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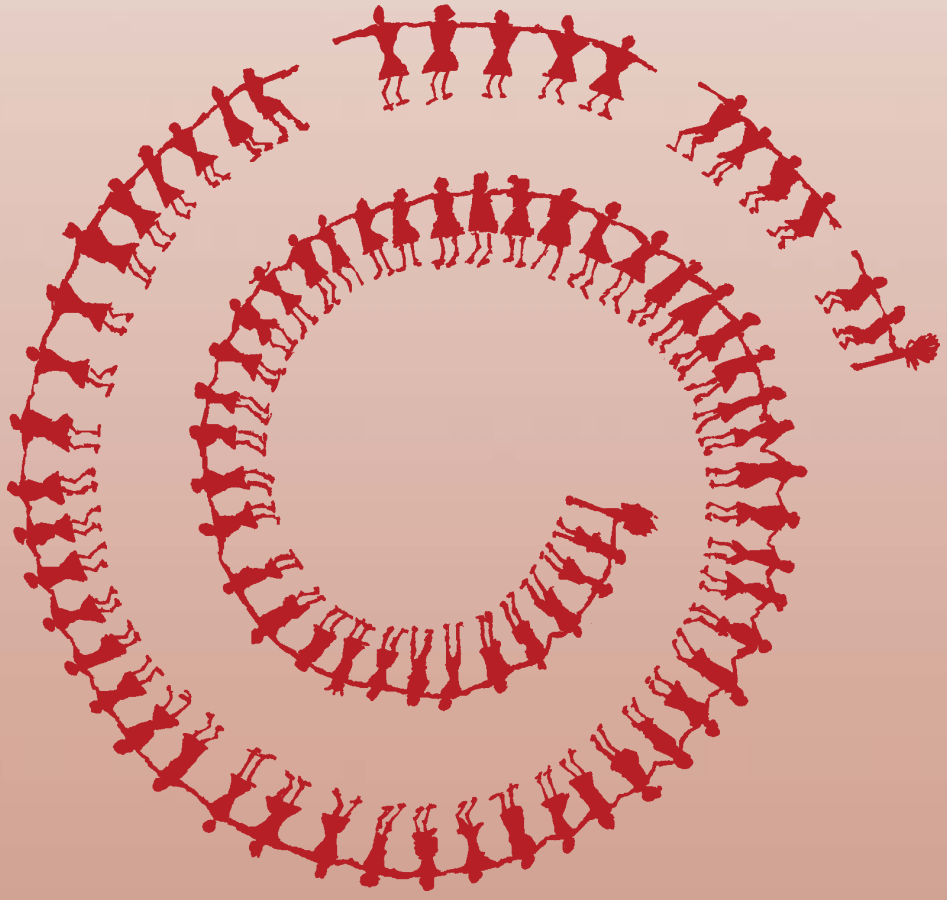
South Asia Region, Education Global Practice

Value for Money from Public Education Expenditure on Elementary Education in India

April 2016



Discussion Paper Series

South Asia Region, Education Global Practice

Value for Money from Public Education Expenditure on Elementary Education in India

APRIL 2016

Discussion Paper Series

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The Bank would like to thank Seema Bansal, Garima Batra and Shubhaluxmi Ganguly (Boston Consulting Group) for their help in finalizing the research on early childhood education (ECE). Mamata Baruah provided necessary support in formatting and publishing.

ABBREVIATIONS AND ACRONYMS

ASER	Annual Status of Education Report
AWC	Anganwadi Centres
AWW	Anganwadi Workers
BRC	Block Resource Coordinator
CPC	Child Parent Center
CRC	Cluster Resource Coordinator
CAG	Comptroller and Auditor General
DISE	District Information System on Education
ECCE	Early Childhood Care and Education
GOR	Government of Rajasthan
GTR	Grade to Teacher Ratio
ICDS	Integrated Child Development Services
IECEI	Indian Early Childhood Education Impact
IRT	Itemized Response Theory
LEP	Learning Enhancement Program
MHRD	Ministry of Human Resource Development
MP	Madhya Pradesh
MWCD	Ministry of Women and Child Development
NAS	National Achievement Survey
NCTE	National Council for Teacher Education
NCERT	National Council of Education, Research And Training
NISA	National Independent Schools Association
OOSC	Out of School Children
PISA	Programme for International Assessment
PPE	Per Pupil Expenditure
PTR	Pupil-Teacher Ratio
RMSA	Rashtriya Madhyamik Shiksha Abhiyan
ROI	Return on Investment
RTE	Right to Education
SC	Scheduled Caste
SSA	Sarva Shiksha Abhiyan
ST	Scheduled Tribe
TLM	Teaching Learning Materials
UDISE	Unified District Information System for Education
VFM	Value For Money

FOREWORD

Investing early in children is the key to enhancing the India's competitiveness at the global level. India's right to free and compulsory elementary education (RTE) to all children of the age group of 6-14 years of age rightly focuses on the early years and has demonstrated impressive gains. Almost 98% of habitations having access to an elementary school; pupil-teacher ratios have improved significantly and *Sarva Shiksha Abhiyan* (SSA) as the vehicle for the RTE has taken huge strides in developing infrastructure for elementary schools across the country. While these are certainly reasons to celebrate, the concern at present is the persisting low levels of learning in the early grades. The recently concluded nationally driven National Achievement Test (NAS), 2015 for Class V that provided an opportunity to compare achievement levels over a period of time shows a decline in learning outcome levels. This holds true across States and across subjects. It is time to take stock of the return on the investments in school education to test its efficiency and effectiveness.

The World Bank's study ***Value for money from Public Education Expenditure on Elementary Education in India*** has been undertaken as part of its ongoing support to *Sarva Shiksha Abhiyan.* The study reflects findings that have profound implications for the school education sector; the decrease in Class V learning outcome levels is expected to reduce students' expected wage earnings by up to 11.9 percent, significantly reducing India's labour force productivity and economic growth. This is a phenomenon that links integrally to the key issue: *have young children been provided the right start in life?* Are they taught by teachers who are qualified, motivated and accountable? While India pays its teachers three times more than China, it needs to enhance the presence of these teachers in the classrooms and actually teaching. Recent studies show that greater accountability from teachers and improved presence in classrooms would reduce teacher costs by $1.5 billion per annum.

The Report has raised some major emerging issues in the education sector while evaluating the value for money as a reflection of its being used efficiently to yield a high return in terms of children's access to quality education and learning outcomes. Key funding of the study and major recommendations are included in the Report. An infographic based summary of the report is present below for easy readability.

I hope this study will be useful for academics, policy makers, educational practitioners and people interested in the education sector in India.

Keiko Miwa
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EXECUTIVE SUMMARY

The World Bank has been supporting the Universalization of Elementary Education (UEE) program for India through its support to the flagship program of the Government of India, the *Sarva Shiksha Abhiyan (SSA)*. The Bank's ongoing support to SSA is a little over $ 1 billion. With reducing national level budgetary allocation and scarcity of resources for publicly-funded education, it is important to analyse the efficiency and effectiveness of the investments in the sector. It is critical that financial investments made have been used efficiently and yield a high return in terms of children's access to education and learning outcomes.

With this objective, the World Bank as a part of its ongoing support to SSA, undertook a Value for Money (VFM) analysis that could assess the returns from public education expenditure. This paper attempts to calculate and benchmark the economic value of any increases in children's access to schooling and in students' learning levels that may result from increases in public education spending over time.

Some insights about key issues and recommendations are presented in Infographics for easy readability below:

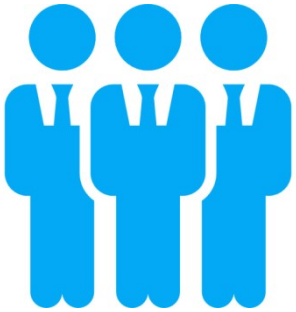
Elementary Education in India: Some Facts

Dwindling Enrolment: Increase in Small Schools

- In the last 9 years, while number of Government schools increased by 1.4 lakh, their total Enrolment fell by 6.7 Million students. The number of private school rose by 1.7 lakh and their total enrolment rose by 35.5 million.
- The reduction in total enrolment has rendered many Government schools economically unviable. There are 96,965 'small' schools in India (those with 20 or fewer students as a whole, for classes 1 to 5 or 1 to 8).

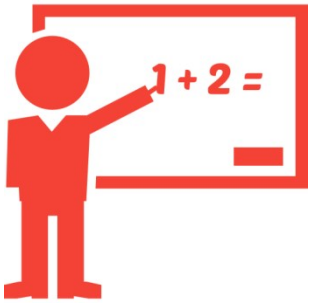
Learning Outcome Levels and Associated Costs

- Half of students enrolled in Class V, cannot read a Class II level text; for children enrolled in government schools in Class V, reading levels between 2010 and 2012 are increasingly getting *lower* and *stuck* ***(ASER 2014)***
- During the period 2011-12 to 2014-15, the aggregate learning outcome levels for Class V students declined by 6 to 33 points ***(National Achievement Survey- NCERT).*** During the same time period the annual per pupil expenditure increased by up to 253 percent
- Cost per unit of learning achievement is INR 338 in government schools and INR 63 in private schools.



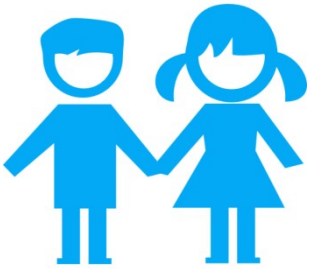
Labour Force Productivity

- Every 'one standard deviation' positive increase in cognitive skills can increase a students' expected wage earnings by 18 percent.
- The decrease in Class V learning outcome levels between 2011-12 and 2014-15 is expected to reduce students' expected wage earnings by up to 11.9 percent.



Teacher Salaries and Absenteeism

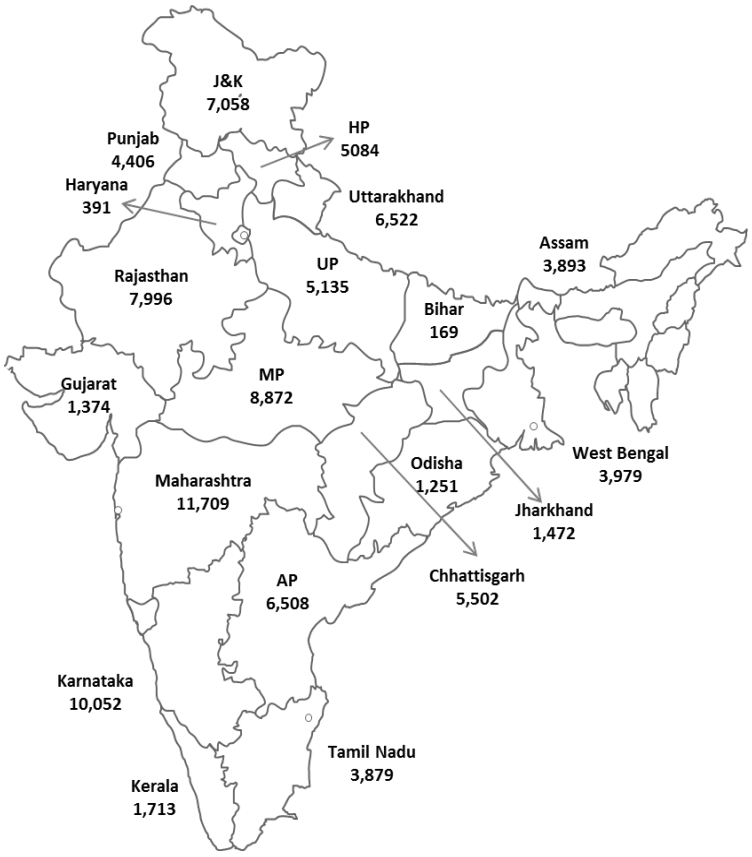
- Government school teachers in India are given a remuneration which is three times what China pays its public school teachers and 25 times what private schools in India remunerate their teachers.
- The fiscal cost of teacher absence in India is around US $ 1.5 billion (or INR 9800 crore) per annum.



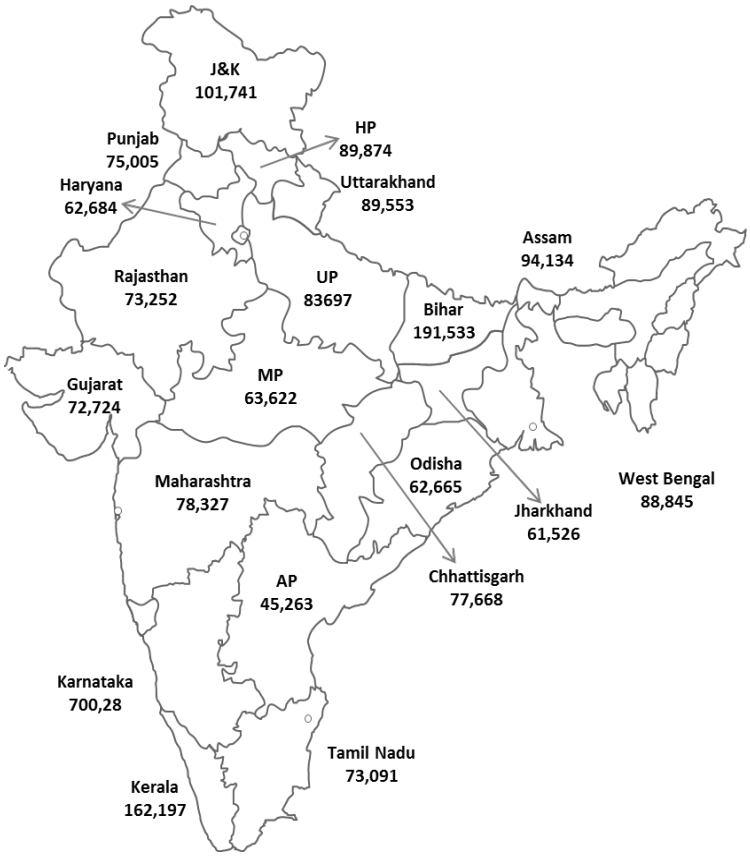
Early Childhood Education

- Adding 2 years of pre-school education to SSA (Right to Education) can generate a return as high as INR 25 for every INR 1 invested- with about 30 to 60 percent additional income over one person's lifetime

The Small Schools Phenomenon



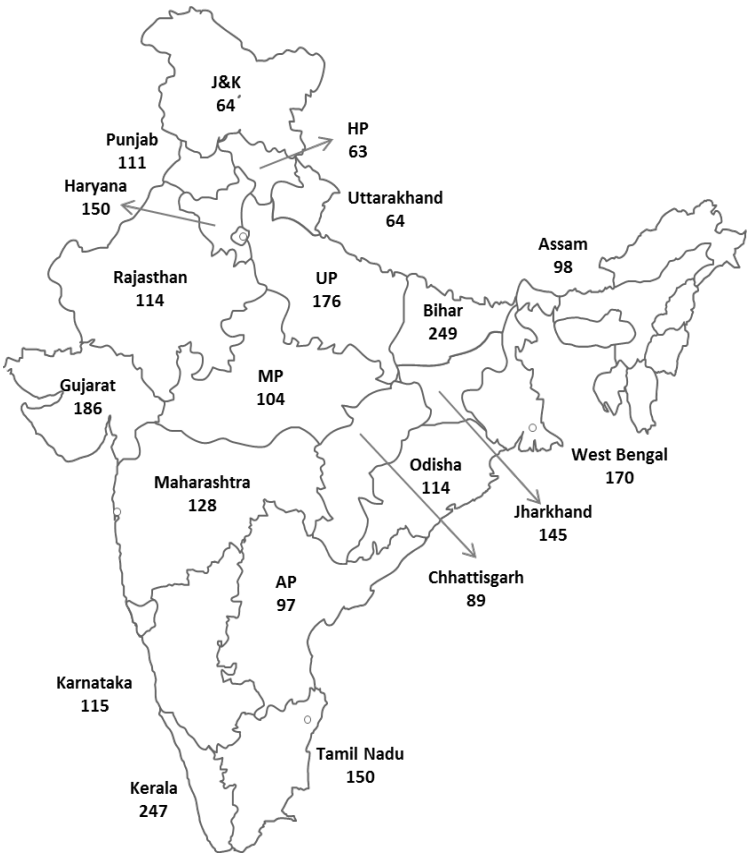
Number of Small Schools (computed from UDISE raw data)



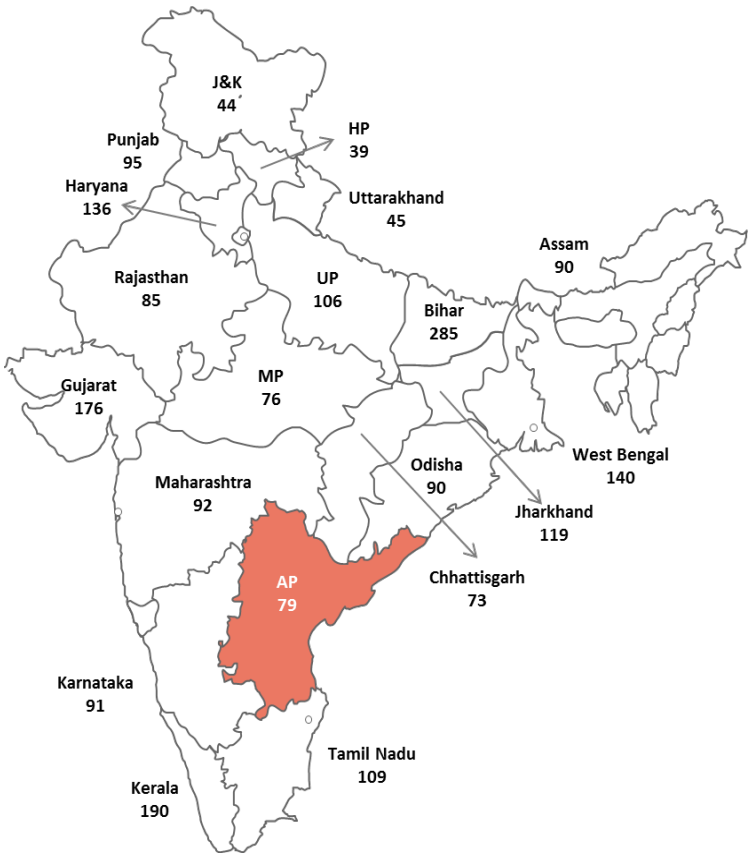
Mean Annual per Pupil Teacher-Salary-Cost in Small Schools

- The reduction in total enrolment may make many Government schools economically unviable. There are 96,965 'small' schools in India (those with 20 or fewer students as a whole, for classes 1 to 5 or 1 to 8).
- These nearly 1 lakh 'small schools' have a PTR of mere 6.7 students per teacher, a mean teacher salary cost per pupil of INR 85,872 p.a, and with the teacher salary bill going up to of INR 9,700 crore pa.
- While recognizing that some of these 'small' Government schools are in remote or hilly areas, the PTR of 6.7 students per teacher suggests (given the number of teachers allocated) that over time, student numbers have dwindled, leading to low cost-effectiveness.
- The RTE Act's requirement for establishing more Government schools increases wastage, given the trend of the emptying of Government schools.
- To improve cost-effectiveness, in Rajasthan, Maharashtra and Chhattisgarh, about 23,700 Government schools have been merged with other Government schools or been closed down in 2014-15.

Emptying of Government Schools



Average Enrolment per Government School
(UDISE 2005-06)



Average Enrolment per Government School
(UDISE 2014-15; Except AP for which 2013-14)

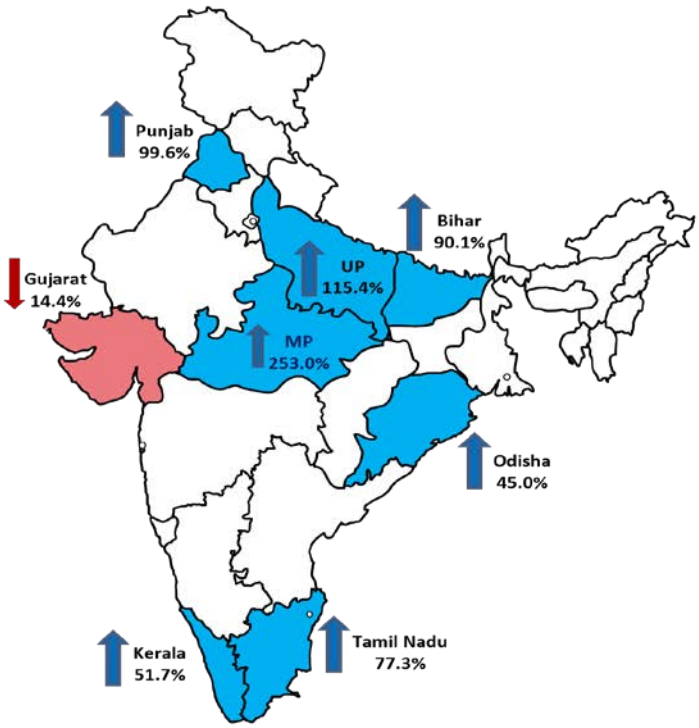
In the last 9 years, while number of Government schools increased by 1.4 lakh, their total enrolment fell by 6.7 million students.
The number of private school rose by 1.7 lakh and their total enrolment rose by 35.5 million.

Average enrolment per Government school fell by 24 students from a low base of 131 students per Government school in 2005, implying a 20% reduction in mean school size in 9 years.

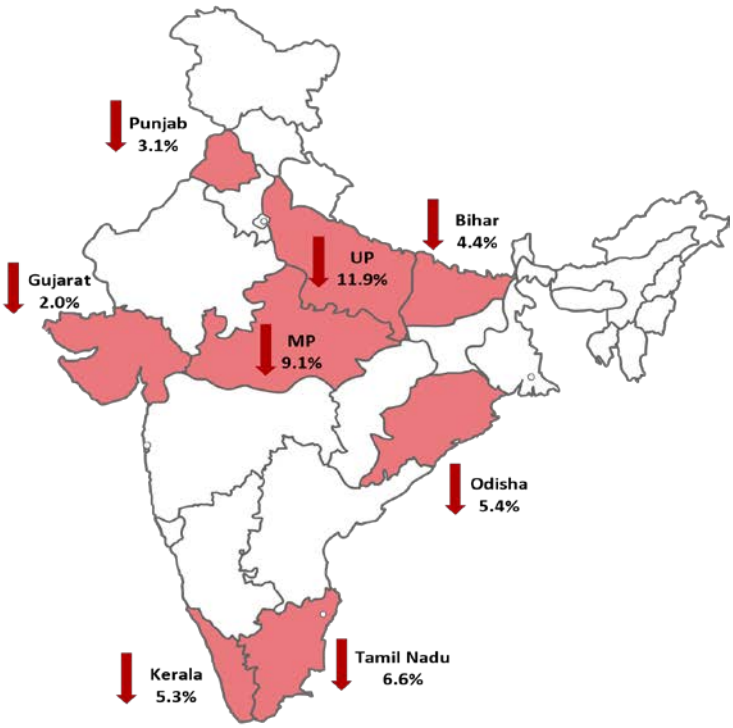
Between 2007 and 2014, Government schools with 50 or fewer students as a proportion of all Government schools increased from 24.3% to 32.3% (from 2.3 lakh to 3.5 lakh small schools).

Since RTE obligated state Governments to establish neighborhood schools, 65,065 new Government schools have been established, reducing the mean size per Government school from an already low base. Currently, mean size per school (class 1 to 8) is 106 students per Government school.

Comparison of Change in Learning Outcome Levels vis-à-vis Change in Annual Per Pupil Expenditure at Government Schools



Change in Annual per Pupil Expenditure at Govt. Schools 2012 vs 2015



Change in Class V Learning Outcome Scores for Govt. Schools NAS 2012 vs NAS 2015 (NCERT)

- There has been a sizeable decrease in the learning outcome scores of Class V students.
  The decrease in the aggregate learning outcome scores (for mathematics, comprehension and environmental sciences) varies between 6% to 33 percentage %
- The average decrease in learning outcome scores for mathematics, comprehension and environmental sciences is 18, 18 and 13 points respectively.
- As per the 2015 NAS, many of the States that were recorded to be doing better than the National average in 2012 are found to have reported some of the lowest learning outcome scores.

