

Self-report and Test Discrepancy: Evidence from National Literacy Survey in Bangladesh

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ABSTRACT

This paper aims to explore the discrepancy between self-reported and test based literacy estimates. The *Education Watch* national literacy survey data of 2002 were used to do so, where literacy status of a nationally representative sample of 13,145 persons was collected through the above two different methods. The findings revealed that the literacy rate generated through a literacy test was significantly lower than that found through self-report method. At the national level the amount of discrepancy was 9.5 percentage points. The level of discrepancy varied from one group of population to another. Discrepancy was more likely among the primary school educated rural females of age 15-24 years and less likely to never schooled and college educated urban males of age 25 years and above. This shows that literacy assessment through self-report method cannot be equally appropriate for all population. More risk especially due to over reporting occurred among those having some years of schooling. A question of quality of primary education also raised here. Considering the low quality of school education and increased enrolment in Bangladesh this paper suggests for a paper-pencil based literacy assessment rather than oral reporting.

BACKGROUND

Literacy has been used as an indicator of educational attainment of a nation for long. One probable reason might be the immediate impact of the nations educational efforts, which is suppose to be reflected primarily in an increase of their literate population. Literacy may be considered as a consolidated outcome of basic educational efforts. It also helps to compare one nation with another and to prepare league table ranking the nations. Literacy rate is used to calculate education for all development index (EDI) and human development index (HDI) (UNESCO 2004, UNDP 2005).

Literacy is not a fixed phenomenon. The concept as well as the definition of literacy varied over time. Since 1957 to a recent past UNESCO alone has provided a number of definitions. Besides, Freire (1973), Davis *et al* (1990), Freire and Macedo (1987), OECD (1992, 1996) provided various concepts and definitions of literacy. These indicate that there has been a continuous debate on what constitutes literacy and how to define it. However, a UNESCO (1993) definition – “A person is literate who can with understanding both read and write a short simple statement on his [her] everyday life” – is a popular one, but not satisfactory to many.

There are two ways of measuring literacy status of the countries. The most popular one is “reported literacy”, where a single adult person (who is called respondent) reports about the literacy status of each and every person of his/her household or years of schooling completed by them. In such effort, literacy is assessed dichotomously – literate or illiterate. Another more recent way of measuring literacy is “tested literacy”. In this case, each and every person of the households is brought under a rigorous test (both oral and written). Instead of a dichotomous assessment, three to five levels of literacy status of the population is identified (Cambodian Ministry of Youth Education and Sports 2000, OECD 1997). In both the cases, prior selection of definition is a must. It is to be noted that the later way of literacy assessment is more valid than the former one. However, the former one is easier to administer and does not require much time for data collection. On the other hand, development of a valid test is a hard and time-consuming job, and duration of a literacy test depends on the length of the test instrument. In general, literacy test is administered on a sample of population, but household reporting is considered for both census and sample surveys.

Examination of deviation between the literacy rates found in different methods is not a new one. In Lesotho, a small African country, the literacy rate was used to be quoted somewhere in between 60% and 90%, but when a test was conducted the actual literacy rate was reduced to 46% (Ziegahn and Sakoane 1985). UNESCO has assisted some countries to conduct national literacy surveys through testing the population. The literacy survey in Bhutan (2004) showed that the tested rate was 38% lower than the once based on self-assessment. It was about 29% lower in Lao PDR (2001) and 27% in Laos (2004). The discrepancy was higher among the females than the males in Laos (28.6% vs. 25.8%).

In Bangladesh, the national bureau of statistics collects literacy rates at the national, district and sub-district levels. This is done through decennial censuses. Organization like Compulsory Primary Education Implementation and Monitoring Unit also does literacy survey biannually. However, they follow slightly different definitions. The bureau of statistics used a similar definition of literacy for the last three censuses. The definition is “capacity of reading and writing a simple letter in any language.” Both the organizations collect literacy information through reporting of a single member from each household. Different literacy rates were found through above two government sources. Whereas the CPEIMU survey showed the adult

literacy rate as 54.8%, it was 47.5% according to the census bureau (CPEIMU 2003, BBS 2003).

