Learning Outcomes in Elementary Education in Rural India: An Inter-state Comparison.

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Abstract

An investigation is done on learning outcomes among children of different states of India at elementary level. Here 24 major states of India are considered. The exercise is done on the basis of different ASER report from 2010 onwards whose informationis rural specific.Learning outcome index of the students of each state are here calculated both at standard III and standard V level. It is observed that in most of the states, the learning achievement of the children at elementary level is deteriorating but not rapidly. It has also come out that higher literacy among parents;availability of some school related factors like Mid-day Meal, proper drinking water,sanitation and playground facilitycan play a positive role to improve the learning achievement of the rural Indian children at elementary level.

Keywords: Elementary Education, Inter-state Comparison,Panel Data Regression Model.

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Introduction:

Education is a process of imparting knowledge and developing powers of reasoning and judgement of an individual.It is one of the pillars of Human Development Index (HDI). Without successful investment in human capital, a nation cannot achieve sustainable economic development.It was identified that if marginal year ofschooling rises, the enterprise income also raises by 5.5 %point (Sluis D.V Justin et al, 2004).Education not only provides knowledge and skills among the children, youth and adults to be active citizens and to fulfil themselves as individuals but also literacy in particular contribute directly to poverty reduction. It has been estimated that global poverty can be decreased by 12 % point if all children in less developed countries can get access to elementary education (Education for All Global Monitoring Report, 2009). The vicious circle of povertyof a less developed country can be broken through investment in human capital formation which will result in overall development of the economy and that can be done through improving the quality ofelementary education.Better learning outcome at elementary level can help the future citizens to be capable to work as skilled worker in their adult hood and can earn higher amount. This can play an important role to remove the incidence of poverty of that economy.

Since independence, Government of India has taken several initiatives to improve literacy rate in India. Here we can mention,SarvaShikshaAbhiyaan (SSA) which aims to provide universal elementary education to children between the age group of 6-14 years. SSA has its root back to 1993-94 when the District Primary Education Programme (DPEP) was launched. Actually it is a primary vehicle for implementing the Right to Free and Compulsory Education Act (RTE).Right toEducation Act enacted by "Parliament of India "extended to the whole of India except Jammu and Kashmir aims to provide free and compulsory education to all children of the age of 6-14years.This Act is also known as "Fundamental Child Right" enshrined in Article 21A of the Constitution (Ministry of Law and Justice, 2009).

Overview of Existing Literature:

Investment in education gives the maximum return than investing in any other resources. For example, every $1 spent on an individual's education yields $10.15 to economic growth over the persons working age (EFA Global Monitoring Report, 2009). AmbrishDongre, *et. al.*(2016) mentioned that the launch of the SarvaShikshaAbhiyaan (SSA) in 2001 has resulted

in a significant increase in Govt. of India's (GOI) funding for elementary education. At the central and at the state level, allocation on elementary education increased more than two fold from Rs 68853 crores in 2007-08 to Rs 147059 crores in 2012-13. Budgets for specific initiatives aimed at improving learning quality accounts for less than 1 percent of SarvaShikshaAbhiyaanbudget [PAISA Report, 2012]. With passage of time, school enrolment is approaching towards 100%.According to Planning Commission report (2011), in most of the Indian states there is a gradual enhancement of both Gross Enrolment Rate (GER) and Net Enrolment Rate (NER) at elementary level.India is close to "schooling for all". But no proper enquiry has done to identify the learning outcome of the children at elementary level. Here it will be investigated after considering 24 major states of India[1].

Research objective:

This paper will try to investigate the scenario of learning outcome among the children at elementary level in different states of India after implementation of SSA. Learning outcome is the best indicator of learning because it shows what learners have actually learnt after completion of the class. Actually if we want to remove vicious circle of poverty of an economy we should generate more skilled labour and that can be materialized if children can enhance their knowledge from elementary level.Besides that we will also try to investigate the possible factors which can influence learning outcome of the children at elementary level in rural India.

Data Source:

Annual Status of Education Report (ASER) is an annual household survey to assess children's schooling status and basic learning levels in terms of reading and mathematical ability. ASER survey has provided a mirror image of rural public education system. It collects data for a representative sample of children from every state and almost every rural district in India.On average ASER survey had reached over 560 districts each year, surveying on average of 650,000 children in more than 16,000 villages and 30 randomly selected villages in each district in the country[2]. This is about twice the size of the rural sample of the NSS survey. Data on reading and basic mathematical ability was collected every year for all

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[1]Sikkim is not considered due to unavailability of necessary data.

[2] In each district, 30 villages are sampled from the census 2001 village list using Probability Proportional to Size (PPS) sampling technique. The sample design employs a rotation panel of villages. Each year, 10 villages from three years ago are dropped and 10 new villages are added.

states in India, using household survey methodology. In ASER Report, education achievement in different states has been portrayed using two scale i.e. reading ability and mathematical ability.

Reading ability has been tracked using two parameter and they are:

(i). Percentage of children in standard III who can read a standard II level text

(ii). Percentage of children in standard V who can read standard II level text.

Mathematical ability of the students at elementary level is represented in ASER data in the following way:

(i). Percentage of children who can do at least subtraction at standard III level.

(ii). Percentage of children who can do at least division at standard V level.

The present study is solely based on ASER report but we have considered the time period from 2010, the time period from which the Right to Education Act was implemented.

Methodology

Initially, we have arranged the state level data on reading ability and mathematical ability obtained by ASER household survey over the years (from 2010 to 2016).Then to get a proper indicator of learning outcome of the children at elementary level in different states and in different years, the Learning Outcome Index at standard III and standard V level will be calculated. This Index is a composite index obtained after taking the geometric mean of reading ability and mathematical ability of the children(in percentage term) in rural public school in each state. Relative picture of learning outcome of the children in elementary education among 24 major states of India[3]is shown by the Rank Analysis method. We have also calculated the Average Growth Rate(in %) at standard III level and standard V level among the different states of India.Later on, we want to investigate possible family related and school related factorswhich may influence learning outcome of the children in rural India on the basis of Panel data regression analysis.

Learning Outcome Index (LOI):

It is already mentioned that this index is an indicator of the learning abilityamong children enrolled in rural public school at standard III and standard V level.LOI_{1i}=Learning Outcome Index for standard IIIlevel children of the ith state is calculated byusing the following method:

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[3]Here out of 24 considered states, Manipur, Meghalaya, Mizoram, Nagaland, Arunachal Pradesh, Himachal Pradesh and Tripura are under special assistance of Central Government. But special assistance from Central government may not reflect better learning achievement of the children at elementary level.