- The decrease in learning outcome scores is expected to have an adverse impact on the income that students can expect to derive upon joining the workforce.
- The decrease in expected income would be a result in a drop in productivity due to poor learning outcomes.
- While the decrease in expected income varies from State to State, it ranges from 2.0 percent to 11.9 percent.
- In absolute terms, the expected income for students who completed Class V in 2015 will be up to INR 1,827 per annum less than what students completing Class V in 2012 would expect to earn.

Causes for Low Learning Achievement Levels

Large educational inputs related expenditure, i.e. on items that have little relationship with student learning levels; example: expenditure to reduce pupil teacher ratios by large scale hiring of teachers to meet 1:30 Pupil Teacher Ratio (PTR) to meet requirements of the Right to Education (RTE) Act.

Stretched fiscal capacity of Government through increasing teacher salaries while these salaries are already high compared to other developing countries; up to 10 times the salaries of contract teachers and up to 25 times the salary in private schools.

Inefficiency of maintaining small schools due to diminishing student population.

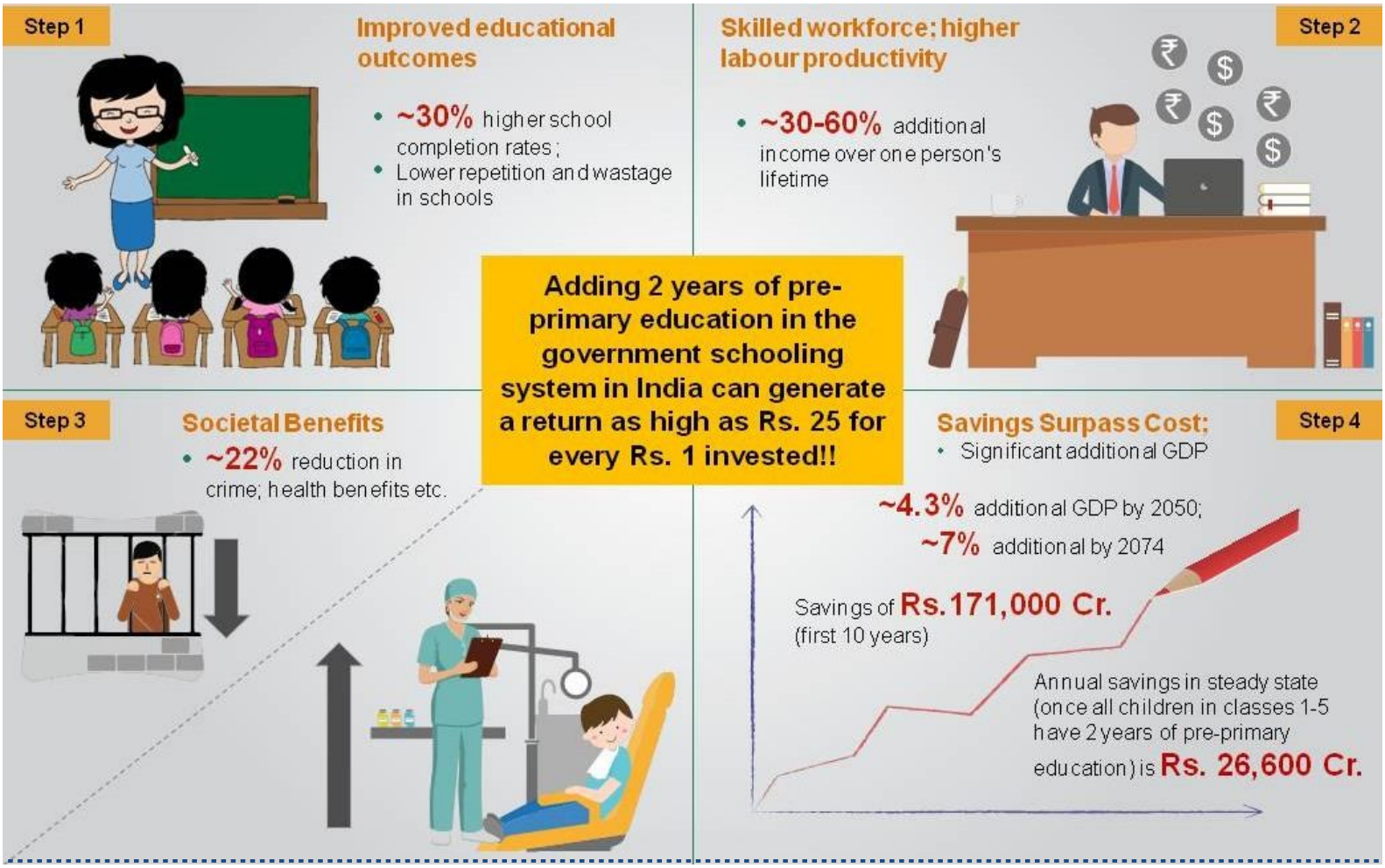
Lack of access to quality pre-school education (as per RTE Act) leading to lack of preparedness of young children on cognitive, con-cognitive and socio-emotional skills constraining their ability for smooth transition to formal schooling in Class I.

Private schools with pre-school have greater enrolment trends and retention levels

Wastage may be due to considerable proportion of non-genuine enrolments and high levels of student absence – need to have third party assessment of enrolment data and attendance rates for Government schools.

Low teacher attendance rates and need for enhanced accountability.

Need for greater autonomy and efficiency in the social accountability mechanisms through the School Management Committees that have been put in place under the Sarva Shiksha Abhiyan (SSA).



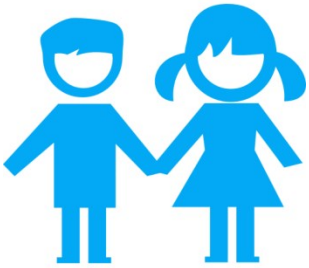
Adding 2 years of pre-primary education in the government schooling system in India can generate a return as high as INR 25 for every INR 1 invested. Students who undergo pre-primary schooling have improved educational outcomes with 30 percent more students completing high school, along with lower repetition and wastage in school. This leads to a skilled workforce and increased labour productivity with 30 percent to 60 percent additional income over an individual's lifetime. Additionally, other benefits to society in the form of reduced crime and improved health outcomes are seen. Finally, benefits of pre-primary education surpass costs required to set up the system within less than 10 years and lead to an additional GDP of approximately 4.3 percent by 2050 and 7 percent by 2074.

Pre Primary Education Works!

Recommendations

Revisiting Norms

- Close/Consolidate unviable small schools and encourage Public Private Partnerships.
- Greater convergence between SSA and RMSA to reduce transation cost at national and state levels
- Closing private schools in the name of non-compliance may be revisited and they may be assisted for reform

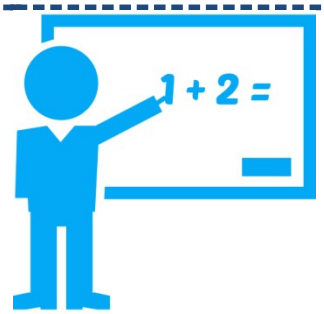


Pre-School education in govt. schools

- Two years of pre-school education may be brought under the ambit of SSA *urgently* as inherent inefficiencies in provision of pre-school education is leading to low learning levels in primary school children and migration of students to private schools that provide pre-school education along with primary schools.

Learning Outcome Levels

- Provide performance based support to states under SSA through ranking of states based on learning outcomes
- India may participate in international assessments starting with PIRLS (Progress in International Reading Literacy Study) testing reading achievement of students in their fourth year of schooling and TIMMS (Trends in International Mathematics and Science Study) that tests 4th and 8th grade students to underatnd its position internationally



Teacher Salaries and Absenteeism

- Reduce teacher costs to the central government: with more efficient sharing of cost of teacher salaries between national and state governments
- Increases in teacher salary may be linked to teacher performance
- Link salary hikes to teachers accountability and performance with a mild form of performance related pay, as was done in Mexico as negotiated with teacher unions
- Strengthen local leaders and School Management Committees for assessment of teacher attendance and performance

INTRODUCTION

Since resources for publicly-funded education are scarce, it is important that every Rupee is used efficiently and yields a high return in terms of children's access to education and learning outcomes. Value for Money (VFM) analysis shows what return the taxpayer gets from public education expenditure. This paper attempts to calculate and benchmark the economic value of any increases in children's access to schooling and in students' learning levels that may result from increases in public education spending over time.

Influential research shows that it is not (average) years of education of the population but rather the (average) cognitive skill levels of the population that explains the economic growth rates of countries (Hanushek and Woessman, 2008). For this reason, the paper focuses first on VFM from government investment in terms of increasing children's learning levels. Section 2 investigates how students' literacy and numeracy skill levels change with changes in per pupil education expenditure by government, and then measures the extent to which those resulting changes in cognitive skill levels influence individuals' productivity in the labour market. It also measures the cost per achievement unit in the government and private school sectors, to compare the VFM from education expenditure in these two schooling sectors. Section 3 examines the various underlying sources of VFM in school education and considers how VFM could be improved. Section 4 considers the VFM from government education expenditure in terms of increased access to schooling denoted by the drop in the number of out of school children (OOSC) between 2009 and 2014. Section 5 concludes.

Key determinant of VFM: Changes in learning levels

VFM shows the amount of output produced for each rupee spent. A state is said to be achieving high VFM for a given amount of educational expenditure, if it increases learning levels more than other states/countries, or, conversely, if it produces a given amount of learning at a lower cost than other states/countries.

The paper follow two different approaches to measuring VFM. Firstly, it examines the change in productivity / earnings that a typical student would expect to get in the labour market, from the change in learning level that he/she experienced between 2012 – 2015, as measured in the National Council of Education, Research and Training's (NCERT) National Achievement Survey (NAS) of class 5 at these two points of time. Then, this is put together with the increase in government education spending per pupil over the same period 2012-15, to yield VFM.

The second approach is to compare the learning output per rupee in the government schooling sector with a suitable comparator. Evidence on two components is needed to calculate the VFM in this approach – on government school pupils' learning levels (output) and on government schools' per student cost (per pupil expenditure (PPE)). Putting these two together, i.e., dividing the annual per-pupil-expenditure by the number of learning units, will yield the rupee cost per learning unit in the government school sector. Ideally, one would like to compare VFM from government education spending in India with the VFM from government education spending in other countries; for that, on the output side, we would need data on students' learning levels on *the same test* taken by students in India and in other countries. We do not have such data for any recent year since India has not taken part lately in any international tests and, even when it participated in the Programme for International Assessment (PISA) test, only two educationally advanced states took part – Himachal Pradesh and Tamil Nadu.

Thus, instead, to see whether VFM from government education spending is high or low, the study compares it with the VFM from private school spending. To do this, the learning output measure for government and private schools within India was required. Since the NCERT's NAS does not test private school students, the paper uses the learning achievement levels measured in the Annual Status of Education Report (ASER) survey. This exercise was undertaken for 8 major states of India. PPE on government elementary schools is calculated from the state governments' published budgets[1], and private schools' total fee level in elementary (class 1 to 8) including the school's tuition fee, examination fee, development fee and other compulsory payments, is taken as their PPE. The median of private school fee in each state is obtained from the National Sample Survey of 2014 (NSS, 2014).

Are we getting value for money? What is the expected change in productivity from a change in learning levels?

The recently concluded NAS 2015 for Class V students provides the first opportunity to compare achievement levels over a period of time, since the same class was also tested in 2011-12. Class V is the first class for which learning outcome scores are available at two separate points in time and that maintains a consistent Itemized Response Theory (IRT) based assessment method. Table 1 contains the results. The mean achievement levels of class V children in eight sample states in Reading, Maths and EVS in 2012 and 2015 are set out in Appendix 1. The comparison of learning levels over the two years in Table 1A shows a decline in learning outcome levels and this downward trend is observed to hold true across States and across subjects.

The literature suggests a positive link between cognitive skill levels and the labour market earnings a student can expect to derive after completing schooling. A drop in learning outcome levels means a drop in the level of cognitive skills and in turn a drop in the individual's (future) productivity in the labour market. This drop in productivity would reduce the remuneration that profit-maximising employers are ready to pay.

In order to facilitate comparison over time and across States, the NAS assumes a normal distribution for learning outcome scores and, by construction, keeps the expected mean score at 250 achievement points with a standard deviation (SD) of 50 achievement points around that mean. Aslam et al (2010) show that a 1 SD increase in cognitive skills increases wages by 18% in India; this is roughly in the range of size of effects from cognitive skills onto wages reported in Table 1 of Hanushek and Woessmann (2008) for Ghana, Kenya and Pakistan. Thus, it is assumed that for every one standard deviation reduction in the learning outcome score, a student's expected earnings upon joining the workforce dip by a factor of 0.18. We multiplied the reduction in the mean test score in terms of standard deviations in the penultimate column of Table 1a by the factor of 0.18, and this gives the percentage change in earnings as a result of the reduction in cognitive skills that a student can expect to derive upon joining the workforce.

The analysis uses change in the aggregate learning outcome achievement levels, i.e. average test scores for 'Comprehension', 'Mathematics' and 'Environmental Sciences' seen in column

[1] Government expenditure on SSA and Mid Day Meals is removed, in order to exclude expenditure on free uniforms, books, scholarships for SC/ST children and on mid day meals. This is to keep Government PPE comparable to the private schools' PPE, since private schools do not spend on these items.

5 of Table 1a. The state wise calculations given in last column clearly highlight how the drop in learning levels is expected to impact the future earnings of students. The drop is expected to be in the range of 2.04 percent in Gujarat to as high as 11.9 percent in Uttar Pradesh.

Table 1b shows that in absolute terms a child completing Class V in 2014-15 should expect to draw earnings which are INR 312 (in Bihar) to INR 1,827 (in Tamil Nadu) less than what a child completing Class V in 2011-12 expected to earn. The estimates for average annual income of a Class V student have been determined using NSSO 67th round data[2].

While the drop in learning levels and therefore the expected drop in economic productivity/ earnings is a worrying sign, the gravity of the VFM problem is further exacerbated by the fact that during the same time period (2011-12 to 2014-15), state governments have increased their expenditure on elementary education. Estimates of PPE of Government elementary schools are set out in Appendix Table 1k, whose note explains the method of estimating the PPE. The change in annual PPE between 2011-12 and 2014-15 are given in Table 1c. During this time period, the annual PPE has increased by upto 150% (in Madhya Pradesh), and by an average of about 81%, if we average across the 8 major states (last row of Table 1c). Only Gujarat has decreased annual PPE, by 15 percent.

To summarise, there has unfortunately been negative VFM from increases in government expenditure on education over the period 2011 to 2014 since over this period, student learning levels fell instead of rising and, when this reduction in cognitive skills is monetised, it shows a negative impact on expected earnings/productivity.

Calculation of VFM – How are private schools doing?

Tables 2a and 2b show the VFM from education expenditure on government and private schools for 8 different states of India, for literacy and numeracy areas respectively. VFM is essentially a measure of the efficiency or cost-effectiveness of expenditure. Table 4a shows that there are large variations in the cost-effectiveness of government spending across the different states, with Uttar Pradesh being an outlier.

Consider the case of Madhya Pradesh (MP) in Table 2a, for illustration. PPE in MP government school system is Rs 9384 per annum and in private schools Rs 3700 per annum. Thus, government schools' PPE is 2.5 times private schools' PPE. However, the learning units are higher in private schools: 58% of private school students and 28% of government students of class 5 could read a class 2 level text in 2014-15. Thus government schools' learning output is just about half that in private schools. Putting the output and expenditure items together, we find that the cost per unit of achievement is Rs 338 in government schools and Rs 63 in private schools, implying that private schools are 5.3 times as cost effective as public schools, or that government schools are one fifth as efficient in producing output as private schools.

However, studies show that a large part of the observed learning advantage of private school students is explained by their more educated and better-off home backgrounds. When home

[2] A national estimate has been adjusted to a State level by using State wise per capita income estimates (2004-05 constant prices) as an adjustment factor. In order to do this, the per capita earnings estimates for the State have been divided by the per capita earnings estimates for India as a whole. The resulting factor has been used to adjust the National level estimate for expected income for a Class V pass out (INR 19,226). The figures for 2014-15 have not been adjusted for inflation so as to maintain comparison with the 2011-12 figures (as adjustment using Consumer Price Index may have nominally negated the negative impact of fall in learning outcome levels).

background is strictly controlled for[3], the raw public-private learning gap greatly falls but is usually not eliminated. In Desai et al (2008) and French and Kingdon (2010) both using national data on India, about 20 to 30% of the private school achievement advantage remained even after controlling strictly for home background. The last row of Table 1a shows that if only 25% of the raw public-private achievement gap of MP is attributed to superior private school quality (e.g., lower teacher absence rates), then private schools are 3.25 more efficient than government schools, rather than 5.3 times.

If all the raw public-private learning difference is due to the superior home backgrounds of private school students, and private school quality is no better that government school quality – then the public-private gap in VFM collapses to the public-private gap in PPE only, i.e. private schools are only 2.5 times as cost-effective as government schools, or to put it another way, VFM from government education expenditure is only 40% as much as the VFM from private schools' education expenditure, as seen in row G in Table 2a.

In summary, there is very low VFM from government expenditure on education, in terms of producing the valued outcome of 'learning' among students. The private schooling sector gets significantly higher VFM in this respect. Together with the earlier finding in section 2.1 where VFM was in fact negative due to reductions in learning levels over time, this paints a fairly grim picture of overall VFM being achieved from public education spending, and it calls for a deep and honest probe into the factors behind these low returns. Section 3 below scrutinizes the most major ingredients behind the low-VFM crisis.

Low VFM from public education spending: Source identification:

There are several identifiable factors behind the observed low VFM that need attention in order to improve the efficiency of government spending on education. The first of these is low learning outcomes from education.

Low learning levels

With the appearance of the NCERT's NAS 2015 of class V, there is clear evidence of poor and falling learning levels in government funded elementary education. The NAS, carried out only in government schools, shows low and falling cognitive skill (literacy and numeracy) levels. To take one example, in the 2010 NAS, only 45% of class 5 students could identify the correct answer to the Multiple Choice Question "How much greater is 555 than 198?" a subtraction word problem around the class 2 level of difficulty. By 2015, 40% of class 5 students who could answer this same question. Table 3 shows a consistent across-the-board decline in learning achievement level (of the order of 5 percentage points) in all subject areas.

Secondly, the national ASER 2014 also indicates a similar story of low and falling learning levels. It shows that among class 5, only 42% of government and 62% of private school students could read a class 2 level text, and only 21% of government and 39% of private school students

[3] Through a regression technique called 'household fixed effects' which compares only the achievement levels of children within the same household who go to private and Government schools. Since the home background (parental education; household wealth, etc.) is the same for different children of the same family, this is a more powerful way of eliminating the influence of family background, and yields a much purer private school effect than the simple cross-section Ordinary Least Squares regression analysis. Desai et al (2008) use India Human Development Survey of 2005-06; French and Kingdon (2010) use three years' of ASER survey. The latter also do village level panel data analysis.

could do simple division, a class 2 or 3 level competency. Even among class 8 students in government schools, only 46% could do the division sum. Some ASER evidence is presented in Table 4.

Thirdly, in the international PISA test of 15 year old children's performance, India stood 73rd out of 74 participating countries, when it had put forward two of its educationally advanced states (Himachal Pradesh and Tamil Nadu).

If VFM is to increase, the single most important reform is to increase children's learning levels. The RTE Act's best ideas for how to improve quality is to insist on lower pupil teacher ratios (30:1 in primary, and lower than that in upper primary), to ensure that teachers have certification of training qualifications, and to ensure the availability of basic infrastructure, but this inputs based approach to quality is not evidence-based (see section 3c below). The RTE Act does not prescribe any measures to strengthen teacher accountability and effort.

On the contrary, the recognition requirement of the RTE Act is compelling the (5 times higher value yielding) private schools to close down due to non-compliance with the physical inputs requirements of the RTE Act or with other recognition conditions. . According to the National Independent Schools Association (NISA), 15,083 private unaided schools have closed down so far due to RTE non-compliance. Closure of private unaided schools often negatively impacts children's right to education (RTE) (in a context where the child population is increasing and state governments are closing down unviably small government schools), while also reducing the overall efficiency of the system by reducing the number of high-value-yielding private schools and continuing to operate the lower-value-yielding government schools which, in some cases themselves do not fulfil the RTE infrastructure norms, since there is no provision in the RTE Act for the closure of government schools that do not comply with RTE norms.

High public expenditure on education

There are various ways of benchmarking the size of public expenditure on education in India. One way is to compare it with that in other countries, e.g. comparing India's "PPE on education as a proportion of the country's per capita GDP" with the same quantity in other countries. Another way is to compare government schools' PPE with private schools' within India.

China and India comparison of public education expenditure

Because of data availability, we compare not total education expenditure but rather its largest component, namely teacher salary expenditure, and it shows that education is produced three times as expensively in India as in China. Table 5.4 in Drèze and Sen (2013) is reproduced here as Table 5; it presents 'teacher salary as a multiple of the country's per capita income' for India and several other countries. The authors find that the ratio of teacher salary to per capita GDP is 0.5 in Indonesia and 0.9 in China but 3.0 in India, i.e. average teacher salary expenditure is three times the average national per-capita-income in India, but that in China average teacher salary expenditure is less than the average national per-capita-income. In other words, China spends only one-third as much on teacher salary as India, when expressed as a multiple of national per capita income. This was before the wage inflation generated by the Sixth Pay Commission, whereby teacher salaries approximately doubled in one go (Kingdon, 2010).

Public and private school comparison of per-pupil-expenditure

Another way of benchmarking the size of public expenditure on education is to compare PPE in government schools with that in private schools. Tables 2a and 2b already showed PPE in public and private schools for 8 major states of India. Table 2a showed that among these eight states, PPE in government schools is anything from 1 to 13 times as much as in private schools.

Non-productive expenditures in education

VFM can also be low due to educational expenditures on unproductive inputs, i.e. on items that have no relationship with student learning levels. One example is expenditure to reduce pupil teacher ratios. The RTE Act 2009 obliges schools to maintain a maximum pupil teacher ratio of 30 in primary classes, and lower than that in upper primary classes (due to specialist subject teachers). But evidence internationally shows that pupil teacher ratio is not consistently related with student learning (Hanushek, 2003; Altinok and Kingdon, 2014). Reducing pupil teacher ratio is a very expensive reform without demonstrated return in terms of increased student learning, especially in the context of high student absence rates and the alleged fake/over-stated enrolment figures in government schools[4].

Another example of increasing spending on non-productive inputs is the increase in government teacher salaries via Pay Commission recommendations. Much of the fiscal capacity of government to increase education expenditure is tapped for increasing teacher salaries when these salaries are already high compared to other developing countries, and are also upto 10 times the salaries of contract teachers and upto 25 times the teacher salary in private schools, which is the market-clearing wage[5]. While it is proper/just that equity concerns (equality of salary between contract and regular teachers within government schools) have led to the 'regularisation' of contract teachers in many Indian states, three separate studies with data from 5 states showed that learning levels among children taught by contract teachers were no less than among children taught by regular teachers[6] even though their salary was upto one-tenth of regular teachers' salary, indicating that higher salaries are not a learning-enhancing input. The fact that learning levels of children attending private schools are not lower (and could be modestly higher) than of children attending government schools, despite teacher salaries being upto 1/25th of government teacher salaries again goes to show that increases in teacher salary are not a learning-related expenditure. Some expenditures that are arguably more quality-related have not been made mandatory[7]. The inefficiency of using bureaucratically set high minimum wages rather than market clearing wages, can be addressed by following the suggestion of a professional development ladder for all teachers, suggested by Pritchett and

[4] Though there are no hard figures, the SchoolTELLS survey of UP and Bihar found that 15% and 35% of enrolments were fake, i.e. included names of children who were never found in the school in 4 unannounced survey visits to the sample schools. The over-reporting of enrolment could be due to the economic incentives to obtain extra food-grains from the Mid-day meal scheme, or extra cloth from the free uniform scheme, or to siphon off funds intended for SC/ST children's scholarship of Rs 350 per year.