In addition to the above efforts of the government, *Education Watch*, an independent initiative of the civil society organizations in Bangladesh, collects literacy information. *Education Watch* attempted both the ways of literacy assessment. This created an opportunity to see how much literacy rates differ from one method to another. Thus, this paper aims to look at the matching rate between “reported” and “tested” literacy or how accurate is the “reported literacy” with respect to the “tested literacy”. An attempt was also taken to see how such difference vary within various sub-groups of population.

LITERACY ASSESSMENT

In *Education Watch* 2002, the literacy status of the population aged 11 years and above was determined in two ways. Firstly, asking a household representative (who is an adult) to report the literacy status of all members of the household, and secondly, administering a test on the household members. These will be named here in this paper as ‘reported literacy’ and ‘tested literacy’ respectively.

Reported literacy

The principal respondent for the information on ‘reported literacy’ was the household head (major decision maker in the household). In absence of the head, his/her spouse was the second choice. In some cases, an adult person of the household (aged 18 years and above) had to be considered. This respondent provided two major information – age of the household members and literacy status. Sometimes, the respondents took help from other members of the households and even from neighbours. Event calendar was used in determining age. In order to provide literacy status, the respondent gave his/her opinion whether the respective person is literate or illiterate. The definition used in this is similar to that of the census definition – “capacity in reading and writing a letter”.

Literacy test

The definition used in the literacy test was – *possession of skills in reading, writing, and numeracy related to familiar contents and contexts and the ability to use these skills in everyday life in order to function effectively*. Thus, the test contains four essential skill components of literacy – reading, writing, numeracy and application of these skills in practical life situation. Twenty-four question items were in the test – six items in each skill area. The literacy was assessed at four levels viz., literate at advanced level, literate at initial level, semi-literate, and non-literate. Persons having literacy at least at the initial level (50% of total score in the test) were considered as literate. This includes person’s *ability to read and write simple sentences on a familiar context; possessing skills of four basic rules of arithmetic; and limited use of these abilities in a familiar context in life situations*. All people aged 11 years and above found in the above household survey were brought under the literacy test. The test was administered separately to each respondent at his/her premise. A two-member team of test administrators took each test.

THE SAMPLE

A nationally representative sample survey was planned. The whole country was divided into eight strata – six rural and two urban. The rural strata are the rural area of the six administrative divisions and the urban parts are metropolitan cities and municipalities. A four stage sampling strategy was applied – upazila, union (ward for urban), village (mahallah for urban), and household. An adequate sample size for drawing valid conclusions for each stratum with

gender segregation was taken. It was calculated that 786 individual is needed to have a valid estimate with 95% confidence interval and 5% error limit, totalling (786x2x8) 12,288 individuals for the eight strata in the national survey.

The survey covered all the 64 districts in the country. A total of 3,840 households from 268 village/mahallahs were surveyed where 19,705 individuals lived. Of them, 14,274 were 11 years and above, of which 13,145 individuals could be brought under the literacy test (52% females and 48% males). The response rate in literacy test is 92%. Non-response occurred mainly due to unavailability of individuals at home.

A strict quality control protocol was applied for collection and recording of data, assessing responses to the literacy test, and analysis of data. Post enumeration check for selected indicators shows that 60% of the age data matched exactly, 84% with one- year deviation and 94% with two years deviation. The matching rate was nearly 98% for the reported literacy data. Using Spearman-Brown formula (Carmines and Zeller 1997, Ferguson and Takane 1989) the reliability coefficient for the literacy test data was found 0.94. These indicate that the data used in this paper are considerably reliable.

Details of the above-mentioned survey and literacy test including the development of test instrument are available elsewhere (Ahmed *et al* 2003). A total of 95 research assistants (half of which were females) did fieldwork during 11 October to 22 November 2002. They were adequately trained prior to the fieldwork.