$LOI_i = \sqrt{A_iB_i}$ where, A_i indicates percentage of children of the ith state who can read at least standard II level textin standard III and$B_i$indicates percentage of children of the ith state who can do at leastsubtractionin standard III.[4].Higher value of LOI_1 means better learning outcome among children at standard III level

Table 1:The values of LOI_1(in percentage) of different states in different years

States	LOI_1 2010	LOI_1 2012	LOI_1 2014	LOI_1 2016
Andhra Pradesh	27.22	36	25.86	27.22
Arunachal Pradesh	22.7	31.7	19.9	12.25
Assam	20.96	12.53	12.92	15.92
Bihar	31.49	18.8	16.76	16.67
Chhattisgarh	16.97	13.78	12.16	17.94
Gujarat	17.21	15.3	14.77	19.88
Haryana	31.22	17.15	22.82	26.37
Himachal Pradesh	36.93	35.99	42.07	46.67
Jharkhand	18.84	13.89	10.26	11.97
Karnataka	20.51	23.75	18.95	22.01
Kerala	49.84	40.66	36.3	36.94
Madhya Pradesh	18.78	6.9	6.67	9.26
Maharashtra	35.23	28.02	24.34	30.45
Manipur	17.33	28.46	30	34.13
Meghalaya	16.82	25.73	23.15	19.11
Mizoram	51.2	38.65	39.35	20.15
Nagaland	22.35	28.65	20	23.55
Orissa	26.7	24.3	26.17	30.64
Punjab	36.08	36.88	27.81	33.33
Rajasthan	15.48	20.98	9.65	12.89
Tamil Nadu	11.19	11.06	18.51	22.11
Tripura	34.95	21.85	30.7	30.15

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[4]Here a gap of two years is considered. The basic logic behind taking this time gap is to get a better picture of change of learning ability among the children at elementary level in a particular state over time.

Uttar Pradesh	11.77	6.6	6.3	7.54
WestBengal	33.31	25.6	32.95	34.95
All India	23.61	18.18	17.2	19.74

Source: Calculated by the authors on the basis of the data given in ASER Report in different years

The above table shows that at all India level LOI_1(overall India) marked a fall from 23.61%in 2010 to 18.18% in 2012 and further to 17.2% in 2014, though it increased very slightly in 2016 by 2.54% as obtained by our calculation based on ASER household survey over the years[5]. All the states except Andhra Pradesh, Arunachal Pradesh Karnataka, Manipur, Meghalaya, Nagaland and Rajasthan marked a fall in their LOI_1 while moving from 2010 to 2012. Similarly while moving from 2012 to 2014 all states except Haryana, Himachal Pradesh, Manipur, Orissa, Tamil Nadu, Tripura and West Bengal marked a fall in learning ability of the children in elementary education at standard III level.On the other hand while moving from 2014 to 2016 all states except Arunachal Pradesh, Meghalaya, and Mizoram marked a rise in the value of learning outcome index[6].

Next we shall look at the learning outcome of the rural children at standard V level[7] on the basis of LOI_2.

$LOI_{2i} = (A_iB_i)^{1/2}$ where, $A_i$indicates percentage of children in standard V who can read a standard II level text and $B_i$indicates percentage of children in standard V who can do at least division.

Table-2: The values of LOI_2(in percentages) of 24 major states of India in different years

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[5]Right to education act is not very successful to improve learning achievement of the India children at elementary level.

[6]The diagrammatic representation of this table through clustered column chart is shown in the appendix

[7]In India, at standard V, the student has completed 4 years of education at elementary level. Though LOI_2 one can get a better picture of learning achievement scenario of children at different states after completion of four initial years of schooling. Higher value of LOI_2 of a state indicates better learning achievement of the children at that state after completion of primary education.

States	LOI$_2$ 2010	LOI$_2$ 2012	LOI$_2$ 2014	LOI$_2$ 2016
Andhra Pradesh	48.66	51.72	46.41	43.25
Arunachal Pradesh	34.1	47.6	39.5	14.2
Assam	31.03	17.21	16.59	17.14
Bihar	54.34	35.96	37.42	33.14
Chhattisgarh	48.02	24.01	25.77	30.8
Gujarat	29.2	23.96	24.9	27.54
Haryana	55.36	33.24	40.74	40.54
Himachal Pradesh	68.4	53.83	52.06	55.63
Jharkhand	44.05	25.56	22.63	25.06
Karnataka	28.32	28.66	27.62	26.85
Kerala	56.47	47.71	39.61	41.42
Madhya Pradesh	45.8	15.64	16.58	21.88
Maharashtra	53.22	33.42	29.3	34.88
Manipur	34.31	35.25	43.1	55.09
Meghalaya	51.26	31.79	16.5	21.7
Mizoram	62.5	48.4	42.1	33.15
Nagaland	33.85	34.8	22.85	25.4
Orissa	37.74	28.16	31.26	34.08
Punjab	69.74	58.12	47.53	52.24
Rajasthan	33.37	18.16	20.32	25.75
Tamil Nadu	20.87	17.03	35.74	32.51
Tripura	37.95	28.5	33	33.15
Uttar Pradesh	25.95	15.26	18	15.9
West Bengal	45.44	37.39	40.27	37.82
All India	41.457	29.09	29.55	29.62

Source: Calculated by the author on the basis of the data given in ASER Report in different years.

If we look at the all India picture, it is observed that the value of LOI$_2$among children has marked a fall from 41.457%in 2010 to 29.09% in 2012[8]. Ithas increased very slightly in 2014

[8]Learning achievement among Indian children after completion of four years of schooling is deteriorating.

by 0.46% only i.e. from 29.09% to 29.55% but later in 2016 it remain more or less stagnant as obtained by our calculation based on ASER household survey over the years. All the states except Andhra Pradesh and Arunachal Pradeshmarked a fall in their learning outcome index while moving from 2010 to 2012. Similarly while moving from 2012 to 2014 all states except Bihar, Chhattisgarh, Haryana, Manipur, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, Tripura and West Bengal marked a fall in LOI_2 .On the other hand while moving from 2014 to 2016 states except Andhra Pradesh,Arunachal Pradesh, Bihar, Mizoram, Tamil Nadu,Uttar Pradesh and West Bengal has marked a rise in the value of the LOI_2.[9]

To draw a comparative analysis of learning outcomeamong children in different states of India over the time, we have considered the Rank Analysis Method.For the Rank Analysis we have arranged the data of Learning OutcomeIndex of standard III and standard V children over the years and then drawn an interstate comparison taking the highest level as rank 1 and so on.

Table -3: Ranking of different states in terms of LOI_1in different years(for std III level children)

States	LOI_1 2010	LOI_1 2012	LOI_1 2014	LOI_1 2016
Andhra Pradesh	10	4	9	9
Arunachal Pradesh	12	6	14	21
Assam	14	21	19	19
Bihar	8	16	17	18
Chhattisgarh	20	20	20	17
Gujarat	19	18	18	15
Haryana	9	17	12	10
Himachal Pradesh	3	5	1	1
Jharkhand	16	19	21	22
Karnataka	15	13	15	13
Kerala	2	1	3	2
Madhya Pradesh	17	23	23	23
Maharashtra	5	9	10	7
Manipur	18	8	6	4

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[9]The diagrammatic representation of this table through clustered column chart is shown in the appendix

Meghalaya	21	10	11	16
Mizoram	1	2	2	14
Nagaland	13	7	13	11
Orissa	11	12	8	6
Punjab	4	3	7	5
Rajasthan	22	15	22	20
Tamil Nadu	24	22	16	12
Tripura	6	14	5	8
Uttar Pradesh	23	24	24	24
West Bengal	7	11	4	3

Source: Calculated by the author on the basis of the data given in ASER Report in different years.

