

Distance and Accountability in Schools

Shekhar Mittal

1 Abstract

With school enrollments levels already around 96% in India, the next challenge in elementary education is ensuring quality of learning outcomes which in turn would lead to reduced drop outs. More than 80% of school going children still rely on government schools and therefore determining the factors that impact accountability and monitoring in government schools continues to be an important question. In this study I try to analyze the effect of distance from the administrative headquarters of a government school on school related quality indicators and thereby on learning outcomes. I try to analyze these effects using a one time pan-India survey. I show that average village wealth indicators decline as the distance from the district HQ increases. Even after controlling for village level wealth, there are certain quality indicators such as vacancy ratio and pupil teacher ratio which decline in government schools as they go further away from the HQ. Importantly this result is absent in private schools. However, one of the indicators which could have convincingly proven our hypothesis - the percentage of staff members actually present during the day of the interview does not show any significant trend. Relying only on the analysis of the dataset at hand, the results are inconclusive!

2 Introduction

Elementary education has received much attention in both the policy and research domain in India over the last couple of decades. The Government of India launched the Sarva Shiksha Abhiyan in 2001-02. It is a federally administered program which began with an emphasis on increasing enrollments in government schools. Besides opening schools, adding classrooms, and recruiting teachers, other schemes such as providing free books, free uniforms and free lunches were created to lure parents into sending their kids to school. While there are question marks on the quality of implementation of such schemes, all this effort has resulted in the increase of student enrollment levels. One of the largest annual rural surveys (for the year 2012) run by a private NGO says that over 96% of the children in the age group 6-14 are enrolled in school.¹ Moreover, the enrollment figures have been consistently more than 96% for the last 4 years.

Despite very high enrollment levels, learning outcomes continue to remain a challenge. More than half of the children in grade V can not read grade II level text. About 75% of the children enrolled in grade V can not do simple division level problems. Therefore, the next challenge lies in increasing returns to elementary education by improving the learning levels. The approach in this regard has been mostly input driven. One of the major steps the government of India has undertaken in the recent past has been the legislation of the Right of Children to Free and Compulsory Education Act in 2009 which made elementary education a fundamental right for every child between 6 and 14 years of age. The Act lays down clear norms which schools need to achieve in order to receive government recognition. Among other things, the norms relate to schools having libraries, play grounds, appropriate pupil teacher ratios.

A key missing feature of the legislation is the lack of focus on fixing accountability. Whether it is unavailability of a school in a particular neighborhood, or a school not having usable toilets, or teachers in a school not delivering the quality of education which is expected of them, the Act does not pin point the specific authority/person responsible for such basic deliverables.

Simultaneous to the effort made being made by the federal and state level governments, another phenomena being observed in India has been the emergence of the privately owned schools. The percentage of 6 to 14 year olds enrolled in private schools in rural India has risen from 18.7% in 2006 to 28.3% in 2012.² The distinguishing feature of these private schools is their direct accountability to parents and therefore their need to be more in control of the day to day functioning. Head teachers in private school are much more likely (and able) to take disciplinary action against shirking teachers than their counterparts in the public schools. Kremer et. al found that only 1 head teacher in the nearly 3000 public schools they surveyed reported ever dismissing a teacher for repeated absence.

On the other hand, 35 head teachers in a sample of around 600 private schools reported having at some point dismissed a teacher for repeated absence and so shirking teachers in the private sector are around 175 times more likely to have disciplinary action taken against them. Teachers in private schools tend to belong to the same community and so tend to travel less and have a greater stake in the welfare of the community. Teachers in government rural schools usually travel to work

¹ASER 2012

²Again from ASER 2012

and do not have similar incentives or accountability.

The degree of decentralization is a key difference between the management structure of private and government schools. Private schools tend to be highly decentralized: School leaders exert greater control over the performance of teachers, leaders are more responsive to parents' demands, teachers come mostly from local communities, schools depend on fees collected from students to take care of the expenses.

On the other hand, government school administration is centralized, where control and pressure comes from the top. School leaders are answerable to block level officers. Block level officers report to district level officials who subsequently report to departments in the state capital. Funding for government schools also follows a similar route. Teachers may come from distant places to a greater extent³. The result is that schools do not feel the need of being directly accountable to parents for results.

So in such a centralized setup, how important is the ease of monitoring? One could imply that it is easy to monitor schools that are physically closer to the administration than the ones who are not. Also government school teachers probably have a strict preference of schools which are conveniently located as supposed to schools which require considerable unease of accessibility. It may be easier for teachers to get away from schools as it becomes difficult to monitor the schools. In a centrally administered setup, monitoring becomes difficult as the distance from the district head quarter increases. Therefore the interesting question is that do school quality and thereby student quality indicators show a decline as the distance from the district headquarter increases? In other words, can the distance from the district HQ be used as a proxy for measuring monitoring level in government institutions? At the same time, distance should not matter as much in private institutions because private schools are decentralized.