MEASUREMENT OF DISCREPANCY

A simple mathematical tool was used in measuring the level of discrepancy. It is nothing but the deviation between 'reported literacy' and 'tested literacy' expressed in percentage. Case to case deviation was calculated first and then transformed it into a percentage distribution. The following formula was used.

$$M_i = R_i - T_i; i = 1, 2, 3, \dots, 13145$$

Where, M_i is the deviation between reported and tested literacy status of the i th individual. It has three values (over reported = 1, correctly reported = 0, and under reported = -1).

R_i is the reported literacy status of the i th individual measuring dichotomously (Literate = 1, Illiterate = 2).

T_i is the tested literacy status of the i th individual decoded dichotomously (Literate = 1, Illiterate = 2).

Since strata population in terms of number of individuals aged 11 and above varies substantially and an equal size was considered in the sample, an appropriate weighting factor (proportion of population in each stratum) was used in order to have pooled estimates (Cochran 1977).

FINDINGS

Before presenting the main findings let us take a look at the literacy rates found independently using the two different methods. The estimated reported literacy rate was 47% at the national level, which significantly ($p < 0.001$) came down to 41.4% when the test was administered (Table 1). This shows that at the aggregate level, over reporting occurred in 5.6% of the cases. The tendency of over reporting was higher for females than males (8.3% vs. 2.8%), with a

difference of 5.5 percentage points. Area-wise, the tendency of over reporting was higher for rural population than the urban population (6.1% vs. 3%), with a difference of 3.1 percentage points. It is to be noted that the difference between the literacy rates found through household survey (reported literacy) and literacy test (tested literacy) was statistically significant ($p < 0.001$) for each of the population groups – males, females, rural population and urban population (Table 1).

Table 1. Literacy rates by methods of assessment and population groups

Assessment type	Males	Females	Rural	Urban	All
Household survey report	50.4	43.9	43.3	66.6	47.0
Literacy test	47.6	35.6	37.2	63.6	41.4
Difference	2.8	8.3	6.1	3.0	5.6
Significance of difference	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$

Let us now move to the main part of the findings. At the national level the proportion of discrepancy was found 9.5% – 7.6% over reporting and 1.9% under reporting (Table 2). This means that the respondents of the household survey correctly reported literacy status (literate or illiterate) for over 90% of the household members. The rate of discrepancy was significantly higher for females than the males – 10.9% for females and 7.8% for males ($p < 0.001$). It was 10% among the rural population and 6.2% among the urban population ($p < 0.001$). The discrepancy rate was higher for females than the males in both the areas. However, the gender gap in discrepancy was higher in rural areas. The highest over reporting was found among the females in rural areas (10.3%) and lowest among the urban males (3%). On the other hand, highest under reporting was observed among rural males (2.6%) and lowest in two groups – females in both rural and urban areas (about 1.3%). All these analyses are provided in Tables 2 and 3.

Table 2. Percentage distribution of various respondent groups by the difference between reported and tested literacy

Population groups	Reported accurately	Over reported	Under reported	Total discrepancy
All	90.5	7.6	1.9	9.5
Males	92.2	5.3	2.5	7.8
Females	89.1	9.6	1.3	10.9
Rural	90.0	8.1	1.9	10.0
Males	91.6	5.8	2.6	8.4
Females	88.4	10.3	1.3	11.6
Urban	93.8	4.6	1.6	6.2
Males	95.2	3.0	1.8	4.8
Females	92.5	6.1	1.4	7.5

Table 3. Rate of discrepancy by area of residence and sex

Area of residence	Sex			Significance (M v F)
	All	Males	Females	
National	9.5	7.8	10.9	$p < 0.001$
Rural	10.0	8.4	11.6	$p < 0.001$
Urban	6.2	4.8	7.5	$p < 0.02$
Significance (R v U)	$p < 0.001$	$p < 0.001$	$p < 0.001$	

Stratum-wise analysis shows that the proportion of discrepancy was highest in rural Barisal division (13.9%) and lowest in metropolitan cities (5.8%) (Table 4). In addition, at least three areas were found where the proportion of discrepancy was higher than the national average. These are also rural divisions – Chittagong (12.5%), Sylhet (11.8%), and Khulna (10.0%). Rate of discrepancy was higher for females than the males in all the eight areas. The highest gap occurred in rural Chittagong division (7.9 percentage points), followed by municipalities (3.7 percentage points). Discrepancy in case of the females of rural Chittagong and Barisal divisions were too high – over 15%. It is surprising to note that the proportion of discrepancy in case of the females of rural Chittagong was much higher (almost double) than their male counterparts.

