

Measures of Inequalities

S.M.I.A. Zaidi¹

If we look at the educational facilities provided in the developing countries of the world we may find that these facilities, in terms of availability of schools, are not evenly distributed across the population, areas or the regions. India being a developing country is no exception to this malady. Despite the fact that during last more than half a century i.e. after the independence, as a result of planned development, tremendous progress has been made in the country in the field of education. From the very beginning after the independence the focus in India has been on providing educational facilities to all sections of population irrespective of their caste, class, sex or place of residence. It is specifically true for elementary education as it is a constitutional directive to the government to provide free and compulsory education to all children of the country till they attain the age of 14 years. However special measures have been taken to facilitate backward sections of population and backward areas to ensure that they get equal opportunities of education. Despite all these sincere efforts it is disappointing to note that we are still running a system of education which note that in India we still have inequities persisting in the field of education. In this regard some prominently evident inequities (also known as disparities) are gender inequities, social inequities, spatial inequities and regional inequities.

The Education Commission (1964-66) accorded great emphasis on the equity aspect of growth of education. The Commission suggested some measures for reducing the disparities and these suggested measures have been endorsed in the National Policy on Education (1968). Further the National Policy on Education (1986), its Programme of action (POA) as well as its modified version of 1992, have shown great concern and given commitment for education for equality. It lays special emphasis on the removal of disparities and suggests measures for equalisation of educational opportunities. The Policy document assured that the objective of equalisation of educational opportunities will be achieved by attending to special needs of those sections of population that have been denied such

¹ Professor and Head, Department of Educational Planning, NUEPA, New Delhi – 110016 (INDIA).

educational opportunities so far. The Part IV of the National Policy on Education (1986) clearly promised equality in education with respect to women, scheduled castes, scheduled tribes, minorities and handicapped.

As a result of endorsement in the NPE and POA about equality of educational opportunities the primary/elementary education, the programmes like District Primary Education Programme (DPEP) and Sarva Shiksha Abhiyan (SSA) have given great emphasis on this aspect. Under these two countrywide programmes one of the important objectives set for all the districts is related to reducing all kinds of disparities in access as well as participation in primary/elementary education. The DPEP talked of reducing all kinds of disparities to less than 5 percent while SSA sets the target of zero disparity at primary level by 2007 and at elementary level by 2010. It may be noted that the goal of universalization of primary education (UPE) or the universalization of elementary education (UEE) cannot be achieved if any kind of disparities persist in the system of education.

In order to realize the goal of equity in education it is important to address the problem of inequality in access i.e. availability of educational facilities. However it may be noted that access of educational facilities may not be seen only in quantitative terms but also in terms of quality of education that is imparted in various type of schools. It is therefore clear that equity does not mean that schools should be provided every where and to every one but the quality of education imparted in various types of schools should be more or less comparable.

Inequities are still persisting in the provision of educational opportunities even at the primary and upper primary level as primary and upper primary schools have not yet been provided to all sections of population and to all the habitations in the country. As per the Seventh All India Educational Survey (i.e. as on 30th September 2002) primary schools/sections have not been provided to cent percent population or habitations within a walking distance of 1 km. Similarly upper primary schools/sections have not been provided to all habitations within 3 kms. walking distance in the country. This is despite the fact that uniform criteria of 1 km. in large and diverse country like India is also questionable as 1 km distance in a metropolitan city has altogether a different meaning than 1 km distance in a remote rural and tribal area or in a hilly terrain. This is because simple distance norm does not take into account either the physical barriers or the transport facilities available at a place for attending school. It is

because of the inequities in access that disparities are found persisting in participation of children living in different areas also. This is one of the reasons that enrolment in rural areas is generally found less when compared to urban areas.

We may take any indicator related to education like literacy rate or enrolment ratio or even retention or dropout rate, the data exhibits all kinds of disparities like inter-state, inter-district, inter-regional or even gender (i.e. male-female) disparities, social (SC-non SC and ST non ST) disparities and spatial (rural-urban) disparities. If we look at the literacy rates of SC rural female and compare it with literacy rate of non-SC, ST urban male it shows the disparity of a very high order at the national level.