However, there is sorting of population that occurs on the distance from the district headquarters. Households which live closer to the district are on average economically and socially better off compared to the households which live further away from the district headquarters. Subsequently, it becomes difficult to disentangle the effect of increasing difficulty in monitoring from the decreasing wealth of the population as the distance of the village in which the school is located increases.

I get around this problem by using the factor analysis approach to create an index which acts as a proxy for village wealth. One can imagine that villages which are far off, but are wealthier, impose greater pressure on government schools to perform and also the teachers are more willing to report for duty in such locations as compared to locations which are poorer and far off.

Private-school teacher salaries are typically one-fifth the salary of regular public-school teachers (and are often as low as one-tenth of these salaries). This enables the private schools to hire more teachers, have lower pupil teacher ratios, and reduce multi-grade teaching. Private school teachers are significantly younger and more likely to be from the same area as their counterparts in the

³In a small conversation with a renowned education researcher, I was told that one of the key features that was removed from the Right to Education Act was the requirement that all the teachers in a rural government school will belong to nearby communities.

public schools. They are 2-8 percentage points less absent than teachers in public schools and 6-9 percentage points more likely to be engaged in teaching activity at any given point in time. They are more likely to hold a college degree than public-school teachers, but are however much less likely to have a formal teacher training certificate. Children in private school have higher attendance rates and superior test score performance, with the latter being true even after controlling for family and school characteristics. (Kremer et. al)

Another study indicates that higher-ranking and more powerful providers, such as headmasters, are absent more often than lower-ranking ones; Men are absent more often than women. Teachers from the local area are absent less often. They find little evidence that pay strongly affects absence; by contrast, they find evidence that the quality of infrastructure at the facility has a role. This finding is consistent with the idea that teachers and health workers are extremely unlikely to be fired for absence, but that their decisions about whether to go to work are influenced by the working conditions they face.(Chaudhury et. al)

In this paper, I try to analyze the effect of increasing distance from the district headquarters on school education related outcomes. I analyze indicators related to both a school as well as an individual. As the distance from the headquarters increases the quality indicators of the villages indicate a downward trend. Similarly the household level education indicators - related to both the inputs as well as learning levels also show a downward trend. The results if we interact the distance with wealth index are positive and significant.

When it comes to schools, some of the quality indicators, which can be linked to ease of monitoring, of government schools are negative and significant with distance from the district headquarters. Indicators of quality such as teacher vacancy ratio, pupil teacher ratio etc deteriorate as we go further away from the district headquarters. A similar effect is absent from the private schools. However, a major test that would have rejected the null hypothesis that distance does not matter is insignificant. The major indicator that I tried was the percentage of teachers that were actually present in the school on the day of the interview. Considering the limitations of the data: non-experimental setup, non-panel data for only one year etc., there is nothing much that I can do at this point. The results are inconclusive.

3 Data

3.1 Data Description

For this paper I rely on the data from the India Human Development Survey (IHDS) 2005. The dataset is made available by the National Council of Applied Economic Research (NCAER), New Delhi, and the University of Maryland with particular focus on the issues related to human development. The IHDS is a nationally representative survey of 41,554 households in 1503 villages and 971 urban neighborhoods across India. These households include 215,754 individuals. The IHDS was conducted in all states and union territories of India except Andaman and Nicobar Islands, and Lakshadweep. These states include 384 districts, 1503 villages and 971 urban blocks located in

276 towns and cities. Villages and urban blocks form the primary sampling unit (PSU) from which the households are selected. Urban and rural PSUs are selected using a different design (Desai et al.).

For this paper I consider only the top 15 states of India. I do this because it may be the case that in the smaller states there are other omitted variables that come into play. The smaller states may also have special rules and policies that are applicable only to them. It seems safer to use only the main states of India for our analysis. The survey also has detailed information on village characteristics. After dropping the non-major states, we have 1319 villages in our sample which still have atleast 1 school present whose quality indicator we are using in our sample.

The survey has information on household characteristics: household residence (rural or urban), household size, membership of a social group, and religion; individual characteristics: age, education (number of standard years completed), gender, marital status and relation to the household head. The survey also has information on occupation, industry, number of hours work in a usual day and wages and salaries of individuals, and the principal source of income for the household. The components of household income include farm income, income from interests (or dividend or capital gains), property, pension, income from other sources etc. A household belongs to one of the following social groups: Scheduled Caste (SCs), Scheduled Tribe (STs), Other Backward Classes (OBCs) and Others.¹⁰ The dataset provides additional information: whether an individual failed or repeated a class, whether he/she can converse in English and his/her division in secondary board examination.

