

# Literacy Externality and Its Relevance- A Case Study of Bihar

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## Abstract:

Literate member in a society can be considered as a public good which is able to create positive externality to the illiterate members, by sharing the benefits of their literacy. Within a household with literate member(s), illiterate members will have access to information and they can complete the works that requires merely the literacy skill alone. This paper aims to study the relevance of literacy externality in measuring aggregate literacy rate in a more realistic way distinguished from the conventional crude measure of literacy like literacy rate, especially in those states like Bihar, where literacy rate is very low.

**Keywords:** Literacy externality, Effective literacy, Proximate illiterates, Isolated illiterates

## 1. INTRODUCTION:

It is said that what gets measured gets noticed. The conventional indicator of measuring literacy is the literacy rate, indicating the proportion of adult population of a community who are literate and, therefore, the distribution of literates across households is ignored. This distribution is important since the illiterate people living in close proximity of literate person may be able to get benefit from the literate(s) in many directions. With an objective to take into account such positive externalities of literacy, Kaushik Basu and James E. Foster(1998) have suggested an alternative measure of literacy, called effective literacy, by introducing two different concepts of illiterates, namely proximate illiterate and isolated illiterate. To be specific, effective literacy takes into account the intra-household externality arises from the mere presence of a literate member within a family, thereby distinguishing the illiterate population into two broader sets, those living with at least one literate member within the family (termed as proximate illiterate) and those living even without that in their family (termed as isolated illiterate).S. Subramanian(2004) has further extended the concept to accommodate the possibility that the externality enjoyed by the proximate illiterates from the presence of a literate among them may positively depend on the proportion of literates within the household and, therefore, may vary from one family to another. As is mentioned above, the distribution of literacy in the society gives rise to two kinds of scenarios. First, the entire population is distributed in only two types of families: families with all the members are literate and families with all the members are illiterates. Second, there are some families, if not all, having at least one literate member. Although the conventional measure of literacy indicates the proportion of adult literates in both the cases to be the same, the second case is capable to generate some positive externality among its illiterate members from the mere presence of some literate members among them. For instance, a literate person can read and write on behalf of illiterate members or

illiterate members and can provide important informations which can further help in improving their standard of living.

In a country like India, literacy is the main component for social and economic growth.. Over the years, India has changed socially, economically, and globally. After the 2011 census, literacy rate India 2011 was found to be 74.04%. Though this seems like a very great accomplishment, it is still a matter of concern that still so many people in India cannot even read and write. The numbers of children who do not get education especially in the rural areas are still high. Though the government has made a law that every child under the age of 14 should get free education, the problem of illiteracy is still at large.

Now, if we consider female literacy rate in India, then it is lower than the male literacy rate as many parents do not allow their female children to go to schools. They get married off at a young age instead. Though child marriage has been lowered to very low levels, it still happens. Many families, especially in rural areas believe that having a male child is better than having a baby girl. So the male child gets all the benefits. Today, the female literacy levels according to the Literacy Rate 2011 census are 65.46% where the male literacy rate is over 80%. The literacy rate in India has always been a matter of concern but many NGO initiatives and government ads, campaigns and programs are being held to spread awareness amongst people about the importance of literacy. Also the government has made strict rules for female equality rights. India literacy rate has shown significant rise in the past 10 years.

The lowest literacy rate in India is seen in the state of Bihar. Bihar has a total literacy rate of 63.82%. Overall Males and Female literacy rate is 73.39% and 53.33% respectively. Total Rural literacy rate in Bihar is 43.9%. In rural areas of Bihar, Males and Female literacy rate is 57.1 and 29.6 respectively. Total Urban literacy rate in Bihar is 71.9. In urban areas of Bihar, Males and Female literacy rate is 79.9 and 62.6 respectively. Patna has highest Literacy Rate of 63.82% followed by Rohtas (62.36%) and Munger (60.11%). Kishanganj has lowest Literacy Rate of 31.02% followed by Araria(34.94%) & Katihar (35.29%). Even though males have higher literacy levels in most parts of India, male literacy level in Bihar is 73.39% which is less than overall literacy level of India (74.04%).

