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Gender parity index in primary school in rural India: An analysis

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Abstract. Patriarchal forces have imposed many subjective norms on girls in achieving education mainly in rural India. Initially on the basis of 2011 Census report of India, the rural population dominated districts of 16 major states of India are identified. Next we have tried to identify the possible factors which can influence Gender Parity Index (GPI) during the time of enrolment in primary education in rural India. Due to disparity in socio-cultural factors across india, which can possibly influence girl's enrolment in primary school, we have divided India into four zones. This paper on the basis of DISE statistics have found that school development grant influences GPI in Eastern, Western and Southern zones and teaching learning material grant influence GPI value in Eastern and Western zone and also encourages overall enrolment of children in Northern zone in rural schools. It is also found that increased female teacher positively influences GPI value in primary school enrolment in Eastern and Southern zone of India. Reduced pupil-teacher ratio has positive impact on girls enrolment in primary school mainly in Eastern, Western and Southern zone of India. Availibility of mid day meal in school has positively influenced GPI value in primary school enrolment in Eastern, Western and Southern zone of India and also have positive impact in increasing overall enrolment in rural primary schools in Northern zone of India. Female literacy and overall literacy have positive influence GPI in Eastern zone of India. Provision for specialised toilet for girl child has also motivated parents to enrol their girl child to primary school mainly in Eastern, Western and Southern zone of India.

Keywords. Patriarchal society, Gender discrimination, Gender parity index, DISE statistics, Panel data regression model, Gross enrolment ratio.
JEL. C33, I24, I38, J12, J16, R12.

1. Introduction

India have increased her spending[1]on primary education to achieve universal primary educationfor its children and eliminate gender disparity in achieving education from elementary level. Education is the base of human capital formation and an important factor to ensure gender equality and empowerment. It provides positive changes in human life by enhancing the knowledge, skill, intelligence of a person and enables to lead a successful life. Gender inequality may be defined as discrimination against women based on their sex. India's economy is

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characterised by gender based discrimination. The major cause of gender inequality in Indian society lies in the system of patriarchy. Rural girls are mainly confined within the four walls of their house. Societal norms put heavy burden on girls resulting to their dependence on their male counterpart. In rural areas, people have the notion that girls are meant for household chores and get married and send to others house. On the other hand, boys are considered as the legal heirs of the family. Due to this notion, boys sometimes get preferential feeding in achieving education compared to girls.

Various complimentary programme has been initiated that specifically target girls to eliminate gender imbalance in enrolment in school. Since independence, one of the main objective of social welfare policies in India is to provide basic education to all strata of the society. The Sarva-Shiksha-Abhiyan (SSA) is a flagship program launched to provide universal primary education. With the launch of Right to free and compulsory education Act (RTE)[2] in 2010, the SSA has gained the legal force for its implementation, by making primary education as a fundamental child right for Indian citizen. The Mid day meal scheme works as a catalyst for driving rural poor children to school, but still India cannot achieve the Education for All goals. Indian society still faces the problem of child labour and adolescent marriage.

According to the United Nations Annual Report (2016), providing education to women is the most effective way to improve the status and condition of women and also economic prosperityof the family. Progress towards gender parity in primary school enrolment is one of the Millennium Development Goals as well as one of the Education for All (EFA) goals. An educated person is an asset for any country. Education helps to reshape the future of the nation and to achieve the Millennium Development Goals (MDGs).Still in the twentieth century, millions of girls are deprived of their rights to basic education. Here we mention different public policies adopted by different State Governments to encourage girl's education and reduce school dropout and gender based discrimination: These are as follows:

(a) Balika Samraddhi Yojana: It is launched by Gujrat government to encourage girl's education by providing monthly scholarship to girl child up to 18 years of her age.

(b) Delhi Ladlischeme: It is launched by Delhi government to give financial assistance in various stages of education to girls to promote girls education and reduce school dropout. This policy also control female foeticide as it provide financial support in giving birth to girls with the aim to end discrimination against girls. To get the benefit of these scheme, the family need to stay above 3 years in Delhi with income ceiling of 1lakh.

(c) Beti Hai Anmol Yojana: It is launched by Haryana government to encourage girl's education by providing financial assistance through

scholarship range of Rs 300 to Rs 1200. It is provided to girls from class I to class XII.

(d) Kanyashreeprakalpa: It is launched by West Bengal government, to encourage girls education and to reduce child marriage. It's basic objective is to improve the status and well-being among girls by providing annual financial assistance and one time grant payment after reaching 18years.

(e) Sabooj Sathi scheme: This scheme is coined by West Bengal Chief minister to empower girls and reduce school dropout rate among girls. This scheme is also called "Bicycle Distribution Scheme" which can reduce the transportation cost of girls to attain school.

Some public policies are also taken mainly focussing the girls living below poverty level. These are:

(1) Bangaru Thali: This scheme was launched in 1st may 2013 by government of Andhra Pradesh to eliminate discrimination between gender and support female child in terms of socially and economically. The benefit of the scheme was provided to below poverty line girls to support education till graduation.

(2) Bhagya Laxmi Scheme: This scheme is launched to give assistance to girl child living below the poverty line in Karnataka. It's main objective is to encourage their education and reduce dropout. It also provide them special health insurance maximum of 25,000 per year.

(3) Kanya Jagriti Jyoti Scheme: This scheme was launched to encourage education to girl child in Punjab living below poverty line.

Various government policies have been implemented to increase overall school access but fails to eliminate gender imbalance from the society in achieving formal education. The basic objective of all the above mentioned schemes is to spread girl's education mainly in the rural areas. Still, according to Census report 2011, in rural areas the literacy rate among women is 58.75% where that of male is 78.57%. If we look at overall literacy rate, it is observed on the basis of Census data, 2011 that 65.46% of women are literate where as that rate of male is 74.04%.

Education among women boosts her earning capacity and improves her bargaining power in family and the society. Education has the ability to narrow the long standing gender gap in the field of education achievement. Illiteracy and child marriage are correlated. Among total cases of child marriage, nearly 40% of child marriage take place in India (UNICEF, 2009), although only 514 cases of such marriage were registered in India during 2004-08 (National Crime Record Bureau, 2008). Incidence of child marriage varies inversely with the level of development (Sagade, 2005). Poverty, lack of awareness, illiteracy of parents, unemployment, social custom, etc. are the main cause of child marriage. Lawrence Summers (1992) emphasized that investing in female education provide the highest return in developing countries once all its benefits are being concerned. A World Bank study (1999) of 100 countries found that, when women gain four year of education on average, fertility per women is dropped by about one birth.

More educated women lead to greater productive labour force, later marriage, lower fertility, improved child health and nutrition. Hence, if gender based discrimination can be reduced in education then the status, condition and dignity of girls can be improved. So enrolment of girls in primary education is necessary for development.

1.1. India's position in terms of gender equality

India's value in GDI was 0.819 in 2015 which implysmedium human development. On the basis of GDI, countries are divided into five groups by absolute deviation from gender parity in HDI values. Here India falls in group 5 comprises with low equality in HDI achievements between men and women (absolute deviation gender parity of more than 10%). Thus India's society is characterised by gender based discrimination. Besides that in terms of Gender Inequality Index, India ranks 125 out of 159 with value 0.530 in 2015. World's Economic forum's (WEF) Global Gender Index measurement captures gender equity among countries based on four major areas such as education, politics, economy and health. India's rank is 108 in 2017 among 144 countries. India's rank has fallen by 21 placed compared to last year rank of 87. This imply gender inequality among the Indian society is predominant and also increased compared to previous years.

1.2. Importance of gender parity index during the time of enrolment in primary eductaion

Gender Parity Index is a socio-economic index designed to measure the relative access to education of boys and girls. It emphasises on egalitarian treatment based on gender, here in terms of enrolment in elementary education.

