Impact Evaluation of Public Schools' Monitoring Program in Khyber Pakhtunkhwa Province, Pakistan

Section Choice:

1. Effects of Education Policies
2. Academic Learning in Education Settings

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Abstract

Background: Recent evidence support the idea that many interventions, which only focus school participation such as children enrollment, and attendance might not improve test scores for the average student. One important component of the school environment is teachers punctuality which greatly influence the overall performance of the schools. To what extent increasing teachers presence in school improve children performance still remains a researchable question. Moreover, developing countries are struggling to improve teachers' presence in schools through different strategies, however, evidence are inconclusive regarding the monitoring of teachers given the limited resources and number of government schools.

Purpose: To evaluates the impact of an innovative biometric (GPRS/GSM) monitoring system through smart phones implemented(in 2014) for increasing teachers' attendance and school performance in Khyber Pakhtunkhwa (KP) province, Pakistan

Setting: We attempt to find a comparable administrative unit called FATA which has not been affected by the program yet has similar socio-economic characteristics across the border with the treatment province satisfying all conditions for a valid comparison(Figure-I)

Subjects: The number of functional public sector primary and secondary schools in the treatment(KP province) are 28000 while FATA(not treated) has in total 4344 functional public sector schools.

Intervention: A landmark project called *Independent Monitoring Unit (IMU)* implemented by provincial government for over 28000 public sector primary and secondary schools in the North Western KP province in Pakistan. A large number of Monitors were hired, trained and special mobile sets were distributed among monitors with special GPRS/GSM software installed. Monitors randomly visit public school in each district of designation and are rotated(after three months) to avoid possibility of relationship bias. Upon visiting each public school, they collect school based information and mark attendance status of teachers using biometric thumb impression. The data in the central office is updated immediately and recorded using GPRS technology. Thus, there is no possibility of manipulation of teachers' attendance information at school level once monitors visit the school.

***Research Design*:** Ideal conditions for a natural experiment by utilizing an annually conducted independent and systematically random survey that enabled us to create treatment and control areas. The control region is totally not exposed to the Monitoring Program by virtue of being a different administrative unit directly controlled by the federal government. Due to being ruled by different political party, the treatment province has implement the program only within the KP province.

Data Collection and Analysis: We utilize a nationwide survey-*Annual Status of Education Report* (ASER)- that is systematically and independently conducted every year across all regions to form an ideal natural experimental setting where treatment province has a valid comparison counterpart region. ASER is a non-governmental organization that collects data regularly, in a systematically random way that has no direct or indirect influence on the intervention program. We have a

sufficient baseline datasets and private schools data which makes it possible to conduct pre-treatment and falsification test on all relevant factors affecting school-based and children related outcome(e.g table-1 & A2). Using data on 321839 children and over 5000 public sector school with household, children and school related characteristics(2012 to 2016), we firstly carry out a simple difference-in-difference analysis of the treatment and control units using. Next we attempt to instrument teachers attendance at school using the IMU as an instrument to check the effect on the test performance(conducted at home) on the enrolled children.

Findings: Monitoring of government schools through trained monitors equipped with special GPRS/GSM technology has improved teacher's attendance by nearly 8% in the year immediately following the program while the effect decreases by nearly half after two years of the program introduction(table-2). We find the program's direct effect on the enrolled children's test performance at home(table-3). Enrolled children's standardized Reading, Math and English ability has improved significantly at 0.13, 0.14 and 0.15 standard deviation points respectively at the lower(0-5) grades. Higher grade (6-10) children standardized Reading, Math and English ability has a slight improvement. We find no significant effect of the program on children test performance through teachers attendance, although positive. We also check the program impact on the enrollment status of children and children attendance at schools. The results are robust on different specification and sub-samples of schools districts clusters.

Conclusion: The results imply a strong effect of technology assisted monitors on the teachers attendance, however, how long such effect sustain depends on complementary measures that link teachers' performance with children performance. The effect on enrolled children's performance shows positive effect of the school monitoring program on children(could be indirectly attributable to teachers attendance). The positive effect on the enrollment status imply a positive change in the behavior of parents in an area which suffered from high drop-out rate at early grades.

