimator of mean impact. In addition to this assumption, the method also requires that the propensity score function $P(D|X)$ is strictly between zero and one. Rosenbaum (2002) and Rosenbaum and Rubin (1983) show that if conditioning on $X_i$ eliminates selection bias then it must be the case that conditioning on $P(D|X_i)$ also eliminates selection bias. It is important to note that any standard probability model can be used to estimate the propensity score, *e.g. a logit model:*

$$P(D|X_i) = \frac{e^{\mu h(X_i)}}{1 + e^{\mu h(X_i)}}$$

Where *h(Xi)* is a function of covariates with linear and higher order terms. Using this expression, ATET can be modified as:

$$ATET = E_i\left[E_{P(D|Xi)}(\Delta_i|X_i, D = 1, P(Xi))\right]$$

With the help of above estimator, we matched on the factor which has led to the school choice. After looking into the theory and the logic proposes that in families of lower social class the decision to shift from public to public private partnership school could only be on how informed the parents are. As it is widely known that this particular school is operating under Public Private Partnership contract and it may

be providing better education. Thus along with key co-variates, we also use father education and the mother education for matching the students potential outcomes. The outcome remained Math result, English result, sum of mean-score result.

*Survey and questionnaire design*

With the purpose of evaluating the effect of an intervention in public school we surveyed the household, community and academic profiles of students. To examine the change in outcomes we formed a comparison group comprising a public school in the same neighbourhood, and conducted a similar survey there. The survey consisted of collecting house hold data consisting of a number of dimensions (See, Box-2) and conducting a test in both the schools.

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Box 2: Dimensions of Household Survey

The dimensions of the house hold data consisted of the following
- Student information
- Household information
- Parental information
- Parents education
- Family income and employment information
- Possessions
- Health status
- Hygienic conditions
- Mobility
- Time spend at home
- Food intake
- Eating habits
- Types of houses
- Religious beliefs
- Community data
- Parents desire

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Household members from the students' family were interviewed one-to-one to elicit their response on different dimensions. Schools were visited on a random unannounced day to avoid self-selection bias. The sample size is 93 of which 52 belong to the treatment group and 41 to control group. This sample has 99 percent probability that the sample achieved statistical significance for a given sample size and a given difference in mean. Through convenience sampling we confined our sample to students of Class 5 and 8. The students not present there were less than 1 percent of the total population. We collected the house hold data of 140 students in the treated schools but only 66 appeared in the test of English and even less

for the mathematics test. Thus we were left with the sample size of 52 only. In the control group we started with the sample size of 100, tests were conducted, but house hold data could only be collected for 41 students.

4. Results and Discussion

This section aims to address briefly our empirical findings. In the first subsection, we will analyse the educational outcomes of the public schools and private schools students all over Pakistan. For testing our key hypothesis under consideration at this stage would be, do private schools produce better academic outcomes than public schools? To test this hypothesis, ASER dataset 2014 is being utilized. Once the difference is established we will look for how the public schools differ from the public-private partnership school. Thus in the second stage, we would like to test a similar hypothesis but with different treatment group such as, do public-private partnership schools produce better academic outcomes than public schools? The causation would be assessed while controlling a number of control variables under consideration.

*Hypothesis testing – I: Comparison of Public vs. Private Schools*

In ASER 2014 dataset, students were asked basic questions to assess the reading skills, learning skills, math level, English reading, concluding word and sentence meaning, telling time, solving word problem and naming things in English. The same question was asked from all the students irrespective of their grade and they were awarded points between 1 to 5, 1 being very poor and 5 being very good. Using this dataset, we first discussed results for the whole nation then for four major provinces and five major cities. In Pakistan on average the private school might not have reached the threshold in educational scores but still it is better than the average public school score; aggregately for all grades and subjects. On average the difference in score among schools is no less than 1 point (See, Figure A1 and Figure A2).

The absolute scores vary among schools; the $25^{th}$ to $75^{th}$ percentile range of private school is greater in scores than that of public schools for all grades except grade 9 and 10 (See, Figure A25). The possible reason the private school score is also very low may be that they include low cost private schools and other private schools. May be the score of public schools are high because it include the data of Public Private Partnership Schools. Thus on all the further result discussion there is a possibility that the differences are under estimated.

For the purpose of this study we kept our focus to reading scores, math score and English reading scores. Anonymously it is evident that there exists a significant difference in the scores for all three grading

scales and all the grades among the schools. Private schools even after possible understatement of results are performing better than possibly overstated public schools. The scores from the very beginning years are not very hope full as the public school is performing way less than the private school. Reading Score on average shows that not all Students in both the schools are able to read sentences. The private school is closer to 4 showing possibility that most of them can at least read sentences (score 4) while the public school on average is half way between forming words (score 3) and sentences (score 4) (See, Figure A3).

Figure A4 shows that on average not all the students of both the school can write a Story (score 5). The average difference between the Schools remained the public school lagging behind the private schools for all grade levels, though the difference tends to decrease as the class increases. When observing the absolute 25th to 75th percentile, Figure A26, there are no differences in scores among grade 3rd, 6th, 8th, 9th and 10; exception of some outliers. The difference is most for grade 2nd and grade 7th. The non-existence of variation at higher grade level may be explained by the fact that reading a story (score 5) is a basic task and can be mastered by a grade 4th student.

Math score again portrays the same gloomy picture. On average not all the students know the division of numbers, though the average for private school is closer to knowing subtraction (score 4) while public schools are closer to recognizing numbers from 1 to 99 (Score 3) (see, Figure A5).  In private school on average 2nd grade student can recognize number from 1 to 99 (score 3) as compared to public school 3rd grade students can do that. Similarly 4th grader on average in private school can subtract (Score 4) while a 5th grader in public school (see, Figure A6).

In absolute terms Figure A27 show that 7th grade and onwards the private school students has mastered the division (score 5), exception of outliers. Public school 7th and 8th grade scores are lagging behind, showing their in ability to divide. 1st grade students in public schools still ranges at not knowing anything while in private school the students can at least recognize numbers from 1 to 9 (Score 3). There is no improvement shown in private school score between grade 2 to 3 while a drastic change for public school and no improvement in public school score while transition through grade 3 to 4 and grade 7 to 8. The private school students on average can at least read words (score 4) while the public school students are have mastered recognizing the small letters (score 3) (see, Figure A7). Probing into the differences on grade level (see, Figure A8) the difference is huge on average. Most of the 1st grade students know the small letters (score 3) while the 2nd grade of public school is compete able to it. The difference in scores among schools tends to decrease as the class increases.

The 75th percentile of 3rd grade private school is the ability to read sentences while it is true for 5th grade public school (Figure A28). The difference in score among school remains until grade 6; the grade 7 scores even differ. In absolute terms 2nd grader of private school is same as the 5th grader public school.

The difference is highly evident between grades 2 to 5. Score's difference among schools tends to decrease as the grade gets higher which may be justified by the basic nature of the questions. The private school on average scores between 2.5 to 4.8, whereas, the public school on average varies from 1.5 to 4.7. There is no major variance among subjects.

Province's when compared on the educational outcomes shows that Punjab is followed by Khyber Pakhtunkhuwa than Balochistan and Sindh in the end for public school. For Private schools Khyber Pakhtunkhuwa is replaced by Balochistan. The average scores for both the schools remained between 2 to 3.5 out of 5 (Figure A9). In absolute terms the Box graph (Figure A29) shows similar results for Punjab and Khyber Pakhtunkhuwa. Sindh is lagging behind the other 3 provinces in public sector though the score is similar to Punjab and Khyber Pakhtunkhuwa in private sector. Surprisingly Balochistan Private schools are performing way better than the other provinces.

The overall score shows a gloomy picture and the argument can be made valid that the benchmark, public schools, is so low that the counterfactual, private schools, does not have the incentive to perform any better. The provincial results are consistent to the prior conclusion that the private schools are performing better than the public schools at all levels and the differences are decreasing as the grade level increases. Among the provinces Sindh shows the greatest difference then Baluchistan is next followed by Khyber Pakhtunkhuwa and Punjab shows the least difference among schools (Figure A10). The box graph (Figure A30) shows that Punjab's scores is more or less identical, Khyber Pakhtunkhuwa shows slight variation, Balochistan shows differences in scores and Sindh shows difference on all levels of at least a score.

On average none of the schools in the provinces could read the sentences (score 3); public school have on average mastered reading the words while private schools are closer to reading sentences. The reading scores among provinces in different sectors remained as those of the overall scores (Figure A11). The box graph (Figure A31) shows that public sector Sindh and Balochistan scores are lagging behind the Punjab and Khyber Pkhtunkhuwa scores though all are performing similar in the private sector.

The differences in reading scores over grades are consistent to the conclusion for overall scores, the difference in Punjab being least to being highest in Sindh. The difference also decreases as the grade level increases (Figure A12). Punjab's public school and Private schools are performing better than those of other provinces at each grade level (Figure A32). For private schools Punjab is followed by Sindh then Balochistan and Khyber Pkhtunkhuwa. Sindh is worst for the Public School followed by Balochistan and then Khyber Pkhtunkhuwa.

The provinces performance on average for math is more or less similar to that of the overall score and the reading score. All the provinces in public sector have mastered recognizing the numbers from 1 to 99 (score 3) except for Sindh. In the private sector all the provinces on average are unable to subtract

(Figure A13). In Figure A31, Sindh public school is performing the worst followed by Balochistan. For Private schools all are performing the same. When looking at the average math score on grade level grade 1 in Sindh private school is comparable to grade 3 of public school, in Balochistan grade 1 of private school is comparable to grade 2 of the public school.

In Khyber Pkhtunkhuwa grade 2 is comparable to grade 3 and in Punjab public school is clearly performing better than the private schools previous grade (Figure A14). Box Graph (Figure A34) shows Sindh and Khyber Pkhtunkhuwa Math scores are clearly better in the private sector than in the other provinces. Punjab's public schools are clearly performing the best in math scores. English Reading scores shows that among both the schools on average the provinces have not mastered reading words in English. Public schools are further lagging behind, Sindh is the only province which have not yet mastered recognizing small letters (Figure A15). Figure A35 shows that the Sindh public school being the worst followed by Balochistan while they boxes are all same for private schools.

The variation in score among schools is such that in Sindh public school grade 1 score is comparable to grade 4 score, in Balochistan grade 1 is comparable to grade 3, Khyber Pkhtunkhuwa grade 1 is comparable to grade 2 and this comparison doesn't fall for Punjab (Figure A16). Sindh private school English reading score is performing the best followed simultaneously by Punjab and Balochistan. And the public school in Punjab are the best without any question (Figure A36).

To further narrow down the scope of the study, it is important to find out the differences in the capital cities of the provinces. It will also show the results specific to the urban area only. The cities overall result in public sector shows Quetta and Islamabad are performing equally and best followed by Lahore than Peshawar and at last Karachi. In private sector Quetta is followed by Sindh and Lahore then Islamabad and in the end Peshawar (Figure A17). In absolute percentiles all the cities are performing equally and better in the public sector other than Karachi. While in the private sector Lahore and Quetta are lagging behind remaining others are performing equally (Figure A37).

Islamabad's public schools are performing better or equal to the private schools. Lahore, Quetta and Peshawar's scores are varying, public school scores are better in some instances while private in others .In Karachi the private school scores are comparable to 2 grade higher public school score (Figure A18). Peshawar's public and private schools both are performing better than the other cities followed by Quetta. Islamabad and Lahore shows similar trend for both schools exception for private lagging behind in some cases of Islamabad and public aging behind in some cases of Lahore. In Karachi public school score is lagging behind the most (Figure A38).

The public school on average shows that reading sentences (score 4) is mastered by all the cities except for Karachi. For private schools it is mastered by all except Islamabad (Figure A19). All the cities are

performing equally in both the types of schools except for Quetta in public school which is performing better than others (Figure A39).

When seen in terms of grades in Karachi private school score on average can be compared with two grade higher public school score. Lahore's private schools on average are performing slightly higher than the public schools. Quetta and Peshawar public school is performing better than private school for first 2 grades than the private school scores is greater or equivalent to the public school scores. In case of Islamabad public schools are performing better than the private schools except for grade 8 and 9 (Figure A20). Karachi's private schools are performing the best as their students at grade 2 level read a story.

Followed by Lahore and Quetta then Peshawar and Islamabad is in the end. Lahore, Quetta and Peshawar's public school result is the best followed by Karachi and then Islamabad (Figure A40). The cities on average have mastered subtraction (score 4) in both the schools except for Karachi's public school and Islamabad's private schools (Figure A21). The box diagram (Figure A41) shows that all the cities are falling in the same range of scores except for Islamabad's public school.

Karachi shows the greatest difference between the public schools and private schools followed by Lahore. For grade 1 Quetta and Peshawar's public school scores are greater than private school scores and for the remaining grades Private schools are greater. In case of Islamabad public school scores are greater or equal to private school scores (Figure A20). Karachi's private schools are performing way better as the 3$^{rd}$ grader can do division (score 5) followed by Lahore.

Quetta and Peshawar's public schools are performing the best (Figure A42). English reading scores shows that on average public and private schools in all the cities has mastered reading words (score 4) except for Sindh's public school and Islamabad's private schools (Figure A23). Public schools of Quetta and Islamabad are performing better while private school of Lahore, Karachi and Quetta are better for English reading Score as compared to other cities (Figure A43).

Public and private school difference is huge in context of Karachi followed by Lahore. Quetta and Peshawar showed similar result grade 1 result public school is performing better than the private school and for the remaining private school is performing better or equivalent to public schools. For Islamabad the public school is performing better or equivalent to private schools (Figure A24). Quetta is clearly performing better than any other city for both public and private schools. Peshawar's public schools and private schools are performing just the same (Figure A44).

*Hypothesis I: Impact Assessment*

Propensity score matching algorithm together with logistic regression specification is used to pair the students, on the basis of their household factors, among schools. Then the differences among the scores of those students were recorded. The change in educational outcomes is then attributed to the school type or the treatment provided. Math, English and their Average was treated as the outcome variable to measure the change attributable to the treatment provided. The variables used in matching are Mother's Education, Father's Education and House type (See, Descriptive Statistics available in, Table A01). The matching variables are limited in this analysis because of the limited variable's data is available in ASER data set. The analysis remained consistent to the prior hypothesis that the provision of better school resources, environment, teachers and infrastructure would lead to better educational outcomes. The educational outcomes in partnership schools at all level are expected to be greater than the Public schools by at least difference of two grades. The differences are also found to be significant at 5 percent level of significance (see, Table 4).

Table 4: ASER – Average Treatment Effect on the
Treated: Propensity Score Matching

|  | Unmatched | ATT |
|---|---|---|
| Reading | 0.35* | 0.28* |
|  | (46.70) | (3.85) |
| Math | 0.36* | 0.25* |
|  | (50.00) | (3.65) |
| English | 0.50* | 0.24* |
|  | (66.14) | (3.34) |
| Average Result | 0.39* | 0.30* |
|  | (51.13) | (3.85) |
|  | Treated | Non Treated |
| Observations | 41,494 | 101,354 |

Notes: Absolute values of bootstrapped $t$-statistics in parentheses. The first column reports un matched marks on the test and the second column is the effect on a weighted aggregate computed by using a 3-parameter item response model.
** indicates significance at 1% level; * indicates significance at 5% level; + indicates significance at 10% level

Figure 4 and Figure 5 are showing the bias across the covariates and the propensity score matching graph for treated and untreated observations. These figures show that the balancing property is satisfied in

all the blocks with statistically insignificant difference in means between all the observed covariates in three strata of propensity scores. The Rosenbaum bounds test also confirms the same result.[6]

Figure 4: Histogram of Propensity Score Distribution for Treated and Control Groups
ASER Case
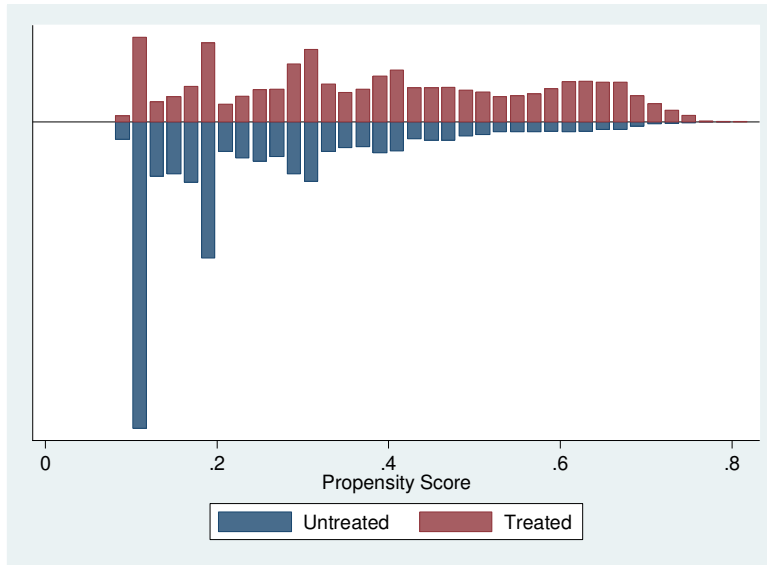


Figure 5: ASER – PS Bias across Covariates



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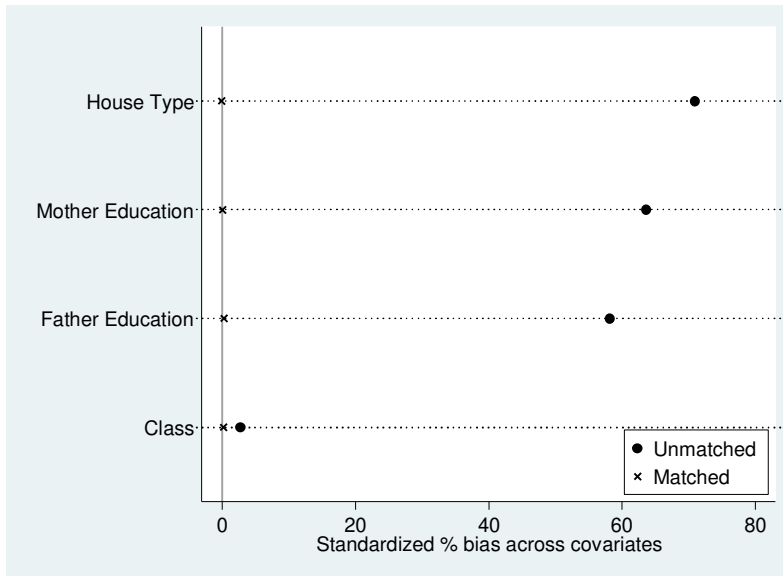
[6] For assessing robustness of PSM estimation results in STATA, we have also used two alternative matching algorithms, like, Kernel matching and Radius Matching algorithms. Despite the fact, using these alternative schemes, there is no change in the significance of reported results.

*Hypothesis testing – II: Comparison of Public-Private-Partnership vs. Public Schools*
(Zindagi Trust Intervention)

The differences in educational outcomes could easily be concluded through observation while the test was conducted in each school. The treated school students showed immense confidence and were confident enough to deal with the tests themselves. In the public school students kept asking for different questions, showed a blank response and required translating help even in the English test. In PPP schools the teacher also showed confidence in their students learning to deal with the test and left the Class room while the test was conducted by independent invigilators. This was not the case in the public school, teachers never left the class room nor did they restraint their selves from assisting the students. This was certainly the case showed in the public school English results of class 8. We somehow were able to control it in other classes and subject tests. Table 5 shows the differences in the differences in the mean of PPP school results and the public school results. Similar observation can be seen in Figure A45.

Table 5: Zindagi Trust - Mean Differencing Results

|  | Class 5 | Class 8 |
| --- | --- | --- |
| Math result | 1.196* | 2.593* |
|  | (0.292) | (0.44) |
| English result | 2.582* | 0.677 |
|  | (0.5777) | (0.659) |
| Sum of Math and English result | 3.771* | 3.447* |
|  | (0.831) | (0.927) |
| Average of math and English result | 1.885* | 1.723* |
|  | (0.415) | (0.463) |

*Standard errors* in parentheses
* $p<0.05$

Figure A51 shows the absolute differences among the School overall outcome. The Box plots show the $25^{th}$ to $75^{th}$ percentile range of school scores and the line on the box shows the median value. The blue line on the graph, above, shows the mean score of partnership school while the red line, below, shows the mean score of public school. All the differences are unanimously positive in favour of the PPP School. When we probe into the scores for different grades the mean of PPP School is better than the Public school (Figure A46). This is also relevant for the absolute values of both grade 5 and grade 8. In case of Grade 5 the Partnership schools $25^{th}$ percentile starts after crossing the $75^{th}$ percentile of the public school. The

minimum difference observed is of at least 2 grades in between (Figure A52). The difference in Math and English score among schools is significant (Figure A47 and Figure A49).

Overall the Math scores are lagging behind the English scores in both the schools. The difference in math score is more than that of the English score among schools. In Figure A53, the math score of the public school is unanimously at score 3 with some outliers while the private school 25th percentile starts from score 3. Despite the ambiguity of English Score partnership school's 25th percentile starts from the 75th percentile of the public school (Figure A55).

The differences between mean math result in class 5 and 8 are significant at 5 percent level of significance (Figure A48). The increase in the mean difference with not much difference in the standard error may be a proponent that the lack of knowledge is accumulating over the years in public schools or/and the incremental knowledge in PPP school is accumulating. Though before any concrete conclusion is reached, over this matter, it requires a detailed study in the particular field. The box pot (Figure A54) shows extreme variation in scores among schools. At grade 5 Public school remains a line and 8 grade is practically no better than that. 8 grade's highest value is at the 25th percentile of PPP school.

Mean difference in English result at grade 5 level is significant but not at grade 8 level it may be because of the uncontrolled factor (Figure A50). Still the box plot (Figure A58) shows a greater difference, consistent to prior analysis, at grade 5 level. At grade 8 level there is wide variation in scores at public school. The 25th percentile of public school grade 8 begins way before that of Partnership school while the 75th percentile ends together. The mean difference in the sum of math and English result and in the average of two results is significant at 5 percent level of significance at both the grade levels. It shows that the understatement of difference in English result at grade 8th level was not enough to go against PPP School. Thus it is proved there is a significant difference in the results and are in favour of PPP School.