GPI = Girl's enrolment in primary grades in year (t)/Boys enrolment in primary grades in year (t)

- GPI<1 implies disparity in favour of Boys i.e. proportionately less girls are enrolled in primary education compared to boys which means girls have comparatively less learning opportunity than boys.
- GPI>1 implies disparity in favour of girls i.e. proportionately more girls are enrolled in primary education compared to boys
- GPI=1 implies there exist gender parity between boys and girls

UNESCO has defined GPI value between 0.97 and 1.03 as achievement of gender parity.

Gender difference is the most basic gender rated disparity measures in primary education. Gender difference refers to difference in net male child school attendance and net female child attendance at primary school. However this measure does not takes into consideration of overall level of school attendance. In such cases countries with higher attendance rates are much closer to gender parity then country with lower attendance rates. So GPI provides a better picture of gender equality of the society compared to gender difference measures.

2. Survey of literature

It is found that the direct costs of education adversely affect the probability of children going to school more to girls relative to the boys (Chandrasekhar & Mukherjee, 2006). Hiring female teacher is one of the key policy that can bridge gender gaps mainly in developing countries (UNESCO, 2010; Herz & Sperling, 2004). It is noted that transfer of grant to school in five developing countries have positively influenced the access to education more to the poor people (UNESCO, 2001). Murlidharan *et.al*, (2013) have found that inputs based measures on school quality have shown a significant improvement over the years .For instance, pupil-teacher ratios have fallen by nearly 20 percent (from 47.4 to 39.8) the fraction of school with electricity and toilets have doubled (from 40 percent to 84 percent for toilets and 20 percent to 45 percent for electricity), fraction of school with functioning midday meal programme has nearly quadrupled (from 21 percent to 79 percent) and the overall index of school infrastructure has improved by 0.9 standard deviations(relative to the school infrastructure index in 2003). There is ample evidence on gender bias or male preference in case of parental investment on their children'seducation (Kingdon 2005; Pal, 2004; Drez & Kingdon, 2001; Glick & Sahn, 2000; Kingdon, 1998; Tansel, 1997). Pal (2004) in his paper found that mother's literacy play a significant role in enrolling their girl child to formal education. Government of India have increased their spending for improvement of school infrastructure mainly of the public primary schools. But the question is whether this school related factors play any significant role to encourage the rural parents to enrol their girl child in primary education. This will be investigated here.

3. Research objective

The basic objective of this paper is to investigate the possible factors mainly school related which are playing positive role to place the value of GPI at targeted level in major parts of rural India.

4. Methodology and data sources

India is predominantly a rural based economy and most of the people lives in rural areas. In rural India, we observe predominance of lower-income families. Lower income parents face a finanacial hardship in addition to the opportunity cost of girls not fulfilling other time intensive household care responsibilities (Rao *et. al*, 2003). So when we give focus on enrolment in primary education particularly among girl child, we have to concentrate our study in rural areas. From the census 2011 we have identified district with higher rural population (more than 50%). In our study we have identified 352 such rural based district based on the basis of Census data, 2011. India is a socio-economic diverse country. Social and cultural factors are different in different regions of India. Ministry of culture of GOI have divided India into overlapping cultural zones to

promote and preserve cultural heritage of various regions of India. Similarly we have also divided the rural predominant district into zones to strenghthen the ancient roots of Indian composite national culture. This local socio cultural practicealso plays an important role during the time of taking decision on girl's education. If we look at the GPI scores of Kerala and Haryana we will found that GPI scores of Kerala is much higher compared to Haryana. One of the main notion of this is cultural difference between the two states. To tackle this, we have divided India into four zones such as North, East, West and South. Culture plays an essential role in how children make sense of the world. Cultural heritage, cultural tradition, cultural practice are time invariant but can influence parental decision on their child schooling (Cole, Hakkarainen, & Bredikyte, 2010). So on the basis of geographical position, under each selected zone, we have identified the states. We assume that cultural and other factors are almost identical zone wise[3]. We have considered the 16 major sates in our study based on data available in DISE Statistics. Table-1 gives the states of India which are considered in any particular zone. Besides that, the total number of rural population dominated districts in each state under particular zone is also mentioned.

Table1. *Zone wise division of the county*

Zone-1(**East**) 109 District		Zone-2(**West**)114 District		Zone-3(**North**)75District		Zone -4(**South**)54District	
States	Number of Rural dominated districts	States	Number of Rural dominated districts	States	Number of Rural dominated districts	States	Number of Rural dominated districts
Bihar	35	Gujrat	17	Haryana	12	A.P	12
Chhattisgarh	15	M.P	27	U.P	51	Kerala	6
West Bengal	14	Maharashtra	41	Punjab	12	T.N	13
Jharkhand	18	Rajasthan	29			Karnataka	23
Orissa	27						

Source: Calculated by the author on the basis of the Census data 2011. So total number of rural district considered in our study= Districts of zone1+Districts of zone 2+Districts of zone 3+Districts of zone4 =109+114+75+54=352 Districts[4]

The entire investigation is based on DISE statistics. This statistics considers both public primary schools and private (both aided and unaided) schools including Madrasasa. Most of the schools are also co-educational schools.

For Panel Regression Analysis, data have been taken with a two year gap. We have considered data of 5 time pointsand those are 2007-08, 2009-10, 2011-12, 2013-14 and 2015-16 respectively. Two year gap is taken to get a proper impact of the available data mainly related to infrastructural development of primary school which is dependent mainly on the government aid. These aids need some time to reach to the rural school as various document, government permission etc. are required to pass these grant. Similarly for the socio economic factors to get a proper trend we have taken a gap of two years. All the data taken from DISE Statistics are presented in percentage forms.

4.1. The model

In rural India, majority of the girls are either engaged in agricultural activity or household chores, specially being in charge of sibling care. Even due to fear of discrimination in the school, girls of the parents are sometimes loosing interest to send their girl's child into school. Apart from that in rural India, poverty, disinterest in schooling, lack of safety in schools are the leading reasons, why girls mainly from the marginalised class are out of school. Here, we have to consider possible school related factors and socio economic factors which might influence the Gender Parity Index in elementary education in rural district of India.

Among the school related factors we have chosen six factors and those are percentage of female teachers (ft), percentage of schools having girl's toilet (gt), percentage of schools received school development grant(sdg) in the previous year, percentage of schools received teaching learning material grant (tlm) in the previous year, Pupil-teacher Ratio (ptr) and percentage of schools having Mid-day meal (mdm). Recent World Bank Report (January 2018) on Afghanistan, it is observed that girl student's enrolment is increasing with the enhancement of new facilities in school like construction of new building, toilet facilities, which provides a safer and better learning environment. We actually borrow that concept and want to investigate whether enhancement ofinfrastructure in primary school mainly through government funding play any positive role to enhance GPI in primary education in rural India.

The model considered for this investigation is presented as:

$$GPI_{itz} = f\{ft_{itz}, gt_{it}, sdg_{i(t-1)z}, tlm_{i(t-1)z}, mdm_{itz}, ptr_{itz}, fl_{itz}, ol_{itz}, a_{iz}\} \quad (1)$$

Where i = (1 to 16) , (t = 1 to 5) and z = 1...4
t= 2007-08, 2009-10, 2011-12, 2013-14 and 2015-16.
Cross section unit= 16

Here GPI_{itz} represents the ratio of girls' enrolment to boy's enrolment in primary education or Gender Parity Index (GPI) of i^{th} district in the t^{th} year in the z^{th} zone. Here $a_{iz}$is the time invariant factor of the z^{th} zone. This unobserved heterogenous factor of z^{th} zone accommodates the social and cultural factors of that zone which can influence GPI in that zone[5]. This factor is time invariant in a particular zone but is different in different zones of India .