For our school level analysis, the survey has information on 1343 government primary schools and 1057 private primary schools.

3.2 Descriptive Statistics

3.2.1 Villages

In our sample, there are 710 households in a village on average, mostly all of them have a government primary as well as private primary school. They are on an average 44.7 kilometres away from the district headquarters. Around 67.5% of the households in these villages have access to electricity. 81.5% of the villages have access to a landline telephone service and 62.6% have access to a mobile telephone service. Average distance to the nearest railway station is 23.3 kilometers. Table 1 presents all the detailed village related summary statistics.

Table 1: Summary statistics for villages

VARIABLES	N	mean	sd	min	max
Total Population (Categorical Variable)	1,315	1.963	0.667	1	3
Total households	1,315	710.5	1,049	4	9,035
Village area (Hectares)	1,313	884.1	1,060	0	8,500
No. of people from outside village who work here (annualy)	1,313	0.714	0.908	0	2
Number of people leave for seasonal work	1,318	133.8	372.0	0	5,425

No. of govt primary schools (I-V)	1,316	1.771	1.665	0	18
No. of private primary schools (I-V)	1,316	0.804	1.741	0	20
Kilometers to nearest primary school (if not in village)	1,304	0.0567	0.624	0	19
Distance to nearest town (in 10kms)	1,317	1.408	1.110	0.100	8.500
Distance to district HQ (in 10kms)	1,319	4.476	2.705	0.200	13.50
Village Accessible by road (dummy)	1,318	1.622	0.583	0	2
Distance from pucca road (in kms)	1,315	1.557	4.118	0	50
Road usable during monsoon	1,254	0.824	0.381	0	1
Percentage households with electricity	1,318	67.53	33.93	0	100
Village access to landline telephone service	1,318	0.815	0.417	0	6
Village access to mobile telephone service	1,314	0.626	0.484	0	1
Distance to the closest railway station (in kms)	1,260	23.31	21.03	0	96
Distance to the closest fair price shop [In village=00]	1,318	0.908	2.284	0	30
Distance to the closest bank [In village=00]	1,318	0.455	0.530	0	5
Mahila mandal in the village (dummy)	1,319	0.478	0.500	0	1
Self-help groups in the village (dummy)	1,319	0.633	0.482	0	1
Number of people who leave for seasonal work (categorical variable)	1,319	0.632	0.589	0	3
Percentage of population which is SC/ST (backward)	1,286	29.75	27.29	0	100
A dummy if the majority village population is backward	1,319	0.200	0.400	0	1
Village has piped water (dummy)	1,319	0.389	0.488	0	1
Number of Group	249	249	249	249	249

3.2.2 Schools

On average 196 students are enrolled in each of the 1343 government rural primary schools. Out of these 196 students, 165 usually attend. These schools usually have around 4.5 classrooms each. 66% of these schools have a playground. Only 41.8% of the schools have a kitchen for cooked meals. Average full time teacher strength in government schools is 4.2 with number of unfilled positions being around 0.95. The average pupil teacher ratio is 57.15. Total staff strength is 5.3 with 85.8% of the staff members being present on the day that the interview was conducted in these government schools. Table 2 presents all the detailed government school related summary statistics.

Table 2: Summary statistics for government schools

VARIABLES	N	mean	sd	min	max
No. of Students Enrolled	1,343	195.9	153.4	6	1,701
No. of enrolled who attend	1,336	165.1	120.5	2	1,200
No. of Girls Enrolled Who Attend	1,329	81.96	63.83	0	532
Quality of Free Meal or Food	1,343	2.477	0.951	0	3
Frequency of Cooked Meal	1,343	3.281	1.166	1	4
No. of Classrooms	1,342	4.494	2.780	0	26
Play Grounds	1,343	0.665	0.472	0	1
Kitchen for Cooked Meals	1,343	0.418	0.493	0	1

Cook	1,343	0.816	0.388	0	1
Number of full time teachers	1,342	4.210	2.883	1	30
Number of part time teachers	1,342	0.330	0.830	0	12
Number of unfilled positions	1,342	0.958	1.449	0	10
Pupil Teacher Ratio	1,342	57.15	53.28	3.500	567
Student Attendance Ratio	1,336	0.866	0.134	0.0654	1.139
Student Attendance Ratio (Girls)	1,329	0.432	0.138	0	1
Faculty vacancy ratio	1,342	0.389	0.711	0	8
No of boys who attend	1,328	83.25	70.51	0	1,141
Sex ratio	1,308	1.329	2.695	0	61
Total staff	1,341	5.315	3.094	1	16
Total staff present	1,341	4.518	2.996	1	16
Ratio of total staff present	1,341	0.858	0.232	0.0909	1
Number of Group	248	248	248	248	248

On average 205 students are enrolled in each of the 1057 private rural primary schools. Out of these 205 students, 189.2 usually attend. These schools usually have around 6.2 classrooms each. 75% of these schools have a playground. Average full time teacher strength in government schools is 6.5 with number of unfilled positions being around 0.29 only. The average pupil teacher ratio is 32.26. Total staff strength is 6.92 with 87.4% of the staff members being present on the day that the interview was conducted in these government schools. Table 3 presents all the detailed private school related summary statistics.

