



Inequality of opportunity in Elementary Education: the case of India

Abstract

This paper is an empirical discussion on educational opportunity in the major states of rural India. The ASER data sets are utilised here for 2013 to estimate the effect of circumstances on reading and mathematical abilities of children. The paper has utilised Roemer's theory of opportunity to develop inequality of educational opportunity. Two major indices are compared namely the Pearson-Cramer's index and the overlap index. The data analysis reveal that the state of Himachal Pradesh is the least unequal state in terms of inequality of opportunity based on both Pearson's Cramer Index and Overlap Index. Himachal Pradesh made spectacular progress in learning ability at the elementary level. The political will at a sustained level removed inequality to opportunity in schooling access. Education of children is a societal norm in this state. West Bengal and Tripura have high percentage of students attending private tuitions and these states reveal remarkable inequality of opportunity in performance of mathematical skills. Kerela has highest percentage point increase in private schools during 2013 yet the circumstance constraint, private schools is not influencing inequality of opportunity because of efficacy of public policies in this state to educate all her children.

Keywords: *Inequality of Opportunity, development and education, India, ASER data sets*

I. Introduction

Education is an indicator of the kind a life one wants to value and live. It generates productive capacities in individuals and stimulates economic growth. However India has witnessed interregional inequality in educational achievements. So reducing inequalities in educational attainment is on the agenda of our policy makers. For reducing inequality, the quest for factors contributing towards the inequality is important. The question is whether such factors are fair or unfair? Based on the idea of fair versus unfair inequality the idea of inequality of opportunity develops its rationale. According to Roemer (1998) dispersion in outcomes may be income, wealth, education can be due to individual abilities, and talents, they can be also partly due to factors or circumstances which are beyond the control of individuals such as the race, gender, ethnicity, place of birth and economic background of parents. Again the idea of inequality of opportunity in education finds its origin in Coleman Report (1966), where the effectiveness of policies had been questioned given the variation in student's performance and family backgrounds.

The task of reducing inequality varies depending upon the potential source of this inequality. When inequality is due to family of origin, gender, caste and economic vulnerability then this inequality can be reduced by compensatory policies. However public policies to reduce inequality when it is due to difference in talents among individuals who had the same opportunities is difficult to implement because it may interfere with ethical objectives. So inequality is made of heterogeneous elements, some are unjust and unnecessary which needs to be eliminated. However some potential source of inequality is desirable to give proper incentives to everyone. A development policy tool that attempts to equalize opportunity by devoting more resources to the disadvantaged groups is the fairest policy option. John Roemer (1998) has defined the concept of equality of opportunity which discusses not only outcome inequalities but what constructs such inequalities. Thus he identifies a path that leads to outcome inequalities. According to Roemer total inequality could be decomposed between inequality, caused by circumstances (which is beyond an individual's control like race, gender or economic origin) and inequality caused by effort which is legitimate inequality. The former type of inequality should be reduced however the latter should not be eliminated. The concept of inequality of opportunity has widely been expanded particularly in education by Ferreira and Gignoux (2011). The aim of this paper is to compute inequality of educational opportunity across major states of rural India using ASER data

sets ,2013. The Annual Status of Education Report (ASER) conducts annual assessment of children's ability to read simple texts and do basic arithmetic. ASER is conducted by Indian non government organization . Pratham and has been conducting surveys since 2005 in every rural district of India. The survey focuses on household and school based assessments. ASER provides data on not only students performance but also on certain factors (circumstances) that conditions the performance. This paper on utilising ASER survey 2013 tries to explain the reasons for inequality of opportunity in educational performance.

The principle of inequality of opportunity suggests that given students' efforts ,circumstances should not affect their outcomes. The literature discusses different methodologies to measure inequality of educational opportunities .Here a measure similar to Asadullah & Yalonetzky (2012) is utilised. A Pearson -Cramer Index (PC) index and overlap index is calculated to measure inequality of educational opportunity at the elementary level across major Indian states. The plan of exposition of the paper is as follows Section II discusses the major findings in the literature on inequality of opportunity. Section III explains the methodology and data utilised. Section IV discusses the major findings , The paper is finally concluded in Section V.