The theoretical justification behind choosing those explanatory variables in our investigation are given below:

(a) **Female teacher** (ft_{itz}): This is calculated by the total percentage of female teachers in primary school over total percentage of teacher (male & female) in primary school of the i^{th}district in the t^{th} year in the z^{th} zone. Female teachers are more effective in teaching girls than male teacher but no worse at teaching boys. It is found that hiring female teachers on current margin may reduce gender gaps and thus increase the participation of girls

in formal education (Murlidharan & Sheth, 2013). But no proper investigation has done to justify this statement. Here we include full time, part time as well as contractual female teachers simultaneously. It is expected that gender of the teacher may play an important role in facilitating student's sense of relatedness to teacher in primary school. In rural areas, various conservative families prefer a female teacher for their daughter. Even the presence of male teacher does not necessarily provide a barriers to girl child's enrolment but parents often prefer female teacher over male teacher. Girls also finds comfortable to discuss their problem with female teacher compared to male teacher. Female teacher act as an advocate to girls, symbolise female empowerment, facilitate needs and perspective of girls, and promote girls friendly learning. Thus gender of the teacher may have a effect on the GPI.

(b) **Girl's toilet** (gt_{itz}): This indicates percentage of primary schools having the provision of girl's toilet in i^{th}district in the t^{th}year in the z^{th} zone. It is an important parameter in determining education achievement by girls in rural areas as girls are more affected than boys due to lack of proper sanitation facilities. Absence of toilet in school implies lack of privacy and dignity for girl child[6]. Parents sometimes also does not want to send their girl in school which does not have separate toilet for girls. It is expected that provision of girls' toilet may increase girls' enrolment in school which is an important determinant of GPI.

(c) **School development grant** ($sdg_{i(t-1)z}$): School development grant is expressed as percentage of school in the i^{th}district who got this grant in the $(t-1)^{th}$ year in the z^{th} zone. Repair/replacement or purchase of equipment like geometry box,black boards, dusters, chalks, newspaper, library books, maps etc., cleanliness of school premise and purchase of dustbins, also procurement of book self are mainly the heads of expenditure for utilization of this grant. This actually enhances the infrastructure of the school including enhancement of drinking water facilities[7]. School development grant provide teaching material, stationaries to students which can reduce the direct cost of education of the rural parents. Thus this grant may attract rural parents to send their girl in school because that will minimize the direct cost of education for their girl child. Here previous year is considered on the basis of the logic that complete information about this grant to the parents may help them to take decision whether they would enrol their girl child in to school or not in the present time period.

(d**) Teaching learning material grant** ($tlm_{i(t-1)z}$): Teaching Learning Material grant is expressed as percentage of school who got this grant in the i^{th}district in the $(t-1)^{th}$ year in the z^{th} zone. As per the guidelines, of the Ministry of Education, all teacher who are regular employee are entitled for this grant. After the implementation of SarvaShikshaAbhiyan, the TLM Grant of Rs 500/- per year is being given to all the teachers working at Elementary Level as a support for qualitative improvement in Education. Teacher with appropriate resources can teach better by making education

more interesting to students. This will also motivate the parents to send their child to school.

(e) **Mid-day meal** (mdm_{itz}): This variable indicates the percentage of schools who have the provision of free meals in primary school of the i^{th}district in the t^{th} year in the z^{th} zone. This program target to provide mid-day meal to every child attaining primary education in public school with minimum content of 300 calories and 8- 12 gram of protein each day of school for minimum of 200 days (Kindon, 2007). Thus, this scheme is important for improving the nutritional status, and also simultaneously improving enrolment, attendance and retention of primary school children Healthy children are more active in class which leads to improved learning outcome among the children. This program also enhance social and gender equity as children from all communities and caste eat their food together which reflects better social integration among children. Poor rural people are so poor that they are unable to provide two times meal to their children and so the mid-day meal will work as catalyst to dive specially girl children to school.

(f) **Pupil-teacher Ratio** (ptr_{itz}): Pupil teacher ratio is the average number of pupil (student) who attend school by the number of teachers in the institution in the i^{th}district in the t^{th} time period of the z^{th} zone[8]. It indicates the intensity of attention a student may receive in school hour keeping in mind that not all classroom are same. It is expected that teacher with fewer student in a class will be able to give more attention to individual student. This may provide security to girl child in school apart from possible improvement of their learning ability.

Besides that, there are some socio-economic factors which may influence the parents during the time of taking decision on enrolment of their girl child in primary education. Due to lack of availability of data, we have consideredonly female literacy and(or) overall literacy as parameters which might affect gender parity index.

Female Literacy (fl_{itz}): This variables is expressed as percentage of literate females in theithdistrict in the t^{th} year of the z^{th} zone. As per census 2011, female population in India constitute of 48.5 % (48.1% in urban& 48.6% in rural) of total population. Overall literacy rate is 74.04% but female literacy rate is only 65.46% compared to male literacy rate of 84.12%. More educated mother will understand the importance of education and will have less or no gender based priority among its children. So female literacy (which is used as a proxy of mother's literacy) is expected to be an important factor for gender parity index.

Overall Literacy (ol_{itz}): Thisvariables is expressed as percentage of literate person in the i^{th} district in the t^{th} year of the z^{th} zone. Overall literacy means combined literacy rates of males and females. Actually this is used as a proxy of literacy of the parents.

The summary statistics of all the explanatory variables are given zone wise in the Appendix. Before going to the result of the regression, we have to check for the possibility of serial correlation between all the independent

variable. Female literacy is a subset of overall literacy and also through VIF estimates we found high correlation between this two variables.

School development grant and teaching learning material grant are two different grant used for two different purposes. One is used for school development purpose and the other one is used to improve the qualitative development of the teacher. School development grant and teaching learning material is not correlated in any of the zone.

School development grant is used for school development purpose and maintainence grant is used for maintainance purposes. Parts of maintainance grant is sometimes used for the maintainance of girls toilet but school development grant is not used for provision of girls toilet in primary school.

School development grant and provision of girls toilet facility in school is not correlated as found in our study[9]

The static panel regression model of equation (1) can be expressed in the following way to rule out the problem of multicollinearity:

$$GPI_{1itz} = f\{ft_{itz}, gt_{itz}, sdg_{i(t-1)z}, tlm_{i(t-1)z}, mdm_{itz}, ptr_{itz}, fl_{itz}, a_{iz}) \quad (1a)$$

$$GPI_{1itz} = f\{ft_{itz}, gt_{itz}, sdg_{i(t-1)z}, tlm_{i(t-1)z}, mdm_{itz}, ptr_{itz}, ol_{itz}, a_{iz}) \quad (1b)$$

Where i = (1 to 16), (t = 1 to 5) and z = 1....4.Cross section unit= 16

To do the investigation, we have to depend on panel data regression model. This model is a Balanced Panel Regression Model. Here Hausman test has accepted the fixed effect regression result for the entire four zones.

Now Fixed effect regression mentioned in Eq.(1a) and Eq. (1b) are done separately for each zone. Intially we consider the Eastern zone of India.