Table 6: Zindagi Trust - Regression results

|  | Math result | English result | Sum of Math and English result | Average of math and English result |
|---|---|---|---|---|
| School | 1.83* | 1.642* | 3.615* | 1.807* |
|  | (.266) | (0.448) | (0.618) | (0. 309) |
| Class | 0.484* | 0.757* | 1.297* | 0.648 |
|  | (0.088) | (0.146) | (0. .204) | (0.102) |
| Constant | -0.116 | 0.8652 | 0.382 | 0.191 |
|  | (0.569) | (0.963) | (1.341) | (0.67) |

*Standard errors* in parentheses

* p<0.05

For association of the differences in mean to the provision of treatment we used a simple regression. Estimation results are shown in Table 6. We regressed the four ways of measuring educational outcome on school and class. The constant remained in significant and all the other variables in regression remained significant at 5 percent level of significance. The coefficient of variable school is signifying the treatment; treated is 1 and control is 0. The coefficient is significant despite changes in the dependent variable. The coefficient signifies that on average if a student provided with such a treatment will show improvement in the results by a more then a level higher. The coefficient of variable class remained very small signifying that on average the students of class 8 are not on a learning level much higher than the 5 grade students.

*Assessment of control variables*

To address the importance of covariates, first we consider the role of household factors like number of households, number of children, gender and age of siblings, number of sibling, number of female siblings and number of male siblings. Number of children in the household was the only variable which was significantly different from between schools; there were more children on average in a PPP school attending student's household than in public school. When number of children in the house hold is included in regression its coefficient is insignificant. Then we probed into the students information, it included 13 questions. The question were who teaches at home, time spend studying students work status and its effect on studies, is father happy or anybody else is not happy with students education and work, there response about students involvement in extracurricular activities and vocational training and the students likeness and disliking to different school dimensions.

Does the parent teach, does the student go to tuition, the time child spends studying at home and does the child works are significantly different among schools. In public school more parents reported teaches their children themselves while in PPP School most students goes to tuition and PPP school student's spends 0.4 hours more studying and a few of the students are reported to be working than the comparison group students. It may be as a result of the intervention that parents started sending their children to tuition instead of teaching the children themselves, student started spending more time studying and they were less involved in working. When run regression parental help have positive significant coefficient with results while tuition, time spend studying and work status does not have significant impact. We generated a variable which sums up the number of help a child gets from out of school. And added 1 to the variable if siblings help each regarding studies other and subtracted 1 if siblings

disturb each other in studies. The variable has significant positive correlation with the educational outcomes.

Fathers and families happiness about child's education and work and is the child engaged are significantly different among the schools. These can be the factors which may influence the academic results of students. Fathers are happier with child education and work in PPP School than the public school. It was not reported in the government school that any family member is unhappy with child's education while it was reported in PPP School. And the students in public school are reported to be engaged more than that in PPP School. When these variables were included in the regression they all have in significant impact on results.

The ranking to agreement to school level personal liking and disliking of different school characteristics are significantly different among schools students. Public school students ranked making friends the highest agreement while PPP school student gave highest rank to their likeness towards teachers. Similarly PPP students report strong disagreement to all the disliking school level variables. While at public school they ranked it highest that they don't understand the course and they don't get chance to play at school. But all these variables showed insignificant coefficient in relation to the educational outcome.

The next part is about the household information, these are among the house hold variable which may trigger the change in educational outcomes. They consists of mother tongue, and the most spoken language, relationship to the head of the family, gender of the house hold head, family structure and the number of small household units existing under the same roof. Gender of the household head, relationship to the house hold head and family structure are statistically different between both the schools. The PPP students are more likely to be daughters of the house hold head than the public school. The gender of the house hold head is most likely to be male than the gender of the house hold head in a public school. And the PPP school student is more likely to be in a joint family than a public school student. Only gender of the house hold head showed significant coefficient when regressed with educational outcome.

We then moved to the parental information of the students. Which included questions like are you a permanent resident of Karachi, are parents alive, parents age and mothers age at the time of marriage. These variables may contribute to the change in the results. All the variables are statistically different among the schools except for the father's age. The PPP students are more likely to be the residents of Karachi than the public school students. In public schools none of the observations reported that the child is orphan while there are such observations in PPP School. The age of mother now and at the time of marriage is also expected to be higher in PPP than in the public school. Native place other than Karachi mother alive, parents age and mothers age at the time of marriage have no significant coefficient when regressed on the

educational outcomes. It is observed significantly that the students headed by their mothers in the absence of their father are performing significantly better.

The next area of concern is parent education. It probed into the computer literacy among the different family members and the parent's education. All these factors may be causing change in the educational outcomes of students except for is the child computer literate. All these variables are significantly different among the schools except for computer literacy of the students. When asked is anybody computer literate at home public school students responded more in yes than the PPP school student. Public school reported almost no mothers to be computer literate while fathers and aunt/uncle cousins as more computer literate and PPP school students showed almost similar computer literacy among the parents, cousins and aunt uncle. The public school students are reported to be more computer literate than the PPP schools.

On average the fathers of students studying at PPP School are likely to be more educated than those of public school. And it is opposite in case of mothers, mothers at public school are comparatively more educated than the mothers at public schools. When the parental education is observed in the regression setting only the computer literacy of the student reported have significant coefficient with regard to the educational outcome. We then looked into the family income and employment information. The change in these factors may cause a difference in the educational outcomes of the students. Fathers work nature, work type, self-employment status and mothers work status, nature and self-employment status differs among schools. Fathers of public school students are more likely to be self-employed, permanent and red collar at employment/work while PPP school student's fathers are less likely to be self-employed and permanent and white collar workers. While the mothers of students at public school is more likely to be working in temporary occupation and are self-employed as compared to the other schools mothers. PPP mothers are less likely to be employed, more likely to be permanent at employment and less likely to be self-employed. When plotted in the regression setting none of these have any significant coefficient. The modes of communication were also explored. We asked for the availability of Radio Computer, TV and number of mobile phones. There is no statistical difference in the responses among the schools except for the number of mobiles. The public school students have a greater number of mobiles than the average number of mobiles owned by the household of PPP School. None of these have a significant coefficient against the academic outcomes.

Household appliances may be among the variables whose difference may trigger the gap between the educational outcomes. The appliance information we gathered are the microwave oven, iron, blender and washing machine. The response showed statistically significant difference among schools for microwave

oven. Public school students reported to have more microwave ovens than the PPP school students. When seen in regression setting only iron have significant coefficient with respect to educational outcomes.

To measure the mobility's effect on educational outcomes we asked for the availability of motorcycle and car. The responses are statistically different for the availability of motorcycle and car. The public school students are more likely to own a motorcycle and car than the students in PPP School. In regression setting none of these variables have significant coefficient against the academic results. We than moved forward to home comfort asking for the availability of ceiling fan, number of beds, number of floor beds, number of chairs and tables. The responses for the number of beds are statistically different among schools. PPP school all the students are likely to have at least 1 bed though public school is likely to have less. Numbers of beds also show statistically significant coefficients against the academic outcomes.

Anthropometrics were studied asking about the place of birth, height at the time of birth, weight at the time of birth and is the child immunised. The responses were not statistically significant when compared between schools except for the immunization. The public school students reported to be more immunized than the PPP school students. When observed against the educational outcomes the coefficient is not significant. Moving to the health outcomes it is reported that when last ill PPP school students were more likely to have been consulted from somebody and had bought the medicine than those of government school. When seen in regressed on the educational outcomes both the variables were statistically insignificant. Then we probed into the hygienic conditions. The responses to having bathed daily are significantly different among schools. The PPP school students reported not having bath daily as compared to the public school students. While asking that the washroom was well built PPP school student reported that there washroom was cemented though it was not so for most of the public school students. Similarly in case of consumption water public school students are likely to have a better quality of water than the PPP school students. None of these variables have a significant coefficient. Then we asked about the commuting of the students to school. The way one travels to school and the time one takes in getting back to normal are significantly different among the schools. The commuting vehicle has a significant coefficient against the educational outcome. It signifies two things the family have house hold resources and they are being used for the child.

While going deep into the time spend at home we looked into broadly time was spend in working or studying, what kind of work does the child do and for how long and the siblings behaviour. The response to weather work or study and siblings behaviour varies between schools. The students at PPP School are more likely to be spending more time studying and indifferent about sibling's behaviour; while the students at public school are less likely to be studying and are helping their siblings in studies. These variables do not show a significant coefficient in relation to the educational outcomes.

Participation in cooking food, cleaning dusting and washing dishes/clothes varies between schools. In all of these works PPP School students are less likely to participate than the public school students. It may be influenced by the intervention that the child spends more time studying and thus less in such activities. None of these have a significant coefficient to the educational outcomes.

Caloric information showed that the calorie consumption varies for the consumption of vegetables, chicken and the number of breads consumed. The PPP students are shown to be under nourished from the given data. The consumption of pulses has a negative significant relationship to the academic outcomes. The consumption of fruits has positive significant relationship. The eating habits when probed by asking questions like does the family eat together, how many meals are taken, total rice and bread cooked? These factors do not vary among the schools. And the coefficients are not statistically significant when seen in relation to the academic results. The housing characteristics are noted as the house ownership, lives in apartment or house, is registered electricity, water, gas, number of rooms and toilets, ceiling type. These factors do not vary between schools. And none of these variables are significant with respect to the academic results.

The next set of variables is the religious beliefs. It included the religion, sect, where does one pray, do you visits the religious congregation and how often do one visit the religious congregation. None of these variables are significant in relation to the educational outcomes except for where does one prays. We then explored the community characteristics which included provision of carpeted roads, sewerage lines, water lines, public tap and public latrine, and load shedding conditions, its timings, coping strategy and time wasted. Load shedding in the area, its timing and coping strategy are significantly different among schools. It is reported by some students in public schools reported not having load shedding issues in the area. And on average electricity timings of load shedding faced by public school students are less than those in PPP School. Still the public school students have access to better coping strategies. Only public taps have the positive significant coefficient in relation to the academic results. The parents desire included a set of variables like what do you expect your child to be, where do you see your child in future, would you allow your child to work and ranking a set of variables-employment, hygienic environment, being a good mother and wife, for a good marriage proposal-from most important to least important. They are not statistically different among the schools nor do they have significant relationship to the academic outcomes.

When regression is run with the set of control variables mentioned above of help provided from home, computer literacy in the family and the house hold resources. The coefficients to the treatment decreased but these are still significant. The regression with controls results are shown in Table 7.

Table 7: Zindagi Trust - Regression results with controls

|  | Math Result | English Result | Sum of math and English result | Average of math and English result |
|---|---|---|---|---|
| School | 1.766* | 1.176* | 3.1* | 1.550* |
|  | (0.316) | (0.559) | (0.744) | (0.372) |
| Class | 0.476* | 0.77* | 1.292* | 0.646* |
|  | (0.102) | (0.173) | (0.239) | (0.119) |
| Constant | -2.708 | 0.388 | -3.098 | -1.549 |
|  | (0.983) | (1.581) | (2.286) | (1.143) |
| Controls | Yes | Yes | yes | Yes |

*Note: standard errors* in parentheses
* p<0.05


*Hypothesis II: Impact Assessment* (Zindagi Trust)


In order to assess the program intervention, PSM model is again used to pair the students, on the basis of their household factors, among schools. Then the differences among the scores of those students were recorded. The change in educational outcomes is then attributed to the school type or the treatment provided. Math, English and their Sum was treated as the outcome variable to measure the change attributable to the treatment provided. The variables used in matching are Mother's Education, Father's Education and House type (see, Descriptive Statistics available in Table A2). The matching variables are limited in this analysis because of the limited variable's data is available in ASER data set.


Table 8: Zindagi Trust – Average Treatment Effect on the Treated

|  | Unobserved | ATT |
|---|---|---|
| Math | 2.16* | 2.04* |
| t-value | (7.31) | (5.09) |
| English | 2.24* | 0.75 |
| t-value | (4.62) | (0.86) |
| Total Result | 4.42* | 2.78* |
| t-value | (6.10) | (2.56) |
|  | Treated | Non Treated |
| Observations | 51 | 30 |

Notes: 1. Absolute values of bootstrapped t-statistics in parentheses. The first column reports un matched marks on the test and the second column is the effect on a weighted aggregate computed by using a 3-parameter item response model.

** indicates significance at 1% level; * indicates significance at 5% level; + indicates significance at 10% level

The analysis remained consistent to the prior hypothesis that the provision of better school resources, environment, teachers and infrastructure would lead to better educational outcomes. The educational outcomes in partnership schools at all level are expected to be greater than the Public schools by at least difference of two grades. The differences are also found to be significant at 5 percent level of significance (see, Table 8).

Figure 6: Histogram of Propensity Score Distribution for Treated and Control Groups
(Zindagi Trust)
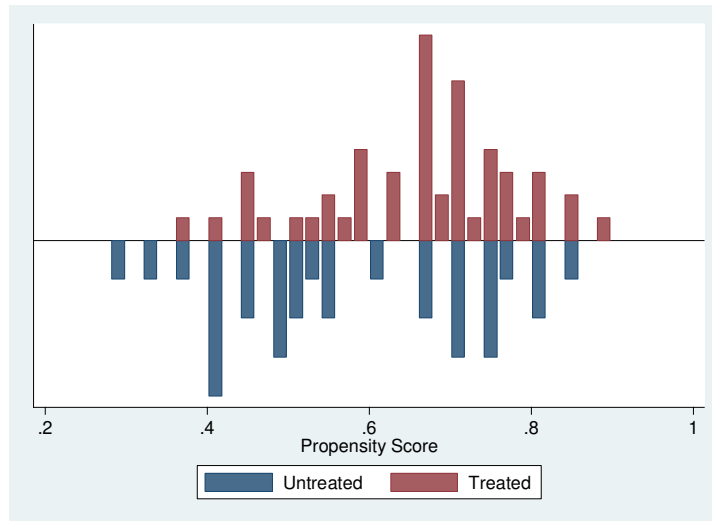


Figure 7: Zindagi Trust – PS Bias across Covariates
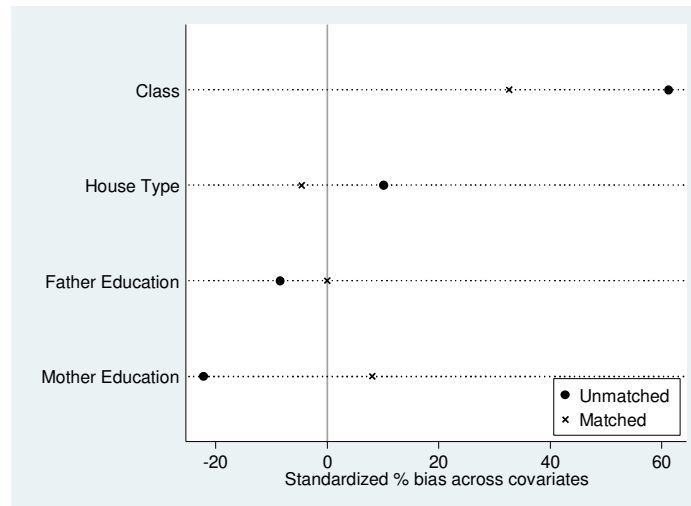


Figure 6 and Figure 7 are showing the bias correction across the covariates and the propensity score matching graph for treated and untreated observations. These figures show that the balancing property is satisfied in all the blocks with statistically insignificant difference in means between all the observed

covariates in three strata of propensity scores. The Rosenbaum bounds test also confirms the same result (see, Table 9).

Table 9: Zindagi Trust - Rosenbaum Bounds[7]

| Gamma | Math | English | Total Result |
|---|---|---|---|
| 1 | 4.00E-08 | 0.048369 | 0.000034 |
| 1.05 | 8.90E-08 | 0.065273 | 0.000063 |
| 1.1 | 1.80E-07 | 0.08522 | 0.000111 |
| 1.15 | 3.50E-07 | 0.108118 | 0.000186 |
| 1.2 | 6.40E-07 | 0.133781 | 0.000297 |
| 1.25 | 1.10E-06 | 0.161947 | 0.000459 |
| 1.3 | 1.90E-06 | 0.192298 | 0.000684 |
| 1.35 | 3.00E-06 | 0.224476 | 0.000989 |
| 1.4 | 4.60E-06 | 0.258101 | 0.001392 |
| 1.45 | 7.00E-06 | 0.292792 | 0.001913 |
| 1.5 | 0.00001 | 0.328171 | 0.002571 |
| 1.55 | 0.000015 | 0.363881 | 0.003387 |
| 1.6 | 0.000021 | 0.399593 | 0.004384 |
| 1.65 | 0.000028 | 0.435006 | 0.005582 |
| 1.7 | 0.000038 | 0.469855 | 0.007003 |
| 1.75 | 0.000051 | 0.503913 | 0.008666 |
| 1.8 | 0.000067 | 0.536987 | 0.010592 |
| 1.85 | 0.000086 | 0.56892 | 0.012797 |
| 1.9 | 0.000109 | 0.599588 | 0.015299 |
| 1.95 | 0.000137 | 0.628898 | 0.018112 |
| 2 | 0.000171 | 0.656786 | 0.02125 |

*Robustness Check*

For robustness check purpose, we have used a number of explanatory variables for propensity score matching – like, Father Education, Mother Education, House Type, Number of household members, Number of children in household, Number of siblings, Possessing an iron, Gender of the household head, Child weight at the time of birth. Table A2 in Appendix provides the mean and standard deviation of those variables. It is interesting to note that, these variables are not much different from each other among schools. The matching estimates shows the change in the math result, English result, sum of results and the average of results caused by the provision of treatment provided to the students. The computed pseudo R-squared is 1.82. Table 10 shows that there is a significant difference between the results on all dimensions. The subject result is expected to increase significantly by at least a grade level higher if the public school students are provided with such a treatment.

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[7] See, bound test detail in Rosenbaum (2002).

Table 10: Zindagi Trust - Matching Results

|  | PPP school | Public school | Differences | Standard error | t-value |
| --- | --- | --- | --- | --- | --- |
| Math result | 4.98 | 2.7 | 2.28* | 0.345 | 6.59 |
| English result | 7.78 | 5.22 | 2.56* | 0.817 | 3.13 |
| Sum of results | 12.76 | 7.92 | 4.84* | 0.961 | 5.03 |
| Average of results | 6.38 | 3.96 | 2.42* | 0.480 | 5.03 |

* $p < 0.05$

Figure 8: Histogram of Propensity Score Distribution for Treated and Control Groups
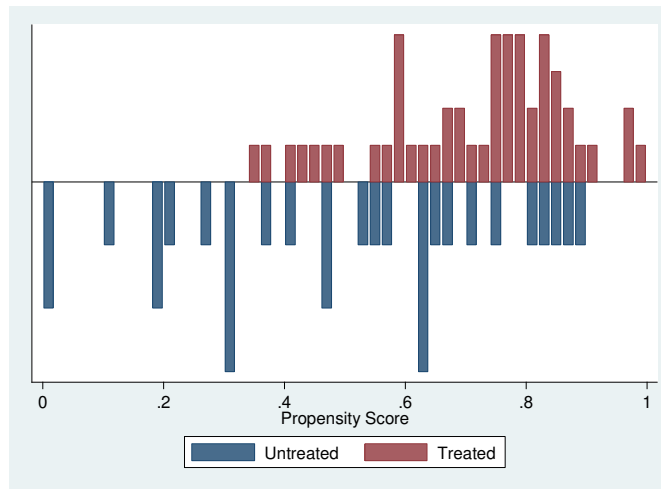


Figure 9: Zindagi Trust – PS Bias across Covariates
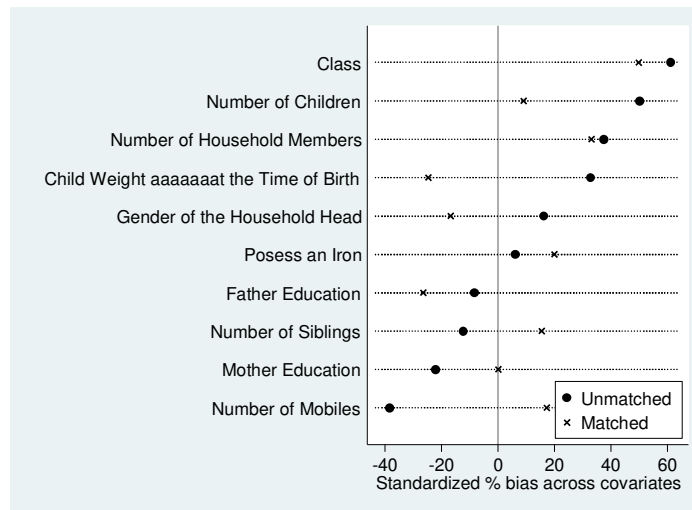


Figure 8 and Figure 9 are also showing the validity of the test conducted. This is a meagre effort to evaluate the possible traces of a way of possible quality education.

5.  Conclusion

Not having the quality education may drag one into a vicious cycle of miseries. Government mandated the free education and spending a huge share of budget on educational sector. Even than if the educational level of child is as low as 12 percent of the 5ᵗʰ grade students have mastered 2ⁿᵈ grade curriculum and 7 percent of the 6ᵗʰ grade students have mastered 3ʳᵈ grade curriculum. Thus with the provision of infrastructure, administrative change, innovation and planning and teachers and student affairs when paired with the usual public school education would show improvement. 67 percent of the 5ᵗʰ grade students have mastered 2ⁿᵈ grade curriculum and 76 percent of the 8ᵗʰ grade students have mastered 3ʳᵈ grade curriculum. Though, the household characteristics of students are not significantly different among PPP School and public school. On average the result are improving by a grade level and the proportion of students crossed at a certain level at PPP School is twice as much as of the public school. Perhaps, the causal effect is not fixed but the household factors which may be changed because of the intervention as the time spends on studying have increased among students. It is observed in the visits to both the school that students at PPP School were more confident and didn't ask much question during the test duration. After looking a positive impact of this program intervention, it is suggested that, government in Pakistan should promote the idea of PPP in education sector and welcome donors and NGOs to play their role in promoting quality of schooling for better educational learning outcomes.