The Broad Objectives of this exercise are as follows:-

- i) The exercise attempts to contribute to the literature by exploring inequality of educational opportunity in India after the implementation of Right To Education (2009),this would show areas where potential attention is urgently required.
- ii) Apply indices of educational opportunity [adapted from Asadullah & Yalonetzky (2012)] to measure the extent of inequality of educational opportunity across major states of of rural India during 2013.
- iii) The exercise attempts to review the position of elementary education and the inequalities of opportunity thereof in India among the 6-14 age group in India.
- iv) The circumstances identified in this exercise are obviously constrained by availability of data,however they are ----attendance of private tuition; attending private schools instead of government schools and availability of electricity.

II.Review of Literature

The two broad approaches utilised in the literature to quantify the extent of inequality of opportunity include the ex-ante approach and the ex-post perspective. The former is taken into consideration when opportunities are equalized between types, while in the case of the latter outcomes are equalized across individuals who have inherited the same circumstances . Checchi and Peragine (2010) discusses that these two approaches always do not generate the same rank order. The initial discussion in the literature on the context of inequality of opportunity focussed on the inequality of opportunities in earnings. The notable works among many are of Peragine (2002,2004), Bourguignon et al (2007), Peragine and Serlenga (2008), Lefranc et al (2008,2009), Aaberge et al (2011) and Andreoli et al (2014). Moving on to the empirical literature on estimation of educational inequality in outcomes it is observed that the earlier works applied the idea of education production function to estimate the influence of socio economic factors on education outcomes, some important contributions include Hanushek (1979), Wößmann(2003), Filmer and Pritchett (2001). The second school of thought concentrated on addressing the issue of intergenerational mobility in educational achievements, Behrman et al (2001), Gaviria and Dahan (2001) Saunders (2012) and Blanden (2013) are some research of considerable interest. D'Addio (2007) studies the impact of intergenerational mobility on economic status for OECD countries. Mazumdar (2005) shows that intergenerational mobility increases economic status considerably. Chevalier (2004) finds a positive effect of both parents education on their children's schooling accomplishments for natural parents only.

The recent development includes conceptualizing the concept of Roemer's theory of inequality in opportunity in the field of education. The important contributions include the study of Ferreira and Gignoux (2014)who computes an exante parametric measure of inequality in educational opportunity for PISA(Programme for International Student Assessment) (2006) test scores in 57 countries.The study discusses two measures on educational inequality: i) one relating to educational achievement and ii) dealing with educational opportunity. Both the measures are computed from PISA surveys

(2006) for fifty seven countries. The measure of inequality of educational opportunity is explained by share of variance in test scores that is denoted by circumstances. The study finds that inequality of opportunity accounts for about thirty five percent of disparities in educational achievement. Singh(2010) opines that for urban India parental education is a major factor that explains inequality of opportunity in consumption expenditure. Asadullah & Yalonetzky (2012) using National Sample Survey data over the period 1983-2004 analyses the extent of inequality in educational opportunity for Indian adults . The findings confirm that Kerala is the least unequal state in terms of educational opportunities. The southern and eastern region of the country experienced a decline in inequality in educational opportunity. The study concludes that attention needs to be given to circumstance such as childhood poverty that affects enrolment in schools particularly for the vulnerable social groups. Singh (2011) using data from Human Development Survey(2004-2005) finds considerable inequality of opportunity in academic ability in India. The study concludes that rural India however has lower inequality of opportunity compared to the urban counterpart. Son(2013) opines that the distribution of opportunity for children in access to primary education is highly inequitable in many Asian countries. Further children in the secondary school age group in developing countries of Asia are more likely to have lower levels of equitably allocated resources for education . The study concludes that policy intervention like conditional cash transfer would be effective in improving school enrolment among such group of children. Gamboa and Waltenberg (2011) discusses the inequality of opportunity in six Latin American countries using PISA datasets (2006 and 2009). The type of circumstances used are schooling type: public versus private; gender and parental education. A decomposable inequality index is used here .Parental education and school types turn out to be significant explanatory factors of inequality of opportunity. The study concludes that inequality of opportunity is large and poses serious challenge to these group of countries. Ersado and Gignoux (2014) by examining three cohorts of individuals aged 21-24 (born between 1964-1967, 1974 and 1977, and 1982-1985) finds that access to education has improved considerably over the period under study. However analysis of test scores from Trends in International Mathematics and Science Study (TIMSS) reveal that there is significant learning inequality owing to circumstances beyond student control ,for example parental education, socioeconomic status and birthplace in Egypt. Further differences in levels of household expenditure in private tuition accounts for unequal learning outcomes. . De Barros, Ferreira, Vega, Chanduvi et al (2009) pp:151-166 presents an assessment of inequality of opportunity in educational achievement across five Latin American countries and nine countries of North America and Europe. The circumstances utilised in the study are –gender, parents’ educational level, occupation of the father and location of the school. It was observed that inequality of opportunity accounted for between 14 percent and 28 percent of overall inequality in reading achievement and 29 percent in mathematics. Garon and Elian (2013) assesses the inequality of educational opportunity in Argentina for 15 year old students from the data obtained from PISA. The study reveals that the important circumstance affecting educational attainment relate to parents wealth and the possession of educational inputs at home. . Ferreira & Gignoux (2010) using DHS (Demographic and Health Surveys) and PISA data sets from Turkey measures inequality in educational opportunities. The study concludes that parental education, ownership of books, family background, possession of electronic gadgets are the important circumstances explaining the largest share of inequalities in educational quality.