From the above table it is observedthat:

(i) Mizoram attains the highest rank in LOI_1 in 2010 and in 2012 and 2014 its position falls to the second highest position but its position falls badly in 2016 and its rank in LOI_1 falls to 14.

(ii) Himachal Pradesh marked a rise in rank and attains the highest position in 2014 and maintains this position later on. Andhra Pradesh and Arunachal Pradesh both the states marked a remarkable rise in its rank from 2010 to 2012 but it is a temporary improvement. Manipur marked an improvement in its position over the years. Meghalaya marked an improvement in its rank from 2010 to 2012 by 11 point and then its rank deteriorated slightly by 1 point and later on its position again deteriorated by 5 point. West Bengal marked a remarkable rise in its rank from 2012 to 2014 by 7 point later on in 2016 also its position as shown by rank in LOI_1 again improved by 1 point.

(iii) Assam marked remarkable fall in its rank in LOI_1 by 7 point in 2012 later on its rank has improved by 2 point and maintain its position till 2016.Bihar rank in LOI_1also falls by 8 point from 2010 to 2012.Haryana also marked a fall in its rank by 8 point from 2010 to 2012 but later on it marked a rise in rank by 4 point and again a rise in rank by 2 point.

Next, the ranking ofdifferent states based LOI_2 in different years will be considered

Table -4**:** Ranking of different states in terms of LOI_2 in different years (for standard V level children)

States	LOI$_2$ 2010	LOI$_2$ 2012	LOI$_2$ 2014	LOI$_2$ 2016
Andhra Pradesh	9	3	3	4
Arunachal Pradesh	17	6	9	23
Assam	20	21	22	21
Bihar	6	8	10	11
Chhattisgarh	10	18	16	13
Gujarat	21	19	17	14
Haryana	5	12	6	6
Himachal Pradesh	2	2	1	1
Jharkhand	13	17	19	17
Karnataka	22	14	15	15
Kerala	4	5	8	5
Madhya Pradesh	11	23	23	19
Maharashtra	7	11	14	8
Manipur	16	9	4	2
Meghalaya	8	13	24	20
Mizoram	3	4	5	10
Nagaland	18	9	18	18
Orissa	15	16	13	9
Punjab	1	1	2	3
Rajasthan	19	20	20	16
Tamil Nadu	24	21	11	12
Tripura	14	14	12	10
Uttar Pradesh	23	24	21	22
West Bengal	12	7	7	7

Source: Calculated by the authors on the basis of ASER Report in different years

From the above table, wecan observe the following facts:

(i)   Punjab attains the highest rank in LOI$_2$ in 2010 and 2012 and later on Himachal Pradesh occupied this position in 2014 and 2016

(ii)   Andhra Pradesh marked a remarkable rise in itsrank from 2010 to 2012 by 6 point and maintains this improved position till 2014 later on in 2016 its rank fall slightly by 1 point. Arunachal Pradesh had marked an improvement in its rank from 2010

to 2012 but it is a temporary improvement. Nagaland had also marked a temporary improvement in rank from 2010 to 2012. Karnataka had shown a remarkable rise in its rank of LOI_2 from 2010 to 2012. Similarly Manipur had shown a remarkable rise in its rank of LOI_2 from 2010 to 2012 by 7 point and then again itsrank rise by 5 point in 2014 and later on by 2 point in 2016. Tamil Nadu had also shown a remarkable rise in its rank of the learning outcomeindex from 2012 to 2014, similarly West Bengal had also marked a remarkable improvement in its rank from 2010 to 2012 and maintains this improved position in the latter year.

(iii) Chhattisgarh marked a remarkable fall in rank from 2010 to 2012 by 8 point but thenin 2014its rankhas improved by 2 point and later on by 3 point in 2016. Madhya Pradesh had shown a remarkable fall in its rank of the $LOI_2$from 2010 to 2012 by 12 point. Meghalaya had shown a remarkable fall in its rank from 2010 to 2014.

So from Table-3 and Table-4, it is observed that there is fluctuation of rank of the states, both of LOI_1 and LOI_2 in different years. Now we have to investigate whether there is any average enhancement of LOI_1 and LOI_2 of different states over the years. This will indicate whether the learning outcome of the children in different states at elementary level are improving or not over the years. The Average Annual Growth rate of LOI_1 and LOI_2 reflect how LOI_1 and LOI_2 have changed over time with in discussing time period. It may take positive or negative value. It is very much useful because it reflects the trend of the variable.

Table-5: Change of Average Growth rate while moving from std III level children to std V level Children

States	Average Growth Rate of LOI_1 between 2010 to 2016 (AGR_1)	Average Growth Rate of LOI_2 between 2010 to 2016 (AGR_2)
Andhra Pradesh	3.116	-3.595
Arunachal Pradesh	-12.006	-13.825
Assam	-4.629	-14.941
Bihar	-17.228	-13.733
Chhattisgarh	5.659	-7.717
Gujarat	6.678	-1.14
Haryana	1.183	-5.961
Himachal Pradesh	8.427	-5.910

Jharkhand	-11.913	-14.233
Karnataka	3.911	-1.738
Kerala	-10.301	-9.306
Madhya Pradesh	-9.253	-9.291
Maharashtra	-2.832	-10.162
Manipur	27.8	17.609
Meghalaya	8.498	-18.187
Mizoram	-23.830	-18.944
Nagaland	5.248	-6.791
Orissa	5.262	-1.785
Punjab	-0.842	-8.324
Rajasthan	5.033	-2.322
Tamil Nadu	28.548	27.474
Tripura	0.41	-2.885
Uttar Pradesh	-9.596	-11.635
WestBengal	3.877	-5.365
All India	-4.540	-9.337

Source: Calculated by the author on the basis of the data given in ASER Report in different years

1. It is found that all India average growth rate in terms of Learning outcome for both standard III (4.540) and standard V (-9.337) have marked a fall overtime.

2. For standard III children, it is observed that Arunachal Pradesh, Assam, Bihar, Jharkhand, Kerala M.P, Mizoram, U.P marked a fall in their average growth rate overtime. Similarly for standard V children in rural India it has been observed that all the states except Manipur and Tamil Nadu marked a fall in their Average Growth Rate.

3. The highest fall in the average growth rate is shown in Mizoram i.e. fall of (-23.830)forstandard III children and (-18.944) for standard V children,similarly the highest growth in the average growth rate is shown in Tamil Nadu i.e. (28.548) for standard III children and (27.474) for standard V children.

Thus it can be concluded that despite of the fall in Average Growth Rate of learning ability there are few states which marked a rise in it over the years.

