

Incidence and Intensity of Academic Deprivation among Children in India

Brajesh Kumar*

Abstract

Reading, writing and numeracy are the foundational academic skills at the elementary level. However, a large proportion of children in elementary education are deprived of foundational academic skills. The objective of this paper is to measure the incidence and intensity of “foundational academic deprivation” (FAD) among children and develop ‘foundational academic deprivation index’ (FADI). The data for this paper has been taken from a sample of 11360 children from the ‘India Human Development Survey – II, 2011-12’. FADI has been constructed using Alkire-foster methodology using three indicators – reading, writing and numeracy. The index thus constructed is disaggregated according to key socio-demographic variables to trace FAD among children. The results indicate that 53.62 percent of children in India were deprived of foundational literacy and numeracy. They were on an average deprived in 88.24 percent indicators, and their FADI was 0.4732. Of the three indicators, children were more deprived in writing and numeracy than reading. There also exist widespread inequalities in academic deprivation according to key socio-demographic variables like public-private schools, social groups, residence, wealth quintile and level of education of adult members in the household.

Keywords: Children, Foundational academic deprivation, Incidence, India, Intensity.

Introduction

Primary education is the first compulsory stage of mass education. However, it has failed to promote learning among children in India. Schools generally demean marginalize children (Fine 1991; Brown & Rodriguez). Improving primary education is the central focus for governments in several countries including UNESCO’s and the Sustainable Development Goals, which include safeguarding inclusive, equitable and quality education (UNESCO, 2008; United Nations, 2013).

* Assistant Professor, Department of Sociology, Babasaheb Bhimrao Ambedkar University, Lucknow, India

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Inequality in access to education has been a matter of central concern in academics (Halsey, Floud and Anderson 1961).

India has achieved notable upsurges in school attendance. Yet the academic performance of students remains abysmally low. Nationally, there exist substantial differences in reading and numeracy among the children from different caste, ethnic and religious backgrounds (Desai, Adams & Dubey, 2008).

Gender differences also exist in elementary education. About half of the world's elementary school-aged girls, who do not go to school, live in Sub-Saharan Africa and about one quarter live in South Asia (World Bank 2011). In India, of all the elementary school-aged children who do not go to school, the majority (56 percent) are girls (UNESCO, 2005).

Social class inequality in schools has also been documented; students of higher social class are likely to have higher performance in academics (Andersen & Hansen, 2012). This inequality arises because of the distance between the lower working-class culture and the 'legitimate' culture [of upper class] that dictates the school system; children of privileged class indoctrinated these cultural forms, and have the maximum cultural capital and hence have the higher academic performance (Bourdieu and Passeron, 1977; Bourdieu 1996).

Quality education must be provided to all children with a particular focus on marginalized social groups. There have been major policy developments and changes in Indian education since 1991. Yet, there is persistent evidence that a large share of young people is at risk of educational disadvantage. Since 1991 the private sector has entered the educational market in India. Simultaneously, public schools are gradually falling short of parental expectations creating a further challenge for the inclusive education system at the elementary level. Foundational literacy and numeracy is a prerequisite to learning as conceived by experts and policymakers. However, various studies expose that a large proportion of children in elementary education are deprived of foundational academic skills of reading, writing and basic numeracy. The objective of this paper is to trace the incidence and intensity of inequality among children in terms of 'foundational academic deprivation index' (FADI).

Reading, writing and numeracy are taken as the best measure child learning at the elementary school level. These three dimensions are analyzed separately to assess child's learning. The multidimensional nature of foundational academic learning (FAL) is itself a challenge to measure "foundational academic deprivation" (FAD). Incorporating the multidimensionality of FAL for creating a single index may be very significant in understanding patterns of FAD. Creating such an index is a challenging task. The objective of this study is to put forward a

multidimensional index for measuring FAD based on the deprivation experienced by children on three dimensions of FAL. The Alkire-Foster method (Alkire, Foster, Seth, Santos, Roche, & Ballon, 2015) is used to identify children that are multidimensionally deprived of FAL. After that adjusted headcount ratio of FAD (M) is calculated which is referred to as a FADI. This method gives a scientific basis for measuring and monitoring FAD.

Data Source and Variables

The data for this paper has been taken from a sample of 11360 children from the 'India Human Development Survey – II, 2011-12'. This is a national survey of 42152 households including 204568 individuals. It also contains data of children aged eight to eleven regarding reading, writing and numeracy. FADI is a composite index consisting of three indicators – reading, writing and numeracy. FADI has been constructed using Alkire-foster methodology. The index thus constructed is used to measure the prevalence and depth of academic deprivation among children. Alkire-Foster methodology is a promising approach to measure poverty in terms of deprivations. This study extends the Alkire-Foster methodology to measure FADI in India. All three indicators have been equally weighted. This methodology also has the advantage of measuring the relative contribution of different indicators to academic deprivation.