Table 4. Rate of discrepancy by stratum and sex

Stratum	Males	Females	All	Gap (F – M)
Rural Dhaka division	7.1	8.8	8.0	1.7
Rural Chittagong division	8.0	15.9	12.5	7.9
Rural Rajshahi division	8.0	10.3	9.2	2.3
Rural Khulna division	9.0	11.1	10.0	2.1
Rural Barisal division	12.9	15.0	13.9	2.1
Rural Sylhet division	10.5	11.8	11.2	1.3
Metropolitan cities	5.1	6.4	5.8	1.3
Municipalities	4.6	8.3	6.6	3.7

One may argue that the components of literacy considered for the assessments are not same, which may have influence in the deviation in literacy rates found in two different methods. It is to be mentioned here that in household survey emphasis was given on reading and writing skills, whereas numeracy and application of 3Rs were added in the literacy test. An attempt was made to see how the deviation between reported and tested literacy varies with the increase of skill component in the literacy test (Table 5). The volume of discrepancy increased with the increase of skill component in the literacy test. At the aggregate level, the discrepancy occurred in 7.7% of the cases when only the reading skill was considered, which increased to 7.9% and 8.9% when writing and numeracy skills were added in the test. Such increase in deviation is less than one percentage points among the males and in urban population, and two to three percentage points in other cases. This shows that the influence of number of components is not much on the deviation of literacy rates – less than two percentage points at the national level.

Table 5. Percentage increase of discrepant cases with the increase of assessment areas in the test

Assessment areas	All	Males	Females	Rural	Urban
Reading only	7.7	7.2	8.1	8.1	5.5
Reading + writing	7.9	7.4	8.3	8.3	5.6
Reading +writing + numeracy	8.9	7.7	9.9	9.4	6.0
Reading +writing + numeracy + application	9.5	7.8	10.9	10.0	6.2

Proportion of discrepant cases were analysed against years of schooling of the respondents. An inverse U shape relationship was observed between years of schooling and

discrepancy (Table 6). The tendency of discrepancy was much higher among those having 4-5 years of schooling (30%) followed by those with 1-3 years of schooling (20.6%). It was nearly 10% among those with 6-8 years of schooling and below 4% among those with 9-10 years of schooling. The proportion of discrepancy was below one percent among those having 11 years or more education and never schooled population. The tendency of under reporting was observed only among those having primary level of education (first five years) and never schooled population. No underreporting case was observed among those with at least secondary education. Similar trend was observed when data were analysed by area of residence and sex of the respondents.

Table 6. Percentage of over and under reported cases by years of schooling, area of residence and sex

Years of schooling	All			Males			Females		
	Over	Under	Total	Over	Under	Total	Over	Under	Total
Nil	0.4	0.2	0.6	0.3	0.4	0.7	0.5	0.1	0.6
≤3 years	13.1	7.5	20.6	11.7	9.4	21.1	14.7	5.3	20.0
4-5 years	24.8	5.2	30.0	17.8	7.1	24.9	30.2	3.8	34.0
6-8 years	9.9	0.0	9.9	5.4	0.0	5.4	13.7	0.0	13.7
9-10 years	3.4	0.0	3.4	2.3	0.0	2.3	4.6	0.0	4.6
11+ years	0.3	0.0	0.3	0.3	0.0	0.3	0.7	0.0	0.7

Years of schooling	Rural			Urban		
	Over	Under	Total	Over	Under	Total
Nil	0.4	0.2	0.6	0.4	0.5	0.9
≤3 years	13.3	7.2	20.5	11.0	9.7	20.7
4-5 years	26.5	5.5	32.0	14.4	3.7	18.1
6-8 years	10.8	0.0	10.8	6.1	0.0	6.1
9-10 years	3.8	0.0	3.8	2.3	0.0	2.3
11+ years	0.4	0.0	0.4	0.5	0.0	0.5