Table 2. *Results of Panel Data Regression for Eastern Zone*

East (The covered states are Bihar, Chhattisgarh, West Bengal, Jharkhand and Orissa)		
Dependent variable **GPI**		
Name of the Variable	Values of the Co-efficient and Standard Errors	
	Equation 1	Equation 2
Girls toilet(gt)	0.0001531(0.0000737)**	0.0001546(0.0000715)**
Mid-day meal(mdm)	0.0001229 (0.000079)*	0.0000354(0.0000804)
Female literacy(fl)	0.0010206 (0.000278)***	
School Development Grant(sdg)	0.0004746(0.0001467)***	0.0004668(0.0001426)***
Teaching LearningMaterial Grant(tlm)	0.0004069(0.0001207)***	0.0003773(0.0001174)***
People teacher Ratio(ptr)	-0.0019243(0.0002636)***	-0.001881(0.0002565)***
Female teacher(ft)	0.0014176(0.0004332)***	0.0014683(0.0004195)***
Overall literacy(ol)		0.0022044(0.0003542)***
Constant	0.7052248(0.0241234)***	0.6340596(0.0273738)***
F Value	39.35***	45.10***
R^2 (Overall)	0.0346	0.0536
Hausman Test value	$\chi^2(7)$=108.98***	$\chi^2(7)$=52.40***

Notes: ***=>significant at 1%, **=>significant at 5%, *=> significant at 10% level

4.1.1. Discussion

All the school related variables like percentage of female teachers in school, availability of girls' toilet, percentage of schools received school

development grant and teaching learning material grant in the previous yearand availability of mid-day meal have positively influenced GPI in primary education in the states of the Eastern zone of India. Besides that, pupil teacher ratio has negatively influenced GPIin Eastern zone of India. This implies that the gender gap during the time of enrolment in primary education in the Eastern zone can be reduced further if we improve the school infrastructure facility, more recruitment of teachers mainly female teachers and overall literacy of the parents.

Table 3. *Results of Panel Data Regression for Western Zone*

West (the covered states are Gujarat, Madhya Prodesh, Maharashtra and Rajasthan)		
Dependent variable **GPI**		
Name of the Variable	Values of the Co-efficient and Standard Errors	
	Equation 1	Equation 2
Girls toilet(gt)	0.0002479(0.0000609)***	0.0002862(0.0000605)***
Mid-day meal(mdm)	0.0001971(0.0000497)***	0.0001672(0.0000492)***
Female literacy(fl)	0.0000326(0.000305)	
School Development Grant (sdg)	0.0003185(0.0001378)***	0.0003224(0.0001372)***
Teaching Learning Material Grant (tlm)	0.0001724(0.0000873)**	0.0001817(0.0000871)**
People teacher Ratio (ptr)	-0.0023288(0.0002279)***	-0.002333(0.0002265)***
Female teacher (ft)	0.000078(0.000484)	0.0001551(0.0004846)
Overall literacy (ol)		0.0005452(0.0003992)
Constant	0.8326883(0.0240388)***	0.8053771(0.02947)***
F Value	32.65***	33.05***
R^2 (Overall)	0.1221	0.1332
Hausman Test value	$\chi^2(7)$=49.18***	$\chi^2(7)$=48.13***

Notes: ***=>significant at 1%, **=>significant at 5%, *=> significant at 10% level

4.1.2. Discussion

It is observed from the above table that better provision of girl's toilet, larger percentage of schools covered school development grant andteaching learning material grant in the previous year, and availability of mid-day meal in rural public school have positively influenced GPI in the rural primary schools of Western India. It is also observed that pupil teacher ratio has negatively influenced GPI during the time of enrolment in primary education in the rural areas of theWestern zone of India.

Table 4. *Results of Panel Data Regression for Southern Zone*

South (The covered states are Andhra Pradesh, Kerala, Tamil Nadu and Karnataka)		
Dependent variable **GPI**		
Name of the Variable	Values of the Co-efficient and Standard Errors	
	Equation 1	Equation 2
Girls toilet(gt)	0.0001094(0.0000764)*	-0.0000791(0.0000823)
Mid-day meal(mdm)	0.0001209(0.0000404)***	0.0001216(0.0000405)**
Female literacy(fl)	.0001235(0.0003275)	
School Development Grant (sdg)	.00022(0.0001086)**	0.0002245(0.0001086)**
Teaching Learning Material Grant(tlm)	.0000403(0.0000353)	0.0000415(0.0000354)
People teacher Ratio(ptr)	-.0012497(0.0005241)***	-0.001253(0.0005248)***
Female teacher(ft)	.0009883(0.0005409)**	0.00091(0.0005402)*
Overall literacy(ol)		-0.0001158(0.0004832)
Constant	1.018459(0.0389356)***	1.027458(0.0444659)***

F Value	6.21***	6.19***
R^2 (Overall)	0.0023	0.0065
Hausman Test value	$\chi^2(7)=15.78$***	$\chi^2(7)=21.40$***

Notes: ***=>significant at 1%, **=>significant at 5%, *=> significant at 10% level

4.1.3.Discussions

It is observed that better provision of girl's toilet in school, higher percentage of the presence of female teachers, higher percentage of schools received school development grant in the previous year, and availability of mid-day meal in school have positively influenced GPI in elentary education in rural primary schools of Southern India. It is also observed that pupil teacher ratio has negatively influenced GPI in Southern zone of India. Next we shall consider the rural primary schools in Northern zone.

Table 5. *Results of Panel Data Regression for Northern Zone with GPI as dependent Variable*

North Zone (Haryana, U.P, Punjab)		
Dependent variable **GPI**		
Name of the Variable	Values of the Co-efficient and Standard Errors	
	Equation 1	Equation 2
Girls toilet(gt)	0.000183(0.0001302)	0.0002076(0.0001301)
Mid-day meal(mdm)	0.0001646(0.000605)	0.0001681(0.000612)
Female literacy(fl)	-0.0008412(0.00002974)**	
School Development Grant(sdg)	0.0001609(0.0001465)	0.0001634(0.000147)
Teaching Learning Material Grant(tlm)	0.0000873(0.0001129)	0.0000809(0.0001132)
Pupil teacher Ratio(ptr)	0.0005123(0.0003649)	0.0005697(0.0003666)
Female teacher(ft)	0.0003285(0.0005097)	0.0002953(0.000511)
Overall literacy(ol)		-0.0001681(0.0000612)*
Constant	0.9381854(0.0364911)***	0.9527079(0.0403767)***
F value	10.82***	10.45***
R^2 (Overall)	0.1012	0.0715
Hausman Test	49.53***	56.13***

Notes: ***=>significant at 1%, **=>significant at 5%, *=> significant at 10% level

All the school related variables chosen for our study failed to influence the Gender Parity Index during the time of enrolment in rural primary schools of Northern Zone. In our first model female literacy creates a negative impact on GPI in the rural states of the Northern zone of India. In our second model, overall literacy of the parents also plays a negative role to improve GPI in primary education in Northern India. We will now try to investigate the causes behind this result.

UNESCO has defined a GPI value between 0.97 and 1.03 as the achievement of gender parity during the time of enrolment. Rural primary schools in all the zones of India except the Northern zone have almost achieved the target. But the picture is quite different in the rural primary schools of Northen zone. It is found that the value of GPI in many rural districts mainly of Haryana and U.P is very low (low as 0.7). This implies that gender discrimination is predominant is these states during the time of enrolment in primary education. This is consistent with the finding of Husain's observation (2011) which shows that Northern Indian women

faces greater discrimination than women in other zones of India in respect to completion of school education. Gender disparity is also not uniform across regions[10].

Our results have shown that female literacy have negative impact on participation of girls in Northern zone. This might be because women have less or no power in decision making in these regions and they are mostly confined in household chores. Female literacy is a subset of overall literacy and due to the negative effect of female literacy on GPI of Northern areas, overall literacy might also have negative impact. GPI is low in these regions which clearly portrays that girls are neglected in Northern zone of India during the time of enrolment in primary school. The fluctuation in the value of GPI (as measured by standard deviation) is also high in Northern zone comparison to other zone in all the five time point in our study. This might be a reason why the exogenous school related factors taken in our study fails to influence GPI in Northern Zone.