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Table A1: ASER – Descriptive Statistics

| | Total | | Public School | | Private School | | Differences | |
|---|---|---|---|---|---|---|---|---|
| Variable | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| Child | | | | | | | | |
| Mother Highest Class Completed | 2.64 | 0.01 | 1.90 | 0.01 | 4.76 | 0.02 | -2.86 | 0.02 |
| Father Highest Class Completed | 5.41 | 0.01 | 4.70 | 0.02 | 7.91 | 0.03 | -3.20 | 0.03 |
| Mother Age | 36.22 | 0.00 | 36.99 | 0.00 | 35.95 | 0.00 | 1.05 | 0.00 |
| House Type | 1.97 | 0.02 | 1.84 | 0.02 | 2.39 | 0.03 | -0.55 | 0.04 |
| | | | | | | | | |
| School | | | | | | | | |
| Current Class Grade | 4.35 | 0.01 | 4.34 | 0.01 | 4.41 | 0.01 | -0.07 | 0.01 |
| Institute Type | 1.33 | 0.00 | 1.00 | 0.00 | 2.00 | 0.00 | -1.00 | 0.00 |
| | | | | | | | | |
| Reading Highest level | 3.64 | 0.00 | 3.55 | 0.00 | 3.90 | 0.01 | -0.35 | 0.01 |
| Is Bonus Question 1 Answered | 0.90 | 0.00 | 0.89 | 0.00 | 0.91 | 0.00 | -0.02 | 0.00 |
| Is Bonus Question 2 Answered | 0.88 | 0.00 | 0.87 | 0.00 | 0.89 | 0.00 | -0.02 | 0.00 |
| Math Highest level | 3.61 | 0.00 | 3.51 | 0.00 | 3.87 | 0.01 | -0.36 | 0.01 |
| English Reading Highest level | 3.64 | 0.00 | 3.50 | 0.00 | 4.00 | 0.01 | -0.50 | 0.01 |
| Is Know Words | 0.77 | 0.00 | 0.76 | 0.00 | 0.80 | 0.00 | -0.04 | 0.00 |
| Is Know Sentences | 0.83 | 0.00 | 0.82 | 0.00 | 0.85 | 0.00 | -0.03 | 0.00 |
| Tell Time | 0.71 | 0.00 | 0.71 | 0.00 | 0.71 | 0.00 | 0.00 | 0.00 |
| Word Problem | 0.63 | 0.00 | 0.61 | 0.00 | 0.67 | 0.00 | -0.06 | 0.00 |
| Can Name | 0.76 | 0.01 | 0.73 | 0.01 | 0.82 | 0.01 | -0.09 | 0.01 |
| Is Bonus Question 1 Answered*5 | 4.50 | 0.01 | 4.46 | 0.01 | 4.57 | 0.01 | -0.10 | 0.02 |
| Is Bonus Question 2 Answered*5 | 4.39 | 0.01 | 4.35 | 0.01 | 4.46 | 0.01 | -0.11 | 0.02 |
| Is Know Words*5 | 3.86 | 0.01 | 3.80 | 0.01 | 3.99 | 0.01 | -0.19 | 0.02 |
| Is Know Sentences*5 | 4.16 | 0.01 | 4.10 | 0.01 | 4.25 | 0.01 | -0.15 | 0.01 |
| Tell Time*5 | 3.57 | 0.01 | 3.57 | 0.01 | 3.57 | 0.02 | 0.00 | 0.02 |
| Word Problem*5 | 3.14 | 0.01 | 3.04 | 0.01 | 3.33 | 0.01 | -0.29 | 0.02 |
| Can Name*5 | 3.80 | 0.00 | 3.66 | 0.00 | 4.09 | 0.01 | -0.43 | 0.01 |
| Result | 3.03 | 0.00 | 2.92 | 0.00 | 3.31 | 0.01 | -0.39 | 0.01 |

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Table A1: ASER – Descriptive Statistics [cont...]

| Variable | Total | | Public School | | Private School | | Differences | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| Province | 2.36 | 0.00 | 2.44 | 0.00 | 4.00 | 0.01 | -1.55 | 0.01 |
| Punjab Result | 3.24 | 0.01 | 3.24 | 0.01 | 2.13 | 0.01 | -1.11 | 0.01 |
| Sindh Result | 2.40 | 0.01 | 2.30 | 0.01 | 3.02 | 0.02 | -0.75 | 0.03 |
| Balochistan Result | 2.80 | 0.01 | 2.75 | 0.01 | 3.25 | 0.02 | -0.50 | 0.03 |
| Khyber Pakhtunkhuwa Result | 3.04 | 0.01 | 2.97 | 0.01 | 3.58 | 0.03 | -0.60 | 0.03 |
| Punjab Reading Highest Level | 3.83 | 0.01 | 3.83 | 0.01 | 3.23 | 0.01 | 0.60 | 0.02 |
| Sindh Reading Highest Level | 3.13 | 0.01 | 3.04 | 0.01 | 3.84 | 0.02 | -0.80 | 0.02 |
| Balochistan Reading Highest Level | 3.37 | 0.01 | 3.34 | 0.01 | 3.96 | 0.03 | -0.62 | 0.03 |
| Khyber Pakhtunkhuwa Reading Highest Level | 3.61 | 0.01 | 3.56 | 0.01 | 3.79 | 0.01 | -0.23 | 0.02 |
| Punjab Math Highest Level | 3.74 | 0.01 | 3.74 | 0.01 | 3.76 | 0.01 | -0.01 | 0.02 |
| Sindh Math Highest Level | 2.97 | 0.01 | 2.87 | 0.01 | 3.64 | 0.02 | -0.78 | 0.03 |
| Balochistan Math Highest Level | 3.32 | 0.01 | 3.29 | 0.01 | 3.80 | 0.03 | -0.51 | 0.03 |
| Khyber Pakhtunkhuwa  Math Highest Level | 3.71 | 0.01 | 3.67 | 0.01 | 3.85 | 0.01 | -0.18 | 0.02 |
| Punjab English Reading Highest Level | 3.84 | 0.01 | 3.82 | 0.01 | 3.89 | 0.01 | -0.07 | 0.02 |
| Sindh English Reading Highest Level | 2.76 | 0.01 | 2.61 | 0.01 | 3.72 | 0.02 | -1.11 | 0.03 |
| Balochistan English Reading Highest Level | 3.28 | 0.01 | 3.24 | 0.01 | 4.03 | 0.03 | -0.79 | 0.03 |
| Khyber Pakhtunkhuwa English Reading Highest Level | 3.76 | 0.01 | 3.69 | 0.01 | 3.95 | 0.01 | -0.25 | 0.02 |
| Cities | 2.57 | 0.01 | 2.94 | 0.02 | 2.44 | 0.01 | 0.50 | 0.02 |
| Lahore Result | 3.51 | 0.03 | 3.51 | 0.05 | 3.54 | 0.04 | -0.02 | 0.07 |
| Karachi Result | 3.48 | 0.01 | 3.04 | 0.03 | 3.57 | 0.02 | -0.53 | 0.03 |
| Quetta Result | 3.79 | 0.03 | 3.81 | 0.04 | 3.76 | 0.04 | 0.05 | 0.06 |
| Peshawar result | 3.25 | 0.03 | 3.24 | 0.05 | 3.27 | 0.04 | -0.04 | 0.07 |
| Islamabad Result | 3.64 | 0.03 | 3.83 | 0.04 | 3.40 | 0.05 | 0.42 | 0.06 |
| Lahore Reading Highest Level | 4.06 | 0.03 | 4.06 | 0.05 | 4.08 | 0.05 | -0.02 | 0.07 |
| Karachi Reading Highest Level | 4.12 | 0.01 | 3.73 | 0.03 | 4.21 | 0.01 | -0.47 | 0.03 |
| Quetta Reading Highest Level | 4.18 | 0.03 | 4.26 | 0.03 | 4.10 | 0.04 | 0.16 | 0.05 |
| Peshawar Reading Highest Level | 4.04 | 0.02 | 4.03 | 0.03 | 4.04 | 0.03 | -0.01 | 0.04 |
| IslamabadReading Highest Level | 3.91 | 0.03 | 4.08 | 0.04 | 3.70 | 0.05 | 0.38 | 0.06 |
| Lahore Math Highest Level | 3.97 | 0.03 | 3.96 | 0.05 | 4.00 | 0.05 | -0.04 | 0.07 |
| Karachi Math Highest Level | 4.05 | 0.01 | 3.59 | 0.03 | 4.14 | 0.01 | -0.55 | 0.03 |
| Quetta Math Highest Level | 4.06 | 0.02 | 4.08 | 0.03 | 4.04 | 0.04 | -0.04 | 0.05 |
| Peshawar Math Highest Level | 4.05 | 0.02 | 4.02 | 0.03 | 4.08 | 0.03 | -0.06 | 0.04 |
| Islamabad Math Highest Level | 4.05 | 0.03 | 4.21 | 0.03 | 3.84 | 0.04 | 0.37 | 0.05 |
| Lahore English Reading Highest Level | 4.14 | 0.03 | 4.11 | 0.05 | 4.20 | 0.40 | -0.09 | 0.06 |
| Karachi English Reading Highest Level | 4.15 | 0.01 | 3.75 | 0.03 | 4.24 | 0.01 | -0.48 | 0.03 |
| Quetta English Reading Highest Level | 4.33 | 0.02 | 4.31 | 0.03 | 4.35 | 0.03 | -0.03 | 0.04 |
| Peshawar English Reading Highest Level | 4.09 | 0.02 | 4.07 | 0.03 | 4.11 | 0.03 | -0.03 | 0.04 |
| Islamabad English Reading Highest Level | 4.13 | 0.03 | 4.31 | 0.03 | 3.90 | 0.04 | 0.41 | 0.05 |

Data Source: ASER Pakistan, 2014 (http://www.aserpakistan.org/)

Table A2: Zindagi Trust – Descriptive Statistics

| | Total | | Public School | | Partnership School | | Differences | |
|---|---|---|---|---|---|---|---|---|
| Variable | Mean | SE | Mean | SE | Mean | SE | Mean | SE |
| Child | | | | | | | | |
| Father Education | 2.68 | 0.09 | 2.76 | 0.18 | 2.65 | 0.10 | 0.10 | 0.22 |
| Mother Education | 2.58 | 0.09 | 2.79 | 0.20 | 2.52 | 0.09 | 0.27 | 0.20 |
| House Type | 1.78 | 0.03 | 1.75 | 0.07 | 1.79 | 0.03 | -0.04 | 0.08 |
| Number of house hold members | 7.16 | 3.46 | 6.52 | 1.75 | 7.69 | 4.35 | -1.16 | 0.61 |
| Number of children in house holds | 4.11 | 2.173 | 3.60 | 2.22 | 4.53 | 2.06 | -0.93 | 0.44 |
| Number of siblings | 4.63 | 1.528 | 4.73 | 1.27 | 4.55 | 1.72 | 0.19 | 0.26 |
| Possessing an iron | 0.948 | 0.222 | 0.95 | 0.22 | 0.95 | 0.23 | 0.01 | 0.34 |
| Number of mobiles at home | 2.6 | 2.176 | 3.03 | 2.18 | 2.33 | 2.15 | 0.70 | 0.35 |
| Gender of the household head | 0.85 | 0.358 | 0.82 | 0.39 | 0.87 | 0.34 | -0.05 | 0.58 |
| Child weight at the time of birth | 2.022 | 0.58 | 1.91 | 0.56 | 2.09 | 0.59 | -0.18 | 0.11 |
| School | | | | | | | | |
| Class | 6.74 | 0.11 | 6.07 | 0.22 | 6.95 | 0.12 | -0.88 | 0.25 |
| Result | 10.86 | 0.42 | 8.39 | 0.48 | 12.81 | 0.52 | -0.42 | 0.72 |
| Math Result | 4.01 | 0.18 | 2.82 | 0.14 | 4.98 | 0.24 | -2.16 | 0.30 |
| English Result | 17.24 | 0.63 | 13.61 | 0.98 | 19.50 | 0.70 | -5.89 | 1.18 |

Data Source: SMB Fatima School, 2014 (http://www.zindagitrust.org/)

Figure A1: ASER - Overall School Score (on average)
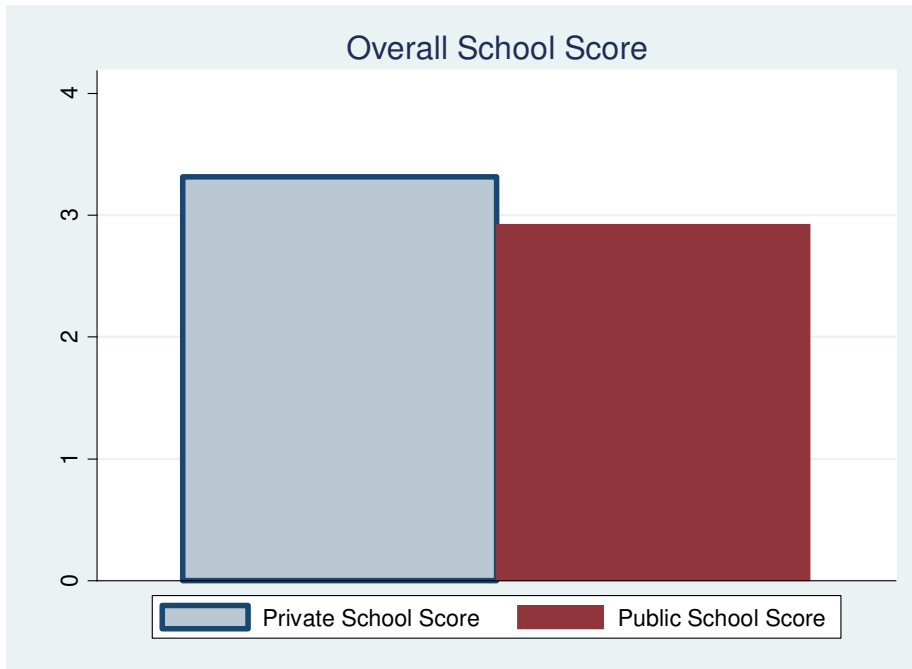


Figure A2: ASER - School Score (on average)
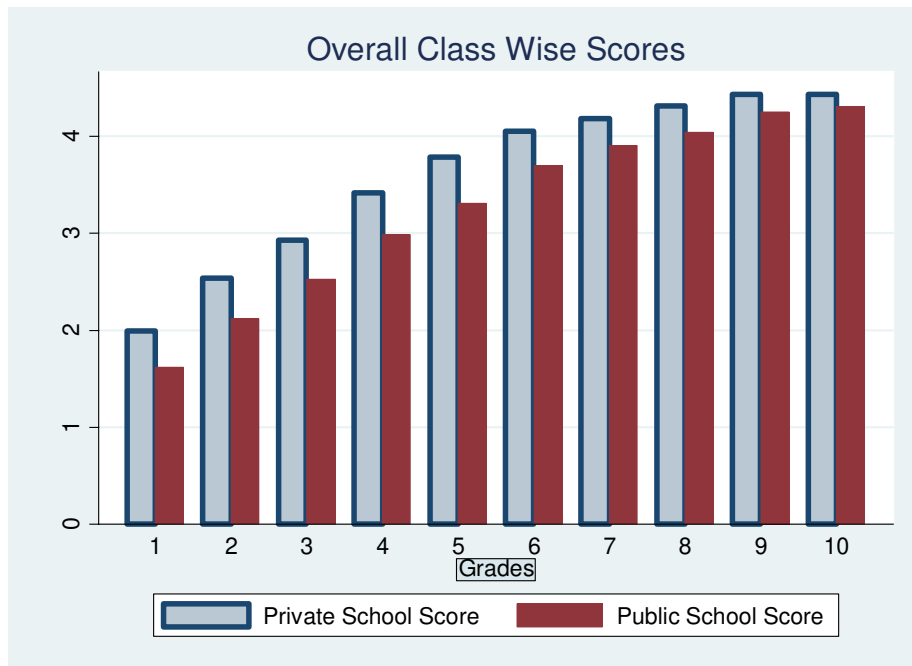


Data Source: ASER Pakistan, 2014

Figure A3: ASER – Overall Reading Score (on average)
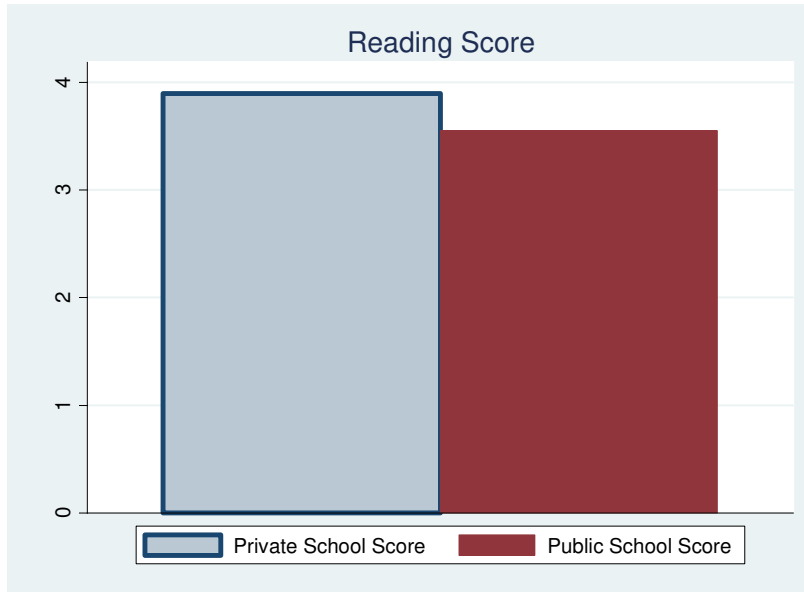


Figure A4: ASER - Reading Score (on average)
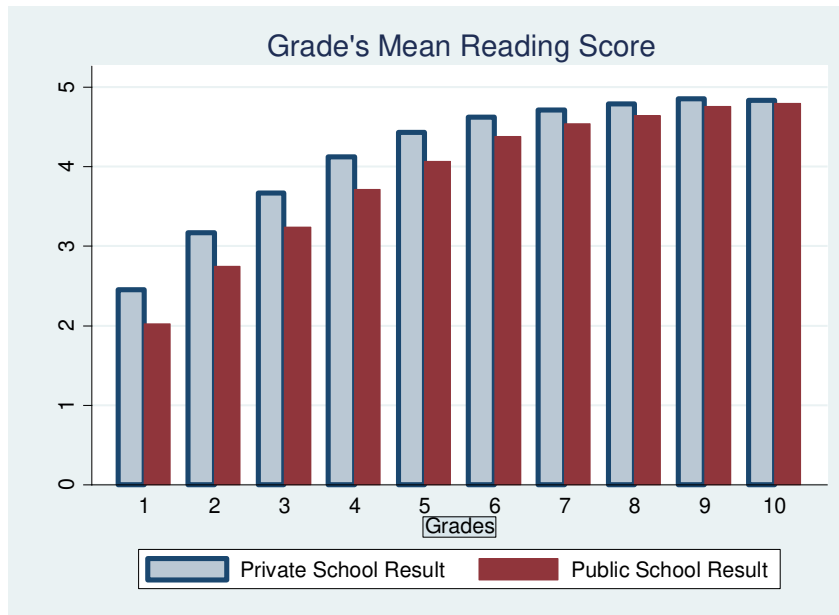


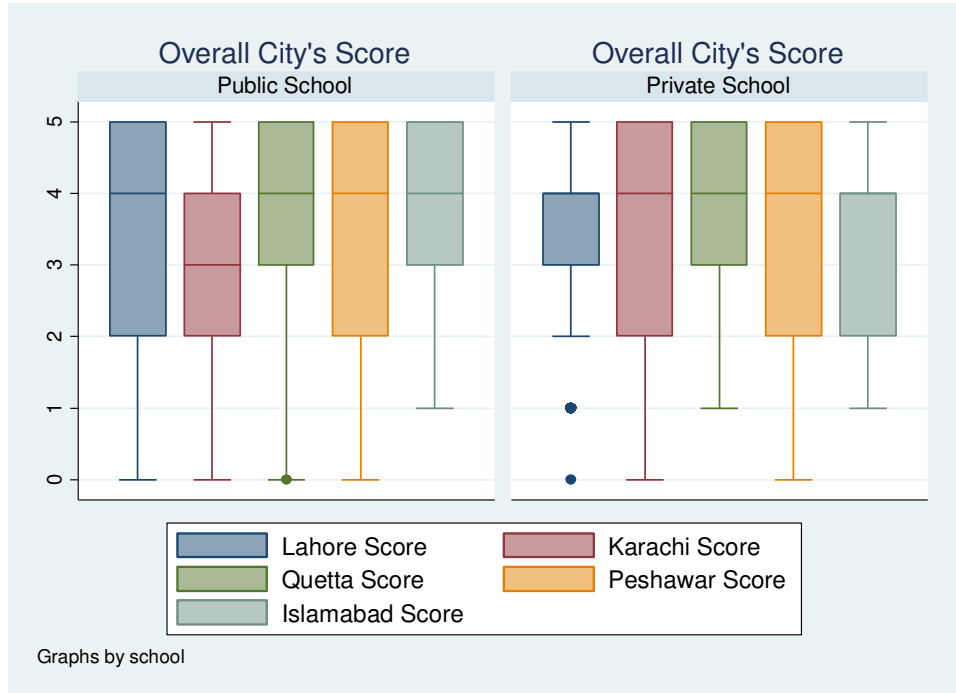Data Source: ASER Pakistan, 2014

Figure A5: ASER - Overall Math Score (on average)