Nine variables have been used in this study. Three critical variables correspond to indicators used in measuring FAD. These are: reading, writing and numeracy as described in Table 1. Further, six socio-demographic variables used in this study are: school type (public or private), gender (male or female), social group, highest adult education in household, and wealth quintile. School type takes two values: public and private; gender takes two values: male and female; residence takes two values: rural and urban; the social group is divided into five categories: forward caste (FC), other backward class (OBC), scheduled caste (SC), scheduled tribe (ST) and Muslim; Highest level of adult education in the household takes four values: no education, elementary education, secondary education and higher education. Finally, the wealth index shows the level of economic status and carries five categories: poorest, poorer, middle, richer and richest.

The Alkire-Foster Methodology

Alkire-Foster methodology is a promising approach to measure poverty. However, it has the potential to measure many other kind of deprivations as well. This study uses the Alkire-Foster methodology to develop FADI by identifying deprivations in three dimensions: reading, writing and numeracy.

Based on deprivation cutoff all children were assigned zero or one score in each of the three dimensions. Deprived children are given score one and non-deprived zero. Each dimension is equally weighted, i.e. 1/3.

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In this way, total weights of all the seven indicators is equal to one i.e. $\sum_{j=1}^3 w_j = 1$. Dimensions of their weights and deprivation cutoff are given in Table 1.

The Sum total of the weighted score of each child on all dimensions represents their deprivation score. Since each dimension is equally weighted the maximum possible deprivation score of any respondent can be one and minimum zero. A zero deprivation score means the child is not deprived in any of the dimensions and a deprivation score of one means the respondent is deprived in all the dimensions. Here deprivation cut-off is applied to identify multidimensionally deprived children. In this study, a deprivation cut off of greater than 0.33 is applied. So a child is multidimensionally deprived of FAL if their score is greater than 0.33. Those children whose score is less than or equal to 0.33 are censored i.e. they are not considered multidimensionally deprived of FAL. Thereafter this study focus on only those children who are multidimensionally deprived of FAL.

Table 1: Dimensions, indicators, weight and deprivation cut off

Dimensions	Weight (w_j)	Deprivation cutoff
Reading	1/3	Not able to read short paragraphs and stories
Writing	1/3	Not able to write sentence without mistake
Numeracy	1/3	Not able to perform subtractions and division

The headcount ratio, H , is the proportion of children multidimensionally deprived of FAL. If q is the number of children who are multidimensionally poor and n is the total child population then the multidimensional headcount ratio or incidence H is given as:

$$H = \frac{q}{n}$$

But this measure of incidence violates *dimensional monotonicity* (Alkire & Foster, 2011a). Dimensional monotonicity requires that if a multidimensionally deprived child who is not deprived in all indicators, becomes deprived in an additional indicator, then FAD should increase. This means that H is not a good measure of FAD because the increase in deprivation in an additional indicator does not change H . To overcome this limitation another measure, intensity (A), is used which takes account of the extent to which the deprived child is deprived in multiple dimensions. After that *adjusted headcount ratio* (M) is measured. The intensity (A) of FAD is the weighted average

deprivations among multidimensionally deprived children. To calculate A , deprivation scores of multidimensionally deprived children are summed and divided by the total number of multi-dimensionally deprived children and given as:

$$A = \frac{\sum_i^q c_i}{q}$$

where c_i is the deprivation score of the i th multidimensionally deprived child.

The deprivation score c_i of the i th multidimensionally deprived child can be expressed as the sum of the weights associated with each indicator j ($j= 1, 2, \dots 7$) in which child i is deprived, $c_i = c_{i_1} + c_{i_2} + \dots + c_{i_7}$.

The adjusted multidimensional FAD (M) value is the product of two measures, the incidence (H) and the intensity (A) and given as:

$$M = H \cdot A = \frac{\sum_i^n c_i}{n}$$

M refers to the proportion of FAD that multidimensionally deprived children in a society experience as a share of the deprivations that would be experienced if all children were deprived in all dimensions.

Subgroup decomposition of M is used for analyzing FAD by caste, religion, level of education, wealth index and residence. Population subgroup decomposability allows understanding and monitoring adjusted headcount ratio of the subgroup and comparing them with the aggregate M . So if there are m subgroups then:

$$M = \sum_{i=1}^m \left(\frac{n_i}{n} \right) (M_i)$$

Where M_i is the adjusted headcount ratio of i^{th} subgroup (S_i). And the contribution of i^{th} subgroup to the overall adjusted headcount ratio is given as follows:

$$S_i = \left(\frac{n_i}{n} \right) \left(\frac{M_i}{M} \right)$$

The adjusted FAD also satisfies the dimensional breakdown and hence can be used to analyze the dimensional composition of M . So the contribution of dimension j (D_j) to the overall adjusted headcount ratio is given as follows:

$$D_j = w_j \frac{h_j}{M}$$

Where w_j is the relative weight attached to j^{th} indicator and h_j is the censored headcount ratio of the j^{th} indicator.