Possible factors (both household and school related) which may influence the learning outcomeof the rural children of India in elementary education:

Coleman (1966) claimed that the learning outcomes of the children are very much dependent on family background. Kundu and Dutt (2015) also observed that 'motivation' of the parents play a significant role on learning outcome of their children. 'Motivation' is very much dependent on the education level of the parents and economics condition of the households in which the children belongs. It is observed that despite 96% enrolment at primary education, India's education system fails to capitalize on providing quality education to their children even at elementary level. According to Filmier and Pritchett (1998), household wealth and parent's education have a positive correlation with children's educational outcome. As we are analysing on the basis of ASER data,we have to consider the state specific familyand school related factors which are available in ASER report only. Caste and gender factors are not reflected in ASER data. So these two factors are here not considered. Hence, the possible factors which can influence the Learning Outcome Index are as follows:

1. **Mother's education :(ME):**

Literate women play a major role in socio-economic development. With the passage of time, the literacy rate amongst women in India has gone up from 0.69% in 1901 to 24.82% in 1981(Census report 1981). But still in Twentieth century, nearly three-fourth of women in rural areas are illiterate (ASER, 2014).There is a possible positive correlation between parental educations especially mothers education and offspring education. (Chevalier.Arnaud, 2004). If mother is able to read, then the child born to that mother is 50 percent more likely to survive to the age of five as educated mothers are more likely to immunize their children compared to illiterate mothers (UN Millennium Project, 2006). This is important because there is a high positive relationship between child's health and learning ability

Mother education is divided here into four sections:
1. Percentage of mother'sof the ith state who are illiterate(MEI_i).
2. Percentage of mother'sof the i^{th}state that has attained school education till standard V(MEV_i).
3. Percentage of mother'sof the i^{th}state that has attained school education till standardX(MEX_i).

4. Percentage of mother'sof the ith state who have achieved education qualification above Standard X (MEX_{+i}).

Here data is collected in particular time period.

2. **Fathers education:(FE):**

Studies have also found that a strong link between the education as well as earnings of the father and his offspring. For example the intergenerational correlation in earnings between father and son varies between 0.40 & 0.50 in the U.S and 0.60 in U.K(Chevalier Arnaud *et.al.* 2005).

Father's education is also divided here into four classes:

(i). Percentage of father'sof the ith state who are illiterate (FEI_i).

(ii). Percentage of father'sof the ith state who have attained school education till standard V (FEV_i).

(iii). Percentage of father'sof the ith state who have attained school education till standard X (FEX_i).

(iv). Percentage of father'sof the ith state who have achieved education qualification above standard X (FEX_{+i}).

Besides parental education, there are few other household specific factors which may influence the learning outcome of the children. These are as follows:

3. **Percentage of households of the ith state who have puccahouse (PH_i):**

Pucca household may be an important parameter determining education quality in rural areas. It elevates financial status of the family. Actually a house is a "turning point" in the lives of the poor, which leads towards a better life and so 'Housing for All' scheme is launchedin June 2016. It actually gives security to a child particularly for the girl child. It is expected that a child in pucca house can devote more concentration in his/her study.

4. **Percentage of households of the ith state who have electric connection (EC_i):**

Without electric connection,children face obstacles in completing their homework and preparing their lessons.Studying in kerosene lamp or candle light also cause stress to the child's vision.In India, students whose households are electrified are more likely to complete grade-appropriate tests successfully as compared to their counterparts whose

households are not electrified (Kanagawa and Nakata, 2008). Thus proper electric connection provides a better ambiance for children in pursuing their education.

Percentage of households of the ith state who have proper sanitation (PS$_i$):

Without proper sanitation, human waste goes into the water of the ponds, lakes or river. This water is further used for washingclothes,dishes or even used for drinking purpose in rural areas. Thus many people are prone to many water borne diseases like diarrhoea, dysentery,choleraetc. Globally nearly five thousand children die every day because of these of lack of sanitation facility (Unitarian Universalist Association, 2001).Swachh Bharat Abhiyan (Clean India Movement) is a campaign by the Government of Indiato reduce or eliminate open defecation through the construction of individual, cluster and community toilets but still India failed to achieve 100 percent in availability of proper sanitation facility. Actually to maintain hygiene, toilet facility at home is essential which can reduce the possibility of illness among the children.

As information about income level of the sample household is not available, here we consider pucca household, electric connection and proper sanitation as a proxy variable of household asset as well as financial condition.Children from financially disadvantaged families appear to be less well prepared for the transition to school due to the impact of financial stress on family relationships, which affects children's social/emotional readiness (Smart et al., 2008).

Next we consider possible school related factors which may influence the learning outcome of the rural children of India in elementary education:

1. **Pupil-Teacher Ratio(PTR$_{it}$,)** - Pupil-teacher ratio is the number of students who attend a school divided by the number of teachers in the institution. It is an indicator of the amount of individual attention any single child is likely to receive keeping in mind that not all class sizes are going to be same. The idea that teachers who have fewer students in their classrooms will be able to spend more attention to individual students which may improve his chances for academic success. Thus it is a tool to measure teacher workload as well as allocation of resources. RTE mandates an optimal pupil-teacher ratio of 30:1 for primary school and 35:1 for pre-primary school for all Indian schools.

2. **Percentage of schools of the ith state who have playground facility(P$_{it}$)** - Schools which have playground will enable the children to be physically and mentally active which will affect the intellectual and social wellbeing of the

children. It is important for the children for fun and relaxation as well as for good health. For many children, school playtime is the most active part of their day. Improvement in the physical and mental health of children has occurred as a result of play facilities in the school premises may affect the quality of education achievement.

3. **Percentage of schools of the ith state who have availability to proper drinking water($DW_{it,}$)-** Availability of proper drinking water in school will help to increase students overall water consumption, maintain hydration, reduce the possibility to get affected in various water borne diseases. Proper hydration can also improve academic and physical performance of the students.

4. **Percentage of schools of the ith state in the tth period who have proper toilet facilities available and useable(TS_{it}) -**Lack of sanitation facility may increase the possibilityto get infected by water borne diseases like diarrhoea, dysentery, cholera etc. Availability of proper sanitation in educational institution can create improved learning environment, also facilitating increased attendance and retention of students mainly girl's student.

5. **Percentage of schools of the ith state in the tth period where Mid-day meal is served on the day of visit(MTM_{it})** –This scheme is important for improving enrolment, attendance and retention of primary school children.Students with improved nutrition are more active in class which leads to improved learning outcome among themselves.Poor rural people are so poor that they are unable to provide two time meal to their children and so midday meal scheme will work as a catalyst to drive children to school.

Model 1:

The static panel regression model can be explained in the following way:

LOI_{1it} =f{MEI_{it}, MEV_{it}, MEX_{it}, MEX_{+it}, FEI_{it}, FEV_{it}, FEX_{it}, FEX_{+it}, PH_{it}, EC_{it}, PS_{it}, PTR_{it}, P_{it}, DW_{it}, TS_{it}, MTM_{it}}………………………………Eq. .(1)

LOI_{2it} =f{MEI_{it}, MEV_{it}, MEX_{it}, MEX_{+it}, FEI_{it}, FEV_{it}, FEX_{it}, FEX_{+it}, PH_{it}, EC_{it}, PS_{it}, PTR_{it}, P_{it}, DW_{it}, TS_{it}, MTM_{it}}………………………………Eq. .(2)

Where i = (1 to 24) and (t = 1 to 4). Here t=2010, 2012, 2014, 2016 and 24 states of India is considered as cross sectional unit. Here we have considered a gap of two years as children

need two years to get promoted from standard III level to standard V level as there is no retention policy. [i]

LOI_{it} represents the Learning Outcome Index of the state i in the tth year at two different levels in both the equations[10].