The 2008 EFA Global Monitoring Report (GMR) uses the Net Enrolment rate (NER) as the critical indicator in "a systematic assessment of progress toward EFA since Dakar" (UNESCO 2007). This study is done based on secondary data and due to unavailability of data of Net Enrolment Ratio we will take Gross Enrolment Ratio (GER), and check the effect of the independent factors taken in our study on GER through a panel data regression model for Northern zone. If we look at GER we find an interesting result in Northern Zone.

Table 6. *Results of Panel Data Regression for Northern Zone with GER as dependent Variable*

North (Haryana, U.P, Punjab)		
Dependent variable **GER** (in place of GPI)		
Name of the Variable	Values of the Co-efficient and Standard Errors	
	Equation 1	Equation 2
Girls toilet(gt)	0.0688789(0.0630567)	.064338(.0628313)
Mid-day meal(mdm)	.2057637(0.0293109)***	0.2061564(.0295277)***
Female literacy(fl)	-.3215401(0.1439688)*	
School Development Grant(sdg)	.0199943(.0709253)	.0205052(.0709848)
Teaching Learning Material Grant(tlm)	.0751619(.0546389)*	.076351(.054665)*
People teacher Ratio(ptr)	-.7113988(.1766797)***	-.719094(.1770309)***
Female teacher(ft)	-.1062256(.246776)	-.1153704(.2467462)
Overall literacy(ol)		.03744045(.1772969)
Constant	79.36057(17.66742)***	86.95306(19.49644)***
F Value	9.86***	9.77***
R^2 (Overall)	0.2441	0.2428
Hausman Test value	$\chi^2(7)$=17.69***	$\chi^2(7)$= 17.37***

Notes: ***=>significant at 1%, **=>significant at 5%, *=> significant at 10% level

4.1.4. Discussions

Overall enrolment is increasing with time which may result as boys are much more enrolled than girls in rural primary schools. Availability of mid-day meal and teaching learning material grant received in previous year have positively affected the GER and pupil teacher ratio has

negatively influenced GER in Northern zone. As boys are more enrolled which also increase the GER, this might be a reason why female literacy has negative impact on GPI in rural primary schools in the Northern zone of India.

5. Conclusion & policy initiative

It is observed that in the rural districts of the selected major states of India, under Southern, Western and Eastern zones, GPI lies between 0.97 to 1.03. This indicates the achievement of Gender parity as mentioned by UNESCO during the time of school enrolment in primary school in rural India, But the situation is not encouraging in the rural districts of Northern zone though the overall enrolment in primary education in that zone is satisfactory, Thusgirls are not deprived during the time of enrolment in primary education in most of the zones except Northern zones of India. There are large number of socio-economic factors which influence a parent during the time of taking decision about enrolment of their girl child in primary education. Here we mainly consider the factors related to school infrastructure. In countries with gender enrolment gaps, there should be preference towards hiring more female teachers as there is a correlation between the amount of female teachers and girls' enrolment (UNICEF, 2000; Watkins, 2000). This is consistent with our finding also. In Eastern and Southern zone of India, we have found that higher percentage of female teachers out of total teachers have strong positive impact on girls enrolment rates in rural dominated district in primary education.Female teacher act as a role model for girl children and girls are more comfortable to teachers of same gender. Parents in mainly rural dominated districts think that the presence of female teachers may ensure protection of girls from unwanted attention from boys or male teachers and even from sexual exploitation and abuse. According to the guidelines of SSA norms, the female teacher ratio must be 50% in primary school but most of the primary school failed to maintain this guideline (Evaluation report on SSA, May 2012). Government need to take steps to increase the recruitment of female teacher as these may bridge the gender gap in formal school participation mainly in rural dominated district.

Low pupil-teacher ratio enables more attention of teacher to individual student. It is also found in our study that pupil teacher ratio have negative impact on girls enrolment in primary school in mainly rural dominated districts of India. In Eastern, Western and Southern zone, we have found negative impact of Pupil-teacher ratio on GPI. In Northern zone, we have found negative relation between PTR and Gross Enrolment Ratio. More recruitment of teachers mainly female teachers can improve GPI in primary education during the time of enrolment in rural primary schools of India.

Mid-day meal scheme was launched to maintain nutritional status of student as healthy student are more attentive in school. This scheme encourages the parents to send their child in school. We have found that this scheme has a positive impact on girls enrolment in primary school in

most parts of India. In Eastern, Western and Southern zone we have found strong positive impact of Mid-day meal scheme on GPI and in Northern zone we have found positive relation between Mid-day meal scheme and Gross Enrolment Ratio.

It is found that school development grant and teaching learning material grant sanctioned by the government plays a positive role in increasing girls enrolment in primary school. In Eastern, Western and Southern zone, school development grant has positive impact on GPI and in Eastern and Western zone teaching learning material grant has positive impact on GPI. Besides that 'teaching learning material grant' has positive impact on gross enrolment ratio in rural public school in Northern zone. These grant also influences the parents to send their children to primary school.

Separate toilet facilities designed for girls children is important for proper sanitation of girl children. Parents also prefer to send their daughter in school with separate sanitation facilities for them. It is also seen that provision of girls toilet in rural public school positively influences the GPI values in rural districts of Southern, Eastern and Western zone of India.

Female literacy which is considered as a proxy variable of mothers education in our study has positive impact on girls participation in primary education. In Eastern zone female literacy have positively influence GPI. But in Northern zone where women faces the maximum discrimination in comparison to other areas and does not have any power in decision making have resulted in negative influence of female literacy on GPI. Educated women cannot be easily dominated and will not let her daughter get discriminated as she knows the importance of education. Dreze and Kingdon(2001) has shown that maternal education has a large positive effect on a daughter's chances of completing primary education and boy's schooling is found to be more responsive to father's education. So for a better and progressive nation government need to take steps to educate the parents mainly the mothers of the child so that the nation will be free from patriarchal dominance and which will open the mind and changes the notion of the parents on their girls which will ensure proper development of the nation in a meaningful way.

Notes

[1]From 2001-2013 GOI's expenditure on elementary education had increased over 11 fold i.e from Rs 3577 crore to Rs 39622 crore (PAISA Report, 2012).

[2] The Constitution (Eighty-sixth Amendment) Act, 2002 inserted Article 21-A in the Constitution of India to provide free and compulsory education of all children in the age group of six to fourteen years as a Fundamental Right.

[3] Tradition and cultureof rural people in a particular zone is assumed almost identical.

[4] To keep maximum homogeneity among the states, we here ignore the states under special assistance.

[5]Admiting daughters in to school in rural India is very much dependent on the socio-cultural factor of the native village of that girl. This factors also influence the decision of the parents during the time of admission of their daughter at primary school.

[6]All India Education Survey in 2002-09 had shown that three out of ten primary schools in rural area were without usable toilet facilities.

[7]All India Education Survey (AIES) done by NCERT, for 2002-09 had shown that one fifth of the total primary schools in rural areas did not have drinking water facilities.

[8]According to the report of the Right to Education Forum (2015), more than 4.1 lack teaching posts are lying vacant in Bihar, Utter Prodesh, Jharkhand.