[5] That is, the wage at which the supply of educated persons equals the demand for educated persons in a local labour market. In rural Uttar Pradesh currently, mean teacher pay is around Rs 1500 per month in 2014-15 (inflating SchoolTELLS data using the inflation index), and the average salary of a primary (class 1 to 5) teacher in Government school is Rs 39,683 pm (Ramachandran, 2015). Thus, Government teacher salary in rural UP is more than 25 times private school teachers' salary. Average teacher salary (of primary teachers) after 15 years' experience is estimated at Rs 43,080 per month, in 2015-16 (based on Appendix Table 4).

[6] Muralidharan and Sundararaman (2010); Goyal and Pandey (2010); Atherton and Kingdon (2010).

[7] For example, investments in school leadership training; increasing teacher competence; monitoring and inspection expenditure; learning surveys; increased parental information about school quality; research and innovation; teaching-learning materials; computers; student exchanges; etc.

Murgai (2008). Another idea is to link salary hikes to increased accountability, or a mild form of performance related pay.

Inefficiency due to non-genuine enrolment

Another problem of wastage is that there is a considerable proportion of non-genuine enrolments and high levels of student absence. Some questions have been raised – from time to time – about the veracity and trustworthiness of enrolment data from the self-reported District Information System on Education (DISE). Newspapers regularly report scams related to fake enrolment numbers. To take two recent examples from Uttar Pradesh, in November 2015, the Comptroller and Auditor General (CAG) and the Mid-Day Meal Authority (MDMA) carried out a joint survey of enrolment figures in UP government schools and found that students' names were entered in the enrolment registers of more than one government school, and that in almost every elementary school, total enrolment was inflated by *at least* 10%[8]. Secondly, in September 2015, the DISE enrolment data for the Lucknow district were reviewed by the District Magistrate who ordered for a survey to be carried out by the district Basic Education Officer. The survey showed that 18% of students in Lucknow were "absent for long period" and the District Magistrate ordered the cancellation of the admission of many of the elementary school children whose names were in the enrolment registers[9]. This is fairly consistent with the findings of the SchoolTELLS survey of 80 rural primary schools in 5 districts of Uttar Pradesh[10] where each school was visited 4 times in the year 2007-08, and it was found that 15% of students in the enrolment registers were never present in the school in any of the four survey visits, i.e. 15% of the total primary school enrolment was apparently fake. And this is disregarding the absenteeism among children who are not fake enrolments[11]. It has been widely suggested that there are economic incentives for government schools to over-report enrolments since grains for mid-day meals, cloth for school uniforms, scholarship money for SC/ST students, and the number of teachers appointed, all these increase with the reported number of enrolled children in a school, and there are no penalties for over-reporting enrolments. A de facto pupil teacher ratio of 30:1, based on attendance rate, would be a desirable policy correction.

[8] http://epaperbeta.timesofindia.com//Article.aspx?eid=31813&articlexml=UP-schools-drawing-funds-for-non-existing-students-02112015004030

[9] http://epaperbeta.timesofindia.com//Article.aspx?eid=31813&articlexml=BSA-SURVEY-18-primary-students-in-city-skip-29092015002036

[10] Rural parts of districts Agra, Shrawasti, Mahoba, Bijnor and Lucknow.

[11] Surveys by the MHRD and the ASER suggest that just over half the children who enrol have a tenuous connection with the school in UP. The ASER survey for 2015 shows student attendance rates in UP government schools as 55.1% in primary and 54.7% in upper-primary schools. Thus, when UP elementary schools show a pupil teacher ratio of 33 according to their enrolment data, this amounts to about 17 pupils per teacher actually present in school any day.

Low teacher attendance rates

Low teacher attendance is another large source of wastage in the publicly funded part of the schooling system. Muralidharan et al. (2015) find that the fiscal cost of teacher absence in India is around US $ 1.5 billion (or Rs. 9800 crore) per annum. They advocate improving governance by hiring staff to increase the frequency of monitoring would be over ten times more cost effective in increasing teacher-student contact time than hiring more teachers.

VFM from changes in access to schooling

One important source of VFM comes from children's increased access to schooling, since schooling has economic and non-economic benefits. A cost-benefit analysis of the return on the Sarva Shiksha Abhiyan (SSA) expenditure – over the period 2003 to 2009 – by Kingdon and Atherton (2010) showed a significant positive economic return from the public expenditure on the SSA program as this period saw an increase in school access.

An important (inverse) measure of schooling participation is the number of OOSC. Estimates of OOSC in India are available from the IMRB surveys commissioned by the MHRD via EdCil in 2005, 2009 and 2014, and the annual ASER surveys. Their findings are summarised in Table 1. They show that between 2005 and 2009, the proportion of OOSC aged 6-14 fell from 6.9% to 4.3%, close to the corresponding numbers of 6.6% and 4.0% respectively in ASER. In absolute terms the number of OOSC fell from 13.5 million to 8.2 million over this period. However, the pace of enrolling OOSC slowed down after 2009. Between 2009 and 2014, the OOSC fell from 4.3% to 3% as per IMRB and from 4.0% to 3.3% as per ASER. In absolute terms, the number of OOSC fell during these 5 years from 8.2 million to 6.1 million, a decrease of about 20 lakh children who are out of school.

While the number of OOSC fell by about 21 lakh, unfortunately 18.5% of the OOSC who enrolled never actually attended school, and another 37% dropped out of school, mostly by the end of grade 2, thus 55.5% of OOSC did not remain in school (IMRB, 2014). This reduces the number of OOSC who had meaningful schooling participation to 44.5% or 9.4 lakh children.

To measure the economic return to staying on in school for these 9.4 lakh youngsters, one would consider the boost in earnings from extra years of schooling. If these students are retained in school until class 10 or beyond, they will enjoy higher earnings and higher productivity and will contribute to economic growth. While there appears to be little economic return to increments in education in the Indian labour market until lower secondary class 10 level of education (Colclough et. al., 2010), perhaps because education below class 10th does not lead to secure literacy and numeracy skills and employers are unwilling to pay higher wages for mere completion 5 or 8 years of schooling without learning cognitive skills[12], a major advantage of elementary education is that it permits access to high school and beyond, where there are significant economic returns. Then there are also the non-economic benefits of basic education. While the literature suggests that even the non-economic returns to education, such as higher civic sense, lower fertility rates, lower infant mortality, better child health and education, etc. are greater from secondary education than from elementary education, again elementary education permits access to the (high return) secondary and further levels of education. Moreover, government must be credited for establishing schools in remote rural

[12] But this phenomenon is not confined to India alone. Colclough et. al. show that the economic return to primary schooling has collapsed over time in most developing countries.

areas where private schools are unlikely to operate, even though there is no established methodology for monetising the non-economic benefits of education or for monetising the benefits to remote communities of having school access.

Changes in enrolment patterns across government and private schools can lead one to question the extent to which the OOSC have been absorbed by government schools, since as Table 2 shows government school enrolments have been falling sharply and private schools enrolments rising strongly[13]. However, it is still likely that the OOSC who joined school mostly joined government school. Despite the difficulty of measuring the benefits from reduction in OOSC, and despite the size of benefits being compromised due to the low quality of schooling, there are nevertheless likely to be positive economic and non-economic returns to schooling participation that is facilitated by government education spending.

The Small Schools syndrome: Is maintaining small, inefficient schools leading to inequity?

Table 6 shows that government schools have been emptying over time: between 2005 and 2014, in the 20 major states of India, while the number of government schools increased by 1,38,422, their total enrolment fell by just under 6.7 million students, so that 'average enrolment per government school' fell by 24 students [from a base of 131 in 2005][14], i.e. mean school size fell by nearly 20%. To understand Table 6, it is useful to see the underlying data in the Appendix Table 2. To take the example of MP, the number of government elementary schools in MP rose from 104,671 in 2005 to 114,360 in 2014-15, i.e. 9,689 new government schools were established in MP in this 9 year period, an increase of 9%. However, the number of students studying in government schools fell by 21,71,597, i.e. government school enrolment fell by 20%. Thus, average government school size fell from 104 students per school in 2005 to 76 students per school, a reduction of 28 students per school, or 27%. Table 6 shows just the changes over time for each of the 20 major Indian states.

The emptying of government schools has reduced school size so much that many government schools are rendered economically unviable, with fewer than 20 students in the entire school as a whole. Table 7 shows, for each state, the number of 'small' government schools that have a total enrolment of 20 or fewer students. The last two rows of Table 7 show that in the listed 20 major states of India, there are 96,965 small schools and that these have 187,396 teachers and 1,254,608 students. Thus, the pupil teacher ratio in these schools is a mere 6.7 students per teacher, and the mean teacher-salary cost per pupil is Rs. 7156 per month. The teacher salary bill of these schools is nearly a staggering Rs. 9,700 crore per annum. The underlying data for each state, from which Table 7 is constructed, is given in Appendix Table 3.

If these were all schools in remote areas, it would be equity-related expenditure that is facilitating access to schooling in remote areas. However, the reality of a pupil teacher ratio of 6.7 students per teacher suggests that at one time they had more students (hence the number of teachers allocated) but that, over time, student numbers have dwindled, thereby lowering the pupil teacher ratio. Thus, some part of this major phenomenon of small schools is due to

[13] The underlying DISE data on total Government and private school numbers and their total enrolments, from which Table 2 has been made, are given in Appendix Table 2.

[14] Over the same period, the number of private (recognised) schools increased by 1,70,064 and their total enrolment increased by nearly 35.5 million students.

reductions in student numbers and is indicative of a large problem of poor cost-effectiveness of education expenditure.

That is presumably why some states have rationalised small schools to some extent during 2014-15, e.g. between Rajasthan, Maharashtra and Chhattisgarh, about 23,700 government schools have been merged with other schools or been closed down (newspaper reports).

While the Government of India's school location policies (reiterated in the RTE Act 2009) have long aimed to ensure a school either within a habitation, or within easy walking distance, little attention has been paid to the fact that school location policies affect not only schooling access but also many important aspects of school quality such as school size, the number of teachers, and the socio-economic composition of the student body. Anjini Kochar (2007) shows that habitation size determines the availability of schools in scheduled caste and tribe (SC/ST) habitations, and also determines the number of teachers, and that these in turn determine schooling attainment of children. Where neighbourhoods are segregated by caste, the availability of neighbourhood schools may lead to caste-based segregation in schools. Kochar shows that this increases the schooling of upper castes but reduces that of SCs. Thus, school location policies, through their effect on school quality, imply that the benefits of school access differ across castes within any given region.

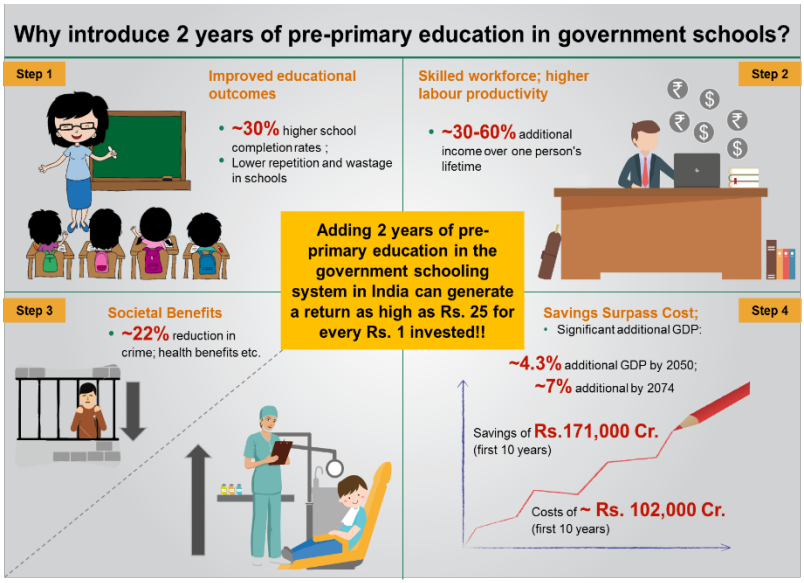
In this context of emptying of government schools, unviably small government schools, and the negative effects of caste-segregated schools, there is an inherent inefficiency built into the RTE Act's prescription that governments must establish neighbourhood primary schools within a 1 km radius, and upper primary schools within a 3 km radius, of every population cluster. In a context where parents have been abandoning government schools, average government school enrolments have fallen secularly, and thousands of government schools are being closed down due to being economically unviable, creating yet more government schools would be very wasteful. This dissonance requires correction with an amendment of the RTE Act.

Convergence for Greater Efficiencies: Downward Integration with Pre-School Education and Upward Integration with Secondary Education:

Improving the Quality of Elementary Education through Introduction of Pre-School Education: SSA, a centrally sponsored scheme, is currently the main vehicle for RTE- for realizing the vision of providing quality education to all: which has demonstrated some success, as evident from the fact that the net enrolment rate at the primary level has risen to about 90 percent in 2011-12 and the annual dropout rate has declined from 9.4 percent in 2007-8 to 5.3 percent in 2012-13. (MHRD, 2013). While these are certainly reasons to celebrate, the concern is the persisting low levels of learning in the early grades, with a significant number of children in grade 5 reported to not being able to read even grade 2 text (ASER 2013), resulting in children moving from one grade to another without learning even the basics of reading and writing. Responding to this concern, the MHRD has launched a new scheme titled "*Padho Bharat Badho Bharat*" with a focus on quality improvement in grades 1 and 2, for which specific funding is provided under SSA.

While this focus on the early grades is well justified since a weak foundation can only lead to cumulative deficits in learning in higher grades, the diagnosis of the problem needs further examination.

Shifting Focus to the Child and School Readiness: Recent research in India in three states on about 12 thousand six year olds has provided convincing evidence that a major factor for low learning levels in early grades is inadequate school readiness with children coming into school in Grade 1 with inadequate cognitive and language competencies which are prerequisites for the primary school curriculum (Indian Early Childhood Education Impact (IECEI, 2014). With the legislative and policy mandate for all children to come into school at age 6, a significant number of children are now coming in from home environments which primarily have an oral culture with very little exposure to literacy environments or even to print material at home, with few role models which could inspire children in this context and with limited opportunities to develop their vocabulary in the school language. As a result they lack some basic cognitive and language competencies due to their limited experiences at home in the early years, which influence their learning levels in school.



Preschool Education: A Profitable investment: Given this context, research across the globe, including in India, is now confirming that even one year of preschool education when children are 4 and 5 years old can lead to a significant increase in their school readiness levels at the time of entry to grade 1, which in turn contributes to enhanced levels of learning in primary grades. (IECEI, 2015) A study by NCERT (1994) on about 38,000 children in eight states provided evidence of impact of preschool participation on retention rates in primary schools which improved by about 15-20 percent as compared to students who had not participated.

An analysis of short and long-term returns to investment in pre-primary education, if integrated into the government system in India, indicates significant potential benefits (The World Bank, 2015). The analysis examines Models 1, 2 and 3 for pre-primary education using a combination of revitalizing programs, mobilizing existing resources and integrating current working systems. Cost benefit analysis is undertaken in order to evaluate the cost to the system for pre-primary education inputs against potential short-term and long-term savings for government and society. The analysis of Model 1, 2 and 3 (table presented below) represent a continuum from most comprehensive intervention to a convergence model to a focused but succinct package program to improve all early learners' school readiness.

Table 1: Models for Investing in Pre-Primary Education (Please see Appendix 5)

Model	Advantages
Model 1: TWO YEARS OF PRE-PRIMARY EDUCATION in Government Schools	• Comprehensive and high-quality • Newly developed infrastructure, teacher training and preschool curriculum • Situated in Government school system in order to ensure continuous transition from pre-primary to primary grades • Return on Investment (ROI) International evidence: ROI ratios from cost-benefit analysis range from $7 to $16 per dollar invested illustrating the high return from investing in pre-primary education • *ROI: India specific: Adding these 2 years of pre-primary can generate a Cost-Benefit Ratio of 25, or Rs. 25 saved for every Rs. 1 invested.*
Model 2: CONVERGENCE between existing government departments to strengthen preschool education at Anganwadi Centers (AWCs)	• Optimizing / integrating existing resources • Adding new resources, improving infrastructure • Improved efficiency of existing systems • *ROI: Convergence model can generate ratio of 10, or a savings of Rs. 10 for every Re. 1 invested in pre-primary education.*
Model 3: SCHOOL READINESS PACKAGE for 30-60 days of preschool intervention at the start of Class 1	• Highly focused and intense preschool pre-literacy and pre-math instruction • Minimal costs with potential of ensuring school readiness for all learners • *ROI: Model 3 yields a cost-benefit ratio of 75, or a savings of Rs. 75 for every Rs. 1 invested in pre-primary education. However, due to the minimal costs incurred in this specific model, benefits are not relevant in absolute terms.*

Towards Composite Schools: Convergence between SSA and Rashtriya Madhyamik Shiksha Abhiyan (RMSA) for increased efficiency: The Rajasthan experience:

The Government of Rajasthan (GOR) has taken a strategic decision to consolidate some of its elementary schools and secondary/senior secondary schools into composite schools. The consolidation is being worked out within the guidelines set under the RTE Act. This case has been examined to study the merits of this move by comparing the effectiveness, efficiency and impact of Elementary schools vis-à-vis composite schools.

Based on the realization that that a lot of elementary schools were actually created by separating primary and/or upper primary classes from existing composite schools, the GOR initiated its move on consolidation. While creating a public school network that was difficult to sustain and was inefficient in operations. A number of schools were operating with poor enrolment, poor monitoring and inadequate supervision mechanisms.

Rapid expansion of the public schools network has led to a sizeable financial outlay towards infrastructure expansion with major outlay towards development of school buildings, classrooms, toilets and drinking water facilities. Resources for outcomes related indicators, monitoring and quality improvement were getting constrained.

The GOR decided to place elementary grades in the same ecosystem that houses secondary and senior secondary classes in order to –

- Place them under the regular care and supervision of the secondary/senior secondary school Principal for concurrent monitoring and reduced unaccounted teacher absenteeism.

- Provide elementary school teachers with access to subject teachers and focussed academic guidance (more qualified, trained and experienced) working with secondary and senior secondary teachers improve the Grade to Teacher Ratio (GTR)[15] thereby increasing the number of effective learning days.

- Provide students from elementary schools with access to facilities such as better equipped libraries, playgrounds, functional computers etc.

- Facilitate greater retention through improved quality of education and stronger parent-teacher association (a result of improved monitoring); and improved transition rates through unconstrained sharing of student data/information.

Effectiveness: Composite schools benefit from having a larger institutional setup in terms of infrastructure, teacher availability and classroom availability. It is well documented that an enabling teaching learning environment leads to better learning outcomes for children, and in this sense certain parameters considered in this analysis have been charted out for both composite and elementary setups.

Unified District Information System for Education (UDISE) data from 2013-14, shows that composite schools perform better than elementary school on various supporting infrastructure/facilities related parameters such as availability of electricity connections, libraries, playgrounds and computers. Data given in Table 1 shows that while 84.4 percent of composite schools have access to electricity, the corresponding figure for elementary schools stands at 52.4 percent.

Table 2: Schools with electricity connection

Variable/Parameter	2013-14	
	Composite	**Elementary**
With electricity connection	84.4 percent	52.4 percent
Without electricity connection	15.6 percent	47.6 percent

While 84.4% of composite schools have electricity connection, 52.4% schools have them at the elementary level. .

[15] Grate to Teacher Ratio refers to average number of Classes/Grades a teacher has to manage at any given point of time.

Table 3: Schools with library facility

Variable/Parameter	2013-14	
	Composite	**Elementary**
With Library	84.0 percent	80.4 percent
Without Library	16.0 percent	19.6 percent

Similarly, while 84 percent of composite schools have a library, the corresponding figure for elementary schools is 80.4 percent. Most composite schools have a larger library setup and many have a dedicated librarian. On the other hand, most elementary schools do not have a library room but rather a small collection of books that are stored in a cupboard.

In order to improve the quality of education being imparted in public schools, the Government has been making efforts to leverage information and communication technology enabled teaching-learning transactions. However, implementing the same requires the schools to have access to computers.

Table 4: Schools with computer availability for teaching learning purposes

Variable/Parameter	2013-14
	Average number of computers available for teaching and learning purposes
Composite	3.0
Elementary	0.5

While composite schools house an average of three computers, the corresponding figure for elementary schools is 0.5 with many elementary schools having no computers. This could also be because a large percentage of elementary schools do not have electricity connections.

More importantly, composite schools seem to have more effective classroom transaction processes. The percentage of teachers with a graduate degree is higher at composite schools. The GTR estimates show that at a given point in time a teacher in an elementary school teaches an average of almost two classes/grades. The corresponding figure for composite schools is closer to a teacher a class/grade.

Table 5: Teacher related parameters

Type of School	2013-14			
	Percentage of teachers with graduation and above	**Percentage of teachers with Professional qualification**	**PTR**	**GTR**
Composite	89.4 percent	96.6 percent	32	1.31
Elementary	81.4 percent	96.7 percent	20	1.83

The difference in GTR when factored in to adjust the average instructional days reveals that the ‘effective instructional days’ in composite school is 159 and the corresponding figure for elementary schools is 99.

Table 6: Average number of instructional days (upper primary)

Type of School	2013-14	
	Average number of instructional days	Average number of effective instructional days
Composite	208	159
Elementary	180	99

The benefits of concurrent monitoring through the Secondary/Senior Secondary school Principals lead to composite schools reporting a lesser need for BRC (Block Resource Coordinators) and CRC (Cluster Resource Coordinators) visits leading to more efficient use of these resources.

Table 7: Monitoring and Supervision

Type of School	2013-14 (Rounded Off)			
	Average no. of visits by Block Resource Centre officer	Average no. of visits by Cluster Resource Centre officer	Average Distance from Block Headquarters (in Km.)	Average Distance from Cluster Resource Centre (in Km.)
Composite	1	1	19	3
Elementary	2	3	24	4

Increased efficiency: Having larger institutional setup in terms of infrastructure availability and human resources, composite schools have the ability to cater to a larger number of students. Working closer towards full capacity enables these schools to put their resources to more efficient use. An analysis of SSA budget allocation on elementary education reveals that 50.1 percent of allocation is towards teacher salaries and trainings, 22.4 percent allocation is towards infrastructure creation and maintenance and 27.5 percent allocation is towards other elements.

The Pupil-Teacher Ratio (PTR) in composite schools is higher than the PTR at elementary schools. Similarly, the number of students per school at composite schools is higher than the corresponding figure for elementary schools. Factors derived from these two data points when used to adjust the allocation figures for teacher related and infrastructure related components, provide for an estimate of the efficiency with which composite schools work.

Table 8: Adjustment factors

Type of School	2013-14	
	PTR	Average strength per school
Composite	32	301
Elementary	20	187
Adjustment factors (composite/elementary)	**1.6**	**1.6**

Using the above given factors to adjust the budget allocation for infrastructure and teacher related components reveals that composite schools provide for a 38 percent more efficient use of funds invested in infrastructure and teacher related components. In terms of percentage points, investing in composite schools leads to a 27.3 percentage point higher efficiency.

Table 9: Effective Efficiency of composite schools over elementary schools

Type of School	Miscellaneous	Infrastructure and resources	Teachers component	Aggregate percentage budget allocation	Difference in Efficiency
Elementary	27.5 percent	22.4 percent	50.1 percent	100.0 percent	**27.3 percent**
Composite	27.5 percent	13.9 percent	31.3 percent	72.7 percent	

Another interpretation of the aforementioned statistic can be that all other outcomes being the same, a composite school spends INR 0.73 per child where an elementary school spends INR 1.00. The only additional cost under the composite school model is the INR 20 per day the Government provides to students in the form of transport assistance.

Conclusions and recommendations

This paper has attempted to measure the VFM achieved from publicly funded education, by looking at both the school access and learning outcomes of children. While it was not possible to monetize the benefits of schooling access, it is clear there will be positive returns from the increase in schooling participation inherent in the observed modest reduction of OOSC.