There are many reasons for why Bihar has lowest literacy rate. Most important reason is poverty and rising population. Illiterate parents and parental attitudes towards education is ignorant which stops children to get proper education. Also there is very high gap between male and female literacy rate in Bihar.

## 2. Literature Review:

Kaushik Basu and James E. Foster (1998) in their paper “On Measuring Literacy” advanced the new measure of literacy, i.e., effective literacy rate. Basu and Foster present a new approach to evaluating the level of effective literacy in a region or country, one that takes into account the presence in a household of a literate person. They characterize the approach and give an empirical illustration of its use. They contend that literate household members generate a positive externality—a kind of public good—for illiterate members. They believe their new measures will be superior to R in predicting or explaining other achievements that depend on literacy. **Subramanian (2004)** in his paper “Measuring literacy: some extensions of the Basu-Foster framework” extends the Basu-Foster idea in his direction. Sabramanian assumes that the magnitude of such externality rather positively depends on the proportion of literates within a family. Instead of assuming a literate member as a public good within the family, he brings the concept of rivalry in extracting externality from the literate member(s) by the illiterates in the family. If there are too many illiterates in the family, each will get less externality benefit from the

literate(s). Similarly if there is relatively more number of literates within the family, they can provide more time and effort for percolating benefits to the illiterates and, as an obvious consequence, illiterates in such a family will be able to extract more externality benefit. **Paola Maria Valenti** in his article “Should We Be Concerned About the Distribution of Literacy Across Households? An Axiomatic Investigation (2001)” proposed a literacy measure that takes into account the externality generated by the presence of literates in the household. He explained that such externality is increasing in the number of literates in the household, and has characteristics of rivalry in consumption, and therefore is a function of the distribution of literates and illiterates in the household. **Diganta Mukherjee and Manash Ranjan Gupta (2003)** in their article “Measures Of Effective Literacy: A Theoretical Note”, discussed the measurement issue of intra-household externality of literacy. They considered the determinants of externality that are several attributes of the members of the household such as age, sex, level of education etc. **L. Benham, (1974)** finds evidence of the husband’s earnings being positively correlated with the wife’s schooling. But he did not deal with the potential selective sorting that may result from marriage, thus it remains unclear whether that found effect results directly from educational externality or is the outcome of marital sorting. **Bryan Maddox & Lucio Esposito** in their paper “Literacy inequalities, mediation And the public good: a case study of physical proximity and social distance in Nepal” (2012) explains the sociological concept of social distance to examine how social stratification impacts the distribution of literacy and how it is shared within and across caste-based groups. . He observed significant inequalities of educational achievement and literacy. He used the term ‘literacy mediation’ for the externality generated by literate people. His study explains that literacy mediation is a widely spread phenomena and it is not restricted to the people who have lowest levels of education and literacy. His study also suggests that apparently women receive more literacy mediation than men. In his paper he has only stated that people receive more literacy mediation from the same caste than outside the caste. But he failed to explain the reason behind this, whether it is due to the proximity with the literate members or some other factors.

### 3. Research Objectives / Aims:

- To estimate district-wise effective literacy rate of Bihar.
- To examine the impact of literacy externality on aggregate literacy rate.

### 4. Research Method:

Basu and Foster (1998) first developed a literacy measure, called effective literacy rate, which took into account the externality aspects of literacy. Later various other versions of such new measures of literacy emerged. The common element in these new measures is that whereas in calculating the standard literacy rate a literate is assigned a score of ‘1’ and an illiterate given a score of ‘0’, in the new measures there are intermediate scores as well to account for proximate literacy. Thus, proximate literates are assigned values between 0 and 1 to account for the fact that these are neither fully literate nor totally illiterate. This value is assigned depending on one’s assessment of the value that should be given to the externality of literacy on the proximate literate. One could, for example, assume that a literate person transfers 50% of the benefit of her literacy to the illiterates in her house. In such a case, if there is at least one household member who is literate, a value of ‘0.5’ would be assigned to each of the proximate literates in the household

So, Effective literacy rate, i.e., E.L.R., can be calculated by using the given formula given by Basu and Foster (1998):

$$E.L.R. = R + \alpha P;$$

Where, R is traditional literacy rate, P is proximate illiteracy rate and  $\alpha$  is a measure of externality of literacy. As mentioned earlier the value of  $\alpha$  lies between 0 and 1. When  $\alpha = 0$ , there is no isolated illiteracy and the value of e-literacy is the same as that for traditional literacy.