School Math Score

Private School Score    Public School Score
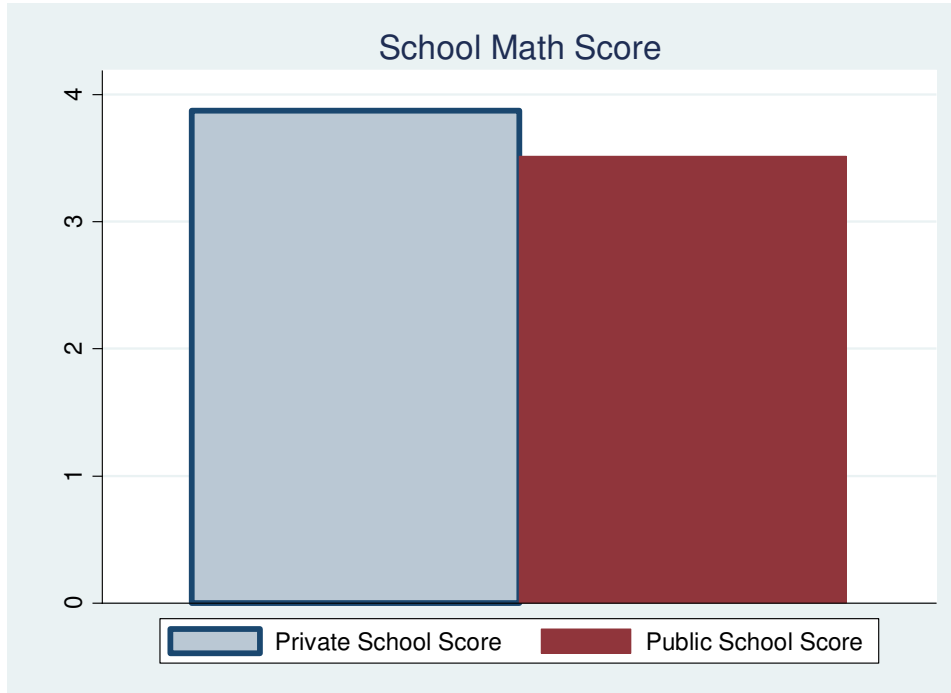
Figure A6: ASER - Math Score (on average)



Grade's mean Math Score

Private School Score    Public School Score
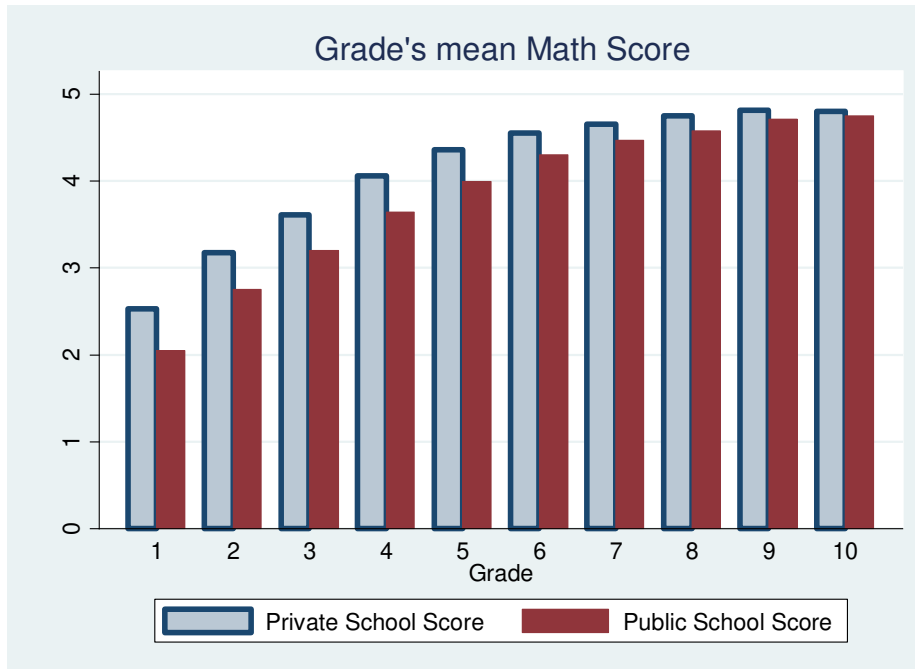
Data Source: ASER Pakistan, 2014

Figure A7: ASER - Overall English Reading Score (on average)

**Mean School English Reading Score**
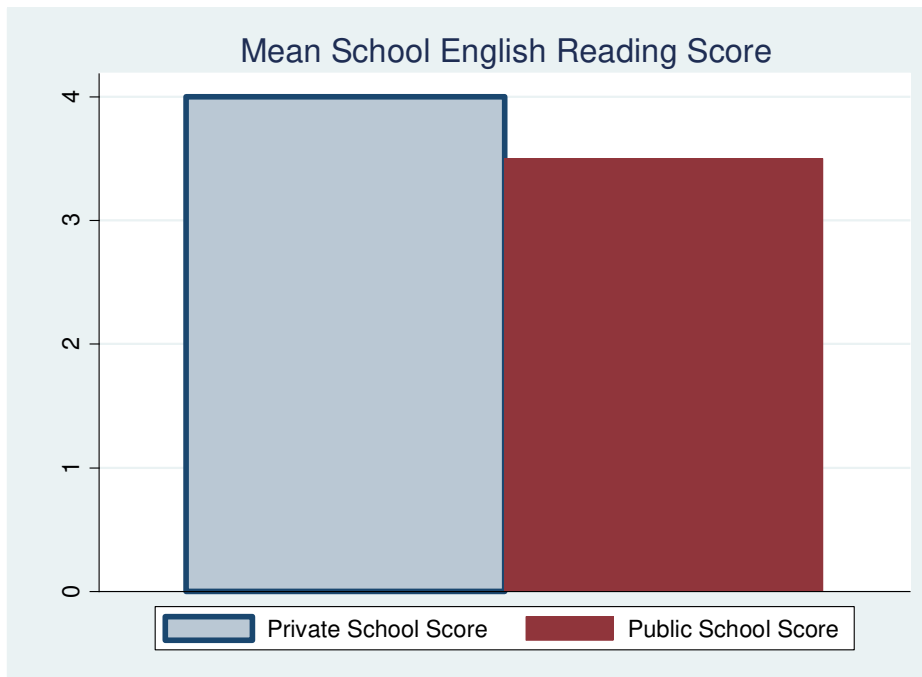


Figure A8: ASER – English Reading Score (on average)

**Grade's Mean English Reading Score**
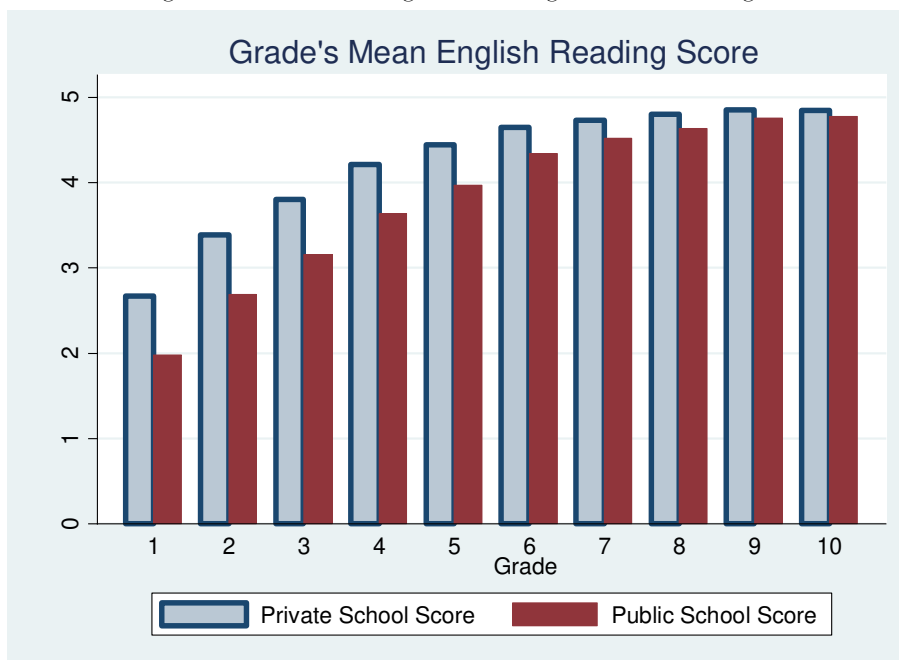


Data Source: ASER Pakistan, 2014

Figure A9: ASER - Overall School Score by Province (on average)
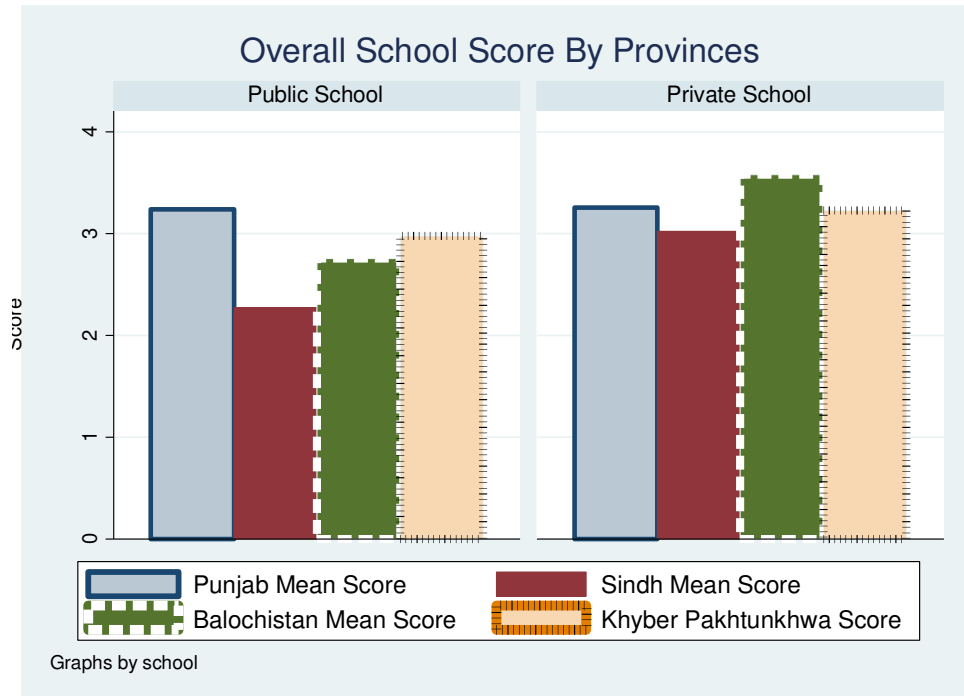


Figure A10: ASER - School Score by Province (on average)
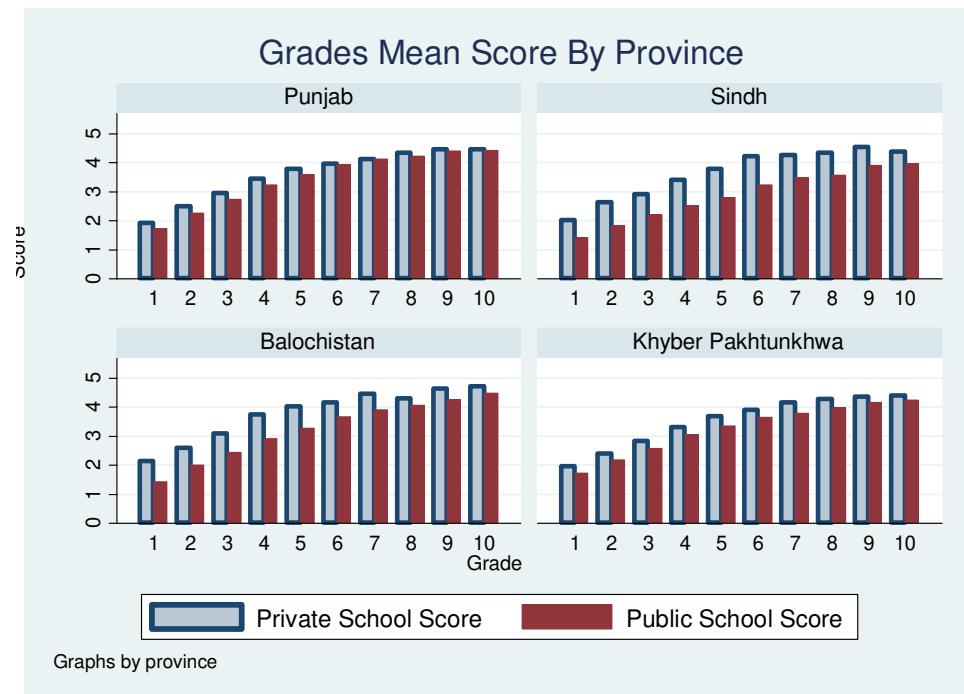


Data Source: ASER Pakistan, 2014

Figure A11: ASER – Overall Reading Score by Province (on average)
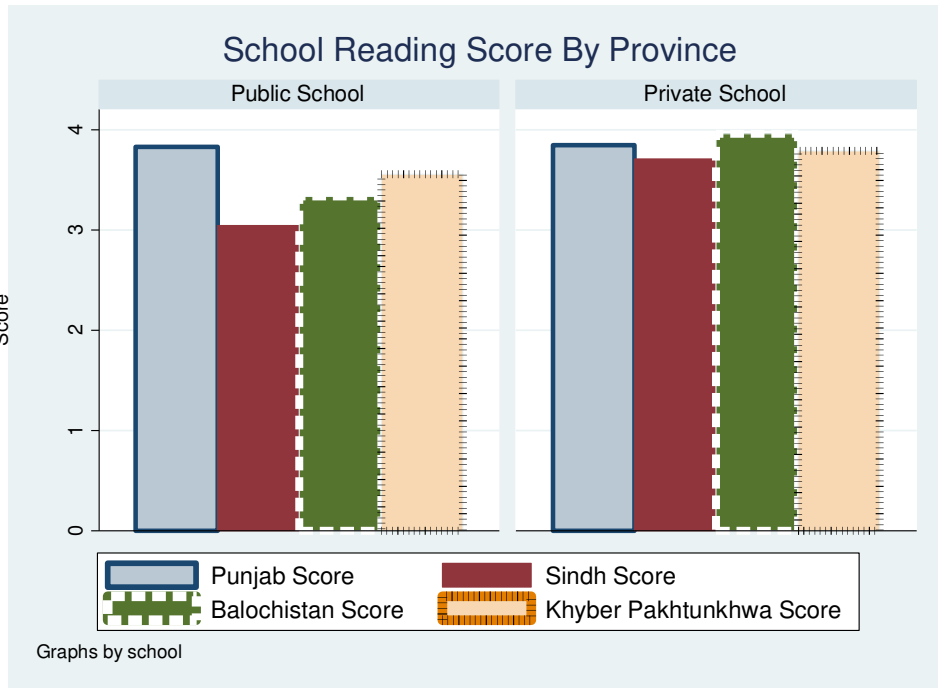


Figure A12: ASER – Reading Score by Province (on average)
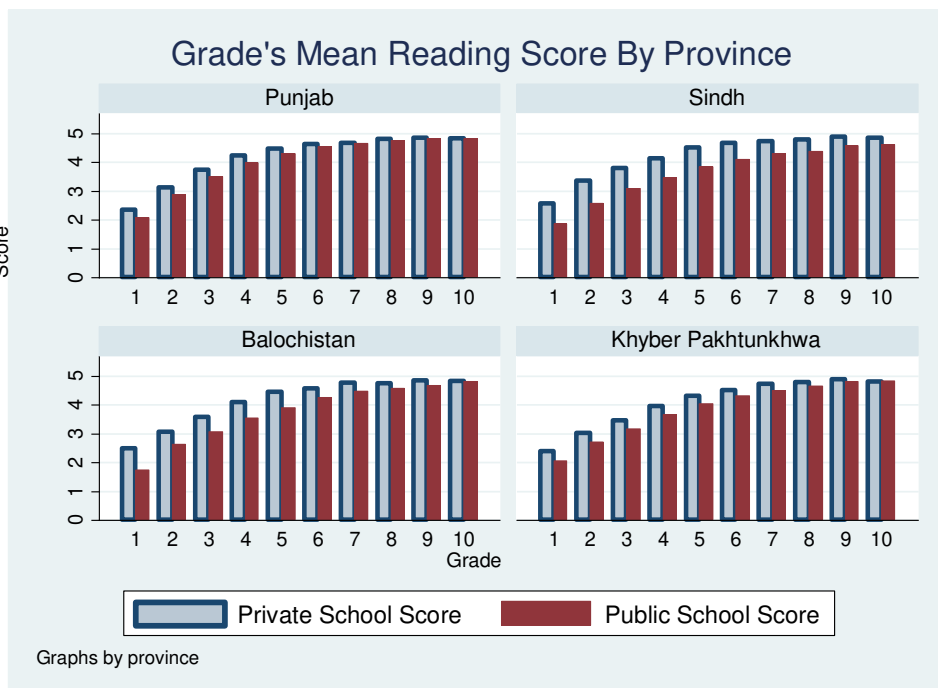


Data Source: ASER Pakistan, 2014

Figure A13: ASER – Overall Math Score by Province (on average)
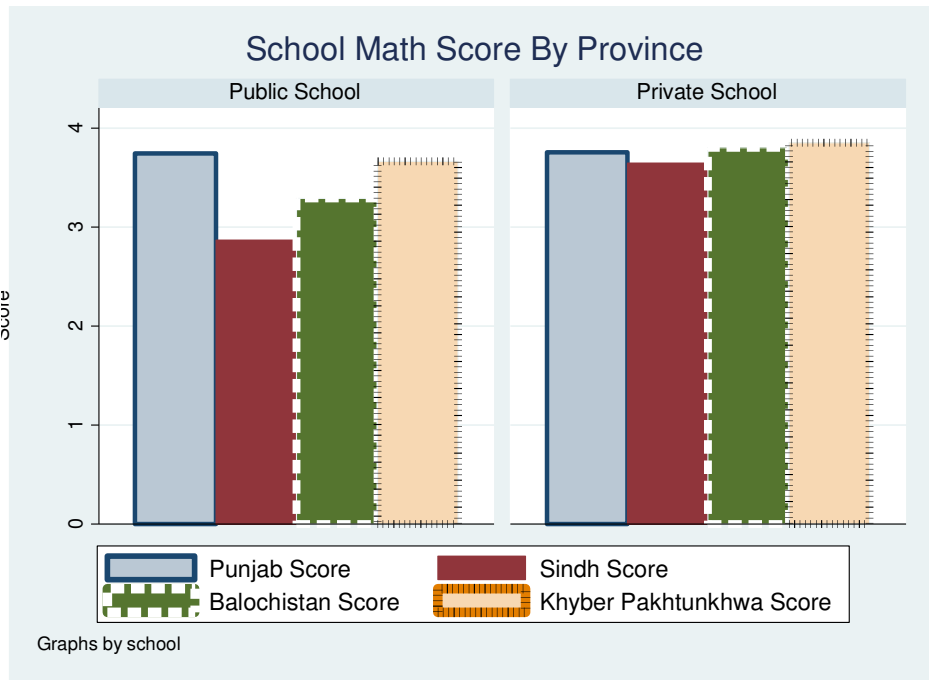


Figure A14: ASER – Math Score by Province (on average)
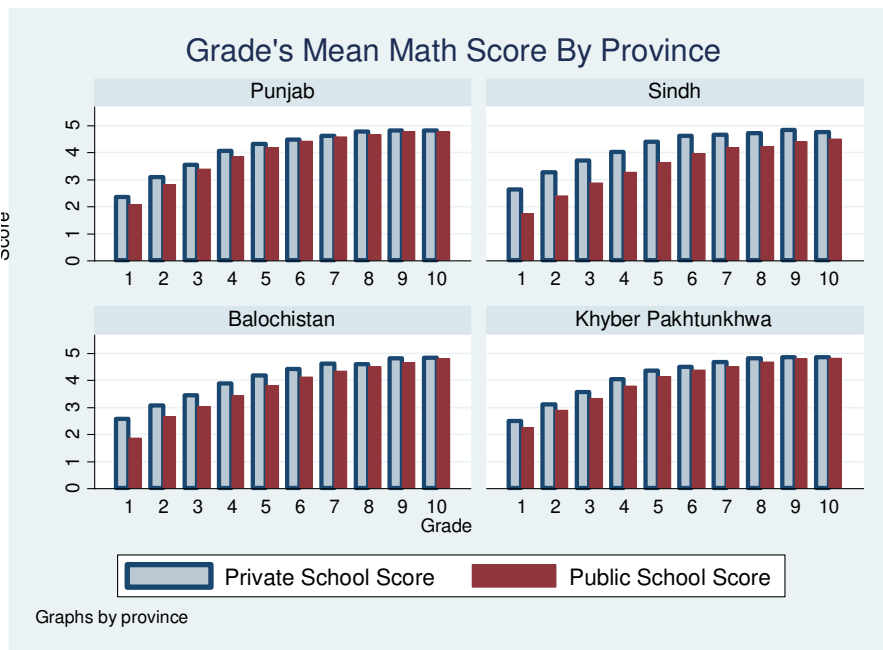