Sadly, the economic returns from public education expenditure are negative in terms of falling learning levels and their deleterious impact on labour market productivity. This problem is compounded by the 'double-whammy' that learning levels fell during a period when government expenditure on education nearly doubled, in per pupil terms. The increase in per pupil government education expenditure over the 10-year period 2006-2015 is due partly to a strong increase in total government education expenditure (1.4 lakh schools established) and partly to a 24% reduction in government school enrolment and a 20% reduction in the average enrolment per government school (Table 6).

VFM from the government school system is also low in comparison with that from the private school system. The reasons are partly to do with lower learning levels in the government school system but more majorly due to the huge cost dis-advantage of government schools which pay bureaucratically set high minimum wages, compared to private schools which pay market-clearing wages based on the supply of unemployed graduates who are willing to work for low salaries. Private schools have flexibility in the mix of inputs they use and they also elicit greater teacher effort and demand greater teacher accountability, as seen from the lower teacher absence rates in private than in government schools (Muralidharan et. al., 2008).

Section 3 of the paper discusses the factors behind the low VFM. These include low learning levels, high public expenditure on education, non-productive expenditures on education, the inefficiency of maintaining small schools, inefficiency due to non-genuine enrolment numbers, and the high teacher absence rates. The recommendations are based around these areas as well.

Recommendations:

Moving from block grants to per-student grants: One of the best ways to increase school and teacher accountability and thus to raise VFM from government education expenditure would be to shift from a "block grant" to a per-student grant to government and aided schools. Under a per-student grant system, there will be strong monitoring of student enrolment numbers, and schools would lose government grant money (and thus be forced to lose teachers) if their student enrolment numbers fall. In most countries, government funding grant to schools is on a per-student basis. Moreover, one can tease even greater VFM through adopting the practice in many developed countries to have efficiency and equity incentives built into the grant formula for schools. For example, in the UK, the per student grant for 2015-16 is fixed at £ 2880 for primary, £3950 for class VIII and IX, and £4502 for class X students, but the school gets, for each child of a designated group, additional per pupil grant for different categories of disadvantage[16].

Rethinking school location policies: While India's long-standing school location policies (reiterated in the RTE Act 2009) have aimed to ensure a school either within a habitation, or within easy walking distance, research suggests that this policy ends up segregating children into different schools by caste, and raises the schooling attainment of the upper castes while reducing that for the lower castes. In other words, school location policies, through their effect on school size/quality, imply that the benefits of school access differ across castes within any given region. Thus school location policies need to be rethought.

Amendment of the RTE Act: In the context of emptying of government schools, unviably small government schools, and the negative effects of caste-segregated schools, there is an inherent inefficiency as well as inequity built into the RTE Act's prescription that governments must establish neighbourhood primary schools within a 1 km radius, and upper primary schools within a 3 km radius, of every population cluster. In a context where parents have been abandoning government schools, average government school enrolments have been falling, and thousands of government schools are being closed down due to being economically unviable, creating yet more neighbourhood government schools would be very wasteful. This dissonance requires thoughtful correction with an amendment of the RTE Act.

Moderation of teacher salary levels in the forthcoming Seventh Pay Commission: The fact that learning levels of children attending private schools are not lower (and could be modestly higher) than of children attending government schools, despite teacher salaries being upto 1/25th (or as little as 4%) of government teacher salaries, and given that PISA test learning levels in China are significantly higher than in India even though teacher salary as a multiple of per capita national income is only one-third as much in China as in India, indicates that increases in teacher salary are not a learning-related expenditure. Thus, moderation of teacher salary increases – especially in the forthcoming Seventh Pay Commission – will help to raise VFM in the government schooling system. Teacher salary moderation can also help to strengthen the School Development and Management Committees (SDMCs) since it will reduce the current huge economic-distance between the well-paid teacher and the typically

[16] Additional per pupil grant for deprivation, between £882 and £1,870 per annum (full breakdown is given); for looked-after children – £1,004; for low prior attainment – primary: £669; secondary: £940; • English as an additional language – primary: £466; secondary: £1,130; a lump sum for every school – primary: £115,797; secondary: £125,155; additional sparsity sum for small schools vital to serving rural communities – primary: up to £44,635; secondary: up to £66,656.

lowly paid parent, since this economic gap hinders parents' ability to hold teachers accountable, as suggested in the literature (Kingdon and Rawal, 2010). Another idea is to link salary hikes to teachers accepting increased accountability, e.g. accepting a mild form of performance related pay, as was done in Mexico in return for a large increase in teacher pay, as negotiated with teacher unions.

Protect the low fee private schools from closure: Since private schools are about 5 times as cost-effective as government schools, and the vast bulk of private schools are the low fee private schools that cannot afford the costs of compliance with all the RTE recognition norms, it is important that government takes a facilitative rather than a punitive approach, protects such schools from closure due to non-compliance with the infrastructure requirements of the RTE Act or with the many other recognition conditions imposed by over-zealous state governments. Governments can help private schools through subsidies to become RTE compliant. Protecting them from closure will also protect children's RTE in a context where state governments are closing down small government schools, and it will maintain the overall efficiency of the system compared with the counterfactual that the high-value-yielding private schools are closed down, and lower-value-yielding government schools continue to operate which, ironically, themselves do not fulfil the RTE infrastructure norms, since there is no provision in the RTE Act for the closure of government schools that do not comply with RTE norms.

Invest in quality-related expenditures: Government must invest more in quality related expenditures which have been largely neglected hitherto, such as investments in school leadership training; increasing the very low levels of teacher competence (as seen in the dismal performance on Teacher Eligibility Tests, TETs), through relevant training; monitoring and inspection expenditure, to reduce teacher absence rates and to ensure the accurate recording of enrolment numbers; annual (non-high-stakes) measurement of child learning to enhance teacher accountability; publication of transparent information for parents/the public about learning levels in all schools, since such visible evidence on relative school quality of all the schools within a district can set up healthy competition between schools); research and innovation; teaching-learning materials; computers; student exchanges; etc.

Creating a professional development structure for teachers: The inefficiency inherent in bureaucratically setting high minimum wages rather than paying market clearing wages to teachers, can be addressed by establishing a professional development ladder for all teachers. Pritchett and Murgai (2008) suggest that all teachers can start life on annually renewable contracts and a modest salary for a specified period (3 or 5 years), after which their work is assessed and, if found satisfactory, they are promoted to the position of a regular teacher with a higher salary and a permanent post. They can be offered one or two more professional development opportunities during their career, relating promotion and pay-rise to their performance appraisal.

Strengthening elementary education through introduction of pre-school education:
In view of the significant and proven benefits of investment in preschool education especially for 4 to 5 year olds (since 5 to 6 year olds are already in school in at least 23 states), and the cumulative benefit of addressing the entire early learning continuum for children's learning, it is recommended that a preschool class may be added to existing primary schools across the country and the curriculum for the pre-primary and first three years of primary be developed in a bottom up manner to ensure continuity and developmental appropriateness. A two year Diploma Course on Preschool Education has already been developed and notified by National

Council for Teacher Education (NCTE) (2015) which could support teacher education for this stage. This recommendation is in alignment with the RTE (2009) Section 12 which encourages all state governments to endeavour to establish preschool classes for children from 3 to 6 years so as to help them develop school readiness for primary grades. Possibilities may therefore be considered of multiple models including relocating AWs to primary schools and ensuring continuity of curriculum, to setting up a one year class in schools prior to grade 1.

Reducing transactions costs via consolidating the SSA and RMSA schemes: At present SSA and RMSA operate as two separate programmes, with two different state implementation agencies, leading to duplication of staff, buildings, vehicles, and efforts. Since many schools are composite schools (containing primary, upper primary, and secondary sections), it makes sense to consolidate the SSA and RMSA into a single centrally sponsored scheme. Savings can be used more productively.

An honest, calm and evidence-driven rethink is needed about education policies. Bold and imaginative reforms are required to deal with the parlous situation of very low VFM that has long being achieved from government's educational funding. One thing is certain: the payoffs from wisely chosen and courageous reform that increases quality and learning levels in government schools will be extremely high, both in terms of government popularity and, more importantly, in terms of individual productivity and national economic growth.

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PAPER I

BENEFITS OF INVESTING IN PRE-PRIMARY EDUCATION

Benefits of Investing in Pre-Primary Education

Government Focus on Primary Education

High-quality and well-timed preschool education has been shown, through sound scientific evidence, to provide foundational learning during the vital early years influencing cognitive functioning, socio-emotional development, self-regulation and overall health (Sylva et al., 2010; Yoshikawa, 2013). Furthermore, research on investments in preschool suggests that early childhood development directly influences economic, health and social outcomes for individuals, society and the government (Heckman, 2011). The rationale for preschool education currently is less an issue of "Why invest in early learning?" but rather a question of "How to structure and implement an effective program?" alongside functioning primary school systems.

In India, the Government is committed under the RTE Act, 2009, to provide free and compulsory elementary education of satisfactory quality for all children between the ages of 6 to 14 years. SSA, a centrally sponsored scheme, is currently the main vehicle for realizing this vision which has demonstrated some success, as evident from the net enrolment rate at the primary level which has risen to 88% in 2013-14 and the annual drop-out rate which has declined from 9.4% in 2007-8 to 4.7% in 2013-14 (DISE, 2013-14). While this increased efficiency in the education system is certainly a reason to celebrate, the concern is the persisting low levels of learning in the early grades with a significant number of children in grade 5 unable to master the basics, leading to a cumulative learning deficit (NCERT, 2014; ASER 2013). In response to this concern, the Ministry of Human Resource Development (MHRD), the department tasked with school education system, has launched a new scheme titled "*Padho Bharat Badho Bharat*" with a focus on quality improvement in grades 1 and 2 for which specific funding is provided under SSA.

This additional intervention in the early grades is well-justified as weak foundational skills have been proven to lead to chronically low learning levels in higher grades (Karoly, L.M., et al, 2005). While poor learning outcomes can be attributed to multiple variables in the school system, there has traditionally been a focus on transforming the "teacher factor" – either teacher absenteeism, poor quality of teaching or lack of skills among teachers which is understood to be correctable through further training and monitoring. This paper argues for a shift in perspective from the teacher to the student, the centerpiece of the learning process, advocating for early exposure to preschool curriculum and instruction.

Shifting Focus to the Child and to School Readiness

Recent longitudinal research from three states in India, on approximately 12,000 children, provides convincing evidence that a significant factor for low learning levels in early grades is inadequate school readiness (ASER, 2013). Children are entering Grade 1 with inadequate cognitive and language competencies, many of which are basic prerequisites for primary school curriculum (IECEI, 2015). This data is critical in light of international research which suggests that children beginning school with sufficient cognitive, behavioural and social-emotional skills required are more likely to benefit from the learning experiences provided as well as experience long-term success (Graue, 1992; Meisels, 1999).

The legislative and policy mandate in India is for all children to start school at the age of 6. However, a significant number of students come from homes where oral culture dominates and

there is minimal exposure to literacy-rich environments. These children often lack access to print materials and parental role modelling of language which has the potential to build their vocabulary. As a result, they lack basic cognitive and language competencies which adversely influence their learning levels in school. Furthermore, the current provisions for pre-primary learning occur at the level of the AWCs which have, in practice, focused on delivering health and nutritional with minimal attention given to pre-primary education. Additional resources, such as structured educational curriculum and pedagogical training for Anganwadi workers (AWW), are required in order for AWCs to effectively facilitate early childhood education delivery. Therefore, a critical need exists currently for children's school readiness to be developed through proper preschool curriculum and instruction during the early years.

The Importance of the Early Years

It is imperative to understand why the early years are a critical time for investing in preschool education in order to maximize school level outcomes. Recent multidisciplinary research from the fields of neuroscience, behavioural sciences, economics, education and child development suggests that 90% of brain growth occurs before a child is 6 years old and the quality of a child's environment, during these early years, strongly influences this brain development (Reiss et al., 1996). Research also indicates that the critical periods for development of language, cognitive and socio-emotional competencies in the form of neural connections occur in the first seven years of life (Doharty, 1997). Therefore it becomes important, during this period, that a child is given exposure to a supportive environment and vibrant educational experiences for the development of competencies, which despite neuroplasticity, become difficult and resource intensive to address at the school level or in later years.

Furthermore, children from disadvantaged backgrounds who experience poverty during their preschool years have lower rates of school completion than children and adolescents who experience poverty only in later years (Brooks-Gunn, J & Duncan, G.J., 1997). For children lacking a supportive home environment due to socio-economic disadvantages or lack of knowledge among caregivers, the effects are visible in school in the form of low learning levels, poor self-regulated behaviour, attention and working memory deficits as well as issues of social maladjustment.

Pre-Primary Education and Learning Outcomes

Global evidence as well as India-specific research confirms that even one year of high-quality pre-school education, when children are between ages 4 and 5, leads to a significant increase in school readiness levels at the time of entry to grade 1, which in turn contributes to enhanced levels of learning in primary grades (IECEI, 2015). A study by NCERT of approximately38,000 children in eight states has provided compelling evidence on the impact of preschool participation on retention rates in primary schools, which improved by 20.5% for preschool participants in comparison to children who had not received preschool education (Kaul et al, 1994).

Evidence also indicates that while participation in preschool has many benefits, these are considerably enhanced if the program is high-quality and leads to sustained impact on learning levels. A recent meta-analysis including evaluations of 84 preschool programs concluded that on average, children gain about a third of a year of additional learning across language, reading and math skills from high-quality preschool education. At-scale preschools in Tulsa and Boston have produced even larger gains of between a half and a full year of additional learning in

reading and math. Furthermore, gains are significantly higher for children from disadvantaged backgrounds or with special needs (Yoshikawa et al, 2015). A review of specific evaluations of programs designed to enhance cognitive ability in mathematics between ages 4 to 5 years (Case, Griffin and Kelly, 1999; Kaul et al 1991) has concluded that strong preschool programs are required to provide a sound foundation in the critical early years necessary to improve the mathematics performance of students at the school level. (McCain, M.N. and J.F. Mustard, 2002).

Research further demonstrates that the sustainability of the benefit in terms of improved learning levels is greater if there is continuity in curriculum and pedagogy from the first two years of pre-primary to the first three primary grades, thus making these early years the "*foundation fives*" (Crouch, in Press) which need to be given special attention and duly strengthened and promoted. These five years are also referred to as the '*early learning unit'* in India's XIIth FYP and emphasized as the early learning continuum which, if appropriately scaffolder, can ensure a sound foundation for children, leading to better learning levels in schools. The XIIth FYP recommended introducing a minimum of a year of preschool education for 4 to 5 year olds in primary schools.

Additional Benefits of Pre-Primary Education

Research indicates that the benefits of quality pre-primary education clearly outweigh the costs and include gains beyond improved learning outcomes and higher incomes. (Yoshikawa, 2015). These benefits may accrue from reduced spending on remedial education at school level, less drop-outs, better social and academic competence and, in the long-term, from lower incidence of deviant behaviour and juvenile delinquency and savings from counselling and the criminal justice systems. Additionally, while long-term benefits can be expected from a better skilled population, increased economic productivity, higher individual earnings; supplemental benefits include improved health outcomes and lower crime rate, which would overall benefit the society and the government socially and economically. Cost benefit analysis of investing in pre-primary education suggests significant benefits for government and society. Established longitudinal studies have analysed adult outcomes of participants from influential preschool programs such as the High/Scope Perry Preschool and the Chicago Child Parent Centers (CPC) and indicated impressive benefit to cost ratios of $7 (in savings) to $1 (in cost) (Masse and Barnett, 2002). Estimates from the Abecedarian Project, another influential preschool intervention, produced a ratio of 2.5:1. A similar study in Brazil demonstrated the benefit to cost ratio for investing in preschool education to be 2:1. Furthermore, returns to investment analysis indicated that program participants could expect a 7 to 12% increase in future income (Young, 2002). According to Lancet (2011), a 50% increase in preschool enrolment in low and middle income countries would generate an estimated $34 billion at 6. 4 - 17.6:1 rate of return. A review of research indicates that while there may be variation in exact ratios of benefits to cost, the "best current evidence suggests that the impact of quality preschool per dollar spent on cognitive and achievement outcomes is larger than the average impact of well-known educational interventions per dollar spent, such as class-size reductions in elementary schools" (Yoshikawa et al, 2015).

Gains from Preschool Education

-30% higher graduation rate

-40% lower repetition rate

-14% higher income/ person: $156,490 more over lifetime (High/Scope Perry Preschool Study)

-7–12% increase in future income for each year of preschool (Chicago CPC Study)

Cost-Benefit Analysis of Investing in Pre-Primary Education

An analysis of short and long-term returns to investment in pre-primary education, if integrated into the government system in India, indicates significant potential benefits (The World Bank, 2015). The analysis examines Models 1, 2 and 3 for pre-primary education using a combination of revitalizing programs, mobilizing existing resources and integrating current working systems. Cost benefit analysis is undertaken in order to evaluate the cost to the system for pre-primary education inputs against potential short-term and long-term savings for government and society. International and India-specific evidence is synthesised in order to gather evidence for how economic gains accrue from investing in pre-primary education during the early childhood years. As data repeatedly advocates that preschool programs must focus on quality and duration, Model 1, 2 and 3 represent a continuum from most comprehensive intervention to a convergence model to a focused but succinct package program to improve all early learners' school readiness.

Table 10: Models for Investing in Pre-Primary Education

Model	Advantages
Model 1: TWO YEARS OF PRE-PRIMARY EDUCATION in Government Schools	• Comprehensive and high-quality • Newly developed infrastructure, teacher training and preschool curriculum • Situated in Government school system in order to ensure continuous transition from pre-primary to primary grades
Model 2: CONVERGENCE between existing government departments to strengthen preschool education at AWCs	• Optimizing / integrating existing resources • Adding new resources, improving infrastructure • Improved efficiency of existing systems
Model 3: SCHOOL READINESS PACKAGE for 30-60 days of preschool intervention at the start of Class 1	• Highly focused and intense preschool pre-literacy and pre-math instruction • Minimal costs with potential of ensuring school readiness for all learners

Model 1: Two Years Pre-Primary Education

Description, Costs and Advantages

Model 1 for pre-primary education entails adding 2 years of pre-primary education in the current government school system in India, including newly trained educators, pre-primary curriculum and teaching methodology, to ensure high-quality, pre-primary learning for the early childhood years. Students entering government schools are introduced to pre-literacy and pre-math learning intended to develop cognitive, linguistic and socio-emotional school readiness skills prior to entering primary instruction. Advantages for Model 1 include a comprehensive and high-quality program; newly developed intervention built from the ground-up; a program situated in the Government school system in order to ensure continuous preschool to primary transition.

Global Evidence

Seminal studies such as High/Scope Perry Preschool, the Abecedarian and Chicago CPC Studies illustrate that preschool interventions yield the greatest gains when there is a focus on

high-quality, sustained curriculum and instruction that is delivered by trained educators in a well-resourced and structured environment (Schweinhart, L.J. et al, 2005; Masse, L.N., Barnett, W.S., 2002; Reynolds, A.J., 2001). Evidence from these longitudinal studies indicates significant benefits for those who attended preschool in comparison to those who did not. Program participants had better education attainment (30% higher graduation rate; 40% lower repetition rate), and higher income over a lifetime (14% higher income per person or an average of $156, 490; 7 to 12% increase in future income for each year of preschool). Furthermore, individual benefits such as higher income contributed to government savings from increased tax revenues over a lifetime (28% increased tax revenues associated with higher expected earnings), reduced government subsidies and spending on remedial or corrective education. ROI ratios from cost-benefit analysis range from $7 to $16 per dollar invested illustrating the high return from investing in pre-primary education. Finally, preschool education can be expected to contribute to GDP increase in 2080 of 3.5% to 4% from a preschool program started in 2005 (Dickens et al, 2006).

India-specific Data

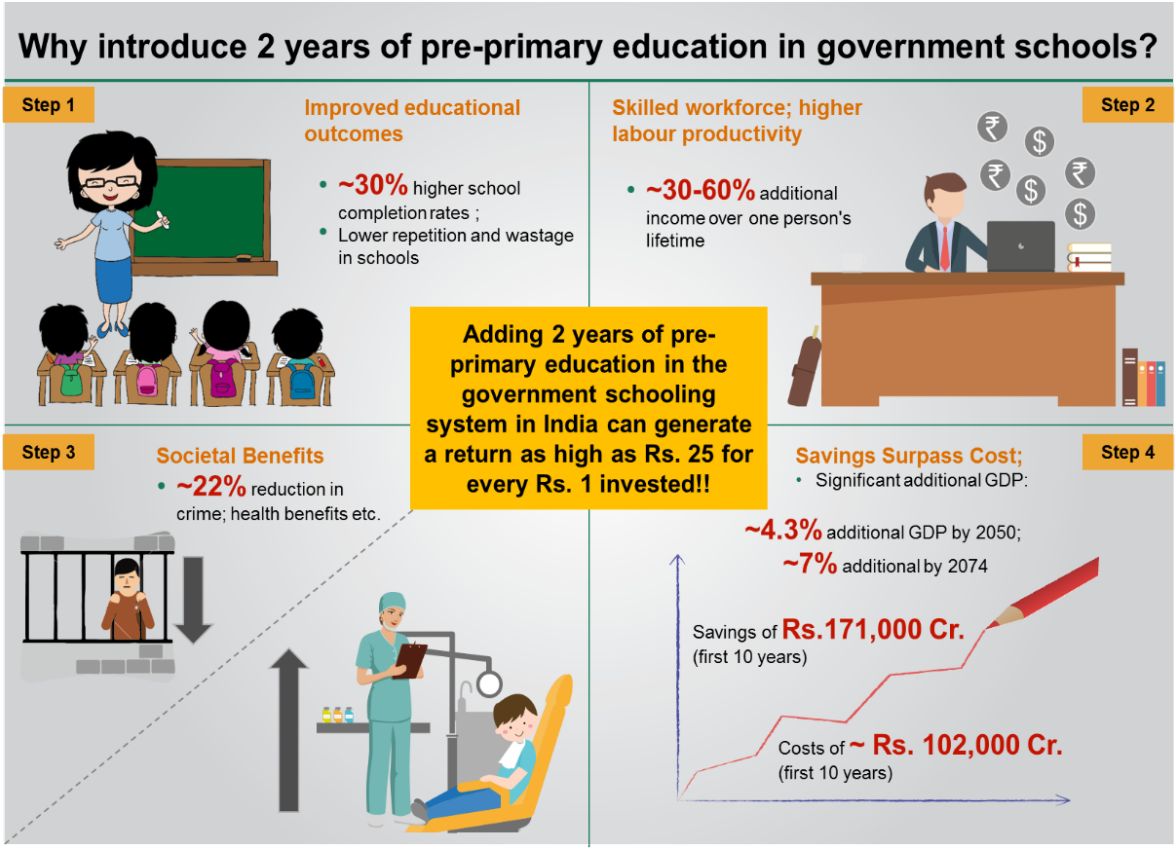
Research in India also points towards higher returns from pre-primary education for disadvantaged populations. Preschool exposure improved learning outcomes with students' average test scores improving positively and significantly as pre-primary education quality improved (Kaul et al, 2014). Students were also likely to have better educational attainment with 20% higher retention for preschool students and 17% less likely to drop out by Class IV (Kaul et al, 1993). Finally, systematic challenges like child labour, social exclusion and economic backwardness can be overcome through Government sponsored preschool programs for children from disadvantaged backgrounds.

Cost-benefit analysis for Model 1 suggests that adding these 2 years of pre-primary can generate a Cost-Benefit Ratio of 25, or Rs.25 saved for every Rs. 1 invested.