Table 3: Summary statistics for private schools

VARIABLES	N	mean	sd	min	max
No. of Students Enrolled	1,072	204.7	181.7	10	1,763
No. of enrolled who attend	1,069	189.2	175.2	8	1,750
No. of Girls Enrolled Who Attend	1,065	83.62	85.98	0	1,348
No. of Classrooms	1,073	6.119	3.646	0	30
Play Grounds	1,073	0.747	0.435	0	1
Number of full time teachers	1,074	6.532	3.951	1	30
Number of part time teachers	1,074	0.209	0.972	0	15
Number of unfilled positions	1,074	0.287	1.046	0	10
Pupil Teacher Ratio	1,072	32.26	20.91	3.333	230
Student Attendance Ratio	1,069	0.925	0.290	0.0753	9.865
Student Attendance Ratio (Girls)	1,064	0.403	0.153	0	3.764
Faculty vacancy ratio	1,074	0.0610	0.224	0	3
No of boys who attend	1,063	105.5	101.7	0	1,056
Sex ratio	1,061	0.911	0.912	0	18
Total staff	1,072	6.918	3.489	1	19
Total staff present	1,072	6.045	3.590	1	19
Ratio of total staff present	1,072	0.874	0.235	0.0625	1
Number of Group	248	248	248	248	248

3.2.3 Housholds

We focus only on the education related indicators at the household level. The survey collected individual level data of around 21838 children who go to government schools. They also conducted learning assesments of around 6153 such children (they had to be between 8 and 11 years old). Around half of these kids cannot read a paragraph with 11.3% among them not able to read at all. 59% of the 6137 kids in the dataset can not do basic subtraction with 21.4% not able to do any math at all. The kids spent on average of 40 hours in education related activities and the household's annual expenditure on the child's education is 786.4 rupees. These kids were absent from school for 3.3 days out of the previous month on average. 48.7 percent of the kids reported that their class teacher was a local person. Around 96% of the children report that teachers are present regularly.

Table 4: Summary statistics for villages households (Government school going children)

VARIABLES	N	mean	sd	min	max
Days/month absent	21,583	3.332	5.560	0	30
Quality of mid-day meal	21,763	1.732	1.799	0	4
Test reading score	6,153	2.415	1.347	0	4
Test math score	6,137	1.368	1.003	0	3
Test writing score	6,105	0.629	0.483	0	1
Faculty attendance	13,846	0.965	0.185	0	1
Class teacher attendance	13,846	0.960	0.195	0	1
Local teacher	13,844	0.487	0.500	0	1

Total time spent studying	20,928	40.34	11.79	0	107
Total money spent on education (annual)	17,952	786.4	1,140	0	21,800
Number of Group	194	194	194	194	194

The survey collected individual level data of around 6825 children who go to some form of rural private schools. They also conducted learning assessments of around 1605 such children (they had to be between 8 and 11 years old). Among private school educated kids, 30.5 % cannot read a paragraph with only 0.3% among them not able to read at all. 37% of the 1596 kids in the dataset can not do basic subtraction with 9.08% not able to do any math at all. The kids spent on average of 41.92 hours in education related activities and the household’s annual expenditure on the child’s education is 2624 rupees. These kids were absent from school for 2.6 days out of the previous month on average. 57.4 percent of the kids reported that their class teacher was a local person. Around 98% of the children report that teachers are present regularly.

Table 5: Summary statistics for villages households (Private school going children)

VARIABLES	N	mean	sd	min	max
Days/month absent	6,698	2.608	5.272	0	30
Quality of mid-day meal	6,646	0.222	0.855	0	4
Test reading score	1,605	3.008	1.170	0	4
Test math score	1,596	1.878	0.985	0	3
Test writing score	1,591	0.788	0.409	0	1
Faculty attendance	3,855	0.982	0.133	0	1
Class teacher attendance	3,855	0.983	0.131	0	1
Local teacher	3,845	0.574	0.495	0	1
Total time spent studying	6,329	41.92	12.15	0	98
Total money spent on education (annual)	5,390	2,624	3,378	0	70,000
Number of Group	194	194	194	194	194

3.3 Creating a proxy for village level wealth

The goal is to determine if administrative distance impacts school quality determinants amongst government schools. A major challenge is the fact that a village’s economic status is an important factor and needs to be controlled before determining these indicators. But it is hard to determine the wealth status of a village in general. We overcome this problem by creating an index to proxy for village level wealth. We are able to do it because the IHDS survey collects information on various characteristics of the concerned villages.