Data Source: ASER Pakistan, 2014

Figure A15: ASER – Overall English Reading Score by Province (on average)
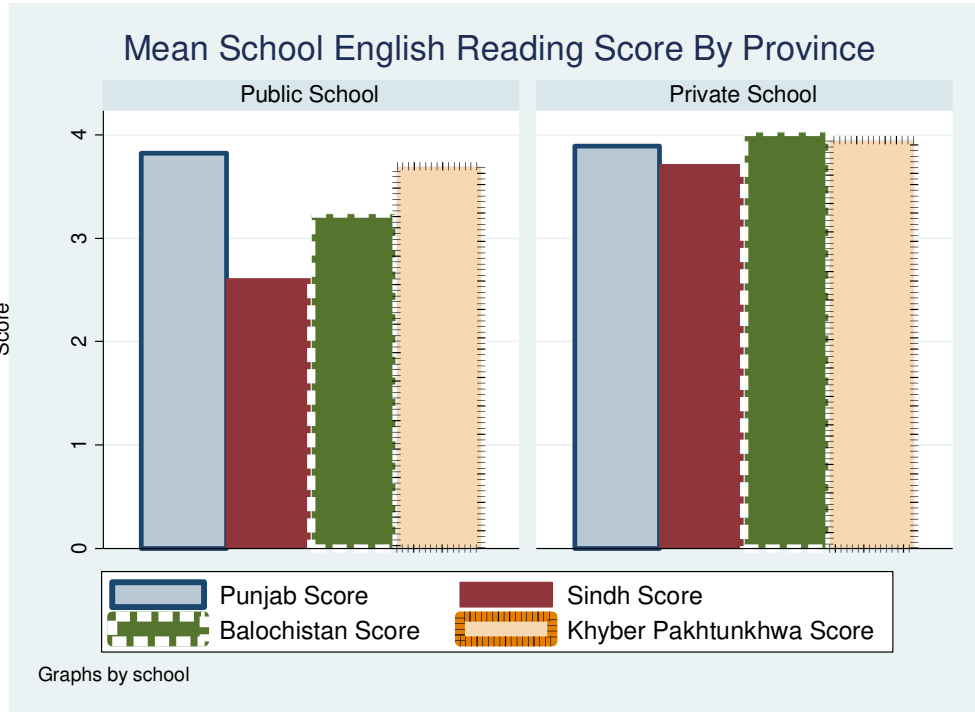


Figure A16: ASER – Overall English Reading Score by Province (on average)
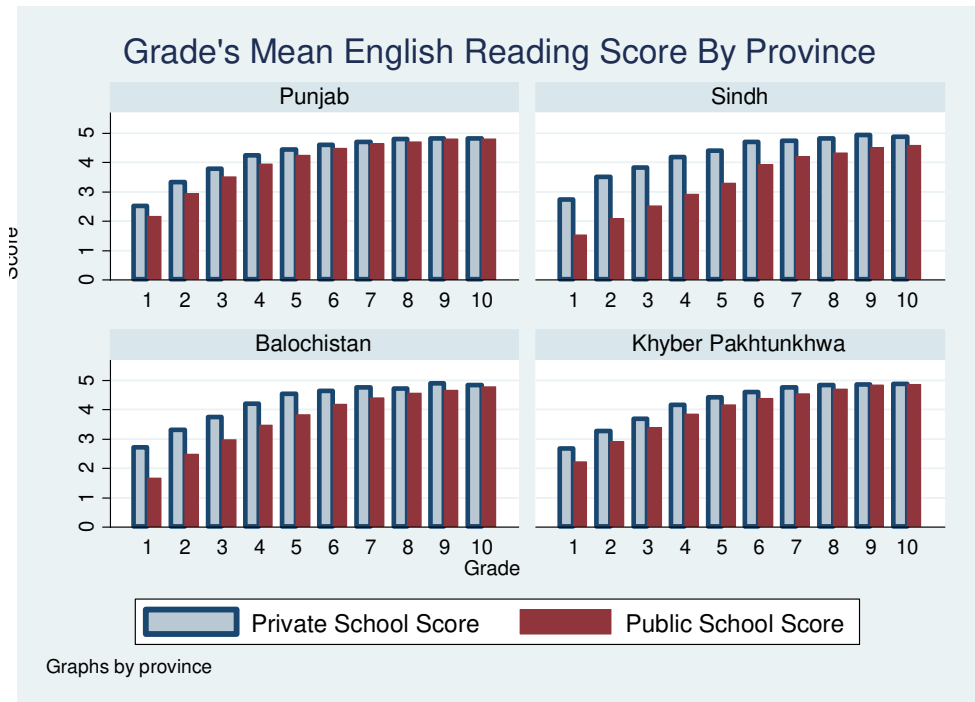


Data Source: ASER Pakistan, 2014

Figure A17: ASER – Overall School Score by Cities (on average)
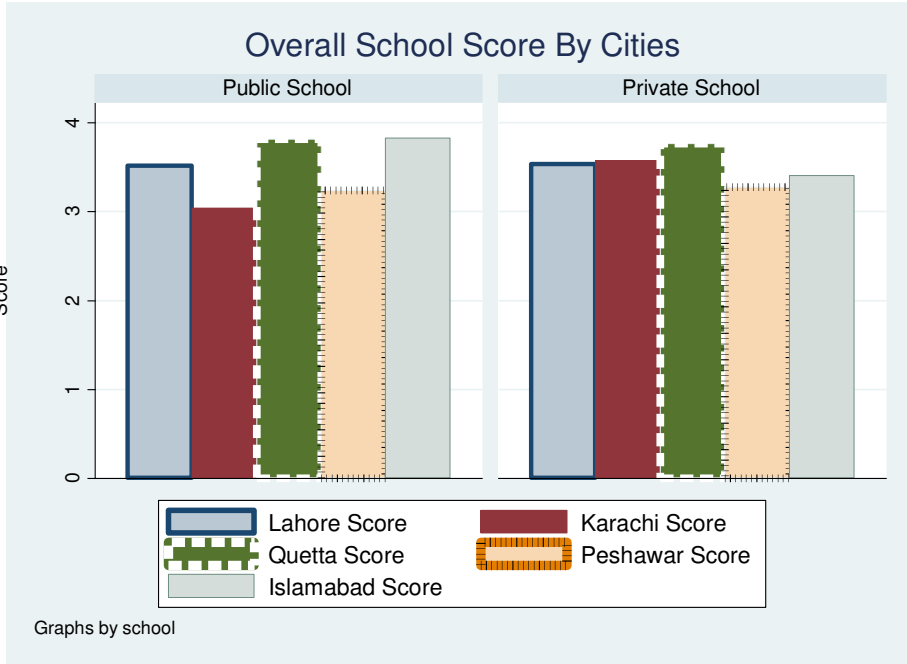


Figure A18: ASER – School Score by Cities (on average)
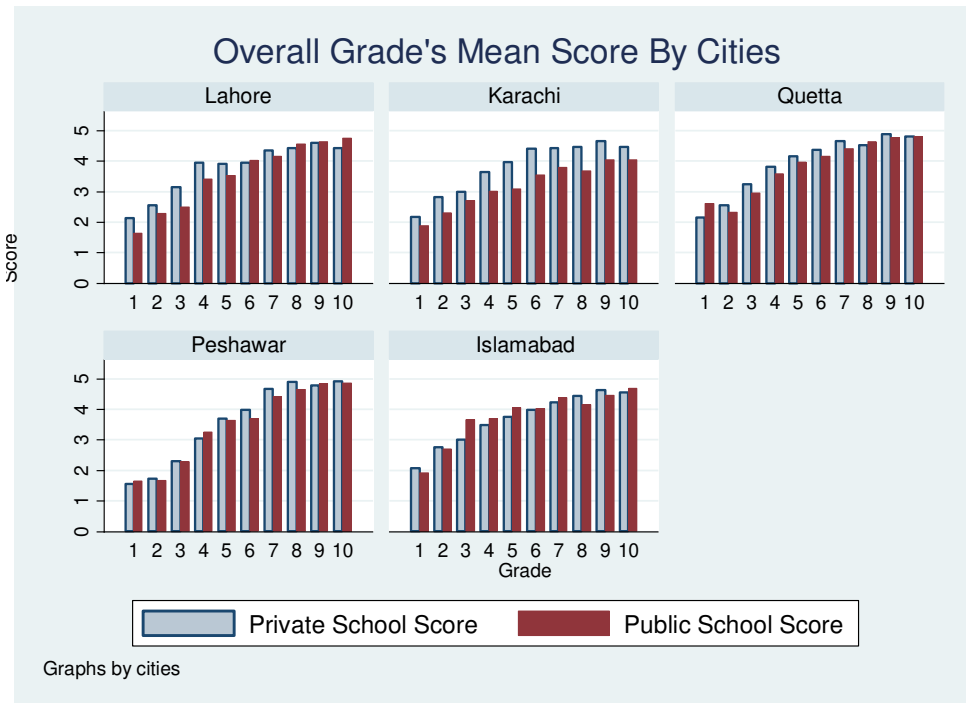


Data Source: ASER Pakistan, 2014

Figure A19: ASER – Overall Reading Score by Cities (on average)

## School Reading Score By Cities



Graphs by school
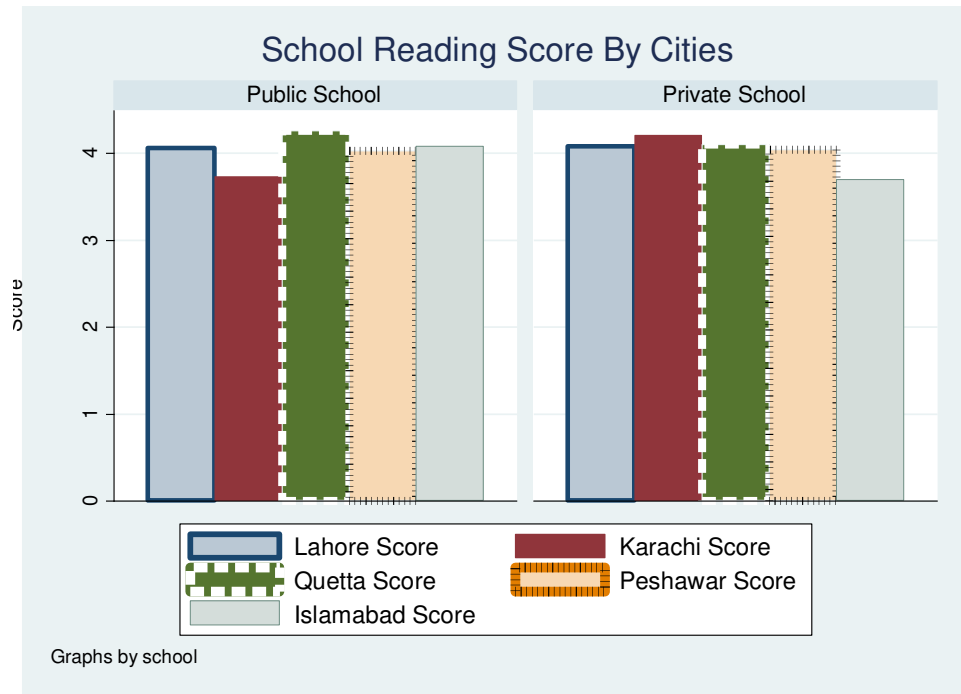
Figure A20: ASER – Reading Score by Cities (on average)

## Grade's Mean Reading Score By Cities



Graphs by cities
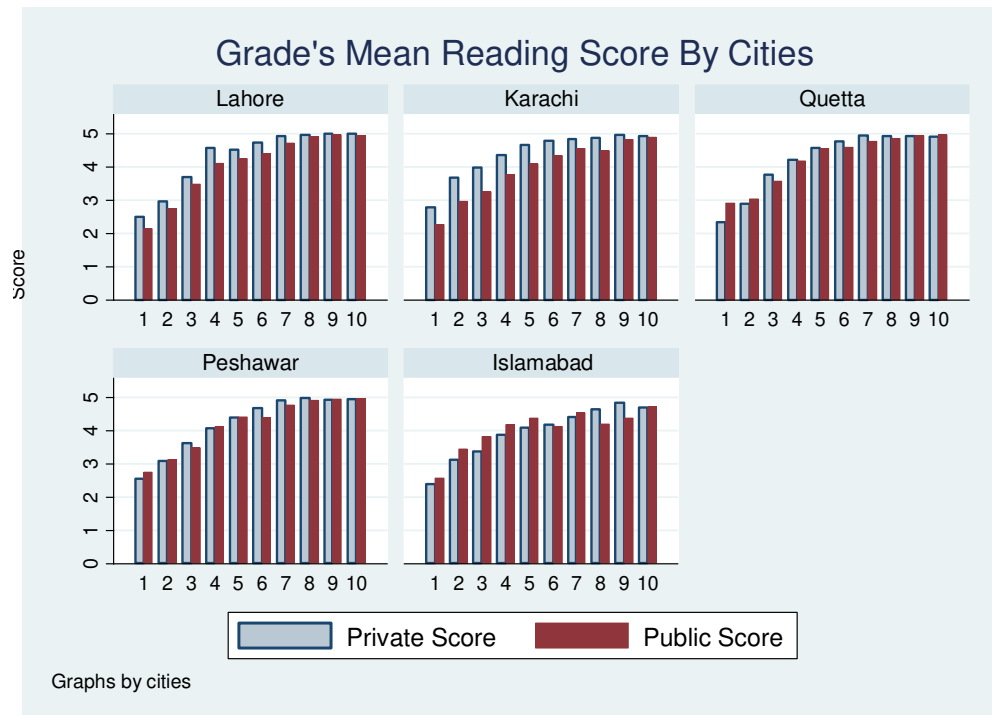
Data Source: ASER Pakistan, 2014

Figure A21: ASER – Overall Math Score by Cities (on average)
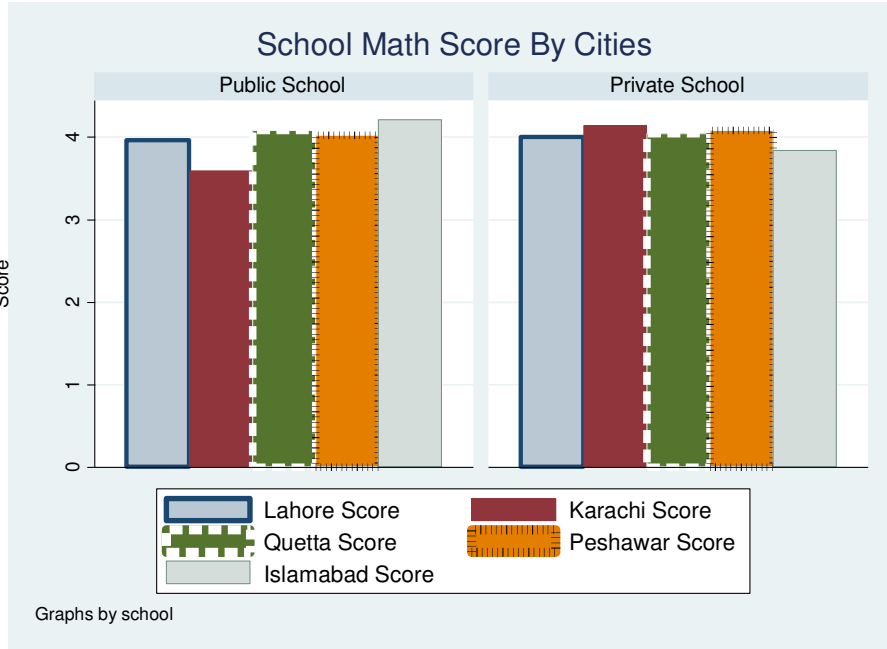


Figure A22: ASER – Math Score by Cities (on average)
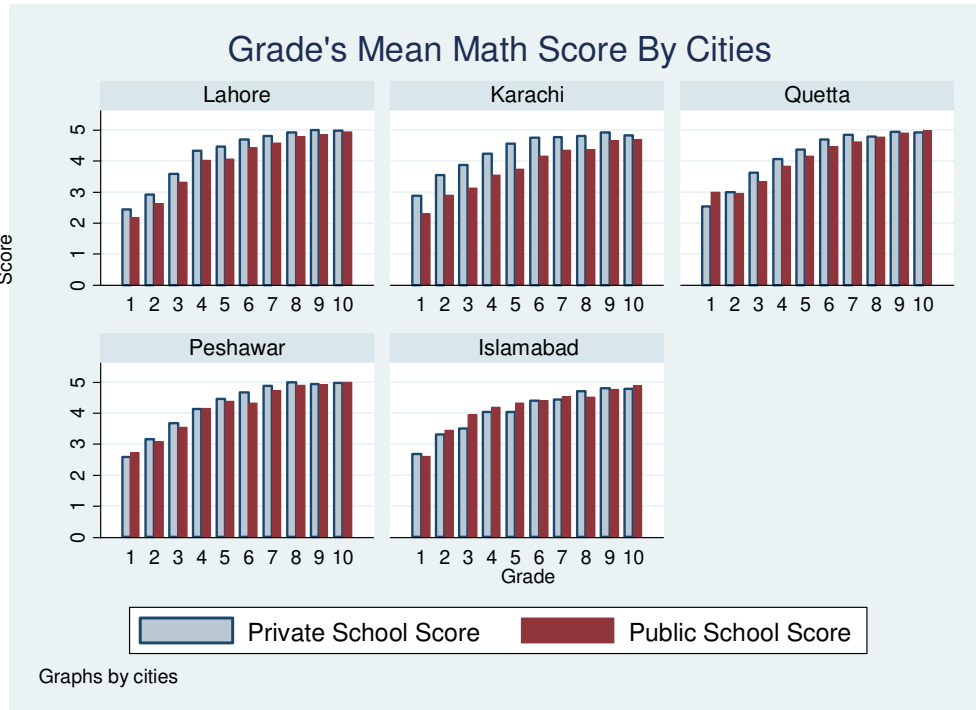


Data Source: ASER Pakistan, 2014

Figure A23: ASER – Overall English Reading Score by Cities (on average)
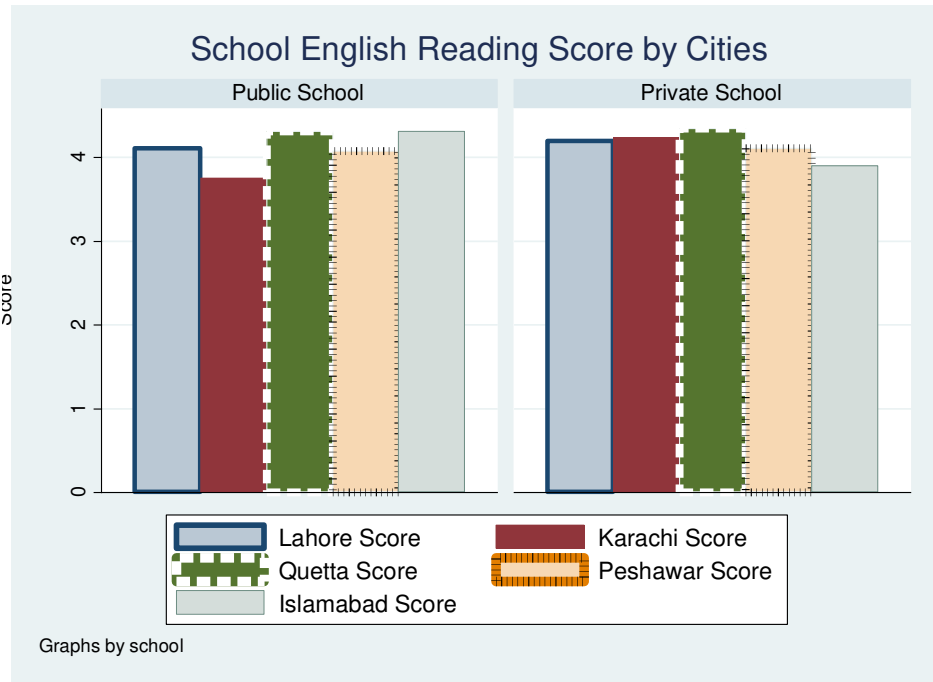


Figure A24: ASER – English Reading Score by Cities (on average)
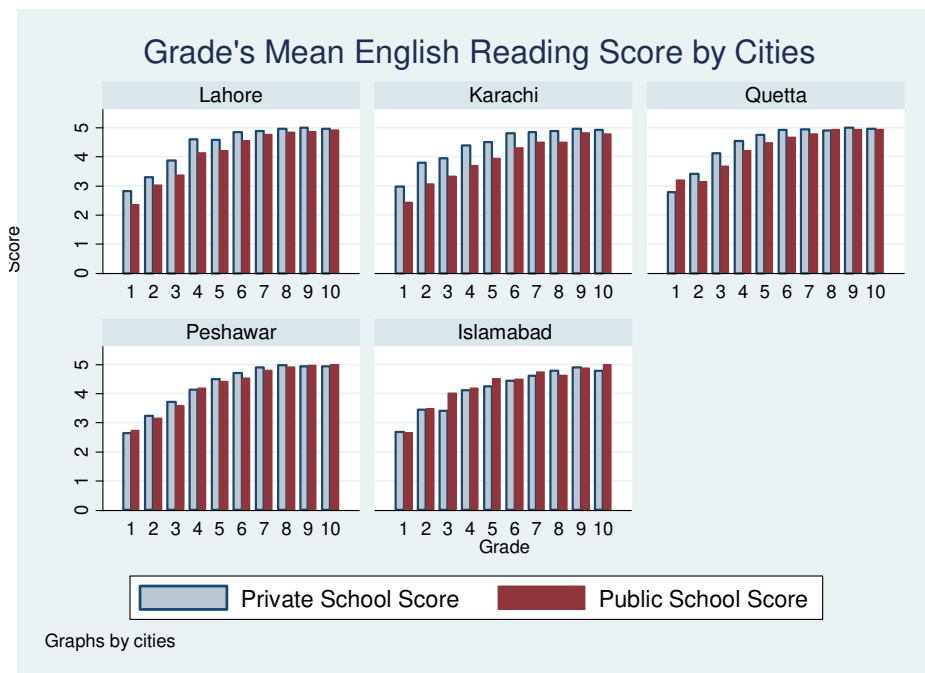