[9] These multicorrelation check is done by VIF estimates

[10]The value of standard deviation among the values of GPI of the 5 zone is highest for the Northern zone and lowest in the Southern zone in all the time point in our consideration as shown in the summary statistics (appendix)

Appendix

Table 1. *Table of Summary Statistics*

Statistic	2007-08	2009-10	2011-12	2013-14	2015-16
			Gender Parity Index(GPI)[East]		
Mean	0.9275229	0.946422	0.96	0.9601835	0.9576147
S.d	0.0577054	0.0459775	0.0341836	0.0324032	0.0299351
Min	0.74	0.79	0.82	0.84	0.86
Max	1.04	1.06	1.06	1.04	1.02
Min District	Saharsa(Bihar)	Godda (Jharkhand)	Dantewade(chattisgarh)	Nayagarh(Orrissa)	Nayagarh(Orrissa)
Max District	Hazaribagh(Jharkhand)	Hazaribagh(Jharkhand)	Siwan(Bihar)	Siwan(Bihar)	Siwan(Bihar)
			Gender Parity Index(GPI)[West]		
Mean	0.912807	0.9150877	0.9102632	0.8964035	0.8918421
S.d	0.0530405	0.0613887	0.0455733	0.0365341	0.0373353
Min	0.76	0.72	0.78	0.76	0.79
Max	1.05	1.06	1.01	0.96	0.97
Min District	Sirohi(Rajasthan)	Sirohi(Rajasthan)	Sirohi(Rajasthan)	Sirohi(Rajasthan)	Sirohi(Rajasthan)
Max District	Rewa(M.P)	Barwani(M.P)	Dewas(M.P)	Dindori(M.P)	Mandla(M.P)
			Gender Parity Index(GPI)[North]		
Mean	.9290667	.9376	.9049333	.9077333	.9145333
S.d	.0723575	.0855797	.0833808	.0705303	.0695214
Min	0.79	0.79	0.78	0.81	0.8
Max	1.13	1.16	1.09	1.07	1.06
Min District	Fatehgarh Sahib(Punjab)	Bathinda(Punjab)	Rewari(Haryana)	Muktsar(Punjab)	Sonipat(Haryana)
Max District	Deoria(U.P)	Deoria(U.P)	SantKabir Nagar(U.P)	Deoria(U.P)	Deoria(U.P)
			Gender Parity Index(GPI)[South]		
Mean	0.9531481	0.9501852	0.942963	0.942778	.9427778
S.d	0.0251654	0.0238304	0.0163256	0.017528	0.017528
Min	0.87	0.88	0.89	0.9	0.9
Max	1.01	1.01	0.98	0.98	0.98
Min District	Dharmapuri(T.N)	Dharmapuri(T.N)	Bijapur(Karnataka)	Bijapur(Karnataka)	Bijapur(Karnataka)
Max District	Guntar(A.P)	Guntar(A.P)	Palakkad(Kerala)	Kodagu(Karnataka)	Pudukkotai(T.N)
			FemaleLiteracy(East)		
Mean	40.42477	40.42477	56.85229	57.11651	57.11651
S.d	13.99153	13.99153	10.65607	10.72642	10.72642
Min	18.6	18.6	32.9	32.9	32.9
Max	69.3	69.3	81.8	81.8	81.8
Min District	Krishanganj(Bihar)	Krishanganj(Bihar)	Dantewade(chattisgarh)	Dantewade(chattisgarh)	Dantewade(chattisgarh)
Max District	Jagatsinghapur(Orissa)	Jagatsinghapur(Orissa)	PurbaMedinipur(W.B)	PurbaMedinipur(W.B)	PurbaMedinipur(W.B)
			FemaleLiteracy(West)		
Mean	49.32807	49.32807	60.19386	60.19386	60.19386
S.d	11.90922	11.90922	10.64771	10.64771	10.64771
Min	18.5	18.5	34.3	34.3	34.3
Max	75.7	75.7	83.5	83.5	83.5
Min District	Anuppur(M.P)	Anuppur(M.P)	Jhabua(M.P)	Jhabua(M.P)	Jhabua(M.P)
Max District	Amravati(Maharashtra)	Amravati(Maharashtra)	Amravati(Maharashtra)	Amravati(Maharashtra)	Amravati(Maharashtra)
			FemaleLiteracy(North)		
Mean	45.12667	45.12667	59.94933	59.94933	59.94933
S.d	12.38242	12.38242	8.658762	8.658762	8.658762
Min	18.6	18.6	37.1	37.1	37.1
Max	75.3	75.3	80.8	80.8	80.8
Min District	Shrawasti(U.P)	Shrawasti(U.P)	Shrawasti(U.P)	Shrawasti(U.P)	Shrawasti(U.P)
Max District	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)
			FemaleLiteracy(South)		
Mean	58.57407	58.57407	67.91852	67.91852	67.91852
S.d	13.77225	13.77225	11.14945	11.14945	11.14945
Min	35.9	35.9	49.6	49.6	49.6
Max	94.3	94.3	96.3	96.3	96.3
Min District	Raichur(Karnataka)	Raichur(Karnataka)	Raichur(Karnataka)	Raichur(Karnataka)	Raichur(Karnataka)
Max District	Kottayam(Kerala)	Kottayam(Kerala)	Pathanamthitta(Kerala)	Pathanamthitta(Kerala)	Pathanamthitta(Kerala)
			Girls Toilet[East]		
Mean	17.49633	35.14954	67.93303	78.00275	93.58165
S.d	11.17066	23.07981	17.7364	20.12379	10.45658
Min	1.7	3.7	27	10.1	51.1
Max	47.3	98.8	99.7	100	100
Min District	Giridih(Jharkhand)	Sitamarhi(Bihar)	Jamui(Bihar)	Puri(Orissa)	Supaul(Bihar)
Max District	Latehar (Jharkhand)	DakshinDinajpur(W.B)	Bankura(W.B)	DakshinDinajpur(W.B)	Bankura(W.B)
			Girls Toilet[West]		
Mean	49.49211	51.4807	87.2693	95.64737	98.47368