We already know that the rate of discrepancy was much higher among those with 4-5 years of schooling. This happened irrespective of sex and area of residence of the respondents. Table 6 shows that discrepancy occurred in case of over a third of the females and a quarter of the males with this level of education. Area wise analysis shows this figures as 32% for rural and 18.1% for urban area. Other interesting feature is that the rate of over reporting was much higher than that of under reporting. Discrepancy occurred in case of a fifth of the respondents with 1-3 years of schooling experience irrespective of sex and area of residence. These may collectively reflect the deviation between peoples' higher expectation from primary education and the actual situation of low quality of such education.

An inverse relationship between age of the respondents and proportion of discrepant cases was observed (Table 7). At the aggregate level, the proportion of discrepant case was 16.5% among those 11-14 years, which reduced to around 11% among those 15-19 years and 20-24 years, and decreased to 6.7% among those 35 years and above. A similar trend was observed when data were analysed separately for males and females, and for rural and urban population. However, the age variation in discrepancy was the least among the urban population.

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Table 7. Percentage of discrepant cases by age

Age (in years)	All	Males	Females	Rural	Urban
11-14	16.5	14.6	18.2	17.8	9.0
15-19	11.1	9.0	12.9	12.1	5.7
20-24	11.5	9.1	13.3	12.3	7.7
25-29	8.3	7.1	9.2	8.9	5.1
30-34	6.8	4.4	8.9	7.2	5.3
35+	6.7	5.9	7.6	6.7	5.6

SENSITIVITY AND SPECIFICITY

Sensitivity of the reported literacy assessment is the proportion of tested literate persons in the reportedly literate population who were identified as literate by the household survey. It is a measure of the probability of correctly identifying a case or the probability that any given case will be identified by household survey. On the other hand, specificity is the proportion of tested non-literate persons who are so identified by the household survey. It is a measure of the probability of correctly identifying a non-literate person through household survey (Last 1988). Sensitivity of the reported literacy assessment was found to be 0.95 and specificity 0.87 (Table 8). This means that the probability of correctly identifying the status of a literate person through the household survey (reported literacy) is higher than the probability of identifying a true non-literate person with the same method.

Table 8. Sensitivity and specificity coefficients by sub-groups of population

Sub-groups of population		Sensitivity	Specificity
Sex:	Male	0.95	0.90
	Female	0.96	0.85
Area:	Rural	0.95	0.87
	Urban	0.98	0.87
Age:	11-14y	0.89	0.77
	15-24y	0.97	0.76
	25y+	0.97	0.91
Education:	Primary	0.85	0.66
	Secondary	1.00	0.00
	Others	0.99	0.99
All		0.95	0.87

Others include never schooled, and college and higher educated population

Sensitivity and specificity coefficients of reported literacy for various sub-groups of population is provided in Table 8. Value of both the coefficients was much lower for those with primary school education. This means that literacy assessment of these people through household survey is least reliable than any other groups of population.

MULTIVARIATE ANALYSIS

In order to predict the probability of discrepancy in literacy rate through household survey (reported literacy) a multiple logistic regression model was established. Four explanatory variables were considered; these are age and sex of respondent, level of schooling completed and area of residence. A step-wise approach was used and the best model was selected through

forward selection and backward elimination of the explanatory variables. The final model took all the four explanatory variables considered. The regression coefficients, their standard errors and the odds ratios are presented in Table 9. It shows that the probability of discrepancy is highest for primary educated rural females of age 15-24 years and lowest for never schooled and college educated urban males of age 25 years and above.

Table 9. Results from the regression analysis predicting the probability of discrepancy in literacy rate

Explanatory variables	Regression coefficient	Standard error	Odds ratio
Sex			
Male	0.00	-	1.00
Female	0.41	0.07	1.51
Area			
Urban	0.00	-	1.00
Rural	0.48	0.10	1.62
Age (in years)			
11-14	0.00	-	1.00
15-24	0.30	0.09	1.34
25+	0.12	0.08	1.12
Education			
Primary	4.06	0.17	57.87
Secondary	2.48	0.18	11.98
Others	0.00	-	1.00
Constant	-5.87	0.21	

Others include never schooled, and college and higher educated population

SUMMARY AND CONCLUSION

Literacy in Bangladesh is assessed mostly through household surveys by asking an individual member about the literacy status of all members of the household (CPEIMU 2003, BBS 2003). The *Education Watch* for the first time conducted a literacy test on a sample of population. This created an opportunity to look at the deviation of literacy rate from one assessment method to another.