Data Source: ASER Pakistan, 2014

Figure A25: ASER – Overall School Score
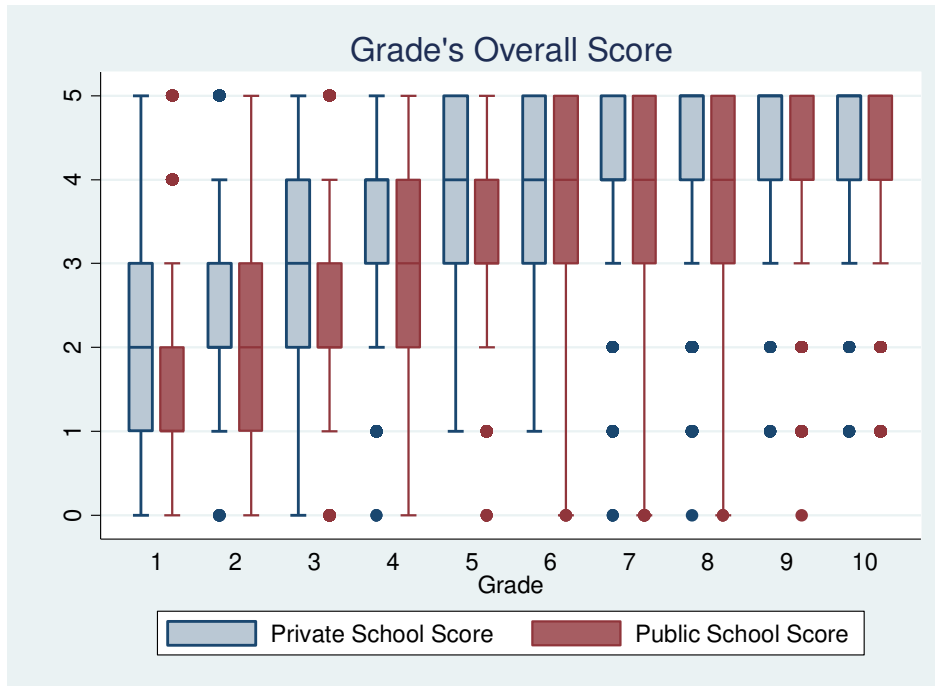


Figure A26: ASER – Overall Reading Score
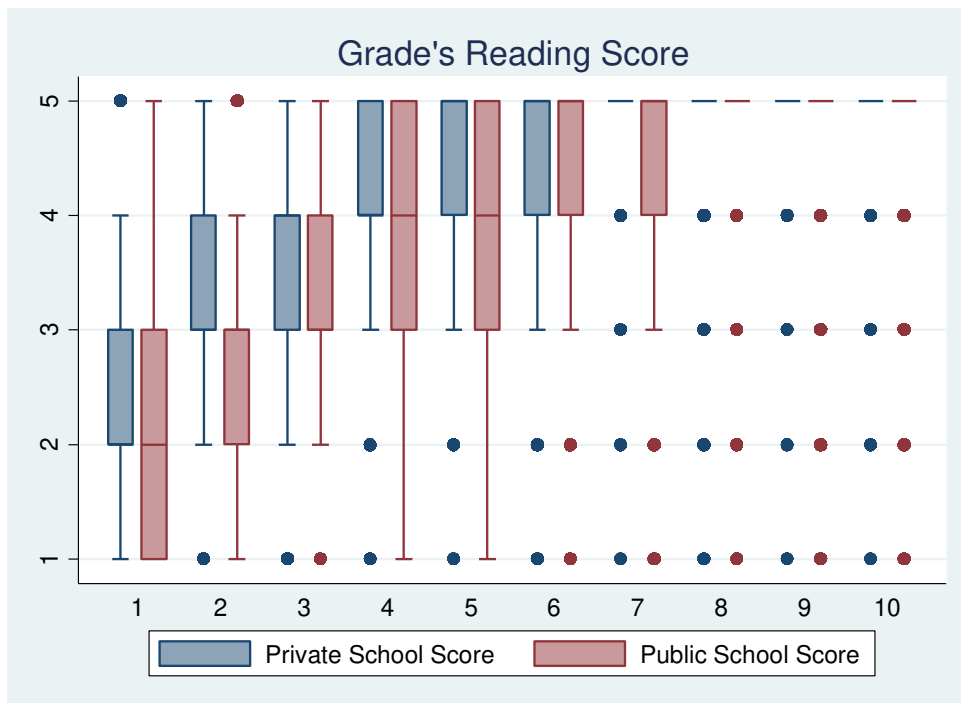


Data Source: ASER Pakistan, 2014

Figure A27: ASER – Overall Math Score
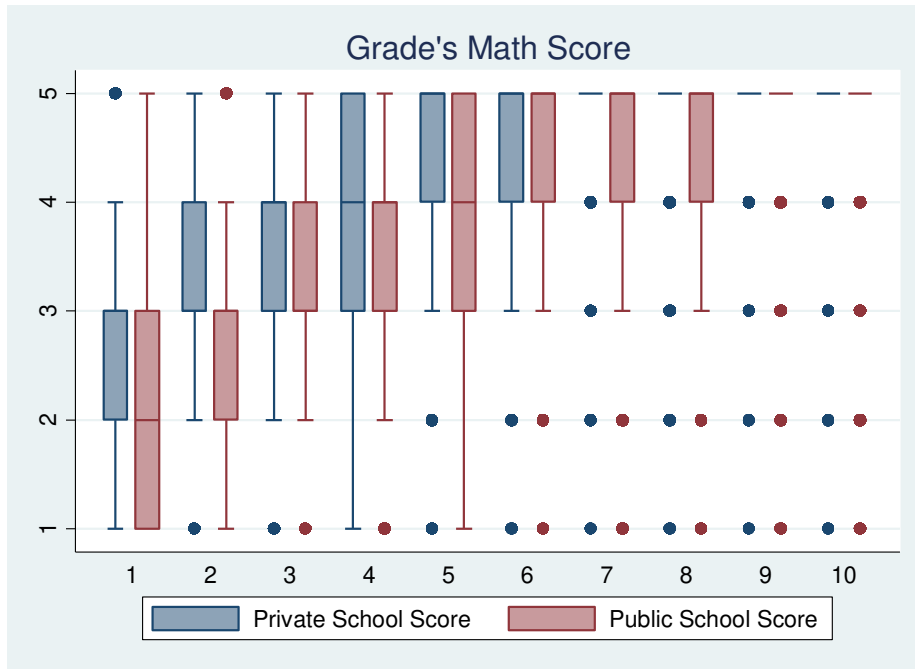


Figure A28: ASER – Overall English Reading Score
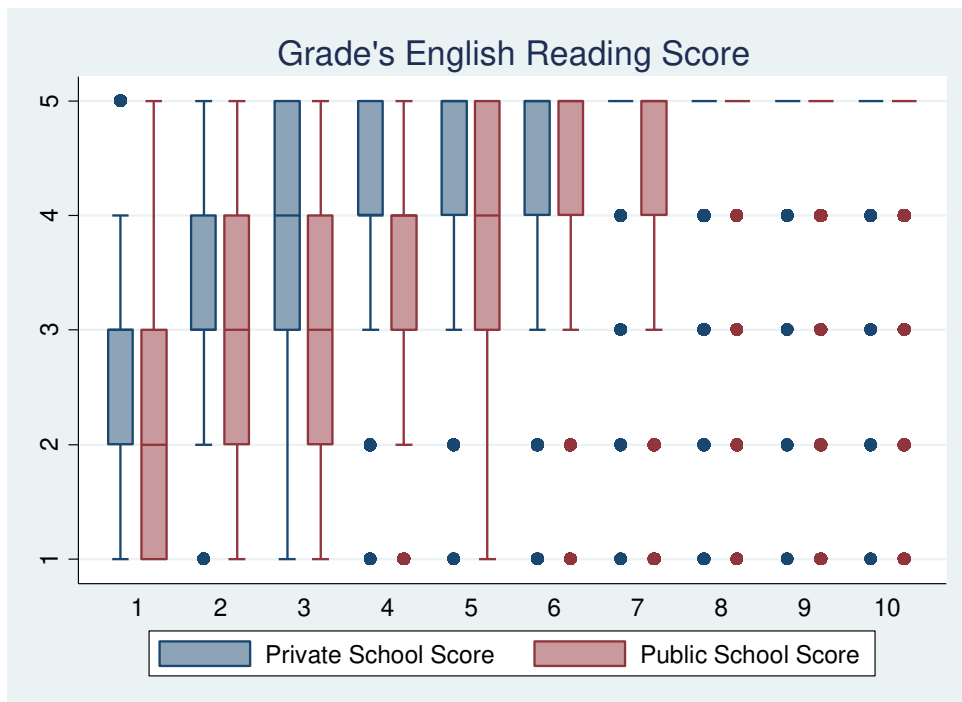


Data Source: ASER Pakistan, 2014

Figure A29: ASER – Overall Score by Province
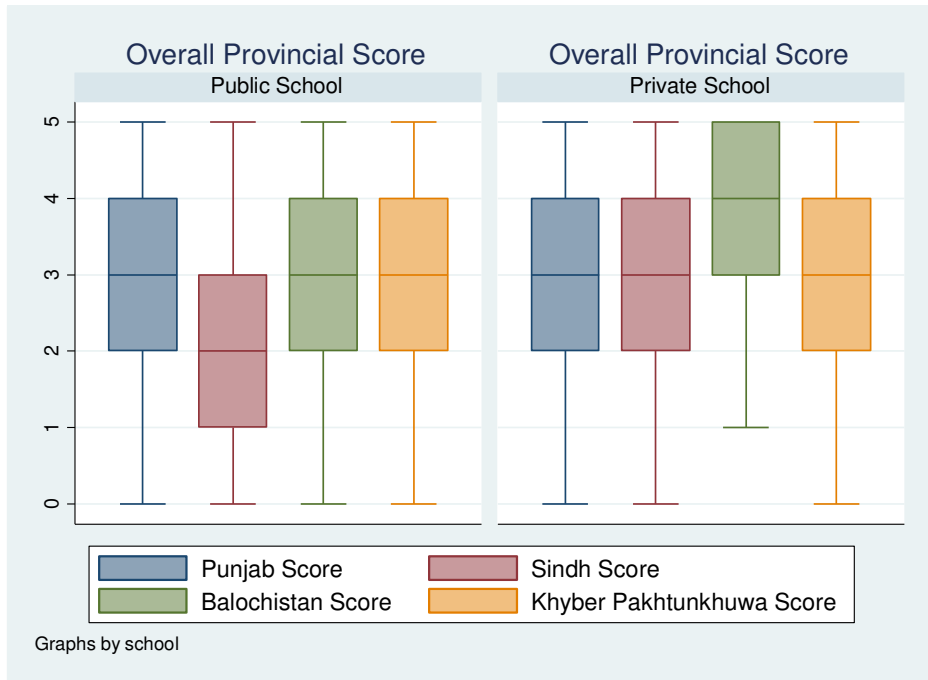


Figure A30: ASER – Score by Province
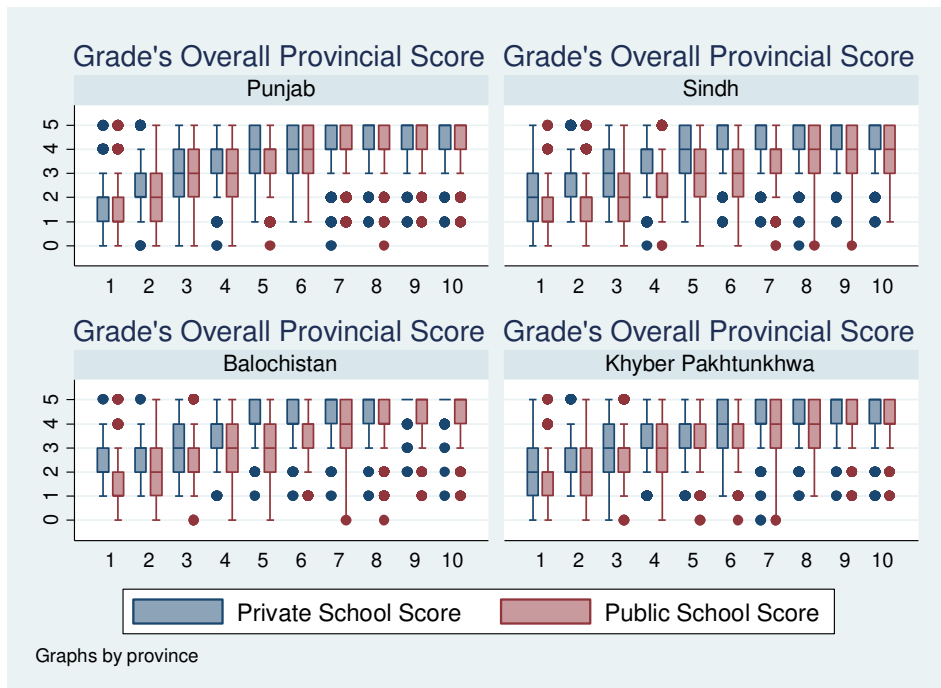


Data Source: ASER Pakistan, 2014

Figure A31: ASER – Overall Reading Score by Province
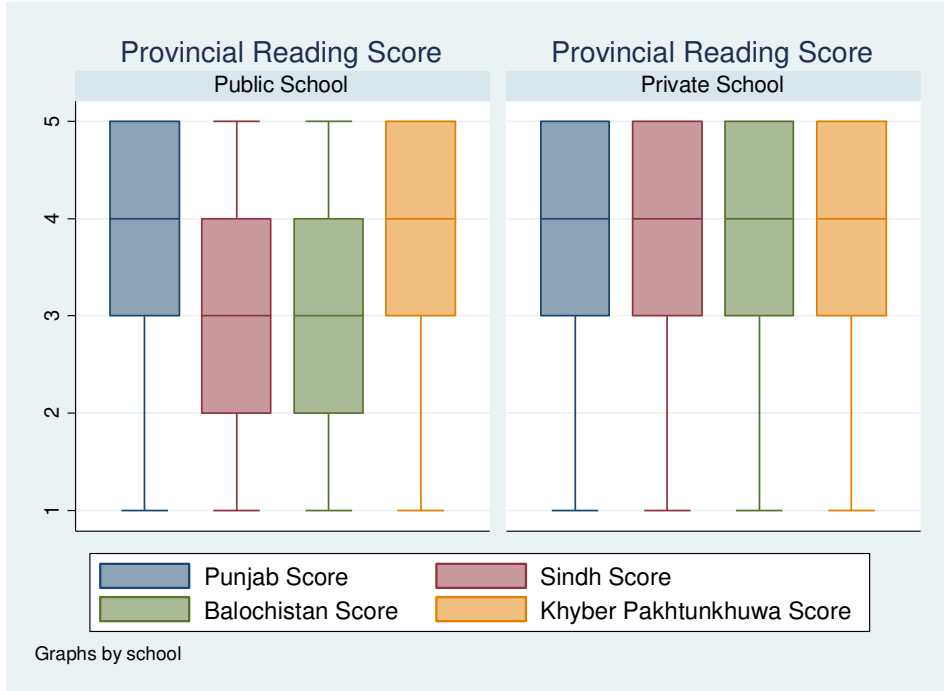


Figure A32: ASER – Reading Score by Province
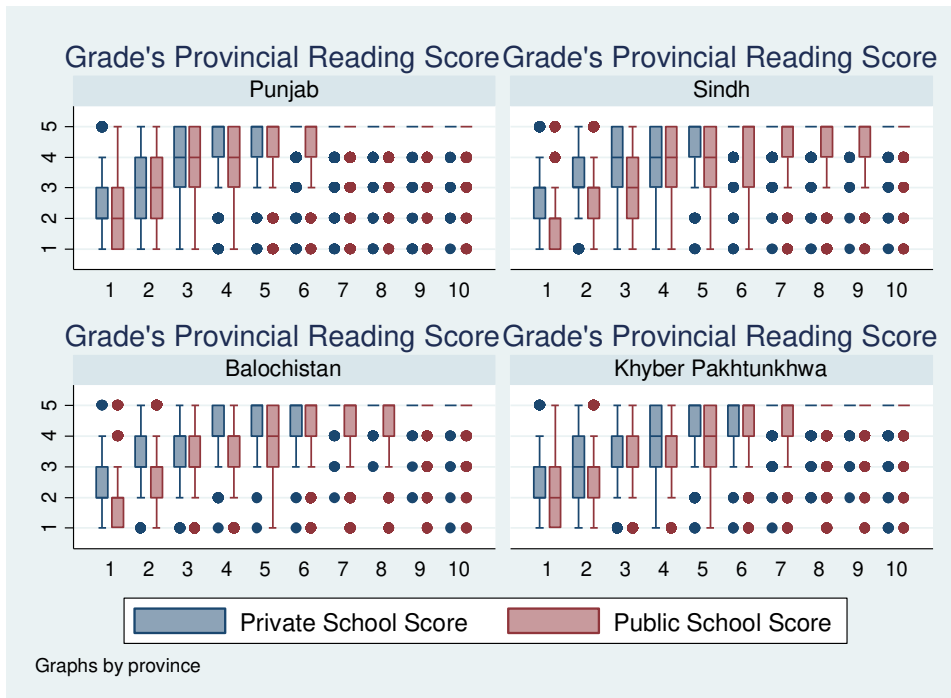


Data Source: ASER Pakistan, 2014

Figure A33: ASER – Overall Math Score by Province



Graphs by school
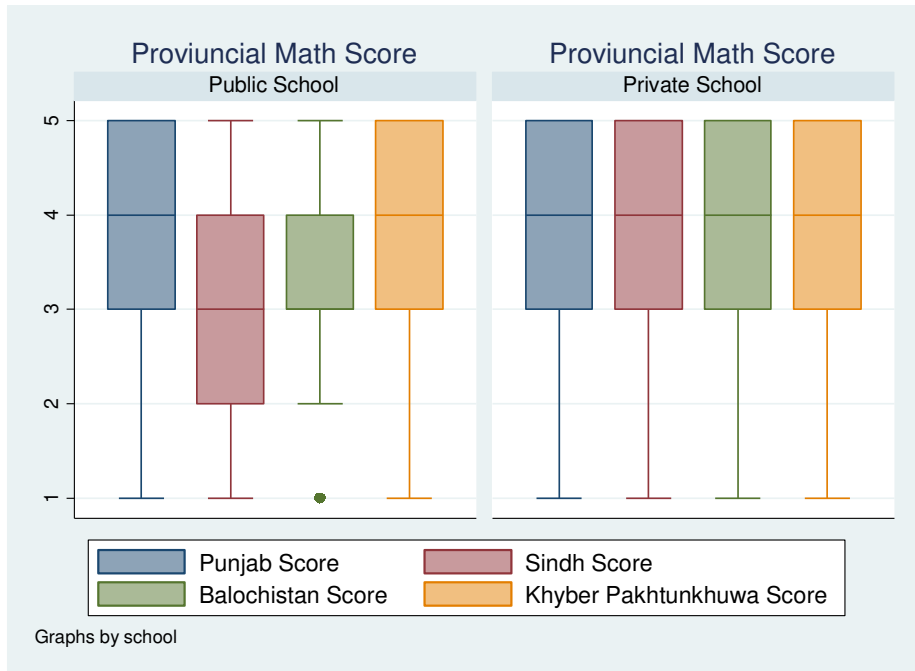
Figure A34: ASER – Math Score by Province



Graphs by province
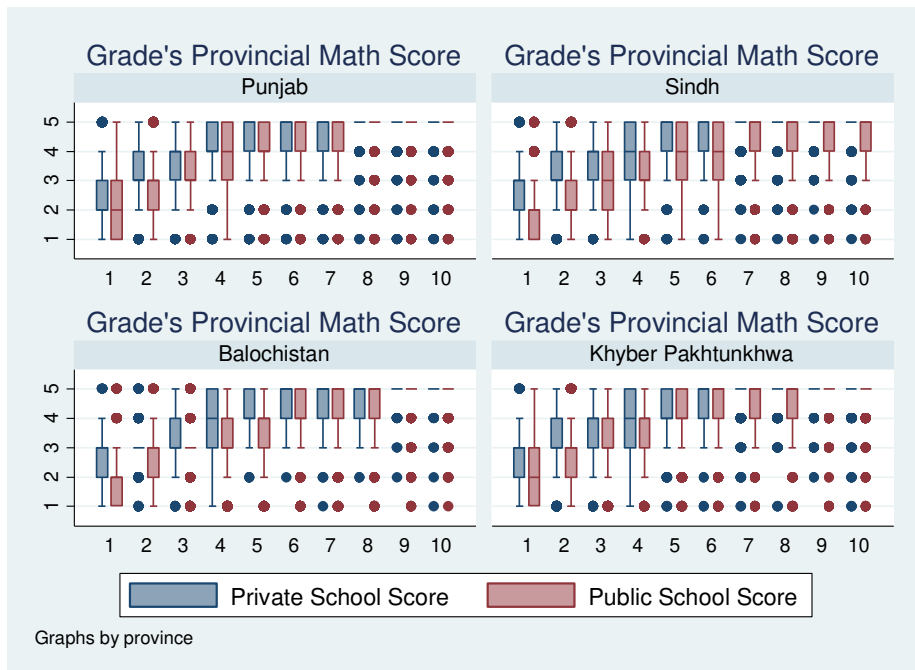
Data Source: ASER Pakistan, 2014