The working hypothesis for the estimation of E.L.R. would be:

$$H_0 = E.L.R. \leq R$$

$$H_1 = E.L.R. > R$$

This hypothesis is derived from the assumption that E.L.R. which includes proximate illiterate is higher than the traditional measure of literacy, i.e., R. If the estimation result supports our assumption then we will reject our null hypothesis, i.e.,  $H_0$  and our study will be significant.

**Data source for estimation-** We have estimated district wise E.L.R. for Bihar using recent data and our data source is secondary data which has been collected from Census 2011 of India. We have taken district wise data for the total population, total number of households with no literate person and total number of literates.

Later on, we have estimated district-wise gender-sensitive E.L.R. by calculating effective literacy rate for both males and females of Bihar. This estimation assumes that female generates more externality than male members of the household. Basu and Foster(1998) also indicated that their measure of effective literacy can easily be extended incorporating gender-sensitive effective literacy measure assuming that the literate females generate stronger externality than males, keeping in mind the usual stronger commitment towards family and social bonding by the female than male. So one can easily make a distinction between m-proximate illiterate and f-proximate illiterate. Since females generates stronger externality,  $0 < \alpha_m < \alpha_f < 1$ . Therefore the gender-adjusted measure of effective literacy can be denoted as

$$L^{**} = R + \alpha_m P_m + \alpha_f P_f$$

Where  $P_m$  and  $P_f$  are the proportion of proximate male and female illiterates respectively.

### 5. Discussion and Analysis:

For the estimation of effective literacy rate of all the districts of Bihar we have calculated literacy rate, proximate illiteracy and isolated illiteracy by taking recent census 2011 of India. Basu-Foster measure of E.L.R. has been used in the calculation. Literacy rate OF Bihar according to traditional literacy measurement is 63.82% and when we calculate the E.L.R. it increased to 67.44%. This result supports our hypothesis that  $E.L.R. > R$ , hence we can reject the null hypothesis. Here value of externality  $\alpha$  has been arbitrarily taken as 0.25. When value of  $\alpha$  is increased to 0.75 E.L.R. increases to 74.69%. This result suggests that when externality received by illiterate member increases E.L.R. also increases. Same trend can be observed when E.L.R. of all the districts of Bihar is calculated.

**Table (i): Estimated Effective Literacy Rates of Some of the Districts Of Bihar**

Area	Literacy Rate, R	Effective L.R.(A=0.25)	Effective L.R.(A=0.75)
<b>Bihar</b>	63.821541	67.4458804	74.6945594
Rohtas	75.588145	80.34976368	89.873002

Patna	72.474613	78.94202724	91.8768553
Munger	73.298899	75.84456402	80.9358931
Gaya	66.346814	73.34967041	87.3553828
Darbhanga	58.262969	61.1943139	67.0570035
Sheohar	56.003699	56.43253157	57.2901962
Purnia	52.492541	54.9864561	59.9742863

Source: Compiled by the author.

Above table shows the estimated result of literacy rate and effective literacy rate of some districts of Bihar. Rohtas has the highest literacy rate (75.5%) and Purnia has the lowest literacy rate (52.5%) among all the districts of Bihar. Calculated effective literacy rate of both the districts are 80% and 54.9% respectively, which are apparently greater than the traditional literacy rate. When the value of externality coefficient increases from 0.25 to 0.75, then the E.L.R. of both districts increases to 89.8% and 59.9%.

## 6. Results / Findings:

**Table (ii): Externality-adjusted effective Literacy Rates of some of the Districts Of Bihar**

Area	Effective L.R.(A=0.25)	E.L.R.* = E.L.R.(1-I)
<b>Bihar</b>	<b>67.4458804</b>	<b>52.82287</b>
Rohtas	80.34976368	76.03869
Patna	78.94202724	77.63496
Munger	75.84456402	63.31622
Gaya	73.34967041	69.21146
Darbhanga	61.1943139	42.82889
Sheohar	56.43253157	32.57231
Purnia	54.9864561	34.34905

Source: Compiled by the author.