I avoid the problem of assigning the appropriate weights to each asset by using the statistical procedure of principal components. Principal components is a technique for extracting a small number of variables that best represent the common information in a larger set of related variables by creating a series of linear combinations of the original variables. The first principal component is created by choosing the weights on each of the variables such that the linear combination captures

the greatest amount of information common to all the variables.

In forming the index I use 9 village level characteristics: Population size of the village (categorical variable), do people to the village from outside to work? (categorical variable), number of people who leave for seasonal work (categorical variable), does the village have access to land-line telephone (dummy), does the village have access to mobile based telephone network (dummy), is the majority of population in the village scheduled castes or scheduled tribes (dummy), does the village have access to piped water (dummy), percentage households that have electricity (continuous), and finally distance of the nearest bank from the village (continuous).

4 Results

4.1 Village level outcomes

I wanted to see if there is a correlation between village level wealth and the distance of the village from the district headquarter. Table 6 shows the results of the regressions. We have controlled for the village wealth by using the proxy and also interacted the index with the distance measure. Clearly, the chances of having access to a landline or of having access to a mobile telephone network decline as distance goes up. Distance that once has to travel to access services from a bank also goes up as one moves away from the district headquarter. This agrees with the perception that economic activity tends to be centered around the district headquarters and as we go away from the center the villages may become poorer. All the regressions have fixed effects at the district level. Standard errors have also been clustered at the district level.

4.2 School level outcome variables and results

4.2.1 Main Outcomes

To test the hypothesis that the ease of monitoring impacts school quality indicators, the IHDS dataset offered a few measures which could be used. The most obvious one is the number of teachers that were actually present during the day of the interview. The primary school questionnaire collected information on total number of teachers working in a school and the details of teachers that were actually present on the day of the interview. Using this information I created a measure called `staff_present_ratio`. However, when we regress this variable against distance from the district headquarters the result is non-significant. The mean value of this indicator is around 85%. So this measure fails to give us any insight on our main hypothesis. Here also I did fixed effects at the district level and clustered the standard errors.

I further created 2 measures around the number of unfilled teaching positions in a particular school. `VacancyRatio` is the ratio of unfilled positions and total number of full time teaching positions in a particular school. `VacancyRatio2` is similar to `VacancyRatio` except that now we also consider part time teaching positions in the denominator. In the case of both of these vacancy related measures, the coefficient for distance from the district headquarter (even after controlling for wealth of the village) was positive and significant (even at the 1% level). This indicates that in government schools as we move away from the district headquarters the number of unfilled positions go up. Interest-

ingly, a similar result is absent in the case of privately owned schools which further strengthens our hypothesis.

When we cluster at the district level for the case of private schools then standard errors go down instead of increasing. Therefore, I have clustered standard errors in the case of government schools and have unclustered standard errors in the case of private schools. I created another bunch of variables(AttendanceRatio and AttendanceRatioGirls) around actual number of children that go to a particular school. These variables also do not show any significance with the distance from the district headquarters. Table 7 shows the results for all the regressions for government schools. Table 8 shows the results for the same regressions for private schools.

4.2.2 Other Outcomes

I also ran fixed effect regressions on some other indicators of quality. There already is a significant difference in the mean values of pupil teacher ratios for government and private schools. While for government schools the pupil teacher ratio is around 52, for private schools the number is around 31.5. For government schools the pupil teacher ratio goes up by 1.16 for every 10km increase in the distance from the district HQ. The result is significant at 1% level. The number of full time teachers show a decline and the number of vacant positions show an increase as the villages go further away from the district headquarters. These results lend further credibility to our hypothesis because a similar result is absent in the case of private schools. Table 9 summarizes all the regressions for government schools and table 10 does it for the private schools.

Giving free lunches in government schools is one of the popular schemes that is run by the government. This scheme necessitates, especially in rural setting, that each government school have a kitchen and a cook. So along with kitchen and cook dummy variables, I looked at the regression results for quality and frequency indicators for the free lunch scheme (mid-day meal scheme). These variables when regressed against distance from the headquarters did not show anything in the coefficients.