As mentioned above a child is identified as multidimensionally deprived of FAD if the weighted sum of deprivation is below a certain measure and here this measure is 0.33. The selection of this cutoff lies

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Results

The result indicates that for a cutoff of $c_i > 0.33$ we find that:

$$H = 0.5363, A = 0.8824 \text{ and } M = 0.4732$$

So the incidence of FAD is 53.63 percent. In other words, about 53.63 percent of children in India are multidimensionally deprived of FAD. The intensity or the average FAD score among the deprived children is 88.24 percent. Further, the adjusted headcount ratio of FAD or FADI is 0.468 i.e. the proportion of FAD that deprived children in India experience as a share of the deprivations that would be experienced if all children were deprived in all indicators. Disaggregating the adjusted headcount ratio down by dimensions reveals the underlying structure of deprivations in FAD. Table 2 indicates the dimension wise composition of FAD.

Table 2: Dimension wise composition of FAD

Dimensions	Percent contribution
Reading	31.1
Writing	34.5
Numeracy	34.4

It is observed that reading contributes 31.1 percent to FAD, writing contributes 34.5 percent and numeracy contributes 34.4 percent. So children are more deprived in writing and numeracy than reading. The results provide important policy insights. Policy formulation and implementation must aim at reducing deprivation in writing and numeracy.

Subgroup Decomposition

Now let us see how the subgroup decomposition property of Alkire-Foster methodology allows to understand the contribution of subgroups to overall FAD.

Table3: Subgroup decomposition of FAD.

Group/ subgroup	Population share in percent	<i>H</i>	<i>A</i>	<i>M</i>	Percent contribution to <i>M</i>
Type of school					
Public	63.5	0.608	0.894	0.543	73.0
Private	36.5	0.411	0.852	0.351	27.0
Gender					
Female	48.2	0.557	0.884	0.493	50.1
Male	51.8	0.517	0.881	0.455	49.9
Residence					
Rural	72.6	0.588	0.892	0.525	80.5
Urban	27.4	0.398	0.845	0.336	19.5
Social group					
FC	16.2	0.361	0.842	0.304	10.4
OBC	37.0	0.522	0.882	0.461	36.0
SC	23.2	0.602	0.897	0.540	26.5
ST	7.7	0.671	0.906	0.608	9.9
Muslim	14.6	0.607	0.878	0.533	16.5
Other	1.2	0.332	0.782	0.260	0.7
Wealth index					
Poorest	21.2	0.760	0.931	0.708	31.7
Poorer	20.7	0.633	0.895	0.566	24.8
Middle	22.5	0.520	0.860	0.448	21.3
Rich	18.6	0.429	0.838	0.360	14.1
Richest	17.0	0.277	0.813	0.225	8.1
Highest Level of adult education in household					
No education	21.4	0.736	0.926	0.681	30.8
Primary Education	33.0	0.613	0.883	0.541	37.7
Secondary education	32.6	0.442	0.848	0.375	25.9
Higher education	13.0	0.249	0.821	0.205	5.6

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A review of previous works indicates that there is wide variation in learning according to key variables. Let us focus on some key variables. All these variables are categorical and hence allows for subgroup decomposition of FAD. Table 3 gives the subgroup decomposition of FAD on some key socioeconomic variables. Let us take the case of social group.

When comparing FADI, one can find that FC and other children perform better, followed by OBC, Muslim and SC. ST children have the highest FADI. But it is interesting to note that OBC children contribute the highest (36.0 percent) to the overall adjusted headcount ratio and ST children contribute only 9.9 percent. This is because of the largest share of the population of OBC children (37.0 percent) and a low share of ST population (7.7 percent). The pattern of FAD will be more clear if we compare the population share in percent of each social group with their percent contribution to the FADI or adjusted headcount ratio of FAD (M).

Percent contribution to FADI for FC (10.4) and OBC (36.0 percent) is less than their population share in percent 16.2 and 37.0 respectively. However, percent contribution to FADI by SC (26.5), ST (9.9) and Muslim (16.5) is more than their population share in percent 23.2, 7.7 and 14.6 respectively. Also, the actual FADI among ST is maximum (0.608), and minimum among others. Similarly, we can understand the pattern of FAD according to other socio-demographic variables from the Table.

Conclusion

Alkire-Foster methodology is an effective approach to measure FAD. It gives a systematic and scientific basis for understanding patterns of FAD. The results show that there is a high incidence and intensity of FAD in India. About 53.62 percent of children in India are deprived of reading, writing and numeracy. They are on an average deprived in 88.24 percent indicators, and their FADI is 0.4732. Of the three indicators, children are more deprived in writing and numeracy than reading, Study also finds widespread differences in FAD according to key socio-economic variables like type of school, gender, residence, social group, wealth index and the highest level of adult education in household. This methodology is also helpful to measure the dimensional composition and their contribution to FAD thereby delineating the underlying structure of FAD. The study reveals that the composition of FAD is different for different subgroups of children. This provides useful policy insights. Overall, the FAL in India is far from satisfactory. Subgroup composition, the dimensional composition of FAD may be given special emphasis in policies related to elementary education in India.

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