A simple empirical illustration can be made employing the same data set on literacy presents district-wise estimates of the quantities E.L.R. and E.L.R\*, where E.L.R\* is the externality-adjusted effective literacy rate (Subramanian,2004) . As we can be seen from the table, E.L.R\* is nearly 14 percentage points behind EL.R. for Bihar as a whole: an aggregate literacy rate of 63% plummets to a sadly undistinguished 52% when literacy is measured by the ‘externality-adjusted’ rate E.L.R\*. The adjustment is less severe for the ‘high E.L.R’ districts than it is for the ‘low E.L.R’ districts: this is not surprising, since R and I are in general negatively correlated. The outcome of this fact is that inter-district disparities in literacy attainment are likely to be more pronounced when literacy is measured by E.L.R\* than when it is measured by E.L.R. This is indeed borne out by a simple computation: the squared coefficient of variation for the E.L.R\*series, at0.236021 is well over twice as high as it is for the E.L.R series, at 0.109134.

**Table (iii): Ranking of Districts according to new measure of literacy and the traditional measure of literacy**

Effective Literacy Rate ( $\alpha=0.25$ )	Effective Literacy Rate ( $\alpha=0.75$ )	Traditional Literacy Rate
Rohtas (1)	Rohtas (2)	Rohtas (1)
Patna (2)	Patna (1)	Patna (5)
Munger (6)	Munger(12)	Munger (2)
Gaya (10)	Gaya(4)	Gaya (15)
Darbhanga (30)	Darbhanga (30)	Darbhanga (28)
Sheohar (35)	Sheohar (38)	Sheohar (32)
Purnia (38)	Purnia (36)	Purnia (38)

Above table reveals that district-wise variation in P is sufficient to leads to a re-ranking of states using E.L.R. instead of L.R. Ranking of districts changes when effective literacy rate is calculated. Some districts like Munger, Darbhanga and Sheohar goes below whereas districts like Patna and Gaya goes above in ranking of E.L.R.. Rohtas’s ranking remains same since the percentage of the proximate illiterate (namely  $P / (P + I)$ ) is certainly higher in the most literate district. But the lower absolute number of illiterates restricts the magnitude of P and hence the potential importance of the intra-household externality in evaluating literacy in high literacy regions. In this sense, our effective literacy approach may prove to be less important for assessments in such districts. Female is greater than that of male.(Basu-Foster 1998). So in the calculation of gender-adjusted effective literacy  $\alpha$  for male is taken as 0.25 and 0.45 for female.

**Table(iv): Comparison of R, E.L.R. & Gender-adjusted E.L.R.**

Area	Literacy Rate, R	Effective L.R.( $A=0.25$ )	Gender-adjusted E.L.R.
<b>Bihar</b>	<b>63.821541</b>	<b>67.4458804</b>	<b>74.9</b>
Rohtas	75.588145	80.34976368	90.76
Patna	72.474613	78.94202724	92.45
Munger	73.298899	75.84456402	81.11
Gaya	66.346814	73.34967041	87.85
Darbhanga	58.262969	61.1943139	67.18
Sheohar	56.003699	56.43253157	57.28
Purnia	52.492541	54.9864561	59.90

From this table we can compare the results of effective literacy rates. Here it is evident that districts like Rohtas, Munger and Patna with higher female population have the higher effective literacy rates as compared to Sheohar and Purnia where female population is low. The resulting index is a measure of overall achievement which, unlike R, is sensitive to the distribution of these achievements across the two genders. Even when there is no particular concern about gender inequality per se, if it so happens that females are more effective than males in generating literacy externalities in the household, then a general concern for greater effective literacy could translate into a specific concern for greater female literacy.

Indeed, there are many studies which suggest the presence of a gender bias in the technology for creating externalities in the household, and hence that the set of functionings available to an illiterate person by virtue of having access to a literate female is larger than the set available when the only literate in the household is male.<sup>2</sup> The measure of effective literacy can be modified to take this into account.

## 7. CONCLUSION:

From the above analysis, it is clear that by taking into account the proximate and isolated aspects of literacy, the e-literacy measure can provide important information which otherwise may remain hidden under the standard literacy measure. Such information has important implications for devising effective and efficient policies for tackling illiteracy in resource-constrained state like Bihar.