Before moving to regression result, Table-6 will concentrate on summary statistics of the variables.

Table-6: Descriptive statistics of both the explained and explanatory variables:

Statistic/ Year	2010	2012	2014	2016
Learning Outcome Index for standard III student(LOI_1)				
Mean	26.045	23.467	22.015	23.420
Cv	0.4099	0.4198	0.4448	0.4121
Median	22.525	24.025	21.41	22.06
Min	11.19	6.6	6.3	7.54
Max	51.2	40.66	42.07	46.67
Min State	Tamil Nadu	Uttar Pradesh	Uttar Pradesh	Uttar Pradesh
Max State	Mizoram	Kerala	Himachal Pradesh	Himachal Pradesh
Learning Outcome Index for standard V student(LOI_2)				
Mean	43.747	32.974	32.075	32.463
Cv	0.3005	0.3786	0.3316	0.3454
Median	44.745	32.515	32.13	32.825
Min	20.87	15.26	16.5	14.2
Max	69.74	58.12	52.06	55.63
Min State	Tamil Nadu	Uttar Pradesh	Meghalaya	Arunachal Pradesh
Max State	Punjab	Punjab	Himachal Pradesh	Himachal Pradesh

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[10]There are few family related factors and school related factors which may be changed significantly after a gap of two years. Besides that we may get a proper trend of the learning outcome index of 24 selected states if a gap of at least two years is considered.

Percentage of households which have a pucca house(PH)				
Mean	28.754	32.895	39.170	40.895
Cv	0.6781	0.7047	0.6682	0.6280
Median	21.4	26.05	34.55	35.3
Min	2.4	2	5.9	5.4
Max	61.5	78.3	90.4	84.6
Min State	Tripura	Tripura	Mizoram	Mizoram
Max State	Tamil Nadu	Kerala	Kerala	Tamil Nadu

Percentage of households which have electric connection(EC)				
Mean	79.462	82.462	87.4	88.95
Cv	0.2339	0.1876	0.1510	0.1221
Median	85.65	86.2	91.9	93.35
Min	38.2	39.8	49.8	56.9
Max	99.1	98.4	99.2	99.3
Min State	Bihar	Bihar	Bihar	Uttar Pradesh
Max State	Himachal Pradesh	Punjab	Punjab	Punjab

Percentage of households which have proper sanitation(PS)				
Mean	52.712	54.175	59.762	67.320
Cv	0.4461	0.4815	0.4515	0.3287
Median	51.7	53.65	57.65	65.2
Min	15	10.6	9.7	21.7
Max	96	97	97.8	97.8
Min State	Jharkhand	Jharkhand	Jharkhand	Jharkhand
Max State	Kerala	Kerala	Kerala	Kerala

Percentage of schools complying with Pupil-teacher ratio ($PTR_{it,}$)				
Mean	50.12	53.308	58.654	60.579
Cv	0.494	0.4605	0.382	0.3537
Median	50.65	52.45	60.35	60.05
Min	8.8	8.5	12.7	11.7
Max	91.9	93	96.6	97.1
Min State	Bihar	Bihar	Bihar	Bihar

Max State	Nagaland	Nagaland	Kerala	Nagaland
Percentage of schools with playground facility(P_{it})				
Mean	61.625	59.954	63.88	64.383
Cv	0.2351	0.2672	0.236	0.237
Median	61.35	58.75	65.2	66.8
Min	37.9	31.4	32.4	29.2
Max	89.5	92	88.3	89.9
Min State	Jharkhand	Odisha	Odisha	Odisha
Max State	Tripura	Tripura	Maharashtra	Maharashtra
Percentage of schools with availability to proper drinking water($DW_{it,}$)-				
Mean	65.041	66.229	68.829	67.7458
Cv	0.3109	0.3340	0.3079	0.3056
Median	72.05	73.8	77.3	75.55
Min	5.1	7.1	15.7	15.3
Max	85.7	85.1	90.4	89.5
Min State	Manipur	Manipur	Manipur	Manipur
Max State	Kerala	Kerala	Bihar	Bihar
Percentage of schools with proper toilet facilities available and useable(TS_i)-				
Mean	46.162	55.108	64.283	68.05
Cv	0.2781	0.2315	0.2352	0.2049
Median	46	52.5	63.75	69.3
Min	24.5	31.7	33.7	40
Max	67.9	75.7	84.8	85.5
Min State	Meghalaya	Meghalaya	Mizoram	Mizoram
Max State	Haryana	Kerala	Kerala	Haryana
Percentage of schools where Mid-day meal is served on the day of visit(MTM_{it})				
Mean	80.987	81.595	78.745	82.283
Cv	0.2516	0.259	0.270	0.2440
Median	93.15	91.75	87.2	91.75
Min	31.9	30.5	24.1	24.6
Max	100	99.8	99.8	99.5
Min State	Nagaland	Meghalaya	Nagaland	Nagaland

Max State	Kerala	Tamil Nadu	Tamil Nadu	Andhra Pradesh
Mother Schooling Over Time (ME)				
Percentage of mother's who are illiterate(ME I)				
Mean	39.308	39.3125	37.616	35.329
Cv	0.4335	0.4447	0.4941	0.4847
Median	40.9	39.45	36.65	34.65
Min	1.0	1.4	0.9	1.3
Max	68.9	71.2	69.7	68
Min State	Kerala	Kerala	Kerala	Kerala
Max State	Rajasthan	Rajasthan	Rajasthan	Rajasthan
Percentage of mother's who have attained school education till Standard V(ME V)				
Mean	19.379	17.679	16.895	16.120
Cv	0.2245	0.3194	0.3309	0.3161
Median	19.5	17.2	16.35	15.05
Min	5.3	5	3.4	3.7
Max	26.7	30.1	27.6	28.7
Min State	Kerala	Kerala	Kerala	Kerala
Max State	Meghalaya	Mizoram	Mizoram	Mizoram
Percentage of mother's who have attained school education till standard X(ME X)				
Mean	33.25	34.245	35.291	36.991
Cv	0.3720	0.3425	0.3336	0.3055
Median	32.6	35.55	37.15	38.85
Min	12.9	13.2	14.5	15.3
Max	61.2	57.5	53.8	54.7
Min State	Rajasthan	Rajasthan	Rajasthan	Rajasthan
Max State	Kerala	Kerala	Mizoram	Kerala
Percentage of mother's whose education qualification is above Standard X(ME X$_+$)				
Mean	8.075	8.775	10.204	11.5875
Cv	0.8210	0.8088	0.8499	0.7483
Median	6	6.6	7.35	8.1
Min	3	2.5	3	3.4
Max	32.5	36.1	42.7	40.3
Min State	Chhattisgarh	Rajasthan	Jharkhand	Rajasthan

Max State	Kerala	Kerala	Kerala	Kerala

Father Schooling Over Time (FE)

Percentage of father's who are illiterate(FE I)