In sum the above discussion reveals a varied pattern of inequality of opportunity in education. The differences of inequality of opportunity are profound across gender, regions and family backgrounds. Differences in family background whether it is parental education or occupation is a major decisive factor in many countries. The literature conclusively indicate that equality of opportunity in education would act as a level playing field in the circumstances related to gender, place of birth, family background to which a child has no control. The studies further indicate that success in life should depend on people’s choices, effort and intrinsic abilities. On the policy front there is a trying agenda – trying to agree on a set of redistributive policies to reduce inequality of opportunity in education.

III. Methodology and Data sets

The Broad Framework

Following the theory of inequality of opportunity inequality should be decomposed into morally fair components and into unfair components. Essentially the opportunities of the individuals should be

equal rather the outcomes themselves. Following Roemer's theory of equality of opportunity, opportunities for the outcome are equal if the outcomes are available independently of factors that lie beyond the control of people (i.e. the circumstances). This condition can be represented as :

$$f(y|C)=f(y).....(1)$$

where y is the outcome in question and C represents the circumstances beyond the control of an individual. The purpose of this empirical exercise is to determine the extent of inequality of opportunity once the elements of C are identified. (Here it deserves mention luck as a circumstance is not taken into consideration because it cannot be amenable to redistributive policy concerns. In our discussion the choice of C is constrained by availability of data .

In the empirical literature on the measurement of inequality of opportunity there are two approaches-parametric and non-parametric. Non-parametric exercise divide individuals into homogeneous groups based either on their circumstances or effort . The partitioning on the criteria of circumstances is also called ex-ante method. Here the population is partitioned into types which are relevant groups of same circumstances. After which the levels of inequality of outcomes is compared (i.e. the educational outcome for example) between and within these groups. The partitioning based on effort is familiar as the ex-post approach which gathers individuals with different circumstances but with same level of effort into tranches and then measures the level of inequality between them. This approach is popularised by Checchie and Peragine (2005). It must be mentioned that the two methods do not necessarily yield the same results. Following the ex-ante approach all individuals are given the same mean value to their outcome belonging to the same type. Suppose there are K types in overall partition, the outcome of a particular type k denoted by y_i (with i no of individuals) is replaced by their group mean denoted by μ^k , Accordingly the level of inequality I(y) can be written as -

$$\theta_a = \frac{I(\mu^k)}{I(y)} (2)$$

Where I(.) is the required inequality index, and θ_a denotes the estimate of inequality of opportunity by eliminating the role of effort, thereby directly estimating the influence of circumstances.

The second alternative type of estimation (ex-post approach) is to leave the inequality within each type as it is and remove the differences in mean outcomes between types so the alternative formulation is obtained by rescaling the original outcomes by the ratio of means - $y^{~k} = y^k \frac{\mu}{\mu^k}$, here all within type variation is eliminated - so the new index stands as

$$\theta_r = \frac{1-I(y^{~k})}{I(y_i)}(3) \quad \text{here } \theta_r \text{ denotes the index of residual. (based on Checchi and Peragine,2010).}$$

Parametric estimation gives a specific functional form to describe relationship between outcomes and circumstances, following Bourguignon et al.(2007)- the following formulation is suggested -

$$y_i = C_i \beta + \epsilon_i(4) \quad \text{where C here includes the circumstances and } \epsilon_i \text{ denotes the residual .}$$

The parametric equivalent of θ_r is written as

$$\theta_r^p = 1 - \frac{I(y_i^{\sim})}{I(y_i)} (5) \quad \text{The superscript p denoting the parametric approach.}$$