S.d	23.11694	27.33558	15.46815	7.010248	3.216139
Min	8.3	7.6	33.2	58	83.1
Max	93.8	96.3	100	100	100
Min District	Dindori(M.P)	Barwani(M.P)	Kheda(Gujrat)	Ashoknagar(M.P)	Barwani(M.P)
Max District	Hanumangarh(Rajasthan)	Sikar(Rajasthan)	Banaskantha(Gujrat)	Bhilwara(Rajasthan)	Bhilwara(Rajasthan)
			Girls Toilet[North]		
Mean	81.69867	78.64	92.81733	98.45867	99.752
S.d	14.2918	24.98647	11.2115	4.277095	.4205401
Min	40.6	5.4	47.3	74.3	98.3
Max	99.9	100	100	100	100
Min District	Azamgarh(U.P)	Jalaun(U.P)	Jalaun(U.P)	Jalaun(U.P)	Rampur(U.P)
Max District	Etawah(U.P)	Baghpat(U.P)	Moga(Punjab)	Baghpat(U.P)	Baghpat(U.P)
			Girls Toilet[South]		
Mean	40.59444	56.88889	91.94444	93.71481	99.66852
S.d	17.69633	15.04008	8.713612	10.66749	.9868618
Min	13.9	33.9	64.1	57.4	93.6
Max	80.1	99.4	100	100	100
Min District	Gulbarga(Karnataka)	Nellore(A.P)	Vizianagram(A.P)	Anantapur(A.P)	Kolar(Karnataka)
Max District	Idukki(Kerala)	Chitradurga(Karnataka)	Haveri(Karnataka)	Haveri(Karnataka)	Chitradurga(Karnataka)
			Female Teacher[East]		
Mean	32.98624	36.55229	38.95963	40.28165	39.8789
S.d	8.733529	9.399809	10.11014	10.23526	9.740618
Min	13.6	13.2	12.6	13.6	14.6
Max	60.6	62.3	66.1	67.5	67.2
Min District	Giridih(Jharkhand)	Deoghar(Jharkhand)	Deoghar(Jharkhand)	Deoghar(Jharkhand)	Deoghar(Jharkhand)
Max District	Jagatsinghapur(Orissa)	Jagatsinghapur(Orissa)	Jagatsinghapur(Orissa)	Jagatsinghapur(Orissa)	Jagatsinghapur(Orissa)
			Female Teacher[West]		
Mean	33.21316	34.1193	34.80526	35.41228	35.99035
S.d	10.38663	10.16174	10.07449	10.34071	10.38574
Min	14	11.8	13.3	16.4	15.8
Max	69.6	63.3	63.3	65.7	64.5
Min District	Jalor(Rajasthan)	Jalor(Rajasthan)	Jalor(Rajasthan)	Jalor(Rajasthan)	Jalor(Rajasthan)
Max District	Amreli(Gujrat)	Valsad(Gujrat)	Valsad(Gujrat)	Navsari(Gujrat)	Valsad(Gujrat)
			Female Teacher [North]		
Mean	42.32933	44.79333	45.73333	44.92267	45.96
S.d	10.91236	10.0262	10.35537	11.88668	10.15239
Min	15.1	14.8	12.3	0	21.1
Max	66.7	70.2	71.2	73.7	73.5
Min District	Baghpat(U.P)	Baghpat(U.P)	Baghpat(U.P)	Sitapur(U.P)	Baghpat(U.P)
Max District	Kapurthala(Punjab)	Kapurthala(Punjab)	Kapurthala(Punjab)	Kapurthala(Punjab)	Kapurthala(Punjab)
			Female Teacher [South]		
Mean	55.58148	57.44444	59.90185	60.59444	61.91296
S.d	15.63014	16.26358	15.86271	15.91965	15.43862
Min	33.4	34.8	37.2	38.2	39
Max	91.7	98.2	99.8	100	99.8
Min District	Srikakulam(A.P)	Vizianagram(A.P)	Vizianagram(A.P)	Srikakulam(A.P)	Srikakulam(A.P)
Max District	Thiruvarur(T.N)	Thiruvarur(T.N)	Thiruvarur(T.N)	Thiruvarur(T.N)	Thiruvarur(T.N)
			School Development Grant[East]		
Mean	70.83028	78.36422	78.69908	88.52615	95.42752
S.d	18.16075	13.5805	15.60422	8.140848	4.783379
Min	1	11.6	0	59.8	72.1
Max	98.8	97	96	98.73	100
Min District	Darjiling(W.B)	Darjiling(W.B)	Malkangiri(Orissa)	Jalpaiguri(W.B)	DakshinDinajpur(W.B)
Max District	Madhepura(Bihar)	Pakaur(Jharkhand)	Koriya(Chattisgarh)	Dhamtari(Chattisgarh)	Munger(Bihar)
			School Development Grant[West]		
Mean	83.73421	80.98158	80.28509	88.3893	90.64123
S.d	10.75245	8.905498	11.05527	12.20279	10.01395
Min	21.9	47.7	31.3	0	0
Max	98.9	98.9	97.4	100	99
Min District	Jhabua(M.P)	Charu(Rajasthan)	Sidhi(M.P)	Shajapur(M.P)	Shajapur(M.P)
Max District	Sindhudurg(Maharashtra)	The Dangs(Gujrat)	The Dangs(Gujrat)	Banaskantha(Gujrat)	Valsad(Gujrat)
			School Development Grant[North]		
Mean	74.736	74.84	70.06533	91.31827	96.67467
S.d	14.21899	16.55213	18.96015	7.562762	11.46241
Min	24	6.2	11.4	68.68	0
Max	98.1	97.6	95.7	99.78	100
Min District	Sirsa(Haryana)	Mau(U.P)	Rampur(U.P)	Mau(U.P)	Baghpat(U.P)
Max District	Karnal(Haryana)	Hisar(Haryana)	Mahendragarh(Haryana)	Fatehgarh Sahib(Punjab)	Fatehgarh Sahib(Punjab)
			School Development Grant[South]		
Mean	82.29074	86.78704	83.17407	95.3163	91.56481

S.d	10.93934	7.965706	8.289074	8.389196	10.94994
Min	44.5	50.1	53.4	60.62	60.4
Max	97.9	98.2	97.4	100	100
Min District	Anantapur(A.P)	Krishna(A.P)	Idukki(Kerala)	Prakasan(A.P)	Krishna(A.P)
Max District	Wayanad(Kerala)	Palakkad(Kerala)	Kolar(Karnataka)	Kolar(Karnataka)	Cuddalore(T.N)
Teaching Learning Material Grant[East]					
Mean	68.71468	72.19083	79.61743	83.90523	89.76972
S.d	19.4595	15.98825	13.82133	10.20548	19.61367
Min	0.4	6.9	0	28.69	0
Max	98.8	94.9	95.1	97.87	100
Min District	Darjiling(W.B)	Darjiling(W.B)	Malkangiri(Orissa)	Purnia(Bihar)	Sheikhpura(Bihar)
Max District	Bhirbhum(W.B)	Pakaur(Jharkhand)	Siwan(Bihar)	Kanker(Chattisgarh)	Korba(Chattisgarh)
Teaching Learning Material Grant[West]					
Mean	79.23158	74.59386	80.90702	87.1836	83.20965
S.d	12.35064	12.03976	10.95851	11.69847	24.99445
Min	44	38.9	30.2	0	0
Max	97.8	97.5	97.4	100	100
Min District	Amreli(Gujrat)	Bhind(M.P)	Sidhi(M.P)	Tikamgarh(M.P)	Tikamgarh(M.P)
Max District	Sindhudurg(Maharashtra)	The Dangs(Gujrat)	The Dangs(Gujrat)	Dohad(Gujrat)	The Dangs(Gujrat)
Teaching Learning Material Grant[North]					
Mean	73.248	67.13467	67.05067	86.41133	87.34933
S.d	18.30513	21.58444	20.31897	13.13338	27.10892
Min	4.7	5.6	2.8	5.1	0
Max	97.3	96.9	93.8	99.4	100
Min District	Baghpat(U.P)	Mau(U.P)	Baghpat(U.P)	Baghpat(U.P)	Baghpat(U.P)
Max District	Jind(Haryana)	Hisar(Haryana)	Fatehgarh Sahib(Punjab)	Muktsar(Punjab)	Kapurthala(Punjab)
Teaching Learning Material Grant[South]					
Mean	77.12222	83.05352	80.08519	70.84407	60.00556
S.d	16.98308	14.80223	14.08649	33.08953	45.88755
Min	0.2	0	1.5	0	0
Max	96.5	96.9	97.4	100	100
Min District	Kurnool(A.P)	Pudukkotai(T.N)	Pudukkotai(T.N)	Pudukkotai(T.N)	Dharmapuri(T.N)
Max District	Wayanad(Kerala)	Palakkad(Kerala)	Kolar(Karnataka)	Raichur(Karnataka)	Hassan(Karnataka)
Mid-Day Meal Availability[East]					
Mean	27.27798	25.94128	94.28349	96.90367	98.04862
S.d	22.61195	20.67169	7.349849	3.714434	2.785865
Min	2.1	0	61.5	81.1	82.5
Max	87.9	76	100	100	100
Min District	Chatra(Jharkhand)	Naupada(Orissa)	Jamui(Bihar)	Krishanganj(Bihar)	Krishanganj(Bihar)
Max District	PurbaMedinipur(W.B)	Bankura(W.B)	Lohardega(Jharkhand)	Simdega(Jharkhand)	Naupada(Orissa)
Mid-Day Meal Availability[West]					
Mean	36.65965	44.84561	92.7114	98.24561	98.16316
S.d	24.69502	25.23296	20.06013	2.528323	2.147535
Min	0	0	0	78.6	85.5
Max	91.7	93.4	100	100	100
Min District	Jodhpur(Rajasthan)	Alwar(Rajasthan)	Bharatpur(Rajasthan)	Kachch(Gujrat)	Surendranagar(Gujrat)
Max District	Neemuch(M.P)	Sagar(M.P)	Morena(M.P)	Valsad(Gujrat)	Navsari(Gujrat)
Mid-Day Meal Availability[North]					
Mean	46.676	53.30667	93.00667	90.04	99.456
S.d	34.21748	28.84805	20.05717	26.75045	1.13331
Min	0	0	0	0	92.7
Max	95.2	95.2	100	100	100
Min District	Yamunanagar(Haryana)	Yamunanagar(Haryana)	Mathara(U.P)	Sitapur(U.P)	Mau(U.P)
Max District	Jaunpur(U.P)	Jaunpur(U.P)	Rupnagar(Punjab)	Auraiya(U.P)	Budaun(U.P)
Mid-Day Meal Availability[South]					
Mean	45.35741	70.77593	95.38704	78.06852	98.38704
S.d	32.62369	25.79194	14.40905	40.5834	7.266518
Min	0	13.4	13.2	0	46.1
Max	91.8	100	100	100	100
Min District	Kottayam(Kerala)	Prakasan(A.P)	Chamarajanagara(Karnataka)	chittor(A.P)	Bagalkot(Karnataka)
Max District	Krishnagiri(T.N)	Gadag(Karnataka)	Belgaum(Karnataka)	Krishnagiri(T.N)	Ramanathapuram(T.N)
Overall Literacy[East]					
Mean	53.99725	53.99725	66.94404	66.94404	66.94404
S.d	12.9476	12.9476	9.472909	9.472909	9.472909
Min	30.2	30.2	42.7	42.7	42.7
Max	79.1	79.1	87.7	87.7	87.7
Min District	Dantewade(chattisgarh)	Dantewade(chattisgarh)	Dantewade(chattisgarh)	Dantewade(chattisgarh)	Dantewade(chattisgarh)
Max District	Jagatsinghapur(Orissa)	Jagatsinghapur(Orissa)	PurbaMedinipur(W.B)	PurbaMedinipur(W.B)	PurbaMedinipur(W.B)
Overall Literacy[West]					