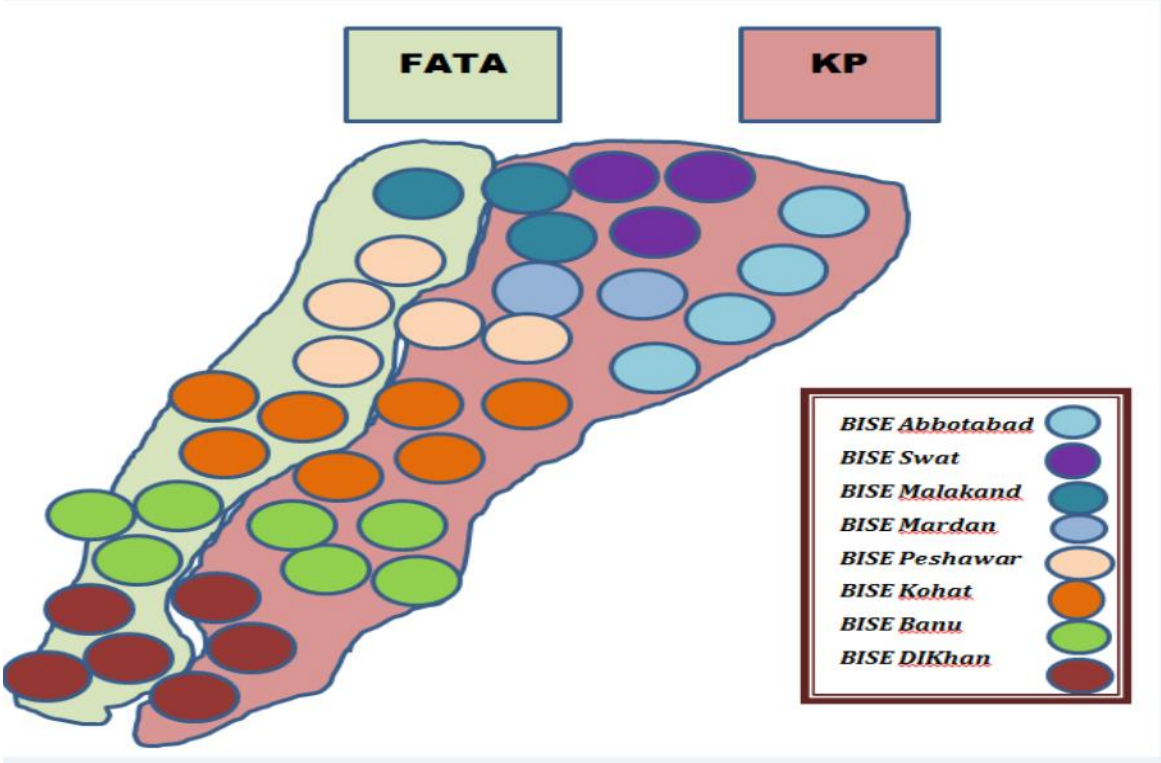

Figure I: Distribution of districts under Education Boards in KP(treatment) and FATA(control) (Source: Authors' own work)

Table -1: Pre-Program Trends of Teachers Attendance in Public Schools

Dep. Var: Teachers Attendance	Post=2013	Post=2014
DiD (Treatment*Post)	0.0264	-0.0201
	(0.0230)	(0.0173)
Post	-0.0131	0.0257*
	(0.0190)	(0.0153)
Treatment(KP)	-0.132**	-0.0917*
	(0.0642)	(0.0502)
School Teaching Quality	0.0359	0.0327**
	(0.0225)	(0.0166)
School Training Quality	0.00330	0.0223
	(0.0268)	(0.0185)
Urban	0.160***	0.0953*
	(0.0587)	(0.0554)
Old_schools	0.00565	-0.00121
	(0.0138)	(0.0103)
School Size	0.0861	0.128***
	(0.0579)	(0.0423)
Schools Facilities Controls	YES	YES
District FE	YES	YES
Year FE	YES	YES
Constant	0.838***	0.837***
	(0.0417)	(0.0317)
Observations	1,933	2,967
R-squared	0.074	0.060