Mean	24.491	23.662	23.083	22.325
Cv	0.4519	0.4231	0.4995	0.4546
Median	26.05	25.1	22.8	24.5
Min	0.4	1.3	1.1	1.6
Max	42	41	51	41.2
Min State	Kerala	Kerala	Kerala	Kerala
Max State	Meghalaya	Meghalaya	Arunachal Pradesh	Meghalaya

Percentage of father's who have attained school education till Standard V(FE V)

Mean	16.666	16.666	15.483	14.866
Cv	0.2731	0.3178	0.3367	0.3029
Median	16.9	16.4	14.7	14.05
Min	5.6	7.7	6.9	6.9
Max	24.5	27.6	28.2	24.2
Min State	Manipur	Manipur	Kerala	Kerala
Max State	West Bengal	Tripura	West Bengal	Mizoram

Percentage of father's who have attained school education till standard X(FE X)

Mean	41.675	42.295	42.725	43.433
Cv	0.2126	0.1850	0.1896	0.1557
Median	39.65	39.85	40.55	41.05
Min	29.1	28.2	26.6	31.7
Max	68	63.9	62.1	62.7
Min State	Meghalaya	Meghalaya	Arunachal Pradesh	Meghalaya
Max State	Kerala	Kerala	Kerala	Kerala

Percentage of father's who have achieved education qualification above Standard X(FE X_+)

Mean	17.191	17.379	18.729	19.395
Cv	0.3628	0.3377	0.3830	0.3808
Median	15.15	15.85	16.9	17.05
Min	9.1	9.3	9	8.0

Max	35.8	30.3	34.6	38.5
Min State	Jharkhand	Meghalaya	Arunachal Pradesh	Meghalaya
Max State	Manipur	Himachal Pradesh	Himachal Pradesh	Himachal Pradesh

Source: Calculated by the author on the basis of the data given in ASER Report in different years

Result of Panel Regression Model:

Before going for regression analysis it is required to check whether there exists any problem of multi-collinearity among the explanatory variables mentioned in Eq.(1) and Eq.(2).

It is observed that 'EC and 'PS' [11] & 'DW' and 'MDM'[12] are highly collinear.

So equation (1) can be expressed in the following ways to rule out the problem of multi-collinearity:

- $LOI_{1it} = f\{MEI_{it}, MEV_{it}, MEX_{it}, MEX_{+it}, FEI_{it}, FEV_{it}, FEX_{it}, FEX_{+it}, PH_{it}, EC_{it}, ,PTR_{it}, P_{it,}, TS_{i}, DW_{it}\}$…………………………….................Eq(1a)
- $LOI_{1it} = f\{MEI_{it}, MEV_{it}, MEX_{it}, MEX_{+it}, FEI_{it}, FEV_{it}, FEX_{it}, FEX_{+it}, PH_{it}, EC_{it,},PTR_{it}, P_{it,}, TS_{it}, MTM_{it}\}$……………………………..Eq(1b)
- $LOI_{1it} = f\{MEI_{it}, MEV_{it}, MEX_{it}, MEX_{+it}, FEI_{it}, FEV_{it}, FEX_{it}, FEX_{+it} ,PH_{it}, PS_{it}, PTR_{it}, \qquad P_{it,} \qquad TS_{it} ,MTM_{it}\}$……………………………………………..Eq(1c)
- $LOI_{1it} = f\{MEI_{it}, MEV_{it}, MEX_{it}, MEX_{+it}, FEI_{it}, FEV_{it}, FEX_{it}, FEX_{+it} ,PH_{it,}, PS_{it}, PTR_{it}, P_{it}, DW_{it}, Ts_{it}\}$…………………………………………….Eq(1d)

  Similarly Eq (2) representing the variables which might affect LOI_{2it} can also be expressed in this way.

Before moving towards panel regression, it is necessary to check whether Fixed effect or Random effect technique is necessary in the regression. The Hausman test suggests rejecting the null hypothesis. Hence fixed effect panel regression is appropriate[13].

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[11]Value of the correlation co-efficient is 0.69.

[12]Value of the correlation co-efficient is 0.7548.

Table 7-: Regression results (LOI$_1$)

Dependent Variable	LOI$_1$ (Excluding electric connection and drinking water)	LOI$_1$ (Excluding electric connection and Mid-day meal availability on day of visit)	LOI$_1$ (Excluding household sanitation and availability of drinking water in school)	LOI$_1$ (Excluding household sanitation and Mid-day meal availability on day of visit)
Name of the Independent variable:	Value of Coefficient	Value of Coefficient	Value of the Coefficient	Value of Coefficient
No schooling (Mother) (MEI)	-2.217449* (0.6147986)	-2.190251* (0.6162269)	-2.057299* (0.5991574)	-2.041881* (0.5987349)
Standard I-V (Mother) (MEV)	-1.272604** (.6263927)	-1.251943* (0.6328464)	-1.165876* (0.613621)	-1.176305* (0.618469)
Standard V-X(mother)(MEX)	-2.245936* (0.6892552)	-2.175471* (0.673576)	-2.000497* (0.7348698)	-1.94784* (0.7202709)
Above Standard (Mother) (MEX$_+$)	0.1514887** (0.0874134)	0.11566391* (0.089552)	0.1562912* (0.0869988)	0.1554143* (0.0888805)
No Schooling (Father) (FEI)	7.799128 (10.99383)	7.694323 (10.9978)	9.326585 (11.08655)	9.471761 (11.22587)
Standard I-V (Father) (FEV)	6.168898 (11.15464)	6.096178 (11.1468)	7.761001 (11.25848)	7.927864 (11.38614)
Standard V-X(father) (FEX)	8.44787 (10.99077)	8.32146 (11.00353)	9.878858 (11.06527)	9.99473 (11.1996)
Above Standard X (Father) (FEX$_+$)	6.363298 (11.06542)	6.232522 (11.07864)	7.913081 (11.16351)	8.056242 (11.30761)
Pucca Household(PH)	-0.3854666* (0.1353877)	-0.3710789 (0.1321503)	-0.3571798* (0.1378951)	-0.3470202* (0.1352846)
Household Sanitation(PS)/ Electric	-0.0164532 (0.1002912)	-0.0202467 (0.098163)	-0.0131698 (0.1235555)	-0.0957797 (0.1288569)

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[13]It is also appropriate because the states are not taken randomly. Actually we have considered all the states of India.

Connection(EC)				
Pupil-teacher ratio (PTR)	0.0484265 (0.0891258)	0.0448304 (0.084831)	0.0540296 (0.0887622)	0.0445774 (0.084522)
Playground Facility(P)	0.02388779* (0.0962931)	0.02377814* (0.0958585)	0.0226244* (0.0930407)	0.02348659* (0.0900434)
Toilet available and useable (TS)	-0.104484 (0.0764595)	-0.039372 (0.1471428)	-0.0787138 (0.0791915)	0.0004404 (0.1547687)
Mid-day meal served in school on day of visit (MDM)/availability of drinking water in school(DW)	0.0166075 (0.0954837)	-0.1005626 (0.0782615)	0.0326762 (0.095844)	-0.0834525 (0.0781487)
R^2 (within)	0.4805	0.4808	0.4802	0.4810

*=> significant at 1% level, **=> significant at 5% level and ***=> significant at 10% level

Discussion: On the basis of the results shown in Table-7 we can mention the following observations:

1. High percentage of illiteracy among mothers creates a negative impact on learning achievement of the children at standard III level. Learning achievement of the children at standard III level will be much better if mother have at least cross standard X level. Mother's with education qualification till standard X fails to create any impact on std III level children

2. Schools with playground enabled the children to be physically and mentally active that results in the intellectual and social wellbeing of the children. Improvement in the physical and mental health of children as a result of play facilities in the school premises has positive impact on the quality of education achievement at standard III level.