Benefits from Cost-Benefit Analysis

Adding 2 years of pre-primary stage to government elementary schools would lead to benefits for the individual, society as well as the Government and these benefits may potentially be magnified as they are sure to include disadvantaged student populations. Model 1 shows a requirement of an initial investment of Rs. 13,600 Crores and an annual spend of Rs. 12,650 Crores. This estimate is based on the understanding, as per DISE data, that there is a significant number of small schools across states with declining enrolments which could accommodate the additional pre-primary grades with minimal expense. The corresponding cost-benefit analysis for Model 1 suggests that adding these 2 years of pre-primary can generate a Cost-Benefit Ratio of 25, or Rs. 25 saved for every Rs. 1 invested.

Benefits of Pre-Primary Education



Further benefits include a skilled workforce and increased labour productivity with 30% to 60% additional income over an individual's lifetime. Additionally, spill over benefits to society can be seen in the form of 22 percent reduction in crime (basis international research) and improved health outcomes finally, benefits of pre-primary education are expected to surpass costs required to set up the system, with savings of Rs 171,000 Crores expected within the first 10 years. Pre-primary investments also contribute to a significant increase in GDP. As more pre-primary educated cohorts enter the workforce with higher incomes, 4.3% additional GDP can be expected by 2050 and 7% additional GDP can be expected by 2074. Figure 1 provides a summary of the analysis for reference.

Ease of Implementation

Benefits for Model 1 highlight the great potential value of a comprehensive 2 year pre-primary education model. Accordingly, Model 1 entails significant requirement of resources, development and integration into the current Government school system in order for the program to function effectively and successfully. Challenges entail the entire movement of preschool delivery from one government department to another and the corresponding logistical shift in responsibilities and obligations that would require. Furthermore, considerable investment is required in terms of infrastructure, advisory, materials and training. However, transferring preschool education to the school system ensures an optimal leveraging of school related resources and transferrable expertise in curriculum and pedagogy as well as allows for the most efficient and logical transition of the preschool learner into the primary grades.

Model 2: Convergence Model

Description, Costs and Advantages
Model 2 focuses on strengthening pre-primary education within existing government AWCs with convergence and coordination between the Ministry of Women and Child Development (MWCD), under the Integrated Child Development Services (ICDS) program, and the MHRD. This model requires construction of new AWCs so that they may function as classrooms, adding a dedicated and trained pre-primary teacher in order to provide instruction at each AWC beyond the AWWs. Costs also include teacher training for pre-primary teachers and supervisors, teaching learning materials (TLM) and additional central costs. Advantages for Model 2 include integrating resources, improving infrastructure, bringing in new resources and improving efficiency of existing government programs.

Evidence
Early Childhood Care and Education (ECCE) for children below 6 years is currently under the charter of MWCD as the ICDS program, which is mandated to offer preschool education for 3 to 6 year-olds as one of its six services (supplementary nutrition; provision of non-formal pre-school education; nutrition and health education; immunizations; health check-ups; referral services). ICDS has a reach of 13.4 AWCs with an enrolment of 3.7 Crore children and is the sole provider of Government ECCE. However, research shows that less than half of AWCs have teaching learning materials and several states report nil yearly expenditures of pre-school kits allocated under the ICDS budget suggesting a lack of delivery of pre-school education.
A recent study which explored the pathways followed by children from 3 to 6 years revealed that with the rising aspirations of parents for enrolling children early in organized education, and rapid expansion of private provisions, the overall trend in parental choice is of 4 year-olds being moved out of AWCs into either private preschools, if the parents can afford it, or to government primary schools as underage children (IECEI, 2015). About 20% children in government schools in Class 1 were found underage and were attending school without formal enrolment. Despite 1.3 million AWCs in place currently, the IECEI study found low school readiness levels among 5 year-olds at the time of entry to Grade 1. The AWCs, due to multiple responsibilities as well as infrastructure and human resource constraints, are not able to provide a systematically organized preschool education program which is required for children over 4 years. In addition, in at least 23 states of India the age for entry to Grade 1 is 5+ years, so that 5 to 6 year-olds are already not in AWCs but formally enrolled in the schools.

Benefits from Cost-Benefit Analysis
Model 2 calls for a revitalization of the current ICDS program utilizing resources available at both MWCD as well as MHRD with shared cooperation and costs between both government departments. The Convergence Model also utilizes continuing assumptions from Model 1 from high-quality pre-primary programs, such as High/Scope Perry Preschool and Chicago CPC, but it also integrates evidence from the U.S. Headstart program which, similar to ICDS, is a large-scale long-running government program offering a combination of pre-primary education, nutrition and health interventions. Data from the Headstart Impact Study (2010) indicates that Headstart provides 80% of the effects of well-known early childhood programs such as Perry Preschool and Abecedarian and Model 2 accordingly assumes 80% of benefits indicated in Model 1. Additionally, students who had attended Headstart were 17% more likely to complete high school than non-participants as opposed to 31% increase in high school completion in Perry Pre-school program and Model 2 adjusts for these differences as well. Additional spill over benefits also indicate that students who had attended Headstart were less likely to be arrested at age 22 (5% vs. 15%) suggesting savings in crime related spending. Overall the

Headstart program has significant benefits albeit lesser than standalone high-quality pre-school programs.

The analysis for Model 2 indicates short-term savings from reduced government spending on remedial education (Rs. 12,333 Crores) as well as household tuition spending (Rs. 5,800 Crores). Furthermore, it predicts long-term savings from reduction in government subsidies (Rs. 1719 Crores in 2032; Rs. 23, 355 Crores in 2074); household savings from higher income (Rs. 12, 300 Crores in 2032, Rs. 37.2 Lakh Crores in 2074); and subsequently government savings from increased tax revenues (Rs. 145 Crores in 2032, Rs. 3.5 Lakh Crores in 2074). Overall, Model 2 yields a cost-benefit ratio of 10, or a savings of Rs. 10 for every Rs. 1 invested in pre-primary education.

Ease of Implementation

Model 2 or the Convergence Model leverages the capacity of multiple governmental departments thus improving delivery of existing programs which in return saves on costs as well as improves efficiency. Effective inter-sectoral coordination requires regulatory, operational and financial convergence between multiple ministries and can be challenging. However, despite the obstacles, the Convergence Model may have potential as MWCD released a curriculum framework in 2012 for ECE outlining pedagogical approaches and curriculum content along with the role of teachers and parents in early learning. In 2013, the newly adopted National ECCE policy set a vision for ECCE and stipulated an institutional arrangement focusing on convergence with the MHRD.

Model 3: School Readiness Package

Description, Costs and Advantages

School readiness research suggests that children lacking in basic cognitive and language competencies perform adversely in early grades. Model 3, or the "School Readiness Package", attempts to mitigate these gaps by introducing pre-primary education, consisting of pre-literacy and pre-math learning, in first 30 to 90 days of Class 1. The package comprises an intense program of instructing and reinforcing basic skills in order to gain a threshold level of competency for young learners over a short, focused period of time. Model 3 requires minimal one-time costs of content development, printing of activity books, TLM, teacher training and additional central costs. Advantages for Model 3 include a focused, short-duration program that seeks to deliver an intervention of basic early skills to prepare all students to learn.

Evidence

Research suggests low learning levels in early grades may be due to a lack of school readiness. School readiness is a measure of how prepared a child is to do well in school from a cognitive, social and emotional perspective. A recent study conducted across three states in India – Assam, Telangana and Rajasthan – with 2500 six-year-olds suggests cognitive and language competencies are lacking for in-coming students resulting in adverse conditions for learning in primary grades (IECEI, 2015). Some of this may be attributed to first generation learners entering school as a result of RTE 2009.

Model 3 offers young learners the opportunity to bridge the growing gap between pre-literacy and pre-math skills and primary learning. The model is an equitable intervention as it is offered to all students and reinforces skills, thus building on success, as well as teaches new basic skills. The School Readiness Package also utilizes underlying assumptions from Model 1 and particularly examines global and India-specific evidence in order to synthesize understandings

of how short-term education interventions may lead to significant but small education gains for students.

Model 3 examines the Pratham Balsakhi Intervention, a Learning Enhancement Program (LEP) or remedial intervention, which resulted in an increase of 0.4 points out of 12.5 total points or 3.2% increase in reading and an increase of 0.3 points out of 6 total points or 5% increase in writing1 (approximately 4% average academic gain). In comparison to Model 1 where high-quality pre-school programs, such as the Perry Pre-school program, showed academic gains of 34% for participants, this indicates a small but significant gain. Hence, estimation of benefits in Model 3 is expected to be scaled down by a ratio of (4% by 34%) or 11.7% of Model 1 benefits.

Benefits from Cost-Benefit Analysis

Analysis of benefits in Model 3 reveal short-term savings from reduced household spending on tuition spending (Rs. 920 Crores). More significantly, it predicts long-term savings from reduction in government subsidies (Rs. 594 Crores in 2032; Rs. 2,816 Crores in 2074); household savings from higher income (Rs. 5,176 Crores in 2032, Rs. 8.3 Lakh Crores in 2074); and subsequently government savings from increased tax revenues (Rs. 101 Crores in 2032, Rs. 77,451 Crores in 2074). Overall, Model 3 yields a cost-benefit ratio of 75, or a savings of Rs. 75 for every Rs. 1 invested in pre-primary education. However, due to the minimal costs incurred in this specific model, benefits are not relevant in absolute terms.

Finally, a comparison between models is presented below which synthesizes cost-benefit analysis across all 3 models in order to offer a comparison of savings for investments in pre-primary education. Models 1, 2, and 3 can be evaluated on the basis of three key metrics: the amount of investment required, years needed to recover costs and the cost-benefit ratio. Model 1 requires an investment of Rs. 14,021 Crores but recovers costs the quickest while Model 2 requires the steepest investment of Rs. 64, 102 Crores as well as the greatest duration of time to recover costs with a reasonable cost-benefit ratio of 10. Finally, Model 3 requires minimal costs of Rs. 1259 Crores and recovers cost by Year 12. However, cost-benefit ratio for Model 3 or the School Readiness Package is 75 and not relevant in absolute terms due to the minimal costs required in the model. The comparison of all 3 models suggests that 2 years of government pre-primary education would recover costs the most efficiently (by year 7) as well as present a meaningful cost-benefit ratio of 25.

Annexure 1 provides further details and assumptions for cost-benefit analysis of investing in pre-primary education as per Model 1, 2 and 3.

Comparison between models

Key metrics	Model 1: Pre-primary under MHRD	Model 2: Convergence	Model 3: School Readiness Package
Investment required (Cr)*	14,021	64,102	1,259
Recovered by	Year 7	Year 19	Year 12
PV of costs (Cr)	134,429	198,459	5,640
PV of benefits (Cr)	3,357,973	1,885,658	427,436
Benefit-cost ratio	25	10	75*

Benefit-cost ratio not relevant in absolute terms due to minor costs in Model 3

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Recommendation

Based on the review and the analysis of Model 1, 2 and 3, presented above, this paper strongly recommends that the MHRD initiate the process to include pre-primary education as part of the RTE (2009) and support states in introducing a pre-primary section in all their government primary schools for 4 to 6 year olds. It is also recommended that the curriculum for the pre-primary and first three years of primary be conceptualized and developed in a 'bottom up' manner (and not top down as is often the case) to ensure continuity in learning as well as a sound early learning foundation for children. Again, this recommendation is in alignment with the RTE (2009) Section 11 which encourages all state governments to endeavour to establish preschool classes for children from 3 to 6 years in order to help them develop school readiness for primary grades. Possibilities may be considered of setting up multiple models as per feasibility, including relocating AWCs to primary schools and ensuring continuity of curriculum, or setting up a one to two years pre-primary section in schools prior to grade 1.

In 2015, the NCTE announced a revised teacher education curriculum which supported pre-primary education and encouraged states to set up a cadre of teachers especially trained for pre-primary and early grades. This investment in pre-primary education which ensures significant returns, and which is specially intended to benefit children from marginalized communities, will contribute in a significant way towards narrowing the social equity gap and ensuring learning for all, one of the Sustainable Development Goals (2015) which India and the international community has made a strong commitment towards.

Details of Cost Benefit Analysis for India

Cost-Benefit Analysis

MODEL 1: Assumptions for Cost & Benefit

Key assumptions for costs calculations

Costs	Key assumptions
Construction of classrooms	Additional classrooms required in only those primary schools with >30 PCR i.e. ~30%; 1 classroom per school; Rs. 5 lakh / classroom; Phased construction and intake over 5 years
Cost of toilets	Additional toilets not required
Mid day meals **Other: stationery, etc.**	MDM: Rs. 1,250/student; Other: Rs. 100/student (assuming that no uniforms / books etc. provided to students)
Teaching learning materials	Rs. 1,000 per classroom
Teacher salaries and training costs	Schools with >20 PTR will require additional teacher for pre-primary i.e. ~70% of schools 1 teacher per school; Rs. 10,000/month salary 30 days induction training @ Rs. 200 per day; 20 days in-service training @ Rs. 200 per day

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Key assumptions for benefits calculations

Benefits	Key assumptions
Immediate Savings:	
• ICDS Savings	1/6th of ICDS budget assumed to be spent towards ECE for 3-6 year olds (given 6 key tasks under ICDS charter) => cost savings of Rs 831 / student; Nutrition expense only towards 4, 5 year olds assumed saved = Rs 297/ student
• Remedial Savings	Savings in LEP line item under SSA budget - starting at 10% in 2017 to 70% savings by 2021 (once ECE kids are in class 1-5); 70% benchmark from Chicago CPC Study); excludes Padhe Bharat Badhe Bharat allocation which will be required for ensuring high learning levels in foundation years
• Tuition Savings	45% primary school children take afterschool tuition (ASER); average tuition spend – Rs. 1,200 p.a.; savings of 70% for ECE participants (Chicago CPC Study)
Long term Savings: • Increased Income	1. Class 12 completion rates increase over time, maxing at 60% (Brazil is around there. Australia is ~80%) 2. % of school / college grads entering workforce assumed at 60% (20% of women and 100% of men) 3. Starting salaries computed basis trades associated with the 3 segments – class 10 pass outs, class 12 pass outs, and college graduates 4. These segments would have otherwise earned as much as class 8 pass outs, class 10 pass outs and class 12 pass outs respectively.

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Key assumptions for benefits calculations

Benefits	Key assumptions
Long term Savings: • Increased Tax Revenue	1. Class 12 completion rates increase over time, maxing at 60% (Brazil is around there. Australia is ~80%) 2. % of school / college grads entering workforce assumed at 60% (20% of women and 100% of men) 3. Starting salaries computed basis trades associated with the 3 segments – class 10 pass outs, class 12 pass outs, and college graduates 4. Income tax slabs changed every 3 years assuming 3% p.a. real growth in tax slabs
• Subsidy Savings	1. Subsidies linked to BPL – food, kerosene, and MNREGA – assumed to remain the same in absolute terms going forward (historically as well, real growth has been ~1.5%) 2. % BPL population reduced basis 30-year historical CAGR of ~2.2%; have taken a floor of 10% BPL families 3. BPL families will come out BPL status as ECE kids join the workforce (assuming 2 kids per family) – this will result in subsidy reduction 4. Subsidy savings capped at 25%

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This investment can be recovered quickly in the short term itself, and will also generate high returns in the long term

Benefits quantified as part of this study

		Short term benefits	Long term benefits
Government	**Reduced costs**	**ICDS cost reduction** as ECE for 4 and 5 year olds moves out **Reduced spending on remedial ed.** • Better learning outcomes • Lower repetition, less drop-outs	**Subsidy reduction** from reduction in number of BPL families
	Increased Income		**Increased tax revenues** • Growing skilled workforce • Higher employability • Higher income
Society	**Reduced costs**	**Reduced spending on tuitions** with better learning outcomes	
	Increased income		**Higher Income given higher labour productivity and skilled workforce** • Higher school completion/ graduation rates • Higher starting salaries

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Investment recovery expected within 7-8 years; cost savings of Rs. 26,600 Cr. annually in steady state

Source of savings	ICDS cost reduction	Lower spending on remedial education *(as much as 70% savings per global studies[1])*	Lower spending on tuitions *(~50% children of low income families take tuitions)*	Total (govt. + society)
Total savings in 1st 10 years (2016-2025)	~ 30,400 Cr.	~ 103,400 Cr.	~ 37,150 Cr.	**~170,950 Cr.**
Annual savings in steady state *(once all children in primary classes 1-5 have 2 years of pre-school education)*	~ 3,800 Cr.	~ 15,400 Cr.	~ 7,400 Cr.	**~ 26,600 Cr.**

Offsets total investment in first 10 years of ~ 102,400 Cr.

Excludes "Padhe Bharat Badhe Bharat" budget, which will be required to ensure high learning levels

xx ***Benefit to Govt.*** xx ***Benefit to Society***

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Long term benefits begin with preschool students entering the workforce: ~25,800 cr. in 2032 and growing at ~14% annually

Source of benefit	Incremental Income – skilled workforce; higher productivity *(30-60% increase over a person's lifetime)*	Increased Tax Revenue *(with higher incomes)*	Subsidy reduction *(as families move out of BPL faster)*	Total benefit *(to Government and society)*
Benefits in 2032 – *when 1st ECE cohort fully enters workforce*	~ 22,400 Cr.	~ 260 Cr.	~ 3,100 Cr.	**~25,800 Cr.**
	15% CAGR	20% CAGR	5% CAGR	14% CAGR
Benefits in steady state ~2074 – *when entire workforce up to 60 yrs of age has undergone ECE*	~ 67.8 Lakh Cr.	~ 6.3 Lakh Cr.	~ 23,350 Cr.	**~ 74.3 Lakh Cr.**

xx ***Benefit to Govt.*** xx ***Benefit to Society***

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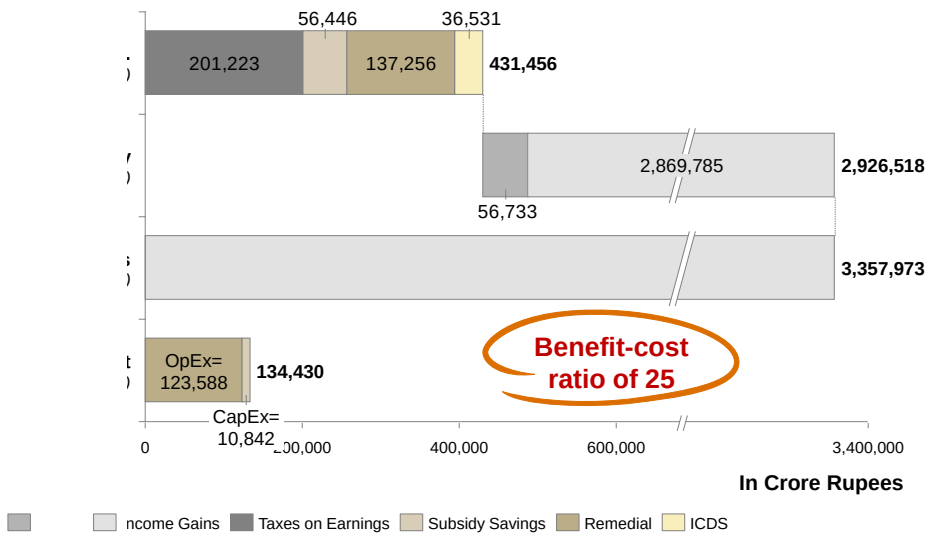
Overall, in 2015 Rs. terms, for every Re. 1 invested, returns up to Rs. 25 will be generated!



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MODEL 2: Assumptions for Cost & Benefit

Model 2: Assumptions for key costs and benefits

Costs

1. **Construction of Anganwadis** such that they can function as proper classrooms
   - 54% 'kachha' Anganwadis will need this
2. **Dedicated and trained pre-primary teacher in each AWC** (over and above AWWs)
3. **Teacher training**
   a. Costs for training pre-primary teachers
   b. Per day payment model to MHRD assumed for additional training infra required
4. **Central costs**
   a. 1 pre-primary expert per state (within ICDS org)
5. **Pre-primary in-service training for all 50,000 supervisors in ICDS System**

Benefits

- **Estimation of benefits is based on a parallel program, Head Start**, a federal program in the US which combines pre-primary education with health and nutrition, similar to ICDS.
  1. Research indicates that HS provides **80% of the effects** of well-known early childhood programs such as Perry Preschool and Abecedarian[1]
  2. Students who had attended HS were 17% more likely to complete high school than non-participants[2]
     - *[as against 31% increase in high school completion in Perry Pre-school program[3]]*
  3. Students who had attended HS were less likely to be arrested at age 22 (5% vs 15%)[2]

→ Overall program has significant benefits albeit lesser than stand alone high-quality pre-school programs

1. Deming, D. (2009) 2. Barnett, W.W. and Hustedt, J.T., (2005) 3. Schweinhart, L.J., et al. (2005)

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Model 2 – Benefits for government and society

Benefits quantified for Convergence Model (in steady state value)

		Short term benefits (in steady state)	Long term benefits (in 2032)	Long term benefits (in 2074)
Government	**Reduced costs**	Reduced spending on remedial education = Rs. 12,333 Cr. *(80% of model 1)*	Subsidy reduction = Rs. 1,719 Cr.	Subsidy reduction = Rs. 23,355 Cr.
	Increased Income		Increased tax revenues = Rs. 145 Cr.	Increased tax revenues = Rs. 3.5 Lakh Cr.
Society	**Reduced costs**	Reduced spending on tuitions = Rs. 5,800 Cr. *(80% of model 1)*		
	Increased income		Higher Income = Rs. 12,300 Cr.	Higher Income = Rs. 37.2 Lakh Cr.

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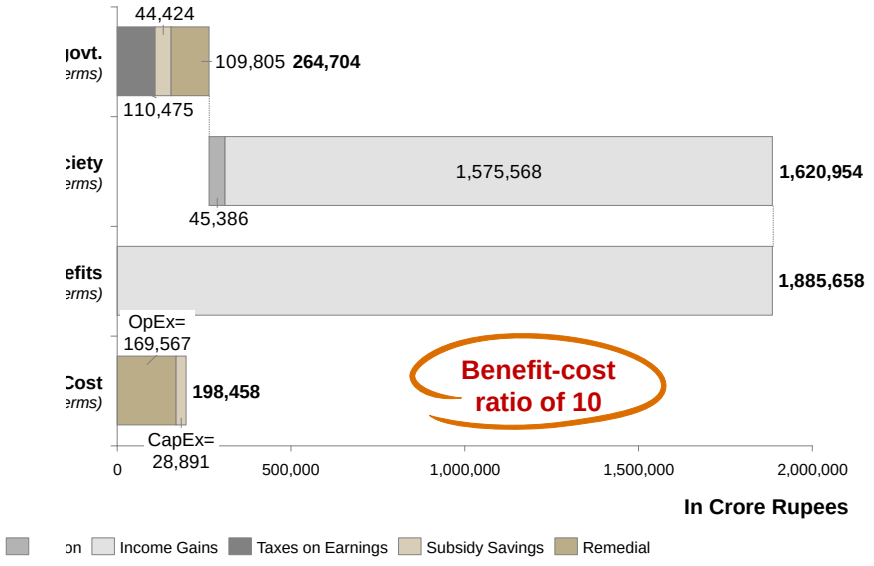
Model 2: Overall, in 2015 Rs. terms, for every Rs. 1 invested, returns up to Rs. 10



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MODEL 3: Assumptions for Cost & Benefit

Model 3: Assumptions for key costs and benefits

Costs

- School Readiness Package Model will require minimal costs
  - One time Content development costs
  - **Printing and distribution of materials including activity books for English, Math and Regional Language content**
  - **Teaching Learning Materials per classroom**
  - Teacher training on how to transact the package (in-service)
  - Central Costs

Benefits

- Research on short-term programs, similar to the school readiness package, show significant but small gains in student achievement
  - Pratham Balsakhi Intervention, a LEP intervention, resulted in an increase of 0.4 points out of 12.5 total points or 3.2% increase in reading and an increase of 0.3 points out of 6 total points or 5% increase in writing[1] (~ 4% average academic gain)
- On the other hand, full fledged pre-school programs (e.g. Perry Pre-school program) shows academic gains of 34% for participants[2]

→ *Hence, estimation of benefits expected to scale down by a ratio of (4% by 34%) = 11.7% of Model 1*

1. Banerjee, A., et al., (2005) Deming 2. Schweinhart, L.J., et al. (2005)

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Model 3 – Benefits for government and society

(all benefits scaled down to 11.7% of model 1)

Benefits quantified for School Readiness Package

		Short term benefits (in steady state)	Long term benefits (in 2032)	Long term benefits (in 2074)
Government	Reduced costs		Subsidy reduction = Rs. 594 Cr.	Subsidy reduction = Rs. 2,816 Cr.
	Increased Income		Increased tax revenues = Rs. 101 Cr.	Increased tax revenues = Rs. 77,451 Cr.
Society	Reduced costs	Reduced spending on tuitions = Rs. 920 Cr.		
	Increased income		Higher Income = Rs. 5,176 Cr.	Higher Income = Rs. 8.3 Lakh Cr.