Mean	63.55526	63.55526	71.49035	71.49035	71.49035
S.d	9.522438	9.522438	8.423986	8.423986	8.423986
Min	36.9	36.9	44.5	44.5	44.5
Max	82.5	82.5	88.2	88.2	88.2
Min District	Jhabua(M.P)	Jhabua(M.P)	Jhabua(M.P)	Jhabua(M.P)	Jhabua(M.P)
Max District	Amravati(Maharashtra)	Amravati(Maharashtra)	Amravati(Maharashtra)	Amravati(Maharashtra)	Amravati(Maharashtra)
			Overall Literacy[North]		
Mean	57.996	57.996	70.10667	70.10667	70.10667
S.d	10.41761	10.41761	7.582899	7.582899	7.582899
Min	33.8	33.8	49.1	49.1	49.1
Max	81	81	85.4	85.4	85.4
Min District	Shrawasti(U.P)	Shrawasti(U.P)	Shrawasti(U.P)	Shrawasti(U.P)	Shrawasti(U.P)
Max District	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)	Hoshiarpur(Punjab)
			Overall Literacy[South]		
Mean	67.77963	67.77963	75.15185	75.15185	75.15185
S.d	10.83984	10.83984	9.045916	9.045916	9.045916
Min	48.8	48.8	59.5	59.5	59.5
Max	95.8	95.8	96.9	96.9	96.9
Min District	Raichur(Karnataka)	Raichur(Karnataka)	Vizianagram(A.P)	Vizianagram(A.P)	Vizianagram(A.P)
Max District	Kottayam(Kerala)	Kottayam(Kerala)	Pathanamthitta(Kerala)	Pathanamthitta(Kerala)	Pathanamthitta(Kerala)
			Pupil –Teacher Ratio[East]		
Mean	41.91743	38.66055	35.83486	33.04587	31.30275
S.d	11.90404	12.4731	13.84605	14.25845	14.67456
Min	19	17	16	10	9
Max	78	68	67	69	68
Min District	Gajapati(Orissa)	Darjiling(W.B)	Darjiling(W.B)	Darjiling(W.B)	Darjiling(W.B)
Max District	Uttar Dinajpur(W.B)	Bhojpur(Bihar)	Gaya(Bihar)	Purnia(Bihar)	Purnia(Bihar)
			Pupil –Teacher Ratio[West]		
Mean	33.25439	30.71053	28.99123	24.77193	21.38596
S.d	8.719636	8.116108	9.417077	5.771512	4.439383
Min	15	13	11	10	9
Max	63	61	92	44	37
Min District	Sindhudurg(Maharashtra)	Sindhudurg(Maharashtra)	Sindhudurg(Maharashtra)	Sindhudurg(Maharashtra)	Sindhudurg(Maharashtra)
Max District	Morena(M.P)	Morena(M.P)	Sidhi(M.P)	Jhabua(M.P)	Jhabua(M.P)
			Pupil –Teacher Ratio[North]		
Mean	47.93333	41.89333	39.57333	37.08	35.24
S.d	12.54757	10.38264	10.99898	10.34769	11.08547
Min	27	18	20	18	16
Max	74	71	75	71	69
Min District	Rupnagar(Punjab)	Gurdaspur(Punjab)	Gurdaspur(Punjab)	Gurdaspur(Punjab)	Gurdaspur(Punjab)
Max District	Kushinagar(U.P)	Sitapur(U.P)	Rampur(U.P)	Rampur(U.P)	Maharajganj(U.P)
			Pupil –Teacher Ratio[South]		
Mean	24.61111	21.96296	19.88889	19	18.87037
S.d	5.260808	4.986635	4.697115	5.24854	4.922211
Min	15	12	11	10	10
Max	40	32	29	33	30
Min District	Hassan(Karnataka)	Hassan(Karnataka)	Hassan(Karnataka)	Hassan(Karnataka)	Chikmagalore(Karnataka)
Max District	Raichur(Karnataka)	Kurnool(A.P)	Kurnool(A.P)	Kurnool(A.P)	Kurnool(A.P)

Source: Calculated by the author on the basis of the data given in DISE Statistics in different years.

Table 2. *Detecting Multicollinearity using Variance Inflation Factor [VIF]*

East			West			North			South		
Variable	VIF	1/VIF	Variable	VIF	1/VIF	Variable	VIF	1/VIF	Variable	VIF	1/VIF
female lit	23.38	0.042769	female lit	23.63	0.042318	female lit	41.37	0.02417	female lit	38.43	0.026023
overall lit	20.17	0.049585	overall lit	20.59	0.04857	overall lit	35.53	0.02814	overall lit	41.41	0.024149
mdm	3.05	0.327950	mdm	1.57	0.636766	mdm	1.19	0.83930	mdm	1.85	0.540096
sdgrant	2.85	0.350785	sdgrant	1.02		sdgrant	1.47	0.67901	sdgrant	1.44	0.696135
girls toilet	2.84	0.352344	girls toilet	1.72	0.582208	girls toilet	1.38	0.72392	girls toilet	2.03	0.491753
tlmgrant	2.72		tlmgrant	1.03	0.972952	tlmgrant	1.27	0.78997	tlmgrant	1.23	0.816288
ptr	1.42	0.702122	ptr	1.50	0.665282	ptr	2.51	0.83930	ptr	2.18	0.458033
fteacher	1.40	0.714881	f teacher	1.72	0.582208	f teacher	2.36	0.42342	f teacher	3.06	0.326523
Mean VIF	7.23		Mean VIF	6.60		Mean VIF	10.88		Mean VIF	11.45	

Source: Calculated by the author on the basis of DISE statistics using stata software.

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