The parametric equivalent of θ_a is

$$\theta_a^p = \frac{I(z_i^{\sim})}{I(y_i)}(6) \quad \text{the superscript p denoting the parametric approach. } z_i^{\sim} \text{ denotes the estimated value following equation (4)}$$

On the index formulation

After delving on the general framework of methodology utilised in studying inequality of opportunity in empirical discussion the paper concentrates on deriving the particular methodology used here- Adapting Asadullah & Yalonetzky (2012) method a set of z circumstances are considered, each one grouped into g_i classes (for $i=1,2,...,z$), a vector of V_i , circumstances is defined with g_i elements. Now the types are generated by a function f that changes circumstances into a natural number so we get

$$f: V_1 \times V_2 \times \dots \times V_z \rightarrow \mathbb{N}_+^T$$

Individuals with same set of circumstances are assumed to be of the same type. So the vector of type is $G = \{1,2,...,T\}$, has $T = \prod_{i=1}^z g_i$ elements. The absolute frequency of population in a group belonging to type t is ($t \in G$), this is denoted as N^t

The outcomes are denoted by the vector $O = \{1, 2, \dots, A\}$. Given that there are b outcome vectors, V_j , with m_j elements (for $j=1, 2, \dots, b$), then defining a function q as follows: $q: V^1 \times V^2 \times \dots \times V^b \rightarrow \mathbb{N}_+^A$. Converts all individuals outcomes into multi-dimensional outcomes.

The Pearson-Cramer (PC) index of inequality of opportunity

The Pearson –Cramer (PC) index of inequality follows Roemer's definition indicates association between types. The index attains maximum value when there is absolute association between types and gets minimum value when the circumstances are identical or irrelevant in determining the outcomes. As derived by Cramer (1946) the index is of the following form-

$$H = \frac{X^2}{X_{max}^2} = \sum_{t=1}^T \sum_{\alpha=1}^A w^t \frac{(p_{\alpha}^t - p_{\alpha}^*)^2}{\text{Min}\{T-1, A-1\} p_{\alpha}^*} \dots (7)$$

Where w^t is the relative weight of the population from type t , $w^t = \frac{N^t}{\sum_{k=1}^T N^k}$, and p_{α}^* is the proportion of the population achieving outcome level

$$\alpha: p_{\alpha}^* = \sum_{t=1}^T p_{\alpha}^t \frac{N^t}{\sum_{t=1}^T N^t} = \frac{\sum_{t=1}^T N_{\alpha}^t}{\sum_{t=1}^T N^t} \dots (8)$$

The overlap index

The overlap index was first computed by Weitzman (1970) to study between group inequality of income distributions. The formulation of the index as follows :

$$OV_w = \int_{y_{min}}^{y_{max}} \min\{f(y); g(y)\} dy \dots (9)$$

where y is a continuous variable with ranging between a minimum and a maximum value (y_{min} and y_{max}) and f and g are density functions for two separate classes. The discrete version is as follows

facilitates comparison with other indices

$$OV_M = 1 - \sum_{\alpha=1}^A \min\{p_{\alpha}^1, p_{\alpha}^2, \dots, p_{\alpha}^T\} \dots (10)$$

The above index follows Roemer's (1998) definition it maximum value when there is absolute association between types and takes the minimum value when there no association between types i.e. identical circumstances.

The purpose of this exercise is to derive the index of inequality of opportunity in learning across elementary education in rural India –the circumstances composed are as follows---schooling type (public versus private); access to private tuition or not and availability of electricity in households or not. The index is computed across mathematical abilities and reading abilities.

On Data Sets utilised

This paper utilises secondary data provided by Annual Status of Education Report (ASER) (2013) for rural India . The utility of ASER data is it is based on outcome variables. ASER carries out annual surveys since 2005. It provides data at the rural level for states and districts of India on learning abilities in school education for both boys and girls belonging to the age group of 5-13. To reflect upon the idea as to how a child has developed mathematical skills –the following classification is used----1. Students with no mathematical knowledge; 2. students with ability to identify numbers; 3. Students able to apply mathematical operations and 4. Students able to perform all of the above three. To estimate a child's reading skills the following classification is used-1. Students who cannot identify letters/ words; 2. Students who can read sentences at least. 3. Students who can at least read Std 2 level text; 4. Students who can perform all the above three. The aim of the data provided is to assess the implications of the educational policies of the Government of India. According to the Report the Government introduction of cess on education has remarkably increased enrolment and the Right to education Act (2009) has improved the infrastructure in schools. However the reports conclude that much efforts are still required in improving the quality of learning at the elementary level in India. Interestingly, with the enactment of Right to Education (2009) enrolment in private schools has also increased. Again ASER (2013) for the first time recorded how much rural households spend on a monthly basis on private tuition. The data indicates that parents whether rich or poor are increasing their expenditure on schooling. So based on the data the circumstances are designed; circumstances designed in this paper to measure inequality of educational opportunity – access to private tuition, attending private schools vis-à-vis public schools and

availability of electricity in households. Availability of electricity indicates the basic opportunity to healthy human capital development