Notes: Table-1 reports Pre-Program trend between KP provice(treatment) and FATA(control) on teachers attendance. Column (1) represent Post=2013 vs Pre=2012 while column (2) represent Post=2014 vs Pre=2012-13. The outcome variable is the ratio of teachers present in school to the total appointed teachers. District and year fixed effect is applied in each regression. Variables *School Teaching Quality* and *School Training Quality* are continuous variables showing the ratio of teachers with masters degree and specific training level to the total appointed teachers in each school. *School Facilities controls* include availability of water, boundary, toilet, library, playground, laboratory, computer and internet . *School Size* is a continuous variable representing the ratio of children enrolled in surveyed school to the school with highest number of enrolled children. The data is taken from the ASER-Pakistan School Survey. Standard errors clustered at village level are shown in parentheses. The unit of observation is the surveyed government school. Statistical significance at the 1, 5, 10% levels are indicated by ***,**, and *, respectively.

Table-2: Program Effect on Teachers' Attendance

Dep. Var: *Teachers_Attendance*	Post=2015(a)	Post=2015(b)	Post(a)	Post(b)
DiD (Treatment*Post)	0.0756***	0.0665***	0.0344**	0.0256
	(0.0151)	(0.0172)	(0.0140)	(0.0162)
Post	-0.00163	0.00415	-0.0347**	0.0328**
	(0.0144)	(0.0152)	(0.0160)	(0.0145)
Treatment(KP)	-0.117***	-0.131***	-0.0372	-0.0390
	(0.0399)	(0.0442)	(0.0410)	(0.0439)
School Teaching Quality	0.0344***	0.0375**	0.0278**	0.0301**
	(0.0125)	(0.0150)	(0.0111)	(0.0127)
School Training Quality	0.0129	-0.00375	0.0167	0.00607
	(0.0143)	(0.0182)	(0.0125)	(0.0147)
Urban	-0.0303	0.0620	0.00645	0.0159
	(0.0469)	(0.0408)	(0.0310)	(0.0346)
Old_schools	-0.00379	0.000548	-0.00650	-0.00469
	(0.00785)	(0.00919)	(0.00751)	(0.00863)
School-Size	0.0945***	0.0460	0.0789**	0.0368
	(0.0357)	(0.0448)	(0.0351)	(0.0433)
Schools Facilities Controls	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Constant	0.884***	0.880***	0.846***	0.839***
	(0.0295)	(0.0302)	(0.0344)	(0.0350)
Observations	4,053	3,019	4,953	3,919
R-squared	0.066	0.075	0.054	0.055

Notes: Table-2 shows the main effect of the monitoring program on teachers attendance. Column (1) & (2) represent Post=2015 while Pre=2012-2014(1) & Pre=2012-2013 respectively. Similarly column (3) & (4) represent Post=2015-2016 while Pre=2012-14(1) & Pre=2012-13(2) respectively. The outcome variable is the ratio of teachers present in school to the total appointed teachers. District and year fixed effect is applied in each regression. Variables *School Teaching Quality* and *School Training Quality* are continuous variables showing the ratio of teachers with masters degree and specific training level to the total appointed teachers in each school. *School Facilities controls* include availability of water, boundary wall, toilet, library, playground, laboratory, computer and internet . *School Size* represent the ratio of children enrolled in surveyed school to the school with highest number of enrolled children. The data is taken from the ASER-Pakistan School Survey. Standard errors clustered at village level are shown in parentheses. The unit of observation is the surveyed government school. Statistical significance at the 1, 5, 10% levels are indicated by ***,**, and *, respectively.

Table-3:Program Effect on Normalized Test Score [Post=2015 vs Pre==2012-14] Grade-0 to Grade-5