Figure A35: ASER – Overall English Reading Score by Province
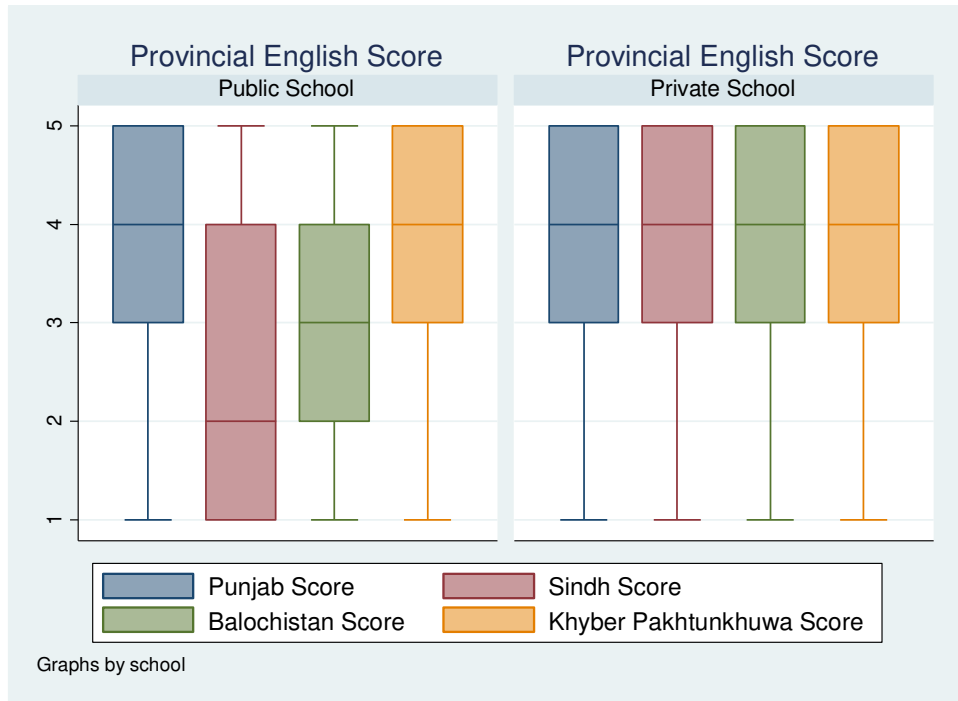


Figure A36: ASER – English Reading Score by Province
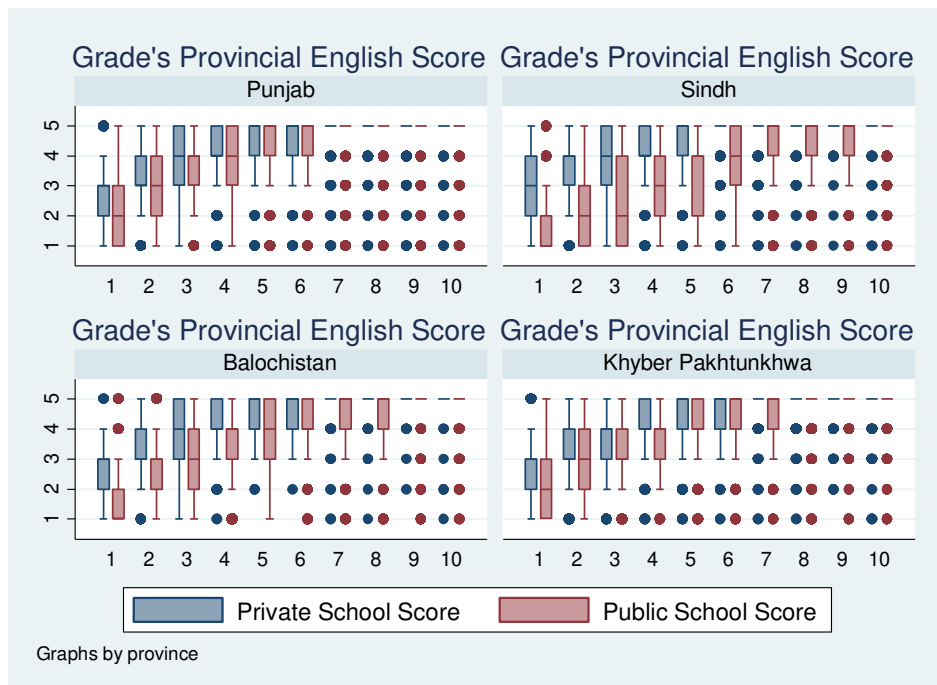


Data Source: ASER Pakistan, 2014

Figure A37: ASER – Overall Score by City



Figure A38: ASER – School Score by City
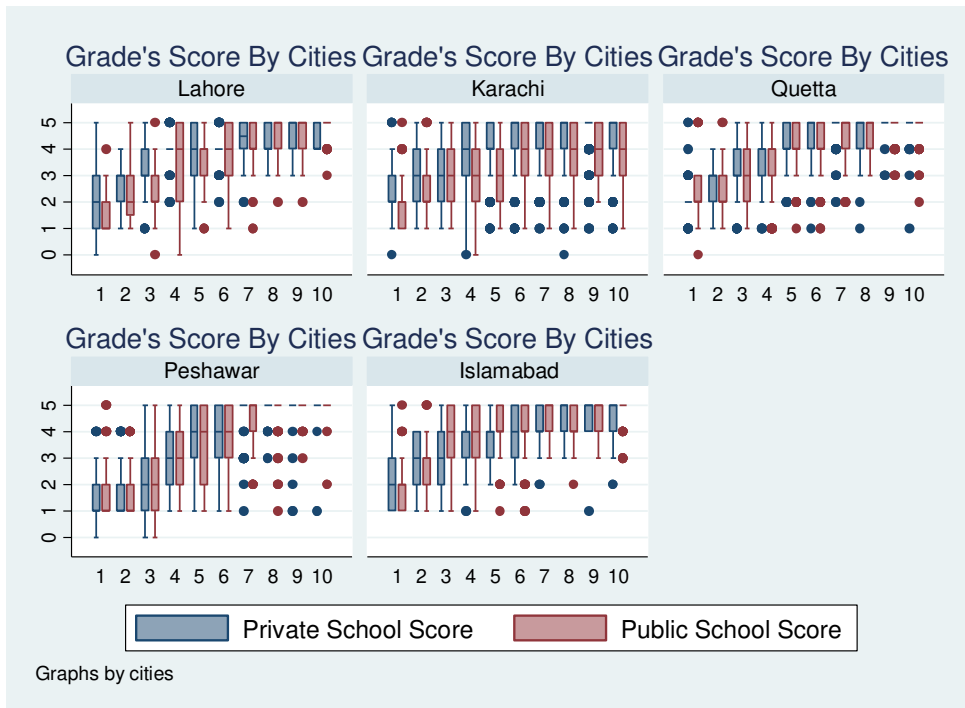


Data Source: ASER Pakistan, 2014

Figure A39: ASER – Overall Reading Score by City



Graphs by school
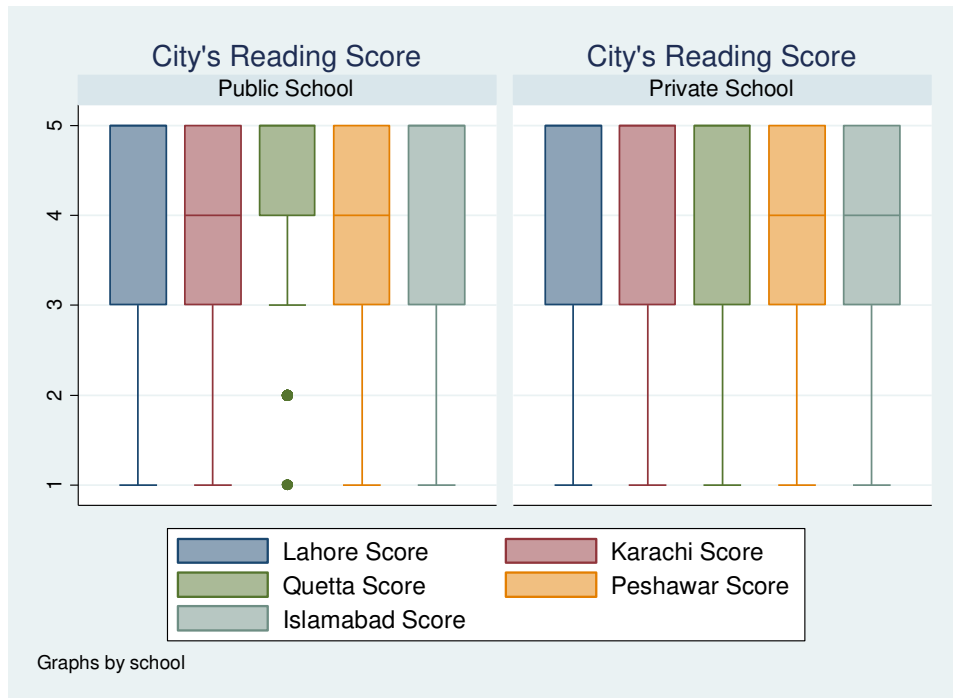
Figure A40: ASER – Reading Score by City



Graphs by cities
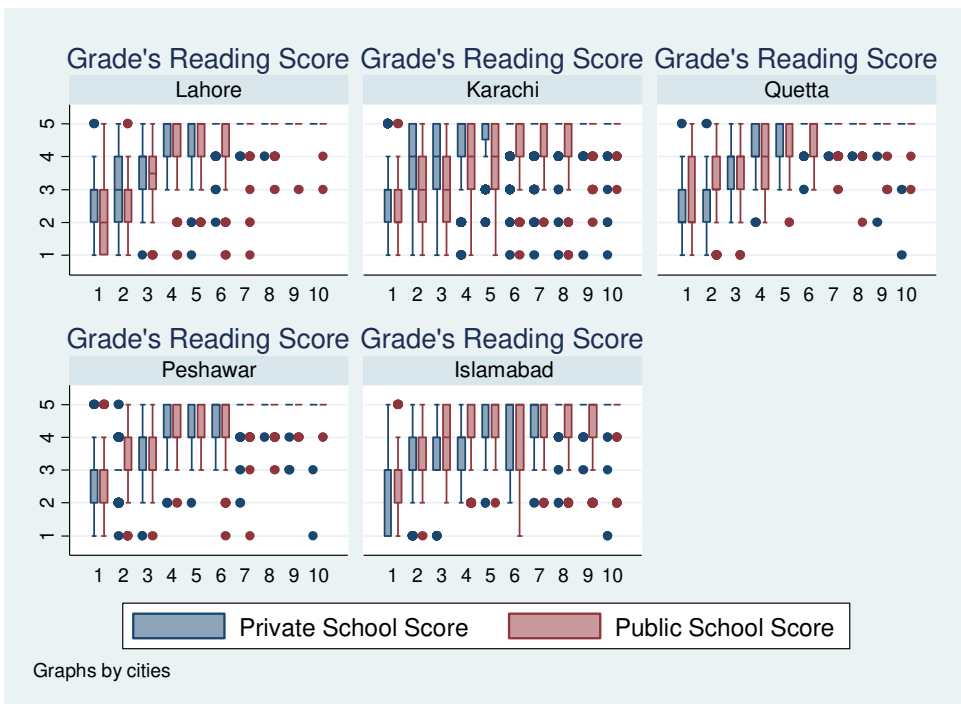
Data Source: ASER Pakistan, 2014

Figure A41: ASER – Overall Math Score by City
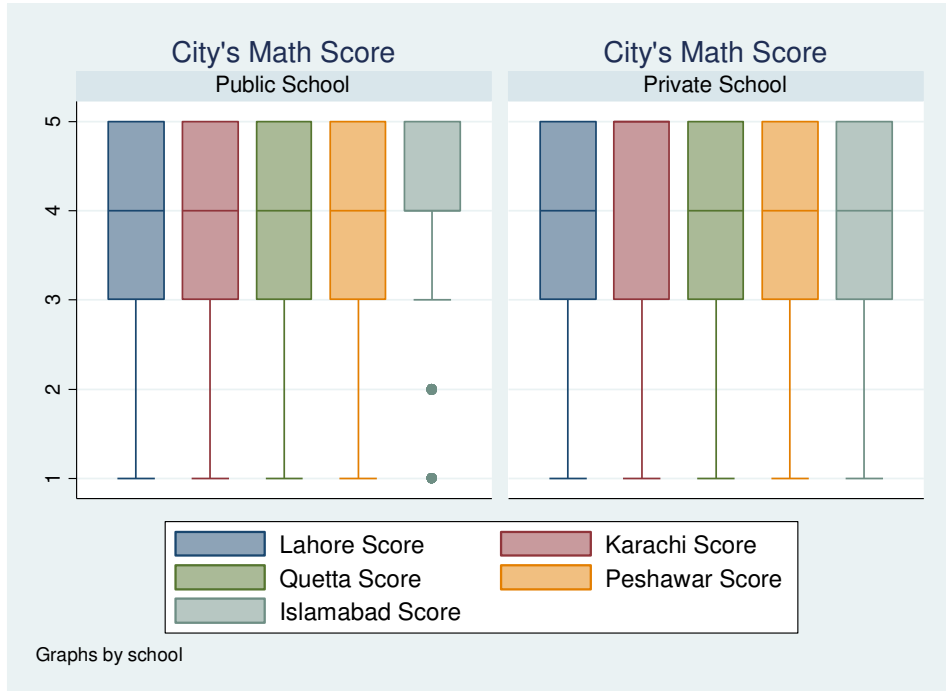


Figure A42: ASER – Math Score by City
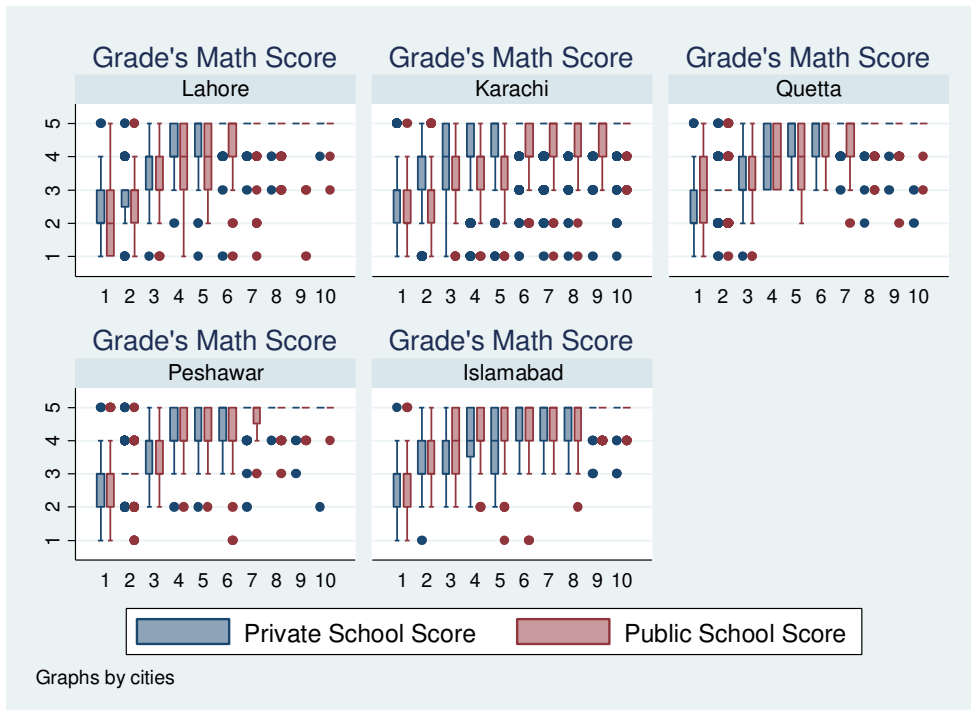


Data Source: ASER Pakistan, 2014

Figure A43: ASER – Overall English Reading Score by City
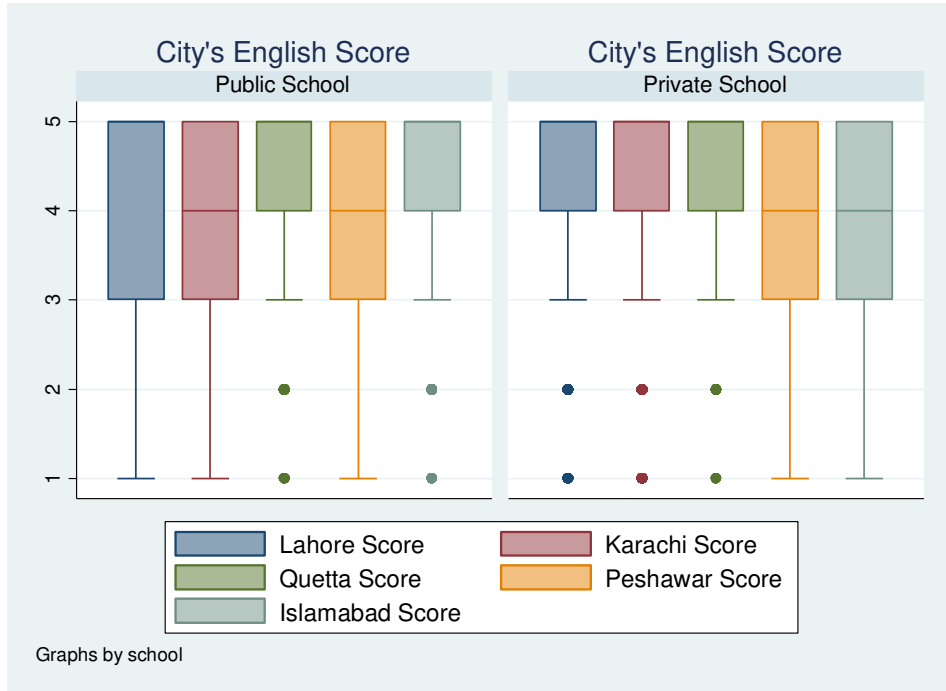


Figure A44: ASER – Reading Score by City
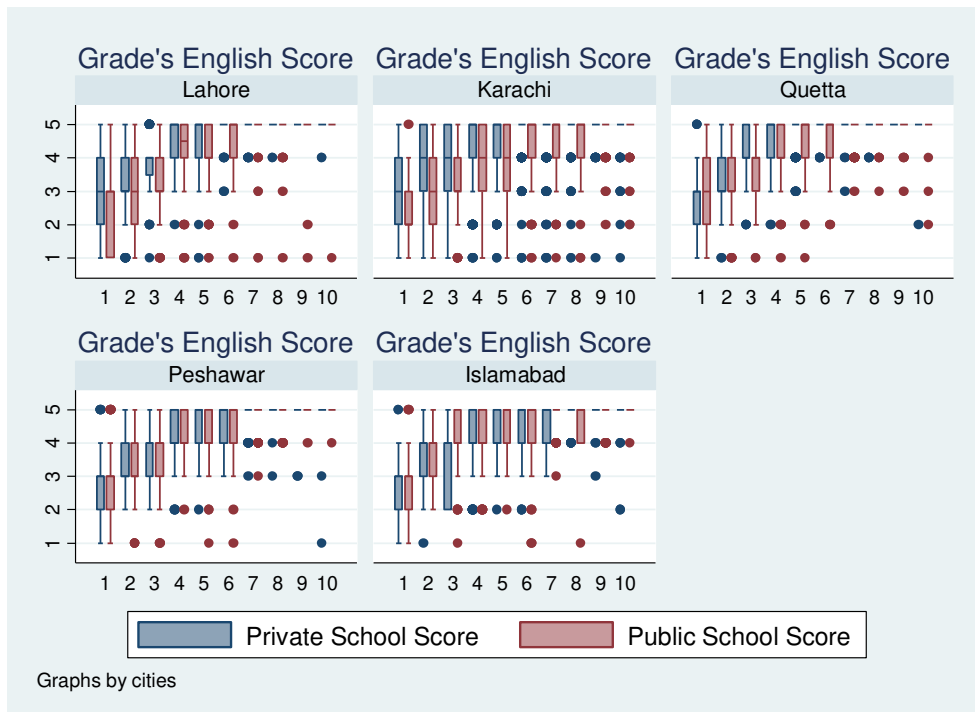


Data Source: ASER Pakistan, 2014

Figure A45: Zindagi Trust – Overall School Score (On Average)
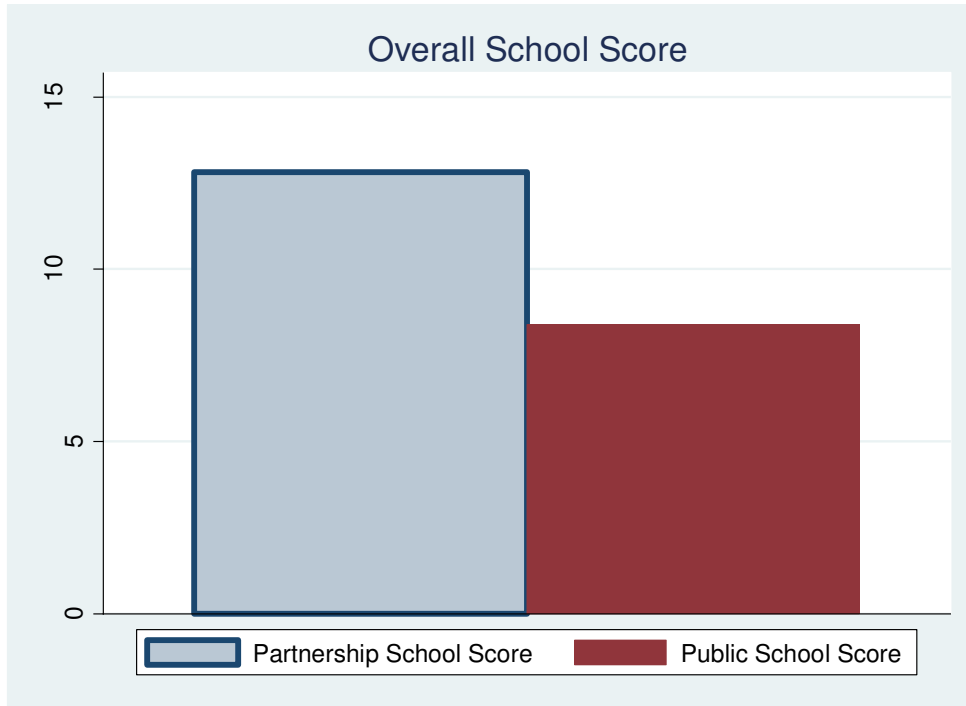