3. Availability of pucca household which is an indicator of rural economic condition fails to create any impact on standard III level children.It has been found that better drinking water facility, sanitation facility at school, and even availability of mid-day meal and better pupil-teacher ratio cannot create any positive outcome on the learning achievement of the children at standard III level.

Table-8-: Regression results(LOI$_2$)

Dependent Variable	LOI$_2$ (Excluding electric connection and drinking water)	LOI$_2$ (Excluding electric connection and Mid-day meal availability on day of visit)	LOI$_2$ (Excluding household sanitation and availability of drinking water in school)	LOI$_2$ (Excluding household sanitation and Mid-day meal availability on day of visit)
Name of the Independent variable:	Value of Coefficient	Value of Coefficient	Value of the Coefficient	Value of Coefficient
No schooling (Mother) MEI	-1.902861* (0.888957)	-1.909612* (0.9165121)	-2.101004* (0.8775242)	-2.010852* (0.896374)
Standard I-V (Mother) (MEV)	1.062289 (0.9056588)	0.6281015 (0.9412301)	0.9066571 (0.8987076)	0.5259236 (0.9259183)
Standard V-X(mother)(MEX)	-3.153653* (0.9965475)	-2.762899* (1.001807)	-3.123501* (1.076288)	-2.625144* (1.078327)
Above Standard X (Mother) (MEX$_+$)	0.0130776 (0.1263852)	-0.0528098 (0.1331936)	0.0248741 (0.1274181)	-0.0442485 (0.1330642)
No Schooling (Father) (FEI)	-26.69636** (15.89524)	-20.13659 (16.35699)	-24.77906 (16.23733)	-17.34738 (16.8064)
Standard I-V (Father) (FEV)	-30.93406 (16.12774)	-24.29682 (16.57859)	-29.02496** (16.48915)	-21.49329 (17.04634)
Standard V-X(father) (FEX)	-25.20741 (15.89081)	-19.13476 (16.36551)	-23.46944 (16.20616)	-16.56101 (16.76707)
Above Standard X (Father) (FEX$_+$)	-21.25525 (15.99874)	-20.68589 (16.47722)	-25.80187 (16.35005)	-18.28209 (16.92877)
Pucca Household(PH)	-0.471094* (0.195748)	-0.3925863** (0.1965466)	-0.4152367* (0.2019608)	-0.3325004*** (0.205363)
Household Sanitation(PS)/ Electric Connection(EC)	0.1427649 (0.1450042)	0.1163107 (0.1484564)	-0.0657032 (0.180959)	-0.1153127 (0.1929133)
Pupil-teacher ratio (PTR)	0.092365 (0.1288609)	-0.0362582 (0.1262612)	0.0909022 (0.1300009)	-0.0363567 (0.126539)
Playground Facility(P)	0.3264113* (0.1392237)	0.5539213* (0.1825701)	0.3707046* (0.1362672)	0.5018124* (0.1848052)
Toilet available and useable (TS)	0.03225243* (0.1105477)	0.3956822* (0.116398)	0.2613341* (0.1159837)	0.3824887* (0.1303251)

Mid-day meal served in school on day of visit (MDM)/availability of drinking water in school(DW)	0.3989553* (0.1380535)	0.4768589* (0.218845)	0.3924303* (0.1403734)	0.3313121* (0.1169974)
R^2 (within)	0.5933	0.5699	0.5874	0.5680

*=> significant at 1% level, **=> significant at 5% level and ***=> significant at 10% level

Discussion: On the basis of the results shown in Table-8 we can mention the following observations:

1. High percentage of illiteracy among mothers and fathers creates a negative impact on learning achievement of the children at standard V level. Mother's with education qualification till standard X fails to create any positive impact on standard V level children

2. Schools with playground facilities have positive impact on the quality of education achievement at standard V level.

3. Availability of proper drinking water, sanitation facility and Mid-day Mealin school leads in overall wellbeing of the children which results to better academic achievement for standard V children. .