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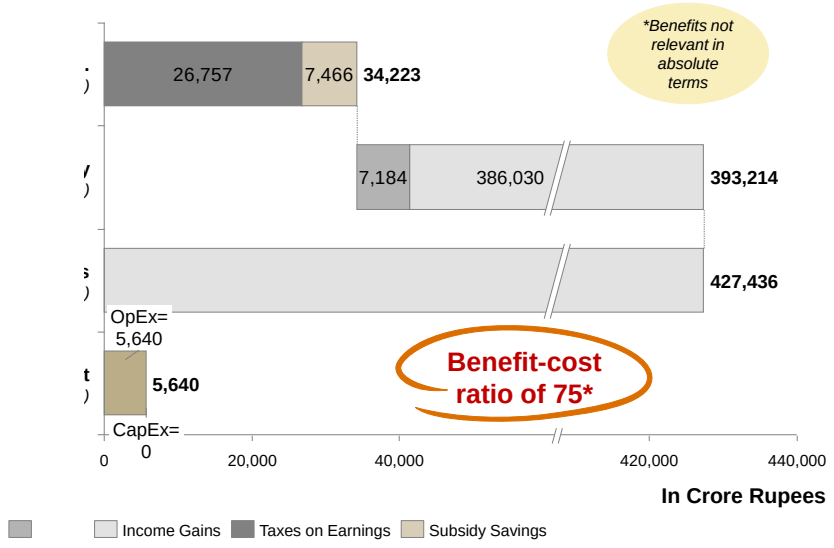
Model 3: SRP Cost Benefit comparison



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PAPER-II

FINANCIAL AND ECONOMIC ASSESSMENT OF THE COMPOSITE SCHOOL MODEL (CLASSES 1-10) IN RAJASTHAN

Financial and Economic Assessment of the Composite Schools Model in Rajasthan

The GOR has taken a strategic decision to consolidate some of its elementary schools and secondary/senior secondary schools into composite schools. The consolidation is being worked out within the guidelines set under the RTE Act. This paper explores the merits of this move by comparing the effectiveness, efficiency and impact of Elementary schools vis-à-vis composite schools.

The Background

The Government's decision to work towards developing more composite schools was based on the realization that a lot of elementary schools were actually created by separating primary and/or upper primary classes from existing composite schools. This decision was the Government's initial response to the RTE. Subsequently, the Government also opened up a number of schools to cater to students who did not come in the prescribed radius of an existing facility.
While tracking the achievements of this move, the Government realized that the State had ended up creating a public school network that was difficult to sustain and was inefficient in its operations. A number of schools were operating with dipping enrolments. Further, a number of schools were not being monitored and supervised at the desired level. As a result there were schools where teachers were found to be absent or taking unaccounted affecting the quality of classroom instruction. Further, leakages were discovered in the mid-day meal scheme.

The responsibility for monitoring the operations of the elementary schools has been placed on the BRCs and CRCs. The number of schools and the geographic spread to be covered only allow for bi-annual monitoring visits. Therefore monitoring and supervision is not concurrent.

The rapid expansion of the public schools network has led to a scenario where the Government has had to cope with a sizeable financial outlay towards infrastructure expansion. Most of the existing outlay has been towards the development of school buildings, classrooms, toilets and drinking water facilities. However, a large number of schools are yet to gain access to inputs that are required to support quality education. This includes but is not limited to inputs such as libraries, play grounds, electricity connections and computers.

The Government's decision to move towards consolidation via composite schools was founded on the realization that this model could address a lot of the aforementioned challenges; in turn leading to the provision of better quality education.

Placing the elementary grades in the same ecosystem that houses secondary and senior secondary classes would:

- Place them under the regular care and supervision of the secondary/senior secondary school Principal. This would ensure concurrent monitoring and reduce unaccounted teacher absenteeism and leakages from the system.
- Provide elementary school teachers with access to subject teachers (more qualified, trained and experienced) who are working with secondary and senior secondary teachers; thereby providing them with access to ongoing academic support.
- Improve the GTR[17] thereby increasing the number of effective learning days.

[17] Grate to Teacher Ratio refers to average number of Classes/Grades a teacher has to manage at any given point of time.

- Provide students from elementary schools with access to facilities such as better equipped libraries, playgrounds, functional computers etc.
- Facilitate greater retention through improved quality of education & stronger parent-teacher association (a result of improved monitoring); and improved transition rates through unconstrained sharing of student data/information.

Having identified the aforementioned benefits, the Government has moved towards ensuring that every *Gram Panchayat* has at least one composite school. Placing this composite school near the seat of the Panchayat also ensures better monitoring and supervision from the community's end. In order to ensure that students' whose schools have been consolidated do not suffer due to the distance between their place of residence and the composite school, the Government provided them with a daily travel allowance (linked with their attendance).

Finally, the Government acknowledged that a few of the elementary school catering to remote villages and those with high student strength (multiple classes for each grade) should be left untouched under the consolidation plan. However, in order to further improve upon the effectiveness, efficiency and impact of these schools the Government has linked them to the composite school under a hub and spoke model. Under this setup, the Principal and subject teachers of each composite school are expected to help with the monitoring and academic supervision/training of teachers at these elementary schools. This model is yet to be fully operationalized and the Government is in the process of finalizing the modalities for the same.

Effectiveness

Composite schools benefit from having a larger institutional setup in terms of infrastructure, teacher availability and classroom availability. It is well documented that an enabling teaching learning environment leads to better learning outcomes for children, and in this sense certain parameters considered in this analysis have been charted out for both composite and elementary setups.

Taking into consideration UDISE data from 2013-14, it has been observed that composite schools perform better than elementary school on infrastructure/facilities related parameters such as availability of electricity connections, libraries, playgrounds and computers.

Data given in Table 1 shows that while 84.4 percent of composite schools have access to electricity, the corresponding figure for elementary schools stands at 52.4 percent.

Table 11: Schools with electricity connection

Variable/Parameter	2013-14	
	Composite	**Elementary**
With electricity connection	84.4 percent	52.4 percent
Without electricity connection	15.6 percent	47.6 percent

Similarly, while 84 percent of composite schools have a library, the corresponding figure for elementary schools is 80.4 percent. Herein, it is also important to understand that most composite schools have a larger library setup and many have a dedicated librarian. On the other hand, most elementary schools do not have a library room but rather a small collection of books that are stored in a cupboard.

Table 12: Schools with library facility

Variable/Parameter	2013-14	
	Composite	**Elementary**
With Library	84.0 percent	80.4 percent
Without Library	16.0 percent	19.6 percent

Similarly, while 84 percent of composite schools have a library, the corresponding figure for elementary schools is 80.4 percent. Herein, it is also important to understand that most composite schools have a larger library setup and many have a dedicated librarian. On the other hand, most elementary schools do not have a library room but rather a small collection of books that are stored in a cupboard.

Table 13: Schools with playground

Variable/Parameter	2013-14	
	Composite	**Elementary**
With Playground	54.0 percent	42.9 percent
Without Playground	46.0 percent	57.1 percent

In order to improve the quality of education being imparted in public schools, the Government has been making efforts to leverage information and communication technology enabled teaching-learning transactions. However, implementing the same requires the schools to have access to computers.

It is observed that while composite schools house an average of three computers, the corresponding figure for elementary schools is only 0.5. As a result it can be concluded that many of the elementary schools do not have computers. This can also be because a large percentage of elementary schools do not have electricity connections.

Table 14: Schools with computer availability for teaching learning purposes

Variable/Parameter	2013-14
	Average number of computers available for teaching and learning purposes
Composite	3.0
Elementary	0.5

More importantly, composite are observed to be more effective in terms of the quality of classroom transactions. The percentage of teachers with a graduate degree is higher at composite schools. Further, while the schools support a higher PTR, they still work within the limits prescribed under the RTE. The PTR at composite schools is 32 students to a teacher and the corresponding figure for elementary schools is 20.

The GTR at composite schools is much lower than the figure observed for elementary schools. The GTR figure has been derived by multiplying the number of schools under ‘primary’, ‘upper primary’ and ‘primary + upper primary’, ‘primary + upper primary + secondary’, ‘primary’ + upper primary + secondary + senior secondary’ + ‘upper primary + secondary’ and ‘upper primary + secondary + upper secondary’ categories with ‘5’, ‘3’, ‘8’, ‘10’, ‘12’, ‘5’ and ‘7’ respectively. The latter set of figures is simply the number of grades in each type of school.

The resultant figures have been divided by the number of teachers working at each type of school.

The GTR estimates show that at a given point in time a teacher in an elementary school is teaching an average of almost two classes/grades. The corresponding figure for composite schools is closer to a teacher a class/grade. As a result, it can be assumed that almost half the children in an elementary school are only passive 'listeners' and not 'learners'.

Table 15: Teacher related parameters

Type of School	2013-14			
	Percentage of teachers with graduation and above	**Percentage of teachers with Professional qualification**	**PTR**	**GTR**
Composite	89.4 percent	96.6 percent	32	1.31
Elementary	81.4 percent	96.7 percent	20	1.83

The difference in GTR when factored in to adjust the average instructional days reveals that the 'effective instructional days' in composite school is 159 and the corresponding figure for elementary schools is 99.

Table 16: Average number of instructional days (upper primary)

Type of School	2013-14	
	Average number of instructional days	**Average number of effective instructional days**
Composite	208	159
Elementary	180	99

The benefits of concurrent monitoring through the Secondary/Senior Secondary school Principal are clarified by the fact that composite schools report a lesser number of BRC and CRC visits; and this is despite these schools being relatively closer to the BRC and CRC offices.

Table 17: Monitoring and Supervision

Type of School	2013-14 (Rounded Off)			
	Average no. of visits by Block Resource Centre officer	**Average no. of visits by Cluster Resource Centre officer**	**Average Distance from Block Headquarters (in Km.)**	**Average Distance from Cluster Resource Centre (in Km.)**
Composite	1	1	19	3
Elementary	2	3	24	4

Efficiency

Having larger institutional setup in terms of infrastructure availability and human resources, composite schools have the ability to cater to a larger number of students. Working closer towards full capacity enables these schools to put their resources to more efficient use. An analysis of SSA budget allocation on elementary education reveals that 50.1 percent of

allocation is towards teacher salaries and trainings, 22.4 percent allocation is towards infrastructure creation & maintenance and 27.5 percent allocation is towards other elements.

As mentioned earlier, the PTR at composite schools is higher than the PTR at elementary schools. Similarly, the number of students per school at composite schools is higher than the corresponding figure for elementary schools. Factors derived from these two data points when used to adjust the allocation figures for teacher related and infrastructure related components, provide for an estimate of the efficiency with which composite schools work.

Table 18: Adjustment factors

Type of School	2013-14	
	PTR	Average strength per school
Composite	32	301
Elementary	20	187
Adjustment factors (composite/elementary)	**1.6**	**1.6**

Using the above given factors to adjust the budget allocation for infrastructure and teacher related components reveals that composite schools provide for a 38 percent more efficient use of funds invested in infrastructure and teacher related components. In terms of percentage points, investing in composite schools leads to a 27.3 percentage point higher efficiency.

Table 19: Effective Efficiency of composite schools over elementary schools

Type of School	Miscellaneous	Infrastructure and resources	Teachers component	Aggregate percentage budget allocation	Difference in Efficiency
Elementary	27.5 percent	22.4 percent	50.1 percent	100.0 percent	**27.3 percent**
Composite	27.5 percent	13.9 percent	31.3 percent	72.7 percent	

Another interpretation of the aforementioned statistic can be that all other outcomes being the same, a composite school spends INR 0.73 per child where an elementary school spends INR 1.00. The only additional cost under the composite school model is the INR 20 per day the Government provides to students in the form of transport assistance.

Impact

At this point it is also important to appreciate that composite schools are imparting better quality education and in this sense are delivering a higher impact at a relatively lower cost per student. This is primarily because of their higher effectiveness in terms of higher number of effective learning days, better supporting infrastructure and stronger monitoring arrangements. At the very outset, it is observed that over the past five years the overall enrolment in Government elementary schools in Rajasthan has decreased by 9.3 percent. However, in the last year itself the composite schools in Rajasthan have reported a 17.6 percent increase in enrolment (where the number of composite schools has largely remained unchanged). The Government also believes that the composite schools have ensured an improvement in retention and transition rates. Secondary school teachers have access to the elementary school records. They are able to track and follow up with parents of students who do not show up for enrolment in class 9. However, the Government MIS does not provide dropout figures and transition rates disaggregated by elementary and composite schools.

As per a paper by Dr Geeta Gandhi Kingdon, every additional instruction day leads to a 0.01 time standard deviation change in students learning outcome scores. The corresponding estimate for having a teacher who holds a graduate degree is 0.09. Assuming a 0.05 standard deviation change for facilitating provisions/infrastructure and adjusting by differences between elementary schools indicators and composite school indicators reveals that the average learning outcome score for students from composite schools can be up to 34 points more than the average learning outcome score for their peers from elementary schools. The learning outcome test used as a basis of the calculation is the NAS which assumed that scores are normally distributed with a standard deviation of 50 points.

Therefore the impact of better access to electricity in composite schools translates into a 0.81 point improvement in learning outcome scores. The estimate has been derived by multiplying the difference in composite school and elementary school performance (32.2 Percent) with the learning outcome change factor (0.05) and the standard deviation for NAS scores (50).

Table 20: Total change in learning outcome factor

Parameters of effectiveness	Difference between composite and elementary	Learning outcome change factor (Std. Deviations)	Change in learning outcome factor
Electricity availability	32.2 percent	0.05	0.81
Library facility	3.6 percent	0.05	0.09
Playground availability	11.0 percent	0.05	0.28
Computer availability	2.5	0.05	2.80
Teachers with graduation and above	8.0 percent	0.09	0.36
Average number of effective instructional days	60	0.01	30.00
Total change in learning outcome factor			**34.34**

*Learning outcome impact factors and standard deviation have been taken from the paper **"Teacher characteristics and student performance in India: A pupil fixed effects approach"**

Further, as per another paper by Dr Kingdon, a standard deviation change in learning outcome scores leads to 18 percent increase in the income that a student can expect to earn after completing upper primary schooling. Given that composite school students are expected to score 34.34 points better than peers studying in elementary schools and that NAS scores work with a standard deviation of 50 points, the expected improvement in income for a student completing upper primary education from a composite school is 12.4 percent. In an absolute sense this work out to be INR 4,397 per year.

Table 21: Change in actual income derived from school completion via composite school over elementary school in Rajasthan

Income parameters	Income (in INR)
Expected income for Upper primary complete (2016)[18]	37,112
Per capita National Income India	61,855
Per capita income Rajasthan	59,097
Per capita income adjustment factor	0.955
Expected income for Upper primary complete Rajasthan (Elementary)	35,457
Expected income for Upper primary complete Rajasthan (Composite)	39,854
Difference in income (Composite vis-à-vis Elementary)	**4,397**

Sustainability

Basis the analysis presented through this paper it can be concluded that composite schools can better sustain the directives of the RTE, SSA and RMSA. They make for more efficient use of funds, are more effective n instruction and thus produce better academic results.

Given the increase in enrolment, transitions rates and learning outcomes; composite schools are facilitating movement of students from elementary to secondary education. They are doing this while imparting better quality education and this makes for a more sustainable case in terms of benefits to students and society at large.

[18] Calculated using a Mincer Regression based NSSO data

APPENDICES

VFM Calculation

Appendix 1: Learning Outcomes: VFM Calculation

Appendix Table 1A: Learning Outcome Scores for Class V								
State	**Class V Reading 2012**	**Class V Reading 2015**	**Class V Mathematics 2012**	**Class V Mathematics 2015**	**Class 5 EVS 2012**	**Class 5 EVS 2015**	**Class 5 All Subjects 2012**	**Class 5 All Subjects 2015**
Tamil Nadu	278	259	279	264	288	267	282	263
Uttar Pradesh	282	248	298	257	284	260	288	255
Punjab	252	249	252	238	245	236	250	241
Odisha	253	232	257	237	253	249	254	239
Gujarat	251	243	256	250	250	247	252	247
Kerala	277	259	244	230	252	240	258	243
Madhya Pradesh	250	229	265	236	264	238	260	234
Bihar	228	208	242	235	236	226	235	223

Appendix Table 1B: Average Annual Earnings for Students Completing Class 5			
State	**Per Capita Income for State (2011-12; 2004-05 constant prices)**	**Per Capita Income Adjustment Factor**	**Annual Earnings for Students Completing Class 5 (2011-12; 2004-05 constant prices)**
Tamil Nadu	89,050	1.44	27,679
Uttar Pradesh	30,071	0.49	9,347
Punjab	76,895	1.24	23,901
Odisha	41,876	0.68	13,016
Gujarat	87,175	1.41	27,096
Kerala	78,387	1.27	24,365
Madhya Pradesh	37,979	0.61	11,805
Bihar	22,582	0.37	7,019
Average Annual earnings for Students Completing Class 5 (2011-12; 2004-05 constant prices)			19,226
National Per Capita Income Estimate for India (2011-12; 2004-05 constant prices)			61,855

Appendix Table 1C: Annual PPE Change Calculation for Odisha, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	6,971.4	
2012 - 13	7,941.8	
2013 - 14	9,047.2	13.9%
2014 - 15	10,317.1	
2015 - 16	12,825.2	

Cumulative Change Between 2011 - 12 and 2014 - 15	**48%**

Appendix Table 1D: Annual PPE Change Calculation for MP, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	5,064.5	
2012 - 13	6,356.2	
2013 - 14	7,977.5	25.5%
2014 - 15	12,662.8	
2015 - 16	14,082.0	
Cumulative Change Between 2011 - 12 and 2014 - 15		**150%**

Appendix Table 1E: Annual PPE Change Calculation for Kerala, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	25,730.0	
2012 - 13	28,829.6	
2013 - 14	32,302.6	12.0%
2014 - 15	39,678.8	
2015 - 16	43,976.8	
Cumulative Change Between 2011 - 12 and 2014 - 15		**54.2%**

Appendix Table 1F: Annual PPE Change Calculation for Gujarat, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	49,187.4	
2012 - 13	49,215.7	
2013 - 14	49,244.1	0.1%
2014 - 15	41,805.7	
2015 - 16	49,329.1	
Cumulative Change Between 2011 - 12 and 2014 - 15		**-15.0%**

Appendix Table 1G: Annual PPE Change Calculation for Tamil Nadu, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	17,731.3	
2012 - 13	21,036.1	
2013 - 14	24,957.0	18.6%
2014 - 15	38,252.0	
2015 - 16	38,912.0	
Cumulative Change Between 2011 - 12 and 2014 - 15		**115.7%**

Appendix Table 1H: Annual PPE Change Calculation for Punjab, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	9,214.3	
2012 - 13	10,971.2	
2013 - 14	13,063.0	19.1%
2014 - 15	17,158.0	
2015 - 16	20,535.0	
Cumulative Change Between 2011 - 12 and 2014 - 15		**86.2%**

Appendix Table 1I: Annual PPE Change Calculation for Bihar, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	3,283.9	
2012 - 13	3,989.0	
2013 - 14	4,845.5	21.5%
2014 - 15	6,249.2	
2015 - 16	7,966.7	
Cumulative Change Between 2011 - 12 and 2014 - 15		**90.3%**

Appendix Table 1J: Annual PPE Change Calculation for Uttar Pradesh, with SSA expenditure		
Year	**Annual PPE Expenditure**	**Annual Aggregate Change**
2011 - 12	9,787.2	
2012 - 13	12,519.2	
2013 - 14	16,013.95	27.9%
2014 - 15	21,814.65	
2015 - 16	29,424.74	
Cumulative Change Between 2011 - 12 and 2014 - 15		**122.9%**

Appendix Table 1K: Estimated annual recurrent PPE in Government schools, by State, 2015-16		
State	**Annual PPE, excluding SSA expenditures**	**Annual PPE, including SSA expenditures**
Odisha	8,897	12,825
Madhya Pradesh	9,285	14,082
Kerala	39,268	43,977
Gujarat	47,045	49,329
Tamil Nadu	33,127	38,912
Punjab	16,166	20,535
Bihar	3,105	7,967
Uttar Pradesh	23,012	29,425

Note: The annual Government schools' PPE has been calculated using State Government revenue expenditure on education figures and UDISE Government school enrolment data. To estimate the PPE on government elementary schools, we have taken the State government's revenue expenditure on elementary education and subtracted from it line items related to government support 'aided' schools, and also subtracted *Sarva Shiksha Abhiyan* (SSA) and Mid-Day Meal (MDM) expenditure. Since most of the secondary schools also provide upper primary education, and thus have 7 classes – all the way from grade 6 to grade 12 – therefore we attribute $(3/7)^{th}$ of the Government expenditure on government secondary schools (i.e. excluding support to aided schools) to being expenditure on government-run elementary education. The resulting estimate for State Government's expenditure has been divided by official enrolment figures for elementary education at Government schools in each state. Given that enrolment figures are only available up till 2013-14, the figures for 2014-15 and 2015-16 have been estimated on the basis of the aggregate growth rate for the preceding years, as set out in the Appendix Tables 1D to 1J. The last column in the table adds in per pupil SSA expenditure (excluding SSA expenditure on civil works). Thus MDM expenditure is not included either in the first or the last column. The PPE estimates also do not include government expenditure on teachers' pensions.

The PPE in elementary education in Government schools in Bihar is very low in comparison with that in other states. This is explained by two things. Firstly, the fact that average pupil teacher ratio was 54 in Bihar, 26 in India (DISE Flash Statistics, 2013-14, latest available in Nov. 2015). Secondly, in Bihar a very high proportion (64%) of teachers were fixed-pay (contract) teachers getting a salary of Rs. 8000 pm, so its salary expenditure is a fraction that of other states[19], for example, in 2014-15, average salary of govt. primary school teachers in 9 states was Rs.39,683 per month (Ramachandran, 2015).

[19] As seen in Table 6, in 2014-15, average school size is 285 students per Government elementary school in Bihar, and only 108 in India. Bihar had an average of 249 students per Government elementary school in 2005-06, and this increased by 36 by 2014-15; The India average in the bottom row, is 131.7 students per Government elementary school in 2005-06, and this fell by 23.7 by 2014-15; thus there are 108 students per Government school in India by 2014-15. Moreover, Table 7 shows that there are far fewer 'small' schools in Bihar (169) than in other states (average 4848 schools), i.e. with fewer than 20 enrolled students as a whole. While 2014-15 raw DISE data is downloadable, the 2014-15 Flash Statistics are not yet available on the U-DISE website as in Nov 2015. Page 13 of DISE 2013-14 Flash Statistics shows 364,715 teachers in Government. schools. Out of these around 2,32,000 are 'fixed-pay' teachers (since their jobs are not annually renewable in Bihar, para teachers there are not called 'contractual' teachers) whose pay was Rs. 8000 per month in Bihar in 2012-13 (from which the later figures are extrapolated).