Table 6: Regression results for village wealth indicators

VARIABLES	MobileAccess	LandlineAccess	road	pds	Bank	PipeWater
Distance to district HQ	-0.0310*** (0.00550)	-0.0132*** (0.00440)	-0.00859 (0.00643)	-0.00957 (0.0298)	0.0305*** (0.00666)	0.0100*** (0.00371)
Wealth Index	0.148*** (0.0335)	0.211*** (0.0313)	0.106** (0.0422)	-0.350* (0.199)	0.0332 (0.0296)	0.404*** (0.0340)
Interaction	0.000244 (0.00494)	0.0125*** (0.00418)	0.0119* (0.00655)	-0.00969 (0.0310)	-0.0254*** (0.00664)	-0.00690** (0.00345)
Constant	0.769*** (0.0246)	0.876*** (0.0198)	1.663*** (0.0288)	0.937*** (0.134)	0.315*** (0.0300)	0.348*** (0.0166)
Observations	1,304	1,304	1,304	1,304	1,304	1,304
R-squared	0.098	0.280	0.048	0.013	0.057	0.401
Number of Group	248	248	248	248	248	248

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7: Regression results for main school outcomes for government schools

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	VacancyRatio	VacancyRatio2	staff_present_ratio	AttendanceRatio	AttendanceRatioGirls	total_staff_present
Distance	0.0326*** (0.00817)	0.0293*** (0.00702)	0.00217 (0.00266)	0.00140 (0.00150)	-0.000623 (0.00164)	0.0172 (0.0146)
WealthIndex	0.0513 (0.0460)	0.0325 (0.0394)	0.000856 (0.0192)	-0.00186 (0.00815)	0.00513 (0.00980)	0.0823 (0.120)
Interaction	-0.0168** (0.00662)	-0.0134** (0.00589)	-0.000351 (0.00261)	0.000720 (0.00150)	0.000160 (0.00141)	-0.00271 (0.0148)
total_staff						0.777*** (0.0697)
total_staff_sq						0.00504 (0.00558)
Constant	0.241*** (0.0364)	0.181*** (0.0313)	0.848*** (0.0119)	0.860*** (0.00675)	0.435*** (0.00728)	0.121 (0.183)
Observations	1,326	1,326	1,325	1,320	1,313	1,325
R-squared	0.022	0.029	0.001	0.001	0.001	0.723
Number of Group	248	248	248	248	248	248

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 8: Regression results for main school outcomes for private schools

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	VacancyRatio	VacancyRatio2	staff_present_ratio	AttendanceRatio	AttendanceRatioGirls	total_staff_present
Distance	0.00158 (0.00324)	0.00127 (0.00317)	-8.55e-05 (0.00304)	-0.00284 (0.00466)	-0.00329 (0.00228)	-0.0158 (0.0240)
WealthIndex	-0.0502** (0.0203)	-0.0474** (0.0199)	-0.00236 (0.0191)	0.0277 (0.0293)	0.0177 (0.0144)	-0.0330 (0.150)
Interaction	0.00608* (0.00320)	0.00563* (0.00313)	-0.00169 (0.00300)	-0.00341 (0.00461)	-0.00133 (0.00225)	-0.00485 (0.0236)
total_staff						0.709*** (0.0655)
total_staff_sq						0.00862** (0.00363)
Constant	0.0537*** (0.0154)	0.0531*** (0.0151)	0.875*** (0.0145)	0.938*** (0.0222)	0.416*** (0.0109)	0.685*** (0.279)
Observations	1,045	1,045	1,043	1,041	1,036	1,043
R-squared	0.009	0.008	0.001	0.002	0.006	0.735
Number of Group	235	235	234	234	234	234

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 9: Regression results for other school outcomes for government schools

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	PTR	QualityMDM	FrequencyMDM	Kitchen	Cook	FullTimeTeachers	UnfilledPositions
FullTimeTeachers							-0.0430*** (0.0151)
Distance	1.161*** (0.419)	0.000544 (0.00885)	0.000816 (0.0107)	-0.00894 (0.00601)	-0.00765 (0.00597)	-0.0974*** (0.0300)	0.0553*** (0.0178)
WealthIndex	5.043 (3.073)	0.102* (0.0560)	0.0644 (0.0691)	0.0156 (0.0375)	-0.00538 (0.0338)	0.123 (0.169)	0.0869 (0.102)
Interaction	-0.833** (0.399)	-0.00234 (0.00768)	-0.00306 (0.00997)	0.00184 (0.00549)	-0.00139 (0.00533)	0.0245 (0.0260)	-0.0221 (0.0147)
Constant	52.05*** (1.882)	2.482*** (0.0397)	3.286*** (0.0482)	0.706*** (0.0268)	0.450*** (0.0267)	4.666*** (0.134)	0.889*** (0.103)
Observations	1,326	1,327	1,327	1,327	1,327	1,326	1,326
R-squared	0.006	0.007	0.001	0.004	0.002	0.017	0.020
Number of Group	248	248	248	248	248	248	248

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Regression results for other school outcomes for private schools

VARIABLES	(1) PTR	(2) FullTimeTeachers	(3) UnfilledPositions
FullTimeTeachers			-0.0170* (0.00883)
Distance	0.103 (0.280)	-0.103* (0.0553)	-0.00153 (0.0139)
WealthIndex	0.888 (1.755)	-0.237 (0.347)	-0.156* (0.0871)
Interaction	-0.317 (0.276)	0.0696 (0.0546)	0.0169 (0.0137)
Constant	31.67*** (1.333)	7.017*** (0.263)	0.403*** (0.0906)
Observations	1,044	1,045	1,045
R-squared	0.002	0.006	0.009
Number of Group	235	235	235

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 Household/Student level outcomes

The final step in the chain is looking at how the difference in quality of schools that arises due to increasing distance eventually impacts the quality and perception indicators for the individual students. Fortunately, the IHDS survey dataset also allows me to test these indicators. I merged the individual level dataset with the village dataset to see if a similar pattern is observed.