IV. Results

Table I: Inequality of Opportunity (Circumstances: Tuition) in Reading Skills Across Major States of Rural India (2013)

STATES	PEARSON CRAMER INDEX	OVERLAP INDEX
ANDHRA PRADESH	0.00119535	0.095605588
ASSAM	0.016945639	0.247372261
BIHAR	0.025586001	0.370970058
CHATTISGARH	0.030401427	0.415852482
GUJARAT	0.00855472	0.135399343
HARYANA	0.00378687	0.190315501
HIMACHAL PRADESH	0.00145968	0.090574101
JHARKHAND	0.018204735	0.306732426
KARNATAKA	0.002180654	0.093414897
MADHYA PRADESH	0.007359676	0.143630213
MAHARASHTRA	0.005253117	0.138024114
MANIPUR	0.003311865	0.256005313
MEGHALAYA	0.002605752	0.129825517
MIZORAM	0.001059704	0.061964115
NAGALAND	0.007713266	0.166623798
ORISSA	0.030401427	0.415852482
PUNJAB	0.003204367	0.127179526
RAJASTHAN	0.004518118	0.101221335
TRIPURA	0.029903339	0.488191027
UTTAR PRADESH	0.016101408	0.209728722
UTTARANCHAL	0.007762737	0.174063474
WEST BENGAL	0.034743267	0.483306069
KERALA	0.008594258	0.275241015
TAMIL NADU	0.002471618	0.113416861
PONDICHERRY	0.035094528	0.478070175
INDIA	0.01345759	0.148630257

Source: ASER 2013, Compilation Self

The Table (I) indicates as far as circumstance (constraint) private tuition in developing reading skills is concerned Himachal Pradesh (7.7% children in 6-14 years avail private tuition) is the least unequal in terms of inequality of opportunity based on both Pearson's Cramer Index and Overlap Index. Himachal Pradesh made spectacular progress in learning ability at the elementary level. The political will at a sustained level removed inequality to opportunity in schooling access. Education of children is a societal norm in this state. De, Noronha and Samson (2000). So the circumstance constrains are less unequal here because efforts of government has been remarkable to remove educational disparities. West Bengal (73.9% children in 6-14 years avail private tuition) Orissa (51.2% children in 6-14 years avail private tuition), Tripura (65.8% children in 6-14 years avail private tuition) and Pondicherry (37.6% children in 6-14 years avail private tuition) are the more unequal states based on this opportunity criteria.

Again based on Table (II) Himachal Pradesh continues to be the least unequal state as far as the influence of circumstance private tuition on mathematical ability is concerned. West Bengal (the proportion of students availing private tuition in this state was highest according to ASER 2013) and

Tripura (following West Bengal ,this state is the second highest as far as percentage of children availing private tuition is concerned)are the among the unequal states as far as circumstance private tuition in influencing opportunity in mathematical ability is concerned. Thus for West Bengal and Tripura circumstance private tuition is acting as a constraint in the equalising of opportunity in educational outcomes. It is worthwhile to mention that National Sample Survey (NSS) 64th round reveal that private expenditure per student on elementary education is highest in Himachal Pradesh next comes Punjab followed by Tamil Nadu. The states with lowest expenditure are Uttar Pradesh, Madhya Pradesh, Jharkhand and Bihar. So the circumstance private tuition in conditioning inequality in learning skills at the elementary level both for reading skills and mathematics is governed not only by the number enrolled but by per capita expenditure. Higher the number declining is the returns from private tutoring, no extra dividend is ensured. It is similar to a parallel schooling system.