Appendix 2: Changes over time in Total Number of Schools, Total Enrolment and Average Enrolment per School

Andhra Pradesh						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt.	Private	Govt.	Private	Govt.	Private
2005-06	76,361	18,623	7,397,630	3,725,310	97	200
2006-07	80,836	20,096	7,332,625	3,974,194	91	198
2007-08	79,324	21,125	6,821,442	4,216,944	86	200
2008-09	79,550	21,753	6,520,838	4,389,525	82	202
2009-10	79,813	22,985	6,310,989	4,540,259	79	198
2010-11	79,358	24,472	6,191,110	4,640,434	78	190
2011-12	78,673	26,098	6,175,060	4,692,880	78	180
2012-13	77,046	27,052	5,994,514	4,717,074	78	174
2013-14	75,089	28,404	5,967,621	4,934,846	79	174
2014-15	--	--	--	--	--	--
Absolute change	-1,272	9,781	-1,430,009	1,209,536	-18	-26
% change	-1.7	52.5	-19.3	32.5	-18.6	-13.0

Source- DISE data, www.dise.in

The 2014-15 figures for Andhra Pradesh appear not to be correct, so they have been omitted.

Assam						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt.	Private	Govt.	Private	Govt.	Private
2005-06	38,053	2,162	3,739,904	212,358	98	98
2006-07	53,261	10,735	4,557,504	865,207	86	81
2007-08	53,950	12,777	4,616,563	1,085,872	86	85
2008-09	60,147	8,395	4,943,370	922,648	82	110
2009-10	44,518	8,820	4,204,893	957,207	94	109
2010-11	44,371	9,488	4,097,714	1,045,304	92	110
2011-12	42,917	7,930	4,174,185	887,186	97	112
2012-13	42,993	8,399	4,045,328	942,701	94	112
2013-14	50,186	6,753	4,563,766	814,862	91	121
2014-15	50,063	15,078	4,522,912	1,330,366	90	88
Absolute change	12,010	12,916	783,008	1,118,008	-8	-10
% change	32	597	21	526	-8	-10

Source- DISE data, www.dise.in

Bihar						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	53,271	507	13,286,024	111,017	249	219
2006-07	54,034	850	14,872,679	247,868	275	292
2007-08	66,636	1,238	17,349,687	313,118	260	253
2008-09	67,656	93	18,675,114	34,175	276	367
2009-10	67,642	14	19,000,385	7,108	281	508
2010-11	67,934	397	19,564,714	97,726	288	246
2011-12	69,366	86	20,519,815	28,982	296	337
2012-13	69,911	429	18,828,627	161,321	269	376
2013-14	70,673	1,698	19,853,552	499,365	281	294
2014-15	71,140	8,056	20,266,079	1,867,028	285	232
Absolute change	17,869	7,549	6,980,055	1,756,011	36	13
% change	34	1489	53	1582	14	6

Source- DISE data, www.dise.in

Chhattisgarh						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	46,944	4,403	4,197,692	609,818	89	139
2006-07	44,889	4,079	3,683,954	511,268	82	125
2007-08	45,754	3,954	3,840,468	567,554	84	144
2008-09	45,847	4,060	3,825,454	667,721	83	164
2009-10	46,266	4,642	3,766,823	748,912	81	161
2010-11	46,394	4,945	3,807,603	824,695	82	167
2011-12	47,210	5,504	3,789,376	946,583	80	172
2012-13	47,822	5,788	3,754,252	984,370	79	170
2013-14	47,468	5,650	3,564,881	1,009,144	75	179
2014-15	47,253	6,046	3,429,623	1,118,510	73	185
Absolute change	309	1,643	-768,069	508,692	-16	46
% change	1	37	-18	83	-18	33

Source- DISE data, www.dise.in

Gujarat						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	32,634	4,622	6,065,471	1,089,529	186	236
2006-07	32,935	5,537	6,083,940	1,456,921	185	263
2007-08	33,114	5,925	6,031,806	1,630,687	182	275
2008-09	33,182	5,924	6,006,917	1,705,360	181	288
2009-10	33,426	6,513	5,881,273	1,933,118	176	297
2010-11	33,552	7,191	5,916,978	2,228,365	176	310
2011-12	33,496	7,444	5,982,181	2,393,253	179	322
2012-13	33,767	8,972	6,215,390	3,003,059	184	335
2013-14	33,713	9,462	6,105,605	3,122,142	181	330
2014-15	33,673	9,965	5,935,018	3,206,626	176	322
Absolute change	1,039	5,343	-130,453	2,117,097	-10	86
% change	3	116	-2	194	-5	36

Source- DISE data, www.dise.in

Haryana						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	12,771	788	1,918,883	165,494	150	210
2006-07	14,478	1,702	2,107,524	384,485	146	226
2007-08	14,735	3,008	2,172,495	774,792	147	258
2008-09	15,467	3,480	2,327,437	914,992	150	263
2009-10	15,155	3,424	2,303,923	1,032,830	152	302
2010-11	14,956	5,235	2,087,364	1,306,276	140	250
2011-12	15,021	5,675	2,135,714	1,511,674	142	266
2012-13	14,988	6,461	2,098,675	1,758,293	140	272
2013-14	14,974	6,450	2,067,684	1,821,312	138	282
2014-15	14,579	7,212	1,983,948	1,970,018	136	273
Absolute change	1,808	6,424	65,065	1,804,524	-14	63
% change	14	815	3	1090	-9	30

Source- DISE data, www.dise.in

Himachal Pradesh						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	14,464	1,549	908,359	163,461	63	106
2006-07	14,521	2,093	870,755	210,844	60	101
2007-08	14,973	2,224	852,496	231,544	57	104
2008-09	15,071	2,289	816,450	248,828	54	109
2009-10	15,091	2,317	777,455	258,662	52	112
2010-11	15,126	2,313	746,331	289,296	49	125
2011-12	15,001	2,384	695,417	310,444	46	130
2012-13	15,111	2,434	657,700	327,136	44	134
2013-14	15,219	2,497	628,831	340,113	41	136
2014-15	15,355	2,601	600,381	358,527	39	138
Absolute change	891	1,052	-307,978	195,066	-24	32
% change	6	68	-34	119	-38	30

Source- DISE data, www.dise.in

Jammu & Kashmir						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	16,105	3,346	1,030,425	536,712	64	160
2006-07	16,471	4,240	1,025,436	603,494	62	142
2007-08	16,502	4,287	1,043,785	617,090	63	144
2008-09	20,866	4,549	1,240,578	667,246	59	147
2009-10	21,311	4,786	1,253,651	719,643	59	150
2010-11	22,180	4,914	1,213,365	784,681	55	160
2011-12	22,538	4,955	1,152,609	755,621	51	152
2012-13	23,103	5,028	1,113,305	745,796	48	148
2013-14	23,234	5,073	1,076,708	764,470	46	151
2014-15	23,378	5,165	1,025,747	827,299	44	160
Absolute change	7,273	1,819	-4,678	290,587	-20	0
% change	45	54	0	54	-31	0

Source- DISE data, www.dise.in

Jharkhand						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	35,584	627	5,167,981	139,153	145	222
2006-07	39,269	1,349	5,997,707	357,309	153	265
2007-08	39,820	2,124	6,183,622	536,050	155	252
2008-09	39,768	2,082	6,002,522	537,611	151	258
2009-10	39,625	2,250	5,757,524	766,409	145	341
2010-11	40,529	2,703	5,598,510	886,951	138	328
2011-12	40,343	2,475	5,390,338	848,648	134	343
2012-13	40,674	2,583	5,144,565	959,946	126	372
2013-14	40,666	2,335	5,021,552	900,852	123	386
2014-15	40,405	6,368	4,819,302	1,718,486	119	270
Absolute change	4,821	5,741	-348,679	1,579,333	-26	48
% change	14	916	-7	1135	-18	22

Source- DISE data, www.dise.in

Karnataka						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	44,373	9,712	5,123,711	1,790,745	115	184
2006-07	44,842	10,522	5,523,379	2,365,873	123	225
2007-08	45,622	10,819	5,445,484	2,476,784	119	229
2008-09	46,199	11,318	5,148,278	2,660,022	111	235
2009-10	46,325	11,834	4,788,516	2,848,229	103	241
2010-11	46,553	12,903	4,625,327	3,043,197	99	236
2011-12	50,885	19,966	4,783,689	3,637,528	94	182
2012-13	46,218	14,742	4,621,231	3,774,358	100	256
2013-14	46,030	15,310	4,277,320	3,546,104	93	232
2014-15	45,639	15,989	4,135,898	3,626,129	91	227
Absolute change	1,266	6,277	-987,813	1,835,384	-24	43
% change	3	65	-19	102	-21	23

Source: www.dise.in

Kerala						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	4,737	6,644	1,170,023	2,130,523	247	321
2006-07	5,084	7,099	1,228,664	2,173,323	242	306
2007-08	5,115	7,311	1,242,177	2,283,533	243	312
2008-09	5,050	7,302	1,180,499	2,204,098	234	302
2009-10	5,098	7,327	1,160,923	2,195,075	228	300
2010-11	NA	NA	NA	NA	NA	NA
2011-12	5,333	9,230	1,007,249	2,662,352	189	288
2012-13	4,946	10,081	948,567	2,930,334	192	291
2013-14	5,111	10,151	919,566	2,919,190	180	288
2014-15	4,571	11,847	869,939	3,067,622	190	259
Absolute change	-166	5,203	-300,084	937,099	-57	-62
% change	-4	78	-26	44	-23	-19

Source- DISE data, www.dise.in

Madhya Pradesh						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	104,671	16,664	10,883,542	2,651,887	104	159
2006-07	105,620	20,238	11,065,004	4,117,305	105	203
2007-08	106,408	22,592	10,748,076	4,662,624	101	206
2008-09	109,757	22,989	10,662,881	4,907,812	97	213
2009-10	111,510	23,455	10,466,162	5,018,827	94	214
2010-11	112,014	23,801	10,653,880	4,702,519	95	198
2011-12	112,079	27,148	10,221,216	4,920,512	91	181
2012-13	112,895	27,227	9,913,184	4,971,038	88	183
2013-14	114,444	26,668	9,511,486	4,901,200	83	184
2014-15	114,360	28,152	8,711,945	4,789,781	76	170
Absolute change	9,689	11,488	-2,171,597	2,137,894	-28	11
% change	9	69	-20	81	-27	7

Source- DISE data, www.dise.in

Maharashtra						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	60,824	23,462	7,809,393	7,149,294	128	305
2006-07	61,893	24,537	7,998,048	7,358,485	129	300
2007-08	61,732	25,548	7,746,195	7,911,902	125	310
2008-09	65,984	26,069	7,696,935	8,221,269	117	315
2009-10	67,573	26,551	7,583,759	8,270,299	112	311
2010-11	68,972	28,253	7,421,942	8,656,256	108	306
2011-12	69,782	29,935	7,231,470	8,930,490	104	298
2012-13	69,541	25,002	6,985,891	9,178,586	100	367
2013-14	67,307	28,130	6,312,059	9,382,952	94	334
2014-15	67,382	29,702	6,185,668	9,611,864	92	324
Absolute change	6,558	6,240	-1,623,725	2,462,570	-36	19
% change	11	27	-21	34	-28	6

Source- DISE data, www.dise.in

Odisha						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	48,387	3,494	5,493,342	348,851	114	100
2006-07	47,967	3,231	4,620,233	307,594	96	95
2007-08	53,667	5,768	5,799,475	541,387	108	94
2008-09	55,715	6,447	5,922,892	625,593	106	97
2009-10	53,041	3,732	5,496,308	493,204	104	132
2010-11	57,179	7,060	5,653,997	717,530	99	102
2011-12	58,023	7,202	5,565,229	739,071	96	103
2012-13	58,355	7,418	5,458,962	761,458	94	103
2013-14	58,412	7,611	5,357,699	798,715	92	105
2014-15	58,508	9,797	5,237,812	1,148,698	90	117
Absolute change	10,121	6,303	-255,530	799,847	-24	17
% change	21	180	-5	229	-21	17

Source: www.dise.in

Punjab						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	18,198	2,100	2,021,749	378,316	111	180
2006-07	18,828	2,122	2,213,348	488,924	118	230
2007-08	18,508	1,518	2,119,908	439,050	115	289
2008-09	19,326	2,549	2,141,047	686,031	111	269
2009-10	19,969	3,303	2,046,938	861,386	103	261
2010-11	20,238	3,204	2,168,656	918,187	107	287
2011-12	20,370	3,594	2,193,899	1,026,200	108	286
2012-13	20,214	4,370	2,155,102	1,094,456	107	250
2013-14	21,343	7,603	2,293,421	1,701,493	107	224
2014-15	19,607	9,416	1,865,431	2,156,170	95	229
Absolute change	1,409	7,316	-156,318	1,777,854	-16	49
% change	8	348	-8	470	-14	27

Source: www.dise.in

Rajasthan						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	75,221	19,098	8,595,362	3,082,114	114	161
2006-07	79,500	21,465	8,661,863	3,800,368	109	177
2007-08	80,576	22,727	8,179,500	4,017,135	102	177
2008-09	81,058	24,027	7,855,141	4,407,590	97	183
2009-10	81,006	24,767	7,476,412	4,698,717	92	190
2010-11	77,532	26,216	7,104,179	4,778,560	92	182
2011-12	77,833	29,766	7,155,509	5,112,169	92	172
2012-13	78,870	31,948	6,818,584	5,541,084	86	173
2013-14	83,564	33,658	6,410,664	5,691,938	77	169
2014-15	69,943	36,311	5,940,328	6,085,868	85	168
Absolute change	-5,278	17,213	-2,655,034	3,003,754	-29	7
% change	-7	90	-31	97	-25	4

Source: www.dise.in

Tamil Nadu						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	34,539	17,035	5,197,684	4,557,013	150	268
2006-07	35,129	17,294	5,084,746	4,691,843	145	271
2007-08	35,336	17,971	4,899,895	4,942,858	139	275
2008-09	35,436	18,454	4,610,905	5,267,716	130	285
2009-10	35,616	18,812	4,460,474	5,464,087	125	290
2010-11	36,122	18,907	4,273,526	5,512,190	118	292
2011-12	36,575	18,966	4,226,225	5,529,293	116	292
2012-13	36,940	19,402	3,913,563	5,747,698	106	296
2013-14	37,000	19,735	3,858,172	5,530,163	104	280
2014-15	37,760	19,393	4,119,616	5,133,327	109	265
Absolute change	3,221	2,358	-1,078,068	576,314	-41	-3
% change	9	14	-21	13	-27	-1

Source : www.dise.in

Uttarakhand						
	Number of schools		Enrolment		Avg. Enrolment per school	
Academic Year	Govt	Private	Govt	Private	Govt	Private
2005-06	16,222	2,685	1,038,613	309,083	64	115
2006-07	16,155	3,006	1,079,319	333,749	67	111
2007-08	16,971	3,639	1,083,967	449,045	64	123
2008-09	17,288	4,295	1,064,243	534,229	62	124
2009-10	17,327	4,800	991,687	588,042	57	123
2010-11	17,345	5,024	941,232	661,995	54	132
2011-12	17,500	5,326	907,931	712,331	52	134
2012-13	17,460	5,600	864,675	773,816	50	138
2013-14	17,426	5,716	832,340	842,024	48	147
2014-15	17,478	6,187	788,258	919,388	45	149
Absolute change	1,256	3,502	-250,355	610,305	-19	34
% change	8	130	-24	197	-30	29

Source : www.dise.in

Uttar Pradesh						
Academic Year	Number of schools		Enrolment		Avg. Enrolment per school	
	Govt	Private	Govt	Private	Govt	Private
2005-06	124,998	36,871	22,055,410	8,119,442	176	220
2006-07	128,962	40,007	23,091,898	9,070,616	179	227
2007-08	135,573	44,485	22,508,818	9,567,565	166	215
2008-09	140,267	46,474	21,487,653	10,870,648	153	234
2009-10	147,070	48,019	19,892,972	11,644,675	135	243
2010-11	151,494	49,548	19,689,829	12,237,360	130	247
2011-12	154,757	65,713	19,585,396	15,540,557	127	236
2012-13	163,078	73,656	18,619,853	17,802,029	114	242
2013-14	160,752	74,897	17,712,153	18,060,720	110	241
2014-15	160,942	82,072	17,096,321	19,711,749	106	240
Absolute change	35,944	45,201	-4,959,089	11,592,307	-70	20
% change	29	123	-22	143	-40	9

Source- DISE data, www.dise.in

West Bengal						
Academic Year	Number of schools		Enrolment		Avg. Enrolment per school	
	Govt	Private	Govt	Private	Govt	Private
2005-06	52,790	6,433	8,950,732	…	170	
2006-07	52,831	14,434	8,636,483	…	163	
2007-08	57,487	12,523	11,542,965	1,728,026	201	138
2008-09	57,344	13,427	11,324,973	1,632,555	197	122
2009-10	77,194	11,362	13,378,168	1,662,626	173	146
2010-11	79,131	8,708	13,438,105	1,024,570	170	118
2011-12	81,623	8,273	13,256,933	1,065,469	162	129
2012-13	82,259	9,445	12,972,344	996,723	158	106
2013-14	81,915	9,657	11,810,855	963,059	144	100
2014-15	82,444	13,128	11,525,341	1,489,769	140	113
Absolute change	29,654	6,695	2,574,609	-238,257	-30	-25
% change	56	104	29	-14	-18	-18

Source- DISE data, www.dise.in

Note: For West Bengal, there is a problem with the private school enrolment data, which appears to be unduly high for the two years 2005-06 and 2006-07.

Table 1a: Change in Earnings due to change in Learning levels for Class 5 Govt.-school Students

State	Change in Reading Comprehension Scores	Change in Mathematics Scores	Change in EVS Scores	Change in mean score all 3 across subjects	Change in mean score in terms of no. of standard deviations	Change in earnings due to drop in mean score
Tamil Nadu	-19	-15	-21	-18	-0.36	-6.6%
Uttar Pradesh	-34	-41	-24	-33	-0.66	-11.9%
Punjab	-3	-14	-9	-9	-0.18	-3.1%
Odisha	-21	-20	-4	-15	-0.30	-5.4%
Gujarat	-8	-6	-3	-6	-0.12	-2.0%
Kerala	-18	-14	-12	-15	-0.30	-5.3%
Madhya Pradesh	-21	-29	-26	-25	-0.50	-9.1%
Bihar	-20	-7	-10	-12	-0.24	-4.4%

Appendix 1 gives the list of learning outcome assessment scores for 2011 and 2015. NAS sets the standard deviation around the mean of achievement test score at 50.

Table 1b: Absolute Change in Annual Earnings of Class 5 govt school Students, 2011-12 to 2014-15

State	Average Annual Earnings in 2011-12	Average Annual Earnings in 2014-15	Absolute Change in Annual Earnings
Tamil Nadu	27,679	25,852	-1,827
Uttar Pradesh	9,347	8,236	-1,110
Punjab	23,901	23,155	-746
Odisha	13,016	12,313	-703
Gujarat	27,096	26,543	-553
Kerala	24,365	23,078	-1,286
Madhya Pradesh	11,805	10,728	-1,077
Bihar	7,019	6,707	-312

Appendix 1 shows the per capita earnings adjustment figures.

Table 1c: Change in Govt schools' Per Pupil Expenditure, 2011-12 to 2014-15

State	Change in Annual Per Pupil Expenditure
Tamil Nadu	115.7%
Uttar Pradesh	122.9%
Punjab	86.2%
Odisha	48.0%
Gujarat	-15.0%
Kerala	54.2%
Madhya Pradesh	150.0%
Bihar	90.3%
AVERAGE FOR THESE 8 STATES	81.5%

Appendix 1 shows annual per pupil expenditure by state, and how the change in PPE is calculated.

Table 2a: Government and Private schools' Value for Money Comparison (using data on children's Literacy Outcomes)

S. No.	Variables	Uttar Pradesh	Bihar	Gujarat	Tamil Nadu	Madhya Pradesh	Kerala	Punjab	Odisha
A	Govt Per Pupil Expenditure (Rs.)	23012	3105	47044	33126	9384	39267	16166	8897
B	Govt Achievement (Reading)	27	45	45	50	28	61	61	50
C	Govt Expenditure per Achievement Units (Rs.) (c=a/b)	859	70	1055	664	338	641	265	178
D	Private Per Pupil Expenditure (Rs.)	1800	4200	5400	10800	3700	8400	7900	7150
E	Private Achievement (Reading)	61	88	64	40	58	71	74	77
F	Private Expenditure per Achievement Units (Rs.) (f=d/e)	29	48	84	269	63	119	107	93
G	Govt./ Private Per Pupil Expenditure Ratio (g=a/d)	12.8	0.7	8.7	3.1	2.5	4.7	2.0	1.2
H	Govt./ Private Numeracy Ratio (g=b/e)	0.44	0.51	0.70	1.24	0.48	0.87	0.83	0.65
I	Private/Government Efficiency Ratio (g = c/f)	29.3	1.5	12.5	2.5	5.3	5.4	2.5	1.9

Note: Rows B and E show the percentage of students of class 5 who can read a class 2 level text, as per the ASER data (see source below). Here per pupil expenditure in the govt. school system is calculated after removing the Sarva Shiksha Abhiyan expenditures (on free uniform, books, cash scholarships) and Mid Day Meal expenditure. This is to make it comparable to per pupil expenditure (fee levels) in private schools, which do not provide meals, uniforms, books or scholarships.
Source: Row A: Authors' calculations based on state government budgets, as summarised in Appendix Table 1K; Rows B & E: Annual Status of Education Report 2014; Row D: calculations based on raw 71st round National Sample Survey collected in summer/autumn 2014.

Table 2b: Government and Private schools' Value for Money Comparison (using data on children's Numeracy Outcomes)									
S. No.	**Variables**	**Uttar Pradesh**	**Bihar**	**Gujarat**	**Tamil Nadu**	**Madhya Pradesh**	**Kerala**	**Punjab**	**Odisha**
A	Govt Per Pupil Expenditure (Rs)	23012	3105	47044	33126	9384	39267	16166	8897
B	Govt Achievement (Division)	12	31	14	26	10	26	37	21
C	Govt Expenditure per Achievement Units (Rs.) (c=a/b)	1902	99	3384	1294	938	1534	436	434
D	Private Per Pupil Expenditure (Rs.)	1800	4200	5400	10800	3700	8400	7900	7150
E	Private Achievement (Division)	39	72	35	26	29	50	54	45.40
F	Private Expenditure per Achievement Units (Rs.) (f= d/e)	47	58	155	414	130	169	147	157
G	Govt./ Private Per Pupil Expenditure Ratio (g=a/d)	12.8	0.7	8.7	3.1	2.5	4.7	2.0	1.2
H	Govt./ Private Numeracy Ratio (g=b/e)	0.31	0.43	0.40	0.98	0.35	0.52	0.69	0.45
I	Govt./ Private Efficiency Ratio (g = c/f)	40.9	1.7	21.8	3.1	7.2	9.1	3.0	2.8

Note: Rows B and E show the percentage of students of class 5 who can do simple (3 digit by 1 digit) Division, as per the ASER data (see source below). Here per pupil expenditure in the govt. school system is calculated after removing the Sarva Shiksha Abhiyan expenditures (on free uniform, books, cash scholarships) and Mid Day Meal expenditure. This is to make it comparable to per pupil expenditure (fee levels) in private schools, which do not provide meals, uniforms, books or scholarships.

Source: Row A: Authors' calculations based on state government budgets, as summarised in Appendix Table 1K; Rows B & E: Annual Status of Education Report 2014; Row D: calculations based on raw 71st round National Sample Survey collected in summer/autumn 2014.

Table 22: Performance in different content areas, NCERT's National Achievement Survey (Class-5), 2011 and 2015

Content Area	% correct answers in NAS Cycle 3 (2011)	% correct answers in NAS Cycle 4 (2015)	Change in % correct answers (2011 to 2015)
Reading comprehension			
Locating information	54	49	-5
Grasp of Ideas /Interpretation	47	42	-5
Inference/evaluation	55	49	-6
Mathematics			
Operations	54	49	-5
Geometry	52	48	-4
Measurement	47	43	-4
Number system	51	45	-6
Environmental Science			
Family & environment	58	54	-4
Food	49	45	-4
Shelter	58	52	-6
Water	64	59	-5
Travel	49	46	-3
Real Life	44	40	-4

Source: NCERT (2015) "What students know and can do: A summary report of India's National Achievement Survey: Class 5 (Cycle 4), 2015.