There are a few dummy responses which are worth exploring: CH5 captures response to “if the class teacher is regularly present”, CH4 captures “if most of the teachers in school are regularly present” and CH6 captures “if the class teacher lives in the same area of the school”. CS11 asks the number of days the kid was absent from school in the last month. CS12 asked about quality of mid day meal scheme. The above mentioned dummy and categorical variables are an unclear measure on the outcomes since they rely on perceptions. As was kind of expected, the regressions with these outcome variables give insignificant results.

Total_education_time captures weekly average of total time spent in education related activities over the last month. Specifically these activities include time in school, time spent doing homework and time spent in private tuition. Total_money captures the total annual amount spent by the household on school fees, on books plus uniforms plus other materials, and on private tuition. It is interesting to note that total time spent on education related activities and total money that a household spends on education declines as distance from district HQ increases. This effect is present in both types of schools. Therefore it becomes important to control for these differences when we look at the learning outcomes.

The important variables of interest are the learning outcomes. TA7LVL is the reading related categorical variable where: 0 = Cant read, 1= Letter, 2= Word, 3=Paragraph, 4=Story. TA8LVL is the math ability related categorical variable: 0= Cant read the numbers, 1= Number, 2=Subtraction, 3= Division. Finally, TA9LVL is the writing related categorical variable: 0= Cant, 1=Writes with 2 or less mistakes. All these learning outcomes have positive and significant coefficients with both time and money spent on education, and for both government and private schools.

But when we regress learning outcomes with distance to District HQ, the reading level shows a negative and significant decline even after controlling for time and money. Importantly, this result is absent in the case of private schools. The learning outcomes related to maths and writing do not show any trend. This might also be because the mean values related to maths and writing are abysmally low to begin with.

This gives further indication that maybe the monitoring of government institutions is important and impacts quality of institutions which subsequently does impact learning outcomes.

Table 11: Results for kids that go to government schools

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	CH5	CH4	CH6	total_education_time	total_money	CS11	CS12	TA7LVL	TA8LVL	TA9LVL
total_education_time	0.000128 (0.000271)	0.000265 (0.000298)	-0.000304 (0.00113)					0.0220*** (0.00266)	0.0167*** (0.00200)	0.00532*** (0.000994)
total_money	4.50e-06 (2.73e-06)	4.33e-06 (2.75e-06)	2.58e-05** (1.18e-05)					0.000342*** (6.56e-05)	0.000282*** (4.77e-05)	6.91e-05*** (1.64e-05)
Distance to District HQ	-0.000997 (0.00140)	0.000723 (0.00135)	0.00978** (0.00391)	-0.102 (0.0716)	-11.25** (5.599)	0.0460 (0.0434)	0.0305*** (0.0112)	-0.0202** (0.00912)	-0.000650 (0.00765)	-0.00365 (0.00365)
Wealth Index	0.0226* (0.0130)	0.0134 (0.0125)	0.0170 (0.0285)	0.366 (0.588)	49.45 (45.44)	0.0589 (0.265)	0.0197 (0.0710)	0.0475 (0.0548)	0.0449 (0.0483)	0.000698 (0.0237)
Interaction	-0.00163 (0.00141)	-0.00103 (0.00139)	0.00351 (0.00354)	0.0599 (0.0797)	8.737 (6.104)	-0.0190 (0.0323)	-0.00524 (0.0107)	0.00489 (0.00809)	0.00449 (0.00706)	0.00230 (0.00328)
Constant	0.958*** (0.0128)	0.950*** (0.0125)	0.435*** (0.0462)	40.85*** (0.326)	845.8*** (25.80)	3.085*** (0.192)	1.600*** (0.0503)	1.516*** (0.119)	0.600*** (0.0907)	0.413*** (0.0444)
Observations	10,854	10,856	10,866	20,655	17,743	21,307	21,487	4,837	4,822	4,796
R-squared	0.003	0.002	0.006	0.002	0.004	0.001	0.002	0.066	0.071	0.025
Number of Group	251	251	251	254	253	254	254	247	247	247

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CH5: presence of class teacher, CH4: presence of regular teachers,