As far as the circumstance private versus public schools is concerned as reported from Table (III) among the least unequal states are Bihar and Jharkhand as far as the influence on reading skills is concerned. According to ASER data (2013) proportion of children enrolled in private schools in rural areas in India is on the rise, however interstate variation exists. Uttar Pradesh a state with high private school enrolment witnessed increase in enrolment in private schools from 30.3% in 2009 to 49% in 2013. Again in Jharkhand a state with low private school enrolment, enrolment increased from 4.3% to 15.7% during the same period. Based on the results of Table (IV) Uttar Pradesh is a highly unequal state as far as the influence of circumstance ,private schools on mathematical abilities is concerned. So higher the incidence of enrolment in private schools the larger is the dispersion in inequality of opportunity constrained by the circumstance enrolment in private schools .Other states which are unequal as far as opportunity inequality in mathematical abilities (due to circumstance private school enrolment)is concerned are Nagaland(39.4 % in 6-14 age group are enrolled in private schools and Maharashtra.(37.5% are enrolled in private schools)Though Kerela shows the highest percentage point increase in enrolment in private schools during 2013 (ASER,2013) the inequality index is low because it is common knowledge that public responsibility in Kerela in spreading education had made remarkable efforts ,negating the circumstance influence.

As per circumstance availability of electricity is concerned based on Table (V) its impact on opportunity index ,the Pearson Cramer Index shows that twelve states have a value within the range of 0.0014 to 0.0043. These are the least unequal states as far as inequality of opportunity is concerned. The states are Karnataka, Nagaland, Himachal Pradesh,Tamil Nadu,Andhra Pradesh,Jammu and Kashmir, Manipur, Jharkhand,Madhya Pradesh,Gujarat, Chattisgarh and Punjab. The states of Tripura, Uttar Pradesh,Assam,Rajasthan, West Bengal, Mizoram and Pondicherry are the most unequal states, (Table V). The value of Pearson Cramer Index ranges from 0.0105 to 0.012, for these states. Karnataka, Nagaland, Himachal Pradesh,Tamil Nadu,Andhra Pradesh,Punjab, Madhya Pradesh,Gujarat and Chattisgarh continue to be the least unequal states as far as the overlap index is concerned when circumstance electricity conditions the inequality of learning outcome in reading skills. Again based on the values of the overlap index (Table V) Tripura , Rajasthan , West Bengal ,Mizoram Assam, Uttar Pradesh continue to be the most unequal states as far as inequality of opportunity in reading skills is concerned.

Based on the results of Table (VI) as far the values of Pearson Cramer index is concerned the least unequal states are Karnataka, Nagaland Himachal Pradesh, Punjab, Andhra Pradesh, Gujarat, Chattisgarh, Kerela and Madhya Pradesh. The value of the index ranges from 0.0008 to 0.003 for these states. The most unequal states based on Pearson Cramer Index of inequality of opportunity are Tripura, Uttaranchal, Mizoram Meghalaya, Orissa, Assam, Pondicherry, West Bengal, Rajasthan and Uttar Pradesh. The value ranges from 0.007 to 0.015 for these states , Table (VI). So as far as circumstance electricity is concerned its influence on inequality of opportunity in developing mathematical skills is varied. Again the values of the overlap index based on the results of Table VI, range from 0.004 to 0.121 as far as the least unequal states are concerned. The least unequal states continue to be Nagaland , Karnataka , Andhra Pradesh, Gujarat, Punjab, Chattisgarh, Madhya Pradesh and Himachal Pradesh based on both the indices, criteria (table VI). Tripura, Mizoram, West Bengal,Assam, Orissa, Rajasthan and Uttar Pradesh continue to be the most unequal state based on the overlap index. (Table VI).Interestingly based on the data of Central Electricity Authority, August 2013, Karnataka,Andhra Pradesh, Tamil Nadu,

have 100 percent rural electrification. Tripura, Orissa are the states with 71-80% percent electrification in villages. Assam, Bihar, Gujarat, Himachal Pradesh, Jammu and Kashmir, Madhya Pradesh, Chattisgarh, Maharashtra, Mizoram, Rajasthan, Uttaranchal and West Bengal are states where rural electrification is to the extent of 81-90 percent. So availability of and utilisation of the essential and important infrastructure electricity goes a long way in explaining the differences in inequality of opportunity in educational outcomes at the elementary level. Comparing the indices across states of India reveal that some states have remarkably low values while others have substantial high inequality as revealed in terms of the values of the indices. This compilation of statistical exercise show that there is a need among policy makers to identify areas of potential progress which would reduce inequality of opportunity in educational outcome.