Table 23 :Annual Status of Education Report, 2010 to 2014

Table 6: Trends over time
% Children in Std IV and V at different READING levels by school type 2010-2014

Year	% Children in Std IV who can read at least Std I level text			% Children in Std V who can read Std II level text		
	Govt.	Pvt.	Govt. & Pvt.*	Govt.	Pvt.	Govt. & Pvt.*
2010	65.5	76.2	67.7	50.7	64.2	53.7
2011	55.8	73.9	60.0	43.8	62.7	48.3
2012	50.5	70.1	55.7	41.7	61.2	46.9
2013	50.3	74.2	56.6	41.1	63.3	47.0
2014	49.2	73.1	56.3	42.2	62.5	48.1

* This is the weighted average for children in government and private schools only.

Table 9: Trends over time
% Children in Std IV and V at different ARITHMETIC levels by school type 2010-2014

Year	% Children in Std IV who can do at least subtraction			% Children in Std V who can do division		
	Govt.	Pvt.	Govt. & Pvt.*	Govt.	Pvt.	Govt. & Pvt.*
2010	55.1	67.7	57.7	33.9	44.2	36.2
2011	44.4	62.5	48.5	24.5	37.7	27.6
2012	36.2	59.3	42.3	20.3	37.8	24.9
2013	33.9	61.3	41.1	20.8	38.9	25.6
2014	32.3	59.3	40.3	20.7	39.3	26.1

* This is the weighted average for children in government and private schools only.

Table 24:Estimates of primary-school teacher salaries as a ratio of per capita GDP

Country/state	Reference year	Estimated ratio of teacher salary to:	
		Per capita GDP	Per capita SDP
OECD average	2009	1.2	--
Asian countries			
China	2000	0.9	--
Indonesia	2009	0.5	--
Japan	2009	1.5	--
Bangladesh	2012	~1.0	--
Pakistan	2012	~1.9	--
India			

Nine Indian states[a]	2004-5	3.0	4.9
Uttar Pradesh[b]	2006	6.4	15.4
Bihar	2012	5.9	17.5
Chhattisgarh	2012	4.6	7.2

Source: Table 5.4 in Chapter 5 of Dreze, Jean and Amartya Sen (2013) "*An Uncertain Glory: India and its Contradictions*". Allen Lane, London. The authors cite the OECD (2011) for OECD countries average figure; Ciniscalco (2004) for China; estimates based on BRAC provided figures for Bangladesh and the Collective for Social Science Research (Karachi) for Pakistan. For India Nine states' estimate, from Kingdon (2010), and for Uttar Pradesh, authors recalculated from Kingdon (2010) using Economic Survey data. For Chhattisgarh, authors' own estimates based on enquiries from Education Departments and Planning Commission data on per capita SDP.

Note:
GDP = Gross Domestic Product
SDP = State Domestic Product

a : Andhra Pradesh, Bihar, Gujarat, Jammu & Kashmir, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, West Bengal. Figures in this row refer to all primary-school teachers (including contract teachers, who earn much lower salaries than regular teachers, and before the Sixth Pay Commission.
b : Based on Sixth Pay Commission scales (fixed in 2009 with retrospective effort from 2006)

The international figures apply to 'statutory salaries of teachers' after 15 years of service, at the primary level. Unless stated otherwise, Indian figures refer to regular teachers (as opposed to contract teachers).

Table 25: Temporal change in number of schools, total enrolment and average enrolment per school, in Govt and Private schools By state (2005-06 to 2014-15)

STATE	Number of schools				Total Enrolment				Average Enrolment per school				
	Absolute Change (2005 - 2014)		% Change		Absolute Change (2005 - 2014)		% Change		in govt. schools In baseline year	Absolute Change (2005 - 2014)		% Change	
	Govt	Private	Govt	Private	Govt	Private	Govt	Private	2005-06	Govt	Private	Govt	Private
Andhra Pradesh	-1,272	9,781	-2	53	-1,430,009	1,209,536	-19	32	97	-17	-26	-18	-13
Assam	12,010	12,916	32	597	783,008	1,118,008	21	526	98	-8	-10	-8	-10
Bihar	17,869	7,549	34	1489	6,980,055	1,756,011	53	1582	249	36	13	14	6
Chhattisgarh	309	1,643	1	37	-768,069	508,692	-18	83	89	-16	46	-18	33
Gujarat	1,039	5,343	3	116	-130,453	2,117,097	-2	194	186	-10	86	-5	36
Haryana	1,808	6,424	14	815	65,065	1,804,524	3	1090	150	-14	63	-9	30
Himachal Pradesh	891	1,052	6	68	-307,978	195,066	-34	119	63	-24	32	-38	30
Jammu & Kashmir	7,273	1,819	45	54	-4,678	290,587	0	54	64	-20	0	-31	0
Jharkhand	4,821	5,741	14	916	-348,679	1,579,333	-7	1135	145	-26	48	-18	22
Karnataka	1,266	6,277	3	65	-987,813	1,835,384	-19	102	115	-24	43	-21	23
Kerala	-166	5,203	-4	78	-300,084	937,099	-26	44	247	-57	-62	-23	-19
Madhya Pradesh	9,689	11,488	9	69	-2,171,597	2,137,894	-20	81	104	-28	11	-27	7
Maharashtra	6,558	6,240	11	27	-1,623,725	2,462,570	-21	34	128	-36	19	-28	6
Odisha	10,121	6,303	21	180	-255,530	799,847	-5	229	114	-24	17	-21	17
Punjab	1,409	7,316	8	348	-156,318	1,777,854	-8	470	111	-16	49	-14	27
Rajasthan	-5,278	17,213	-7	90	-2,655,034	3,003,754	-31	97	114	-29	7	-25	4

Tamil Nadu	3,221	2,358	9	14	-1,078,068	576,314	-21	13	150	-41	-3	-27	-1
Uttar Pradesh	35,944	45,201	29	123	-4,959,089	11,592,307	-22	143	176	-70	20	-40	9
Uttarakhand	1,256	3,502	8	130	-250,355	610,305	-24	197	64	-19	34	-30	29
West Bengal	29,654	6,695	56	104	2,860,123	-764,967	32	-21	170	-30	NA	-18	NA
India simple average	6921	8503	15	269	-336,961	1,777,361	-8	310	131.7	-23.7	20.4	-20.3	12.4
India TOTAL	138,422	170,064	--	--	-6,739,228	35,547,215	--	--		--	--	--	--

Source: DISE state report card for each state for each year 2005-06 to 2014-15, downloaded from www.dise.in

Note: The 2014-15 data on Andhra Pradesh's number of schools seems problematic as the number of schools is dramatically smaller in 2014-15 compared to 2013-14. Thus, we have used only the figures upto 2013-14 for Andhra. The 'India' totals and averages in the last two rows refer to the 20 major states listed in the table.

Table 26:The number of 'small' government schools (with a total enrolment of 20 or fewer), their pupil teacher ratios and per pupil expenditure, 2014-15

States	Number of small govt Schools	Number of Pupils in these govt schools	Number of Teachers in these govt schools	Pupil Teacher Ratio in these schools	Total salary expense per annum (Rs. crore)	Per pupil salary expense (Rs. pa)	Per pupil salary expense (Rs. per month)
	(a)	(b)	(c)	(d=b/c)	(e)*	(f=e/b)	(g =f/12)
Andhra Pradesh	6,508	84,292	7,380	11.4	382	45,263	3,772
Assam	3,893	52,166	9,499	5.5	491	94,134	7,845
Bihar	169	1,660	615	2.7	32	1,91,533	15,961
Chhattisgarh	5,502	71,416	10,729	6.7	555	77,668	6,472
Gujarat	1,374	20,445	2,876	7.1	149	72,724	6,060
Haryana	391	4,833	586	8.2	30	62,684	5,224
Himachal Pradesh	5,084	64,719	11,251	5.8	582	89,874	7,490
Jammu & Kashmir	7,058	90,413	17,793	5.1	920	1,01,741	8,478
Jharkhand	1,472	21,889	2,605	8.4	135	61,526	5,127
Karnataka	10,052	126,153	17,088	7.4	883	70,028	5,836
Kerala	1,713	5,460	1,713	3.2	89	1,62,197	13,516
Madhya Pradesh	8,872	121,546	14,958	8.1	773	63,622	5,302
Maharashtra	11,709	146,831	22,247	6.6	1,150	78,327	6,527
Odisha	1,251	17852	2,164	8.2	112	62,665	5,222
Punjab	4,406	61,948	8988	6.9	465	75,005	6,250
Rajasthan	7,996	105,307	14,921	7.1	771	73,252	6,104
Tamil Nadu	3,879	56,246	7,952	7.1	411	73,091	6,091
Uttarakhand	6,522	77,409	13,409	5.8	693	89,553	7,463
Uttar Pradesh	5,135	69,220	11,204	6.2	579	83,679	6,973
West Bengal	3,979	54,803	9,418	5.8	487	88,845	7,404
Total-20 major states	96,965	1,254,608	187,396		9689		
Weighted average	4,848	62,730	9,370	6.7	484	74,232	7,156

Note: * (e = c x Rs. 43,082 x 12); that is, total teacher salary expense in these small schools in 2014-15 is equal to the Number of teachers in these schools multiplied by the Average teacher salary per month in elementary education in India, and this monthly figure is then multiplied by 12 to obtain the annual total salary expense.

Average salary of primary and secondary government school teachers in 9 Indian states in July 2014, is presented in Table 6.3 in a NUEPA study by Professor Vimala Ramachandran (2015). This is reproduced here as Appendix 2. Ramachandran reports salaries of new appointees (0 years' experience) and salary after 15 and after 25 years' experience. We have taken the salary rate after 15 years' experience as the *average* salary of teachers. While teachers of classes 1 to 5 get primary teachers' salary rate, teachers of classes 6-8 get paid the same salary rate as secondary school teachers. Thus we have taken the simple average of primary and secondary teachers' salaries after 15 years' experience across the 9 states, as the measure of mean salary of teachers of elementary classes (1 to 8). This was Rs. 43,082 per month in the school session 2014-15.

Appendix 3: Some Statistics of Government Schools in India's States as per 2014 – 15 DISE Data

Andhra Pradesh						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	225	0.49	177	-	-
2	**5 or less**	513	1.11	464	1,162	3
3	**10 or less**	1,645	3.57	1,571	10,663	7
4	**20 or less**	6,508	14.11	7,380	84,292	11
5	**50 or less**	25,821	55.97	44,644	698,587	16
6	**100 or less**	35,796	77.59	84,550	1,423,106	17
7	**200 or less**	42,943	93.08	136,859	2,404,808	18
8	**500 or less**	45,967	99.64	180,420	3,256,256	18
Source: raw data of DISE downloaded from www.dise.in						

Assam						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	157	0.31	154	-	0.0
2	**5 or less**	299	0.60	457	565	1.2
3	**10 or less**	922	1.84	1,945	5,799	3.0
4	**20 or less**	3,893	7.78	9,499	52,166	5.5
5	**50 or less**	18,831	37.61	51,785	586,209	11.3
6	**100 or less**	34,579	69.07	108,578	1,719,959	15.8
7	**200 or less**	45,705	91.29	165,909	3,258,766	19.6
8	**500 or less**	49,883	100	838,533	4,414,147	5.3
Source: raw data of DISE downloaded from www.dise.in						

Bihar						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	53	0.07	305	-	0
2	**5 or less**	59	0.08	331	22	0.1
3	**10 or less**	74	0.10	363	153	0.4
4	**20 or less**	169	0.24	615	1,660	3
5	**50 or less**	1,556	2.19	3,797	57,136	15
6	**100 or less**	10,481	14.73	26,566	762,987	29
7	**200 or less**	33,918	47.68	106,621	4,196,426	39
8	**500 or less**	60,388	84.89	271,793	12,610,983	46
Source: raw data of DISE downloaded from www.dise.in						

Chhattisgarh						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	379	0.80	443	-	0.0
2	**5 or less**	681	1.44	1,028	1,137	1.1
3	**10 or less**	1,582	3.35	2,761	8,701	3.2
4	**20 or less**	5,502	11.64	10,729	71,416	6.7
5	**50 or less**	21,403	45.29	48,221	636,953	13.2
6	**100 or less**	36,648	77.56	98,510	1,736,016	17.6
7	**200 or less**	45,436	96.15	141,760	2,927,441	20.7
8	**500 or less**	47,180	99.84	154,750	3,382,334	21.9
Source: raw data of DISE downloaded from www.dise.in						

Gujarat						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	8	0.02	60	-	0.0
2	**5 or less**	51	0.15	139	165	1
3	**10 or less**	223	0.66	495	1,590	3
4	**20 or less**	1,374	4.08	2,876	20,445	7
5	**50 or less**	7,411	22.01	16,748	231,964	14
6	**100 or less**	13,944	41.41	38,959	706,085	18
7	**200 or less**	22,518	66.87	88,496	1,962,218	22
8	**500 or less**	32,036	95.14	177,479	4,844,804	27
Source: raw data of DISE downloaded from www.dise.in						

Haryana						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	21	0.14	8	-	0.0
2	**5 or less**	47	0.32	37	95	3
3	**10 or less**	133	0.91	145	806	6
4	**20 or less**	391	2.68	586	4,833	8
5	**50 or less**	2,942	20.18	7,708	98,086	13
6	**100 or less**	7,161	49.12	28,966	413,082	14
7	**200 or less**	11,852	81.29	65,660	1,077,347	16
8	**500 or less**	14,266	97.85	92,872	1,764,847	19
Source: raw data of DISE downloaded from www.dise.in						

Himachal Pradesh						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	2	0.01	2	-	0.0
2	**5 or less**	482	3.14	906	1,687	2
3	**10 or less**	1,633	10.63	3,364	11,251	3
4	**20 or less**	5,084	33.11	11,251	64,719	6
5	**50 or less**	11,709	76.26	33,956	281,016	8
6	**100 or less**	14,498	94.42	54,222	473,592	9
7	**200 or less**	15,254	99.34	63,762	569,737	9
8	**500 or less**	15,348	99.95	65,536	595,502	9
Source: raw data of DISE downloaded from www.dise.in						

Jammu & Kashmir						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	48	0.21	283	-	0.0
2	**5 or less**	747	3.20	1,877	2,507	1
3	**10 or less**	2,299	9.83	5,725	15,373	3
4	**20 or less**	7,058	30.19	17,793	90,413	5
5	**50 or less**	16,409	70.19	51,852	399,559	8
6	**100 or less**	21,490	91.92	82,704	755,223	9
7	**200 or less**	23,240	99.41	95,981	980,728	10
8	**500 or less**	23,363	99.93	97,346	1,011,150	10
Source: raw data of DISE downloaded from www.dise.in						

Jharkhand						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	91	0.23	397	-	0.0
2	**5 or less**	121	0.30	459	117	0.3
3	**10 or less**	245	0.61	654	1,205	2
4	**20 or less**	1,472	3.64	2,605	21,889	8
5	**50 or less**	12,706	31.45	22,236	433,910	20
6	**100 or less**	25,596	63.35	49,733	1,354,796	27
7	**200 or less**	33,631	83.23	76,208	2,488,021	33
8	**500 or less**	39,561	97.91	108,635	4,267,841	39
Source: raw data of DISE downloaded from www.dise.in						

Karnataka						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	544	1.20	500	-	0.0
2	**5 or less**	1,086	2.37	1,260	2,172	1.7
3	**10 or less**	3,200	7.01	4,480	19,648	4.4
4	**20 or less**	10,052	22.02	17,088	126,153	7.4
5	**50 or less**	22,520	49.34	46,999	541,381	11.5
6	**100 or less**	31,662	69.37	81,055	1,201,573	14.8
7	**200 or less**	40,075	87.81	130,244	2,398,889	18.4
8	**500 or less**	45,270	99.19	176,326	3,896,842	22.1
Source: raw data of DISE downloaded from www.dise.in						

Kerala						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	3	0.06	33	-	0.0
2	**5 or less**	22	0.48	90	73	0.8
3	**10 or less**	79	1.73	312	561	1.8
4	**20 or less**	1,713	8.42	1,713	5,460	3.2
5	**50 or less**	1,448	31.68	7,399	42,687	5.8
6	**100 or less**	2,482	54.30	14,867	116,555	7.8
7	**200 or less**	3,331	72.87	24,583	237,500	9.7
8	**500 or less**	4,109	89.89	41,788	486,670	11.6
Source: raw data of DISE downloaded from www.dise.in						

Madhya Pradesh						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	398	0.35	471	-	0.0
2	**5 or less**	858	0.75	1,201	1,546	1.3
3	**10 or less**	2,170	1.90	3,265	12,499	3.8
4	**20 or less**	8,872	7.76	14,958	121,546	8.1
5	**50 or less**	47,782	41.78	89,065	1,517,279	17.0
6	**100 or less**	87,161	76.22	185,653	4,333,540	23.3
7	**200 or less**	109,438	95.70	265,653	7,351,649	27.7
8	**500 or less**	114,204	99.86	292,218	8,603,286	29.4
Source: raw data of DISE downloaded from www.dise.in						

Maharashtra						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	5	0.00	11	-	0.0
2	**5 or less**	1,154	1.70	2,020	4,131	2.0
3	**10 or less**	3,879	5.76	7,060	26,455	3.7
4	**20 or less**	11,709	17.37	22,247	146,831	6.6
5	**50 or less**	35,164	52.19	70,680	889,649	12.6
6	**100 or less**	46,508	69.00	108,829	1,723,121	15.8
7	**200 or less**	59,042	87.62	182,440	3,532,482	19.4
8	**500 or less**	66,686	99.00	254,074	5,663,642	22.3
Source: raw data of DISE downloaded from www.dise.in						

Odisha						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	4	0.02	26	-	0.0
2	**5 or less**	65	0.33	102	233	2.3
3	**10 or less**	282	1.44	415	2,056	5.0
4	**20 or less**	1,251	6.38	2,164	17,852	8.2
5	**50 or less**	6,712	34.23	15,706	211,696	13.5
6	**100 or less**	12,868	65.62	43,623	661,415	15.2
7	**200 or less**	17,929	91.44	85,880	1,368,700	15.9
8	**500 or less**	19,512	100	108,487	1,794,324	16.5
Source: raw data of DISE downloaded from www.dise.in						

Punjab						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	101	0.17	490	-	0.0
2	**5 or less**	265	0.45	806	615	0.8
3	**10 or less**	952	1.63	2113	6,445	3.0
4	**20 or less**	4,406	7.53	8988	61,948	6.9
5	**50 or less**	24,142	41.26	54078	754,196	13.9
6	**100 or less**	40,880	69.87	109150	1,956,517	17.9
7	**200 or less**	53,021	90.62	172848	2,427,832	14.0
8	**500 or less**	58,307	100	216319	5,111,775	23.6
Source: raw data of DISE downloaded from www.dise.in						

Rajasthan						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	273	0.37	1010	-	0.0
2	**5 or less**	842	1.20	1,972	2,085	1.1
3	**10 or less**	2,340	3.34	4,666	14,522	3.1
4	**20 or less**	7,996	11.43	14,921	105,307	7.1
5	**50 or less**	29,174	41.71	61,645	832,743	13.5
6	**100 or less**	47,920	68.51	143,760	215,871	1.5
7	**200 or less**	64,724	92.54	265,757	4,551,909	17.1
8	**500 or less**	69,846	99.86	315,634	5,872,861	18.6
Source: raw data of DISE downloaded from www.dise.in						

Tamil Nadu						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	1	0.00	10	-	0.0
2	**5 or less**	157	0.42	327	597	1.8
3	**10 or less**	713	1.89	1,440	5,319	3.7
4	**20 or less**	3,879	10.27	7,952	56,246	7.1
5	**50 or less**	15,521	41.10	34,611	448,557	13.0
6	**100 or less**	23,735	62.86	73,579	1,048,850	14.3
7	**200 or less**	32,601	86.34	153,550	2,317,931	15.1
8	**500 or less**	37,215	98.56	232,594	3,625,485	15.6
Source: raw data of DISE downloaded from www.dise.in						

Uttarakhand						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	243	1.39	164	-	0.0
2	**5 or less**	948	5.42	1,405	2,569	1.8
3	**10 or less**	2,455	14.04	4,443	15,017	3.4
4	**20 or less**	6,522	37.31	13,409	77,409	5.8
5	**50 or less**	13,075	74.81	33,211	290,788	8.8
6	**100 or less**	15,804	90.42	48,518	479,809	9.9
7	**200 or less**	17,045	97.52	57,442	647,880	11.3
8	**500 or less**	17,433	99.74	61,016	753,280	12.3
Source: raw data of DISE downloaded from www.dise.in						

Uttar Pradesh						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	237	0.15	396	-	0.0
2	**5 or less**	514	0.32	941	1,043	1.1
3	**10 or less**	1,316	0.82	2,616	7,743	3.0
4	**20 or less**	5,135	3.19	11,204	69,220	6.2
5	**50 or less**	32,317	20.08	79,273	1,085,205	13.7
6	**100 or less**	87,105	54.12	248,249	5,136,582	20.7
7	**200 or less**	146,502	91.02	467,341	13,166,135	28.2
8	**500 or less**	160,500	99.72	531,737	16,788,300	31.6
Source: raw data of DISE downloaded from www.dise.in						

West Bengal						
S. No.	**Enrolment**	**Number of Schools**	**Percentage of Schools**	**Number of Teachers**	**Number of Students**	**Pupil Teacher Ratio**
1	**0 (Zero)**	216	0.26	1112	-	0.0
2	**5 or less**	422	0.51	1,510	705	0.5
3	**10 or less**	976	1.18	2,681	5,347	2.0
4	**20 or less**	3,979	1.82	9,418	54,803	5.8
5	**50 or less**	25,520	30.95	65,535	834,198	12.7
6	**100 or less**	52,226	63.34	160,334	2,766,202	17.3
7	**200 or less**	69,768	84.62	246,839	5,170,506	20.9
8	**500 or less**	77,727	94.28	329,329	7,599,835	23.1
Source: raw data of DISE downloaded from www.dise.in						

Appendix 4: Vimala Ramachandran's evidence on teacher salary levels in India: Actual take home salaries of teachers# (in INR)

State	Primary			Secondary		
	Salary of new appointee	Salary after 15 years	Salary after 25 years	Salary of new appointee	Salary after 15 years	Salary after 25 years
Tamil Nadu	15,345	28,660	50,140	26,370	48,750	84,410
Karnataka	18,794 (R) 21,814 (U)	26,098 (R) 30,198 (U)	33,672 (R) 38,892 (U)	24,272 (R) 28,102 (U)	34,618 (R) 39,978 (U)	44,762 (R) 51,622 (U)
Jharkhand	28,650 (R) 31,600 (U)	39,780 (R) 43,260 (U)	44,400 (R) 48,100 (U)	37,494 (R) 39,208 (U)	57,523 (R) 60,160 (U)	78,637 (R) 82,247 (U)
Odisha	14,031	26,659	27,347	25,625	37,806	43,034
Rajasthan	26,013	NA	NA	28,331	NA	NA
Mizoram	16,504	NA	NA	NA	NA	NA
Uttar Pradesh	29,293	39,683	44,783	37,226	47,716	52,996
Punjab^	35,936 (R) 36,588 (U)	59,113 (R) 60,194 (U)	79,288 (R) 80,742 (U)	40,602 (R) 41,340 (U)	66,868 (R) 68,092 (U)	89,699 (R) 91,346 (U)

Source: State reports ; R – Rural; U - Urban

Actual take home salary includes basic pay, grade pay, dearness allowances, HRA, city compensatory allowances, any other benefits and deductions (if any). Also, actual take home salaries for teachers might differ from district to district. The above is only a generalized indicator for each state.

^ Salaries are given for Mohali district because the salaries of teachers vary across districts.

Source: Table 6.3 in Ramachandran, V. (2015) "Synthesis study of teachers in Nine states", NUEPA, New Delhi.