Figure A46: Zindagi Trust – School Score (On Average)
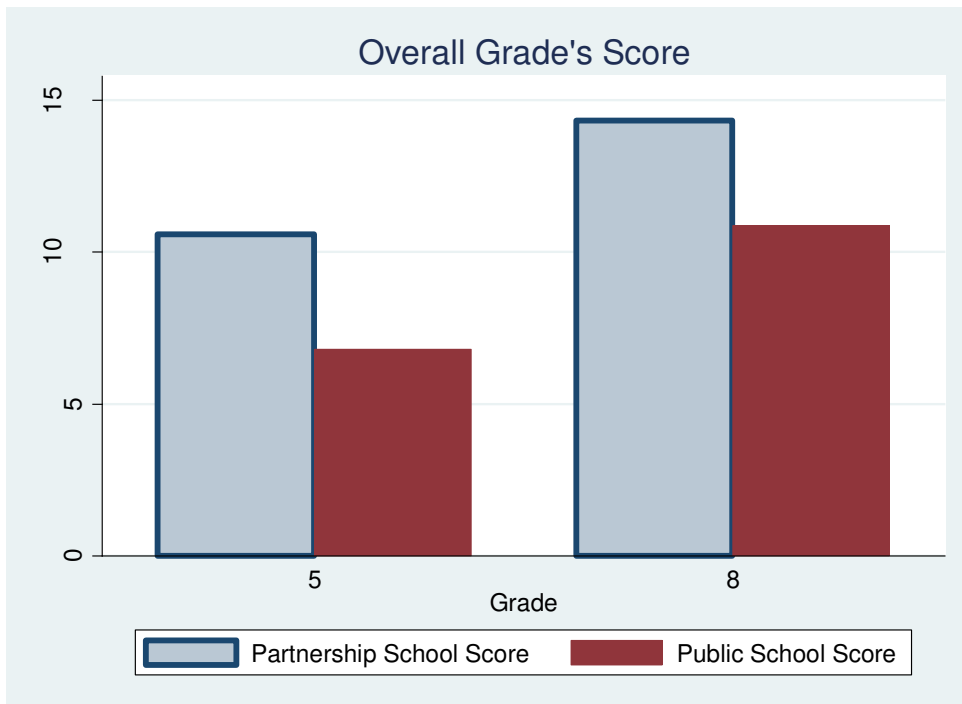


Data Source: SMB Fatima School, 2014
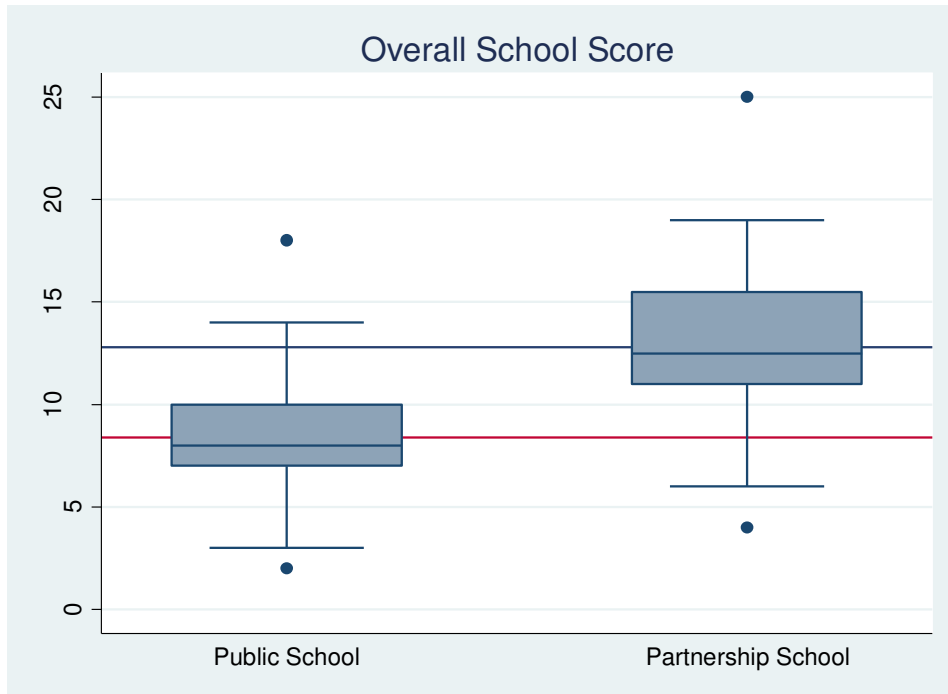
Figure A47: Zindagi Trust – Overall Math Score (On Average)
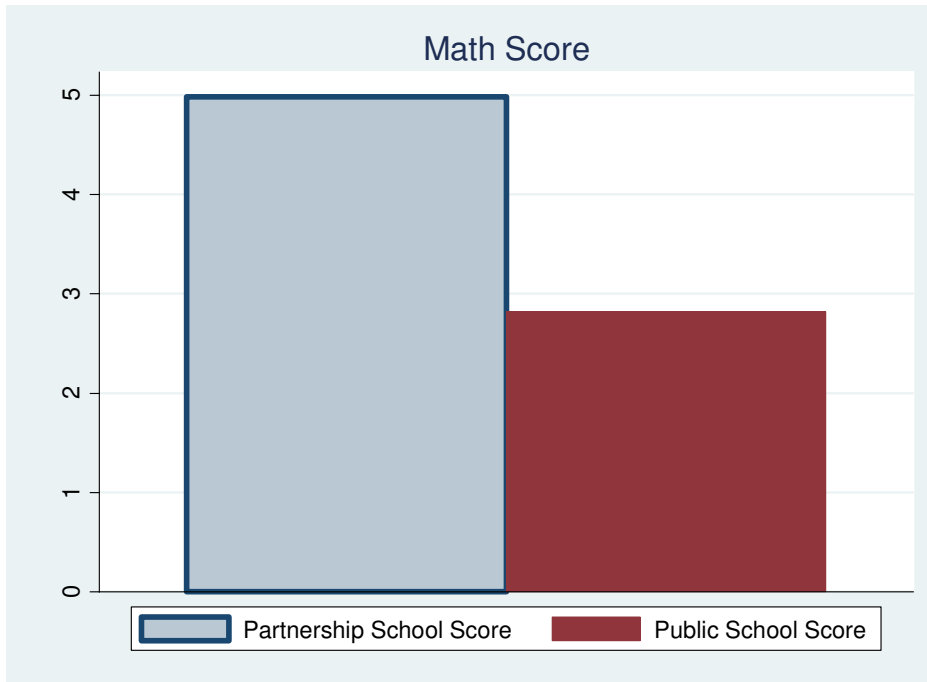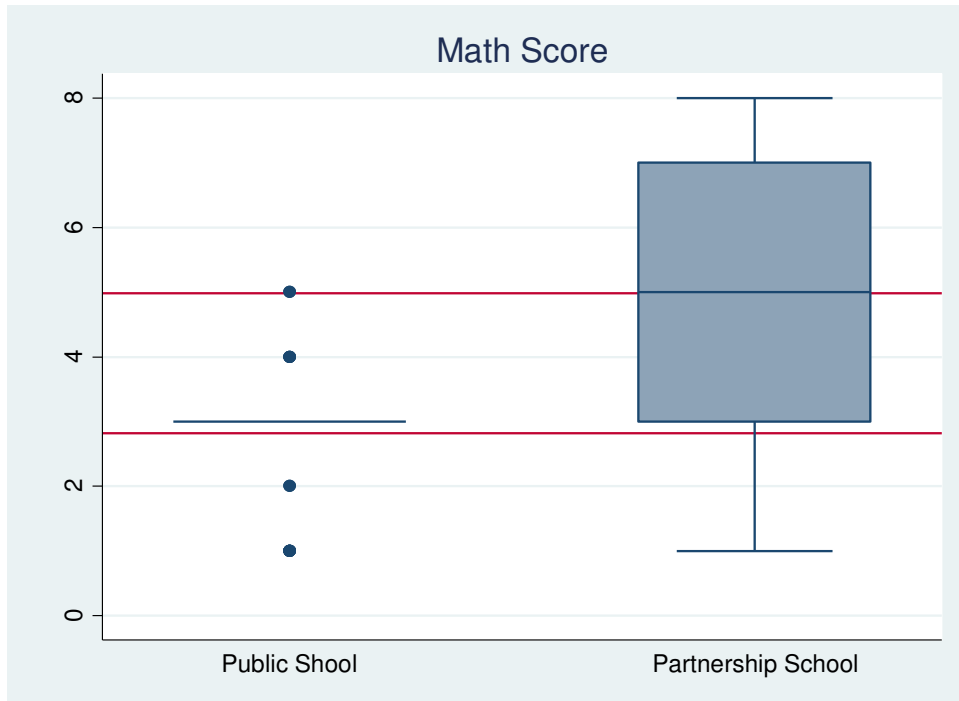


Figure A48: Zindagi Trust – Math Score (On Average)
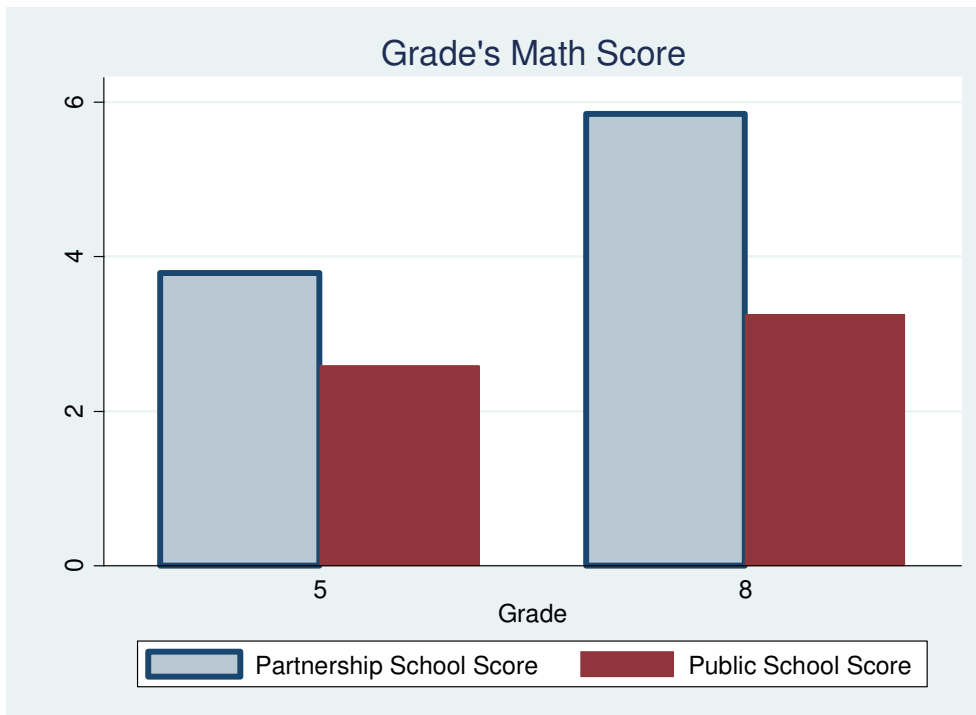


Data Source: SMB Fatima School, 2014

Figure A49: Zindagi Trust – Overall English Score (On Average)



English Score

Data Source: SMB Fatima School, 2014
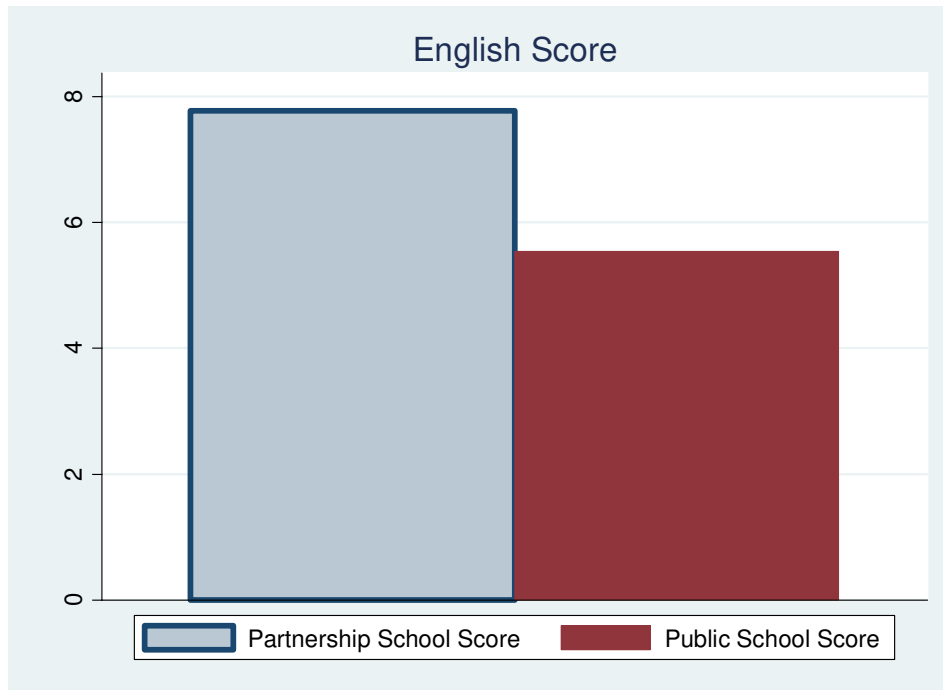
Figure A50: Zindagi Trust – English Score (On Average)



Grade's English Score
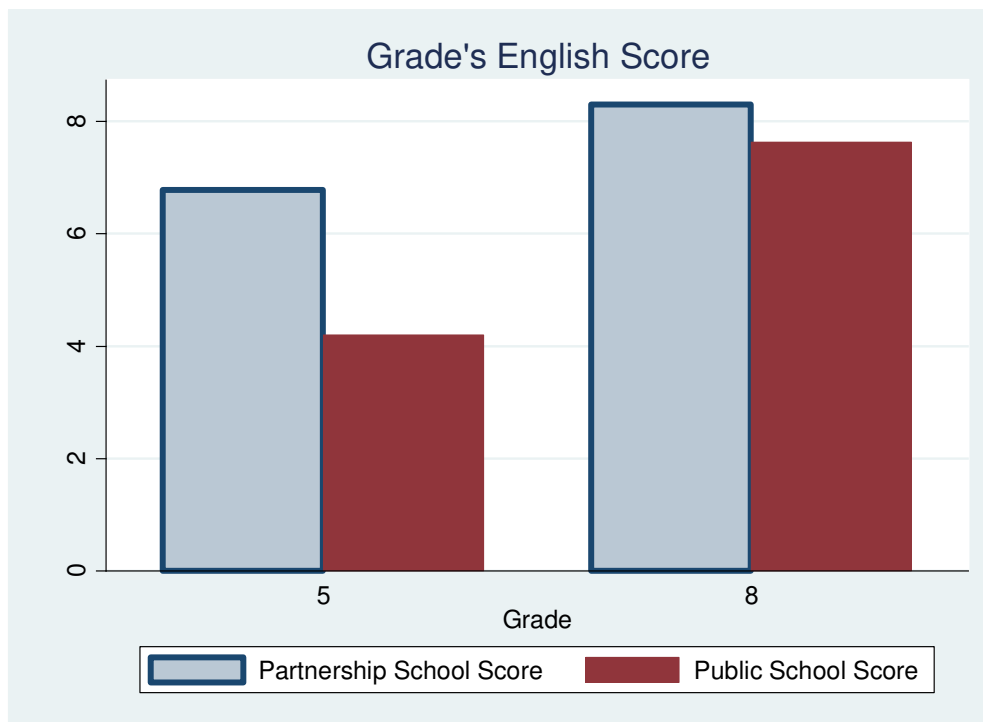
Figure A51: Zindagi Trust – Overall School Score



Data Source: SMB Fatima School, 2014

Figure A52: Zindagi Trust – School Score

Figure A53: Zindagi Trust – Overall Math Score



Figure A54: Zindagi Trust – Math Score
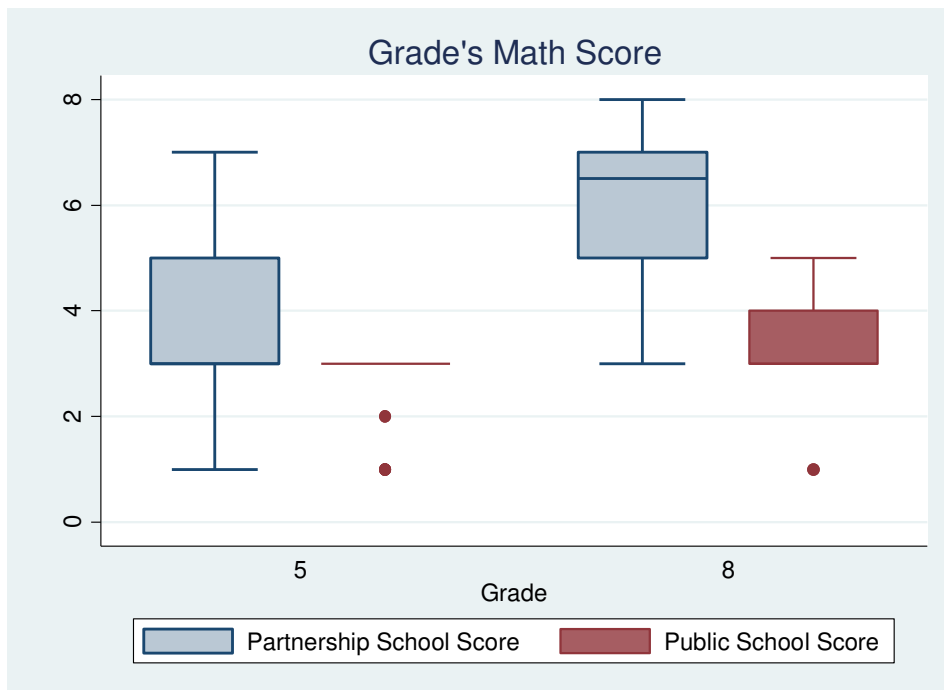


Data Source: SMB Fatima School, 2014

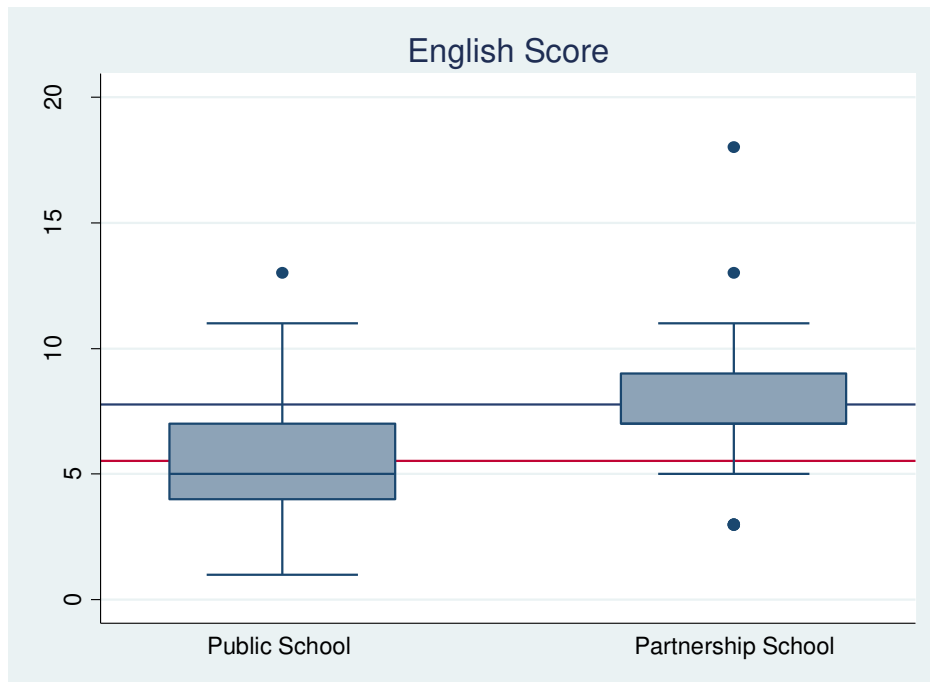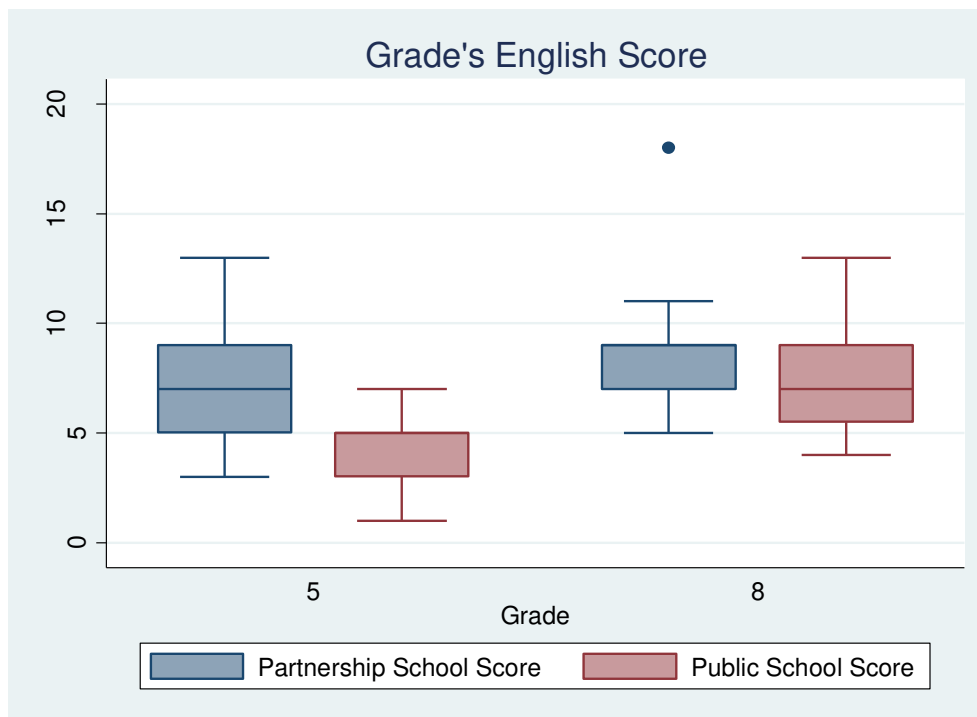Figure A55: Zindagi Trust – Overall English Score



Figure A56: Zindagi Trust – English Score



Data Source: SMB Fatima School, 2014