4. Availability of pucca household which is an indicator of rural economic condition fails to create any impact on standard V level children. It hasalso been found that better pupil-teacher ratio at school and household electric connection and sanitation i.e. assets of household economic condition cannot create any positive outcome on the learning achievement of the children even at elementary level.
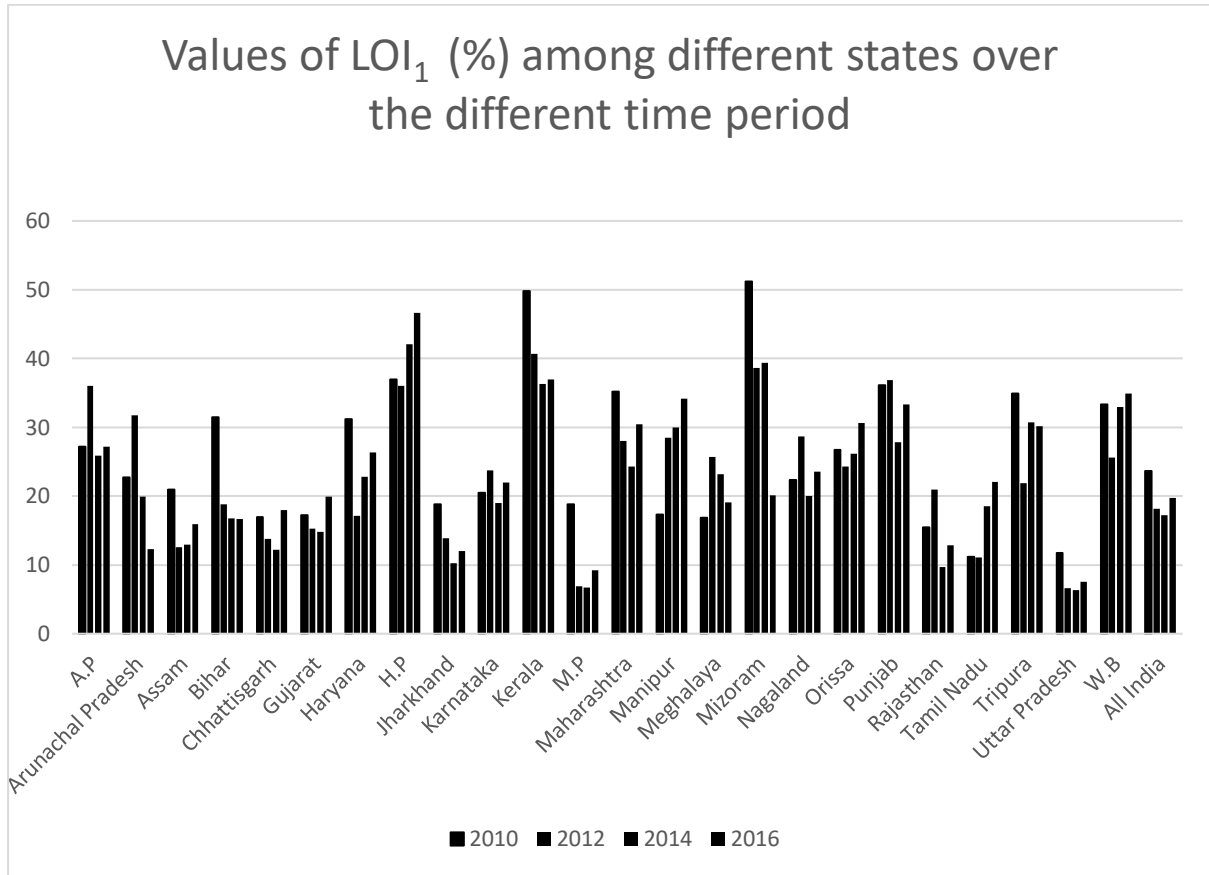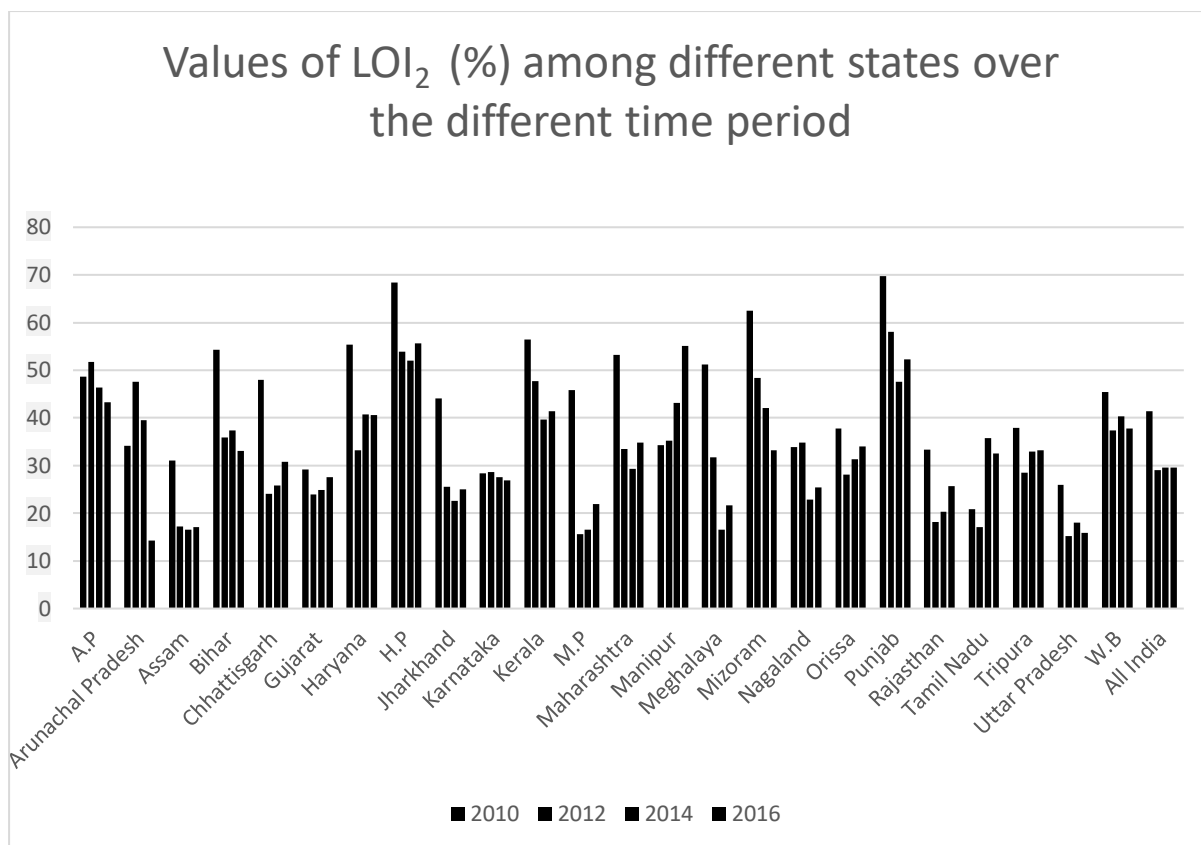
Concluding statements and Policy implications:

Here from the ASER data,it is found that parental education has a positive impact on child's education. Hence to improve the learning outcome of the children at elementary level, expansion of education among the parents is important. Availability of playground facility in the school, availability of mid-day meal, drinking water and proper sanitation at school creates a positive impact on standard V level children to improve their quality of education.

According to last NSSO Employment-Unemployment Report 2011-12, more than 80% worker of India are informal in nature. Their wage /salary income is not very high and a major part of their income is spent for consumption purpose. Very few amount of money is

left to bear the direct cost of education for their children. Poor family inherits less, has to work as unskilled and left fewer bequestsfor their next generation thus they are trapped in the vicious circle (GalorZeira. 1993).Government of India has taken many initiatives to reduce the direct cost of education through different types of subsidised programme both at elementary level and secondary level. India follows strategy of decentralisation of educational management through central state and panchayat raj. Central government has taken many policies like National Programme for education of girls at Elementary level (NPEGEL) for encouraging female literacy and reducing the Gender Parity Index. Similarly various program are also undertaken by the State government like Kanyashree, Sikhashree, programme implemented in West Bengal to increase female literacy .Other programme like BalikaSamraddhiYojana, Ladli Scheme, BetiHaiAnmolYojanaetc are implemented in different states of India to promote girl's education.If a girl receives education then in her next generation, in her motherhood shetends to send her child in school to become educated because educated parents knows the importance of education so they aremore involved to their child's education.Actually, every child's first education begins at home then after attaining a certain age they take admission to school and their school based education starts.It is found that some of the intergenerational effects of education may be transmitted through parents. More educated parents provide an environment which improves their children's opportunities and decision process. A mother knows best, and the amount of education she attains can predict her children's success in reading and mathematical skill. So government apart from giving importance on child education should also give more stress on adult education mainly education among mothers. That can be done through Local panchayat or NGO's. Government need to take strong steps in this matter so that girls get proper education and thus their next generation receive proper schooling and can work as skilled worker in their adult age through improving their learning ability. According to RTE guidelines, a school must have playground, proper drinking water, sanitation, Mid-day meal facility but unfortunately some places are still lacking this amenities. This facilities in school can make a child more attractive to school andthus can devote more quality time in school education. It is required to find out whether the benefit of this policy reaches to every corner of the society. The demographic dividend of India's population can be achieved if and only if the learning outcomes of the children improve so that in their adulthood they can work as skilled worker.

Appendix

Values of LOI$_1$ (%) among different states over the different time period

Values of LOI$_2$ (%) among different states over the different time period

■ 2010 ■ 2012 ■ 2014 ■ 2016

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