Table II: Inequality of Opportunity (Circumstance: Tuition) in Mathematical Abilities across Major states of Rural India (2013)

STATES	PEASON CRAMER INDEX	OVERLAP INDEX
ANDHRA PRA- DESH	0.0011997	0.09243
ASSAM	0.019861	0.319119
BIHAR	0.031187	0.43898
CHATTISGARH	0.033471781	0.459924197
GUJARAT	0.013453	0.225591
HARYANA	0.002521	0.127786
HIMACHAL PRADESH	0.002235	0.103452
JHARKHAND	0.024039	0.367283
KARNATAKA	0.001573	0.097905
KERALA	0.010068	0.270468
MADHYA PRADESH	0.01155	0.158271
MAHARASHTRA	0.008531	0.166577
MANIPUR	0.007403	0.341095
MEGHALAYA	0.002803	0.115794
MIZORAM	0.000556	0.082425
NAGALAND	0.011833	0.239072
ORISSA	0.040559	0.535088
PONDICHERRY	0.006666	0.205666
PUNJAB	0.002021	0.100806
RAJASTHAN	0.008607	0.158255
SIKKIM	0.002818	0.182733
TAMIL NADU	0.001798	0.109005
TRIPURA	0.0360649	0.5799279
UTTAR PRADESH	0.025424	0.279462
UTTARANCHAL	0.009503	0.208891
WEST BENGAL	0.02949	0.479178
INDIA	0.011596	0.231314

Source: ASER 2013, Compilation Self

Table III : Inequality of Opportunity (Circumstance: Private versus Public Schools) in Reading Skills Across Major states of Rural India (2013)

STATES	PEARSON CRAMER INDEX	OVERLAP INDEX
ANDHRA PRADESH	0.004378609	0.214370058
ASSAM	0.001888295	0.079580454
BIHAR	0.002763169	0.075804901
CHATTISGARH	0.003367401	0.111311765
GUJARAT	0.007547133	0.135989378
HARYANA	0.013136789	0.388144314
HIMACHALPRADESH	0.004301384	0.270156053
JAMMU & KASHMIR	0.010337219	0.273494615
JHARKHAND	0.007002763	0.149184822
KARNATAKA	0.003014404	0.148701632
KERALA	0.007934671	0.262606957
MADHYA PRADESH	0.007871759	0.169873434
MAHARASHTRA	0.030215505	0.383383508
MANIPUR	0.106159294	0.560253567
MEGHALAYA	0.007656195	0.221650849
MIZORAM	0.001489154	0.137798895
NAGALAND	0.017286869	0.322074251
ORISSA	0.004393262	0.098015151
PONDICHERRY	0.009771727	0.431006494
PUNJAB	0.004382459	0.143234446
RAJASTHAN	0.011121606	0.264700079
SIKKIM	0.007790195	0.278591735
TAMIL NADU	0.006732891	0.159540467
TRIPURA	0.004249391	0.126893724
UTTAR PRADESH	0.029434215	0.406847575
UTTARANCHAL	0.003916285	0.188537216
WEST BENGAL	0.003611022	0.082314907
INDIA	0.007473691	0.211677906

Source: ASER 2013, Compilation Self

Table IV : Inequality of Opportunity (Circumstance: Private versus Public Schools) in Mathematical Abilities Across Major states of Rural India (2013)

STATES	PEARSON CRAMER INDEX	OVERLAP INDEX
ANDHRA PRADESH	0.001729	0.138552
ASSAM	0.004257	0.138527
BIHAR	0.003407	0.116793
CHATTISGARH	0.004995	0.1347

GUJARAT	0.008868	0.175116
HARYANA	0.018224	0.379545
HIMACHAL PRA- DESH	0.005164	0.275441
JAMMU & KASHMIR	0.009026	0.276644
JHARKHAND	0.007299	0.152571
KARNATAKA	0.004253	0.16399
KERALA	0.002439	0.18356
MADHYA PRADESH	0.009715	0.207395
MAHARASHTRA	0.032134	0.484898
MANIPUR	0.010894	0.317923
MEGHALAYA	0.007426	0.223051
MIZORAM	0.003502	0.17569
NAGALAND	0.094087772	0.569515728
ORISSA	0.004718	0.86615
PONDICHERRY	0.002572	0.132647
PUNJAB	0.003292	0.171327
RAJASTHAN	0.017958	0.311766
SIKKIM	0.003483	0.238426
TAMIL NADU	0.000791	0.073321
TRIPURA	0.001896	0.17569
UTTAR PRADESH	0.031211	0.438468
UTTARANCHAL	0.015348	0.346844
WEST BENGAL	0.001631	0.10002
INDIA	0.009335	0.242556