	std_reading	*std_math*	*std_english*
DiD(KP*Post)	0.130**	0.140***	0.150***
	(0.0524)	(0.0478)	(0.0508)
Post(=2015, Pre=2012-14)	0.0310	-0.00182	0.00452
	(0.0478)	(0.0418)	(0.0450)
Treatment(KP)	-0.169**	-0.395***	-0.275***
	(0.0850)	(0.0787)	(0.0819)
Child Age	0.0847***	0.0722***	0.0674***
	(0.00814)	(0.00749)	(0.00737)
Mother Highest Class Completed	-0.00139	-0.00102	0.000449
	(0.00238)	(0.00214)	(0.00229)
Father Highest Class Completed	0.00103	0.00150	0.00161
	(0.00157)	(0.00155)	(0.00158)
House-ownership	0.0737***	0.0367	0.0219
	(0.0256)	(0.0242)	(0.0261)
Private Tutoring	0.196***	0.154***	0.160***
	(0.0407)	(0.0380)	(0.0426)
Other Family Characteristics	YES	YES	YES
District FE	YES	YES	YES
Year FE	YES	YES	YES
Grade FE	YES	YES	YES
Constant	-0.431***	-0.0736	-0.0709
	-0.0779	-0.0703	-0.0751
Observations	60,308	60,082	60,076
R-squared	0.067	0.067	0.070

Notes: Table-3 reports the main DiD treatement effect of KP province (treatment) and FATA(control) on the *children reading, math and english* standardized test score for Post=2015 vs Pre=2012-14. The data is from the ASER Household Survey. Standard errors clustered at village level are shown in parentheses. The unit of observation is surveyed child enrolled in government school Grade-0 to grade-5(3 to 16 years age). The dependent variable is the ***normalized reading score by grade***. FE on individual grade, District and year applied in each regression. Variables Mother and *Father Years of education* controls for the number of years of parents education. Private tutoring is dummy(=1 if the child receives paid tutoring other than government school) . Other Family characteristics include number of children , house condition, mobile and television availability. Statistical significance at the 1, 5, 10% levels are indicated by ***,**, and *, respectively.

Table -A2: Falsification Test on Private School Data

Dep. Var Teachers_Attendance	Post=2015(a)	Post=2015(b)	Post(a)	Post(b)
DiD (Treatment*Post)	0.000348	-0.0196	-0.0244	-0.0473
	(0.0335)	(0.0375)	(0.0257)	(0.0298)
Post	0.0535	0.0696*	0.0755***	0.0684**
	(0.0338)	(0.0368)	(0.0274)	(0.0293)
Treatment(KP)	0.335***	0.258	0.0967***	0.322***
	(0.0310)	(0.189)	(0.0368)	(0.0322)
School Teaching Quality	0.0348*	0.0239	0.0364*	0.0292
	(0.0190)	(0.0225)	(0.0198)	(0.0234)
School Training Quality	-0.00510	0.00115	-0.00739	-0.00506
	(0.0244)	(0.0322)	(0.0239)	(0.0304)
urban	0.0166	0.0408	0.00401	-0.0332
	(0.0297)	(0.0311)	(0.0276)	(0.0407)
old_schools	-0.0232	-0.0260	-0.0262	-0.0276
	(0.0198)	(0.0220)	(0.0193)	(0.0214)
enrollment	0.0768*	0.0530	0.0874**	0.0718
	(0.0402)	(0.0507)	(0.0395)	(0.0488)
Schools Facilities Controls	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Constant	0.511***	0.576***	0.776***	0.545***
	(0.0267)	(0.189)	(0.0346)	(0.0297)
Observations	1,674	1,292	1,944	1,562
R-squared	0.064	0.100	0.057	0.081

Notes: Table-A2 reports the falsification test of the monitoring program on teachers attendance using private school data. We run the same specification of our main effect on the private school data to see any systematic trend in the teachers attendance of private school data. Column (1) & (2) represent Post=2015 while Pre=2012-2014(1) & Pre=2012-2013 respectively. Similarly colum (3) & (4) represent Post=2015-2016 while Pre=2012-14(1) & Pre=2012-13(2) respectively. The outcome variable is the ratio of teachers present in school to the total appointed teachers. District and year fixed effect is applied in each regression. Variables *School Teaching Quality* and *School Training Quality* are continuous variables which show the ratio of teachers with masters degree and specific training level to the total appointed teachers in each school. *School Facilities controls* include availability of water, boundary, toilet, library, playground, laboratory, computer and internet . *Enrollment* is a continuous variable representing the ratio of children enrolled in surveyed school to the school with highest number of enrolled children. The data is taken from the ASER-Pakistan School Survey. Standard errors clustered at village level are shown in parentheses. The unit of observation is the surveyed private school. Statistical significance at the 1, 5, 10% levels are indicated by ***,**, and *, respectively.