CH6: Class teacher from the same village, CS11: number of days kid absent from school, CS12: quality of mid day meal scheme

Table 12: Results for kids that go to private schools

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	CH5	CH4	CH6	total_education_time	total_money	CS11	CS12	TA7LVL	TA8LVL	TA9LVL
total_education_time	0.000113 (0.000309)	0.000325 (0.000445)	-0.00116 (0.00128)					0.0159*** (0.00444)	0.0158*** (0.00320)	0.00319** (0.00139)
total_money	1.22e-06 (8.02e-07)	1.42e-06 (1.07e-06)	-2.58e-06 (5.84e-06)					3.76e-05** (1.52e-05)	5.00e-05*** (1.04e-05)	1.64e-05** (6.35e-06)
Distance to District HQ	-0.00135 (0.00150)	0.00131 (0.00170)	0.0243*** (0.00922)	-0.0745 (0.155)	-145.3*** (47.22)	0.143 (0.105)	0.0155** (0.00775)	-0.0220 (0.0180)	-0.00709 (0.0172)	-0.00564 (0.00644)
Wealth Index	-0.00613 (0.0122)	-0.0255 (0.0197)	0.0419 (0.0545)	-0.942 (0.865)	-70.86 (167.0)	0.589 (0.571)	0.115** (0.0566)	-0.145 (0.127)	-0.0839 (0.108)	0.000799 (0.0531)
Interaction	0.000683 (0.00177)	0.00274 (0.00317)	-0.00208 (0.0105)	0.00303 (0.154)	-4.986 (26.88)	-0.119 (0.116)	-0.0206* (0.0105)	-0.00436 (0.0200)	-0.0151 (0.0186)	-0.00976 (0.00822)
Constant	0.982*** (0.0130)	0.964*** (0.0175)	0.532*** (0.0636)	42.43*** (0.623)	3,228*** (197.9)	2.031*** (0.408)	0.155*** (0.0305)	2.443*** (0.200)	1.204*** (0.155)	0.658*** (0.0550)
Observations	2,820	2,820	2,817	6,267	5,341	6,636	6,584	1,181	1,174	1,172
R-squared	0.001	0.007	0.012	0.002	0.008	0.004	0.003	0.033	0.051	0.022
Number of Group	223	223	223	243	236	242	243	194	194	194

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

CH5: presence of class teacher, CH4: presence of regular teachers,

CH6: Class teacher from the same village, CS11: number of days kid absent from school, CS12: quality of mid day meal scheme

5 Conclusion

To summarise, average village wealth indicators decline as the distance from the district HQ increases. Even after controlling for village level wealth, there are certain quality indicators such as vacancy ratio and pupil teacher ratio which decline in government schools as they go further away from the HQ. Importantly this result is absent in private schools. However, one of the main indicators which could have proven our hypothesis beyond doubt - the percentage of staff members actually present during the day of the interview does not show any significant trend. The impact of this decline can be finally observed in the learning outcomes at the household levels where reading outcomes in government schools are showing a negative and significant trend. This trend is absent in private schools.

Relying only on the analysis of IHDS dataset it is hard to accept or reject the hypothesis that the degree of difficulty in monitoring the government schools impacts the quality of education imparted in these institutions. Considering that IHDS is a generic survey which is non-experimental and does not have panel data, it is difficult to prove our hypothesis using just the IHDS dataset in the first place.

To convincingly test out the ease of monitoring hypothesis, we need a dataset which specifically captures the learning outcomes of randomized students in the school and asks direct questions on the distance of such schools from the concerned block and district level offices. It would also be helpful to get data on schools after they have undergone some exogenous variation where they are brought under different district administration which changes the distance of the school from the district headquarter leaving everything else the same.

6 References

- Desai, Sonalde, Amaresh Dubey, B.L. Joshi, Mitali Sen, Abusaleh Shariff, and Reeve Vanneman. India Human Development Survey (IHDS) [Computer file]. ICPSR22626-v2. University of Maryland and National Council of Applied Economic Research, New Delhi [producers], 2007. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 30 June 2009.
- Chaudhury, Nazmul, Jeffrey Hammer, Michael Kremer, Karthik Muralidharan, and F. Halsey Rogers. "Missing in action: teacher and health worker absence in developing countries." *The Journal of Economic Perspectives* 20, no. 1 (2006): 91-116.
- Mukherjee, Anit K., and Tapas K. Sen. *Universalising elementary education: an assessment of the role of the Sarva Shiksha Abhiyan*. No. 07/02. 2007.
- Muralidharan, Karthik, and Michael Kremer. "Public and private schools in rural India." Harvard University, Department of Economics, Cambridge, MA (2006).
- Tooley, James, and Pauline Dixon. "Private schools for the poor: A case study from India." Reading, UK: Centre for British Teachers (2003).