Source: ASER 2013, Compilation Self

Table V : Inequality of Opportunity (Circumstance: Availability of Electricity) in Reading skills Across Major states of Rural India (2013)

STATES	PEARSON CRAMER INDEX	OVERLAP INDEX
ANDHRA PRADESH	0.00267684	0.08265189
ASSAM	0.011150523	0.230459886
BIHAR	0.005731937	0.161425721
CHATTISGARH	0.004121683	0.082425718
GUJARAT	0.004030745	0.075958881
HARYANA	0.006925476	0.147402664
HIMACHAL PRA- DESH	0.002404519	0.113214252
JAMMU & KASHMIR	0.003360258	0.120303328
JHARKHAND	0.003468936	0.130001945
KARNATAKA	0.001495002	0.072913377
KERALA	0.005888555	0.236375079

MADHYA PRADESH	0.003970747	0.103495389
MAHARASHTRA	0.005388022	0.099962247
MANIPUR	0.00337314	0.148729175
MEGHALAYA	0.009675302	0.168739772
MIZORAM	0.012719425	0.2274949
NAGALAND	0.002035959	0.079593754
ORISSA	0.008126723	0.18835715
PONDICHERRY	0.012734819	0.120859893
PUNJAB	0.004334357	0.116255643
RAJASTHAN	0.011174324	0.201616999
SIKKIM	0.005339052	0.22123558
TAMIL NADU	0.002580285	0.118649186
TRIPURA	0.010518215	0.194311781
UTTAR PRADESH	0.0109411	0.235991925
UTTARANCHAL	0.006351049	0.153278948
WEST BENGAL	0.011287249	0.224570056
INDIA	0.011764377	0.235595166

Source: ASER 2013, Compilation Self

Table VI : Inequality of Opportunity (Circumstance: Availability of Electricity) in Mathematical Abilities Across Major states of Rural India (2013)

STATES	PEARSON CRAMER INDEX	OVERLAP INDEX
ANDHRA PRADESH	0.00202969	0.058136176
ASSAM	0.010472679	0.26701441
BIHAR	0.006496668	0.188869999
CHATTISGARH	0.002806849	0.089349298
GUJARAT	0.002569071	0.067940401
HARYANA	0.005483814	0.131577859
HIMACHAL PRADESH	0.001229071	0.117188114
JAMMU & KASHMIR	0.004359023	0.151002069
JHARKHAND	0.004252017	0.143842188
KARNATAKA	0.000857686	0.057113521
KERALA	0.003114874	0.137480377
MADHYA PRADESH	0.003838573	0.113142182
MAHARASHTRA	0.004632961	0.121858057
MANIPUR	0.00389843	0.192678652
MEGHALAYA	0.009575881	0.224247503
MIZORAM	0.007572604	0.213483589
NAGALAND	0.001057162	0.044248062
ORISSA	0.009638397	0.240283558
PONDICHERRY	0.010798322	0.135135135

PUNJAB	0.001787956	0.072050063
RAJASTHAN	0.013826354	0.225446998
SIKKIM	0.004530401	0.144069005
TAMIL NADU	0.001182157	0.084631061
TRIPURA	0.007206891	0.191645988
UTTAR PRADESH	0.015078548	0.265917737
UTTARANCHAL	0.007560378	0.185355911
WEST BENGAL	0.011314148	0.240481582
INDIA	0.011799558	0.247936396

Source: ASER 2013, Compilation Self

V.Conclusion

This exercise has investigated whether the inequality of opportunity in the educational context in India affect its outcome at the elementary level in the major states of rural India. The study discussed the major structural models established in the literature to estimate inequality of opportunity. The empirical estimates are based on Pearson-Cramer Index and Overlap index. The study is the first of its kind on utilising ASER data to explain the existence of inequality of opportunity in academic ability. The study has very limited choice of circumstance variables, given the data availability if caste, religion, birth order and place of birth could be included then the value of the index would get magnified. An incomplete research question that could be explored further includes obtaining inferences between inequality of opportunity in education and political intervention, development efforts and health condition of the children. To remove unfair inequality of opportunity in elementary education the role of public policy is unanimously recognized. Himachal Pradesh is a model state as far action public action in removing educational disparities is concerned. The state ensured equal access to educational services to all her children and ensured equal conditions for deriving benefits from these services.

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