Further refinements to the measure could be effected by bringing in inter-household aspects of the externality of literacy. For example, households of isolated illiterates located can benefit from a literate community, neighborhood or workplace in which they exist or move. These households would be in a better position than isolated households which are part of communities, neighborhoods or work environments where literacy levels are very low.

The traditional measure of literacy, the standard literacy rate, does not account for isolated illiteracy. It is determined simply by taking the ratio of the number of literates to the total population. So one reason why the problem of isolated illiteracy has remained unnoticed and stayed outside the range of public policy is the inability of the standard literacy rate to measure it.

## Recommendation / Suggestions (if any):

These isolated illiterates are in greater need of attention from policy makers. Not only are they more vulnerable and deprived of their freedoms than the proximate literates, but can generate negative externalities on each other and on those outside their household. Moreover, given limited budgets available for education and literacy in states like Bihar, it makes more sense to target literacy policies at isolated illiterates so that by making one person literate in a household of isolated illiterates, the rest of the household could be turned into proximate literates. Overall effective literacy at national or sub-national levels could therefore be enhanced more rapidly within the same resources.

However, such externality is not independent of the other attributes of the literate members of the households, like age, gender, caste, level of education of the already literates, etc. Practically each of them may affect the externality of literacy. Incorporating one or more of them into the measurement of effective literacy will improve such new measure substantially and will be of even greater help in designing educational programmes and other major illiteracy-eradication policies.

## REFERENCES:

1. Anand, S. and Sen, A. (1995), 'Gender inequality in human development: theories and measurement', Human Development Report Office Occasional Paper 19. New York: UNDP.
2. Atkinson, A. B. (1970), 'On the measurement of inequality', Journal of Economic Theory, vol. 2, pp. 244-63.
3. Basu K, Foster J (1998), On measuring literacy. Econ J 108(451): 1733-1749
4. Basu K, Narayan A, Ravallion M (2001), Is literacy shared within households? Theory and evidence from Bangladesh. J Labor Econ 8:649-665

5. Basu Kaushik, James E Foster and S Subramanian (1999): 'Isolated and Proximate Illiteracy and Why These Concepts Matter in Measuring Literacy and Designing Education Programmes', *Economic and Political Weekly*, Vol 35, Nos I and 2, pp 35-39.
6. Benham, L., 1974, Benefits of Women's Education Within Marriage, *Journal of Political Economy* 82(1), S57-71.
7. Bryan Maddox & Lucio Esposito (2013) Literacy inequalities, mediation and the public good: a case study of physical proximity and social distance in Nepal, *British Journal of Sociology of Education*, Vol. 34, No. 2, 243–261.
8. Caldwell, J. C. (1979), 'Education as factor in mortality decline', *Population Studies*, vol. 33, pp. 395-13.
9. Dutta I (2004), Generalized measures of literacy. *Math Social Sci* 48:69-80
10. Gibson J (2001), Literacy and intrahousehold externalities. *World Dev* 29:155-166
11. Iversen V, Palmer- Jones R (2007), Literacy sharing, assortative mating, or what? Labourmarket advantages and proximate illiteracy revisited. *J Dev Stud*
12. Lee T (2007), Benchmarking the effective literacy rate. Center for Analytic Economics Working Paper 07-13, 2007. *Math SocSci*
13. Mishra, S., 2001, Isolated and Proximate Illiteracy; *Economic and Political Weekly*, 36,22, 2003 - 8.
14. Mukherjee, Diganta and Gupta, ManashRanjan (April 2003) 'Measures of Effective Literacy: A Theoretical Note', Working Papers of the Institute for Social and Economic Research, paper 2003-10. Colchester: University of Essex.
15. Subramanian S (2004) Measuring literacy: Some extensions of the Basu-Foster framework. *J Dev Econ* 73:453-63
16. Subramanian, S., 2001, Equity, Efficiency and the Measurement of Literacy; Some Extensions of the Basu-Foster Framework; mimeo, Madras Institute of Development Studies, India.
17. Valenti PM (2002), Should we be concerned about the distribution of literacy across households? An axiomatic investigation, Center for Analytical Economics Working Paper 02-15, October 2002

**Web References:**

1. Census of India 2011: [www.censusindia.gov.in](http://www.censusindia.gov.in)