Before going to the main issue, let us take a second look at the methodology of the study. At least two flaws could be detected in the methodology part of this study. First of all, literacy rates found using two different definitions were compared. There is a possibility that the deviation in the literacy rates occurred due to variation in the definition of literacy. This is true to some extent. Because, if we consider only reading and writing parts of the literacy test, which makes two definitions closer to each other, the deviation or the rate of discrepancy, at the national level, comes down from 9.5% to 7.9% – a variation of only 1.6 percentage points. Earlier it was thought that this paper would use the test results of reading and writing skills only. However, the idea was cancelled due to such little variation. Secondly, some important information on the characteristics of the respondents of reported literacy are absent in this study. A better analysis could be provided if information on age, sex and education level of the actual respondents (household head or his/her representative) of reported literacy were collected. Report on literacy status of the household members might vary with the variation in the characteristics of the reporter.

Considering the above methodological limitations in mind, this study clearly shows a significant deviation in the literacy rates when different approach of assessment is applied. Deviation occurred approximately to a tenth of the cases, of which about 80% was due to over reporting and rest under reporting. This suggests that the people in general have a tendency to inflate the literacy data when they report about it in the household survey. The analysis also showed that some kind of minimisation in literacy rate also occurs at the aggregate level due to such over and under reporting. For instance, the actual deviation between the two literacy rates at the national level was about four percentage points lower than the proportion of discrepant cases (9.5% vs. 5.6%). This may help in reducing the overall difference between the literacy rates. However, one should remember that the difference between the two literacy rates was statistically significant. Thus, we should be cautious in using and drawing policy conclusions from self-reported literacy rates.

Discrepancy occurred more among the females and the rural population. Two plausible reasons can be mentioned for this. Firstly, due to various constraints at home and in the schools they may attain lower level of literacy skills from the educational institutions than their counterparts (males and urban population respectively) (Ahmed *et al* 1993). Probably, the respondents of household survey did not consider this issue while reporting on literacy. Secondly, due to less demand of literacy skills in daily life especially among the rural females, these people in general get less chance to demonstrate the level of their literacy skills to others. So, the respondents were unaware about the literacy skills of their fellow members in the households. It is to be noted that there was no indication of under-reporting women's literacy skills in the household survey.

The analysis also reflects on the deviation between peoples expectation from primary education, which is the main source of literacy acquisition, and the actual low quality of education at primary level. Of the various groups of population analysed, the highest discrepancy with a major portion due to over reporting was among those educated in primary schools for 4-5 years followed by those with 1-3 years of primary education. These indicate,

despite the expectation that on pursuing primary education for such number of years people would acquire adequate literacy skills, this does not happen in reality. Low quality of primary education in Bangladesh was reflected in other studies also (PSPMP 2000, Nath and Chowdhury 2001). Nearly 10% over reporting was also observed among those with 6-8 years of schooling. Very lower level of discrepancy (below 1%) was counted among those without any schooling or having 11 or more years of schooling – who are nearly 48% of total population.

It is revealed from the regression analysis that discrepancy in literacy is more likely among the primary school educated rural females of age 15-24 years and less likely to never schooled and college educated urban males of age 25 years and above. This as well as the other analyses suggest that literacy estimate from the household reporting cannot be equally appropriate for all population. Primary school enrolment in Bangladesh is increasing over period but not the quality of education (Chowdhury *et al* 2002, Ahmed *et al* 2003). If it continues, household surveys may provide more unreliable estimates of literacy rate in future. In such a situation, paper-pencil based literacy assessment can be a better option than oral reporting. Bangladesh should move towards paper-pencil based test of literacy.

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