The literacy figures for 2001 census are evident that inter-state disparities are of high order in India. The state wise literacy shows that it ranges from as high as 90.92 percent in Kerala to as low as only 47.53 percent in Bihar. For the female population such inter-state disparities are even still more, such as ranging from about 87.8 percent in Kerala to only 33.5 percent in Bihar. Further district wise literacy in 2001 shows inter-district disparities of even higher order than the inter-state disparities. In 2001 the literacy rate of Aizawl district in Mizoram was 96.6 percent while in Pakaur district of Jharkhand it was as low as 30.5 percent. The female literacy rates ranged from 96 percent in Aizawl to just about 18.5 percent in Kishanganj district of Bihar. These are merely a few illustrations to get an idea about the extent of regional disparities prevalent in the country in terms of literacy.

Methods of Measuring Inequalities

By looking at any of the indicators related to education for two groups or regions or for the same group, area or region at two points of time we may get a rough idea about the extent of backwardness of one section, area, or region in comparison with the other. For example, the male literacy rate of the country in 2001 was 75.85 percent and female literacy rate was 54.16 percent, we can see that there was a gap of 21.69 percent points between the male and female literacy. But in case we have to compare this gender disparity in literacy for the year 2001 with that of 1991 when male literacy rate was 63.31 percent and female literacy rate was 38.79 percent, we will have to apply some method which can give us an idea of the extent of

disparity for these two years in order to compare the gender disparity index of literacy for the years 1991 and 2001.

When we have to measure disparity between two groups or two regions for a specific year or for 2 or more number of years, the following methods may be useful.

Coefficient of Equality

According to this method, if we have to measure, for example, the male female disparity of literacy for a specific year, the following formula may be used.

$$\text{Coefficient of Equality (CE)} = X1 / X2$$

Where $X2 > \text{ or } = X1$ and

$X1$ and $X2$ are the observed values of two groups of population.

The value of CE will always range between 0 and 1. In case of no disparity (i.e. perfect equality) CE will be 1. It may be interpreted as smaller the value of CE higher the extent of disparity and higher of value of CE lesser the disparity.

In case one has to see whether the gender disparities in literacy have increased or declined during a specific time period, e.g. between 1991 and 2001, the Coefficient of Equality for both the years may be calculated and compared.

Disparity Index (Sopher's method)

This method of calculating disparities has been developed by David V. Sopher (1974). According to this method :

If $X1$ and $X2$ represent the respective percentage of value of variables of group 1 and 2 then the disparity index (D) can be calculated by the formula

$$D = \text{Log} (X2 / X1) + \text{Log} [(Q-X1) / (Q-X2)]$$

where, $X2 \geq X1$ and $Q = 100$

In this method of measuring disparities group 2 is taken for the variable having comparatively higher value and group 1 for that having relatively lower value. For example, in order to measure rural urban disparities in literacy, the rural literacy rate should be taken as X1 and urban literacy rate as X2. This is because generally the urban literacy rate is higher than the rural literacy rate. But if the places of variables are reversed and we keep X1 as urban and X2 as rural literacy rates, the value of disparity index will remain the same except that its sign will be negative.

In case of perfect equality i.e. no disparity at all, the value of D will be zero. The measured value of D is interpreted as - higher the value of D higher the extent of disparity and lower the value of D shows lower the disparity. Generally this method is useful in measuring the relative disparity. For example, if rural urban disparity for literacy is calculated for the year 1991 the value of D will not give so much meaning unless we compare it with e.g. the rural urban literacy disparity for the year 2001. While comparing the disparity indices we should keep in mind that the year for which D is less the disparity is comparatively less and the year in which D is found more the disparity is more.

While using any of the two above mentioned methods of measuring disparities it is necessary to keep in mind that these methods can be applied only when the value of variables are in terms of percentages. For example, if the values are in terms of literacy rates or enrolment rates, retention rates, completion rates etc. these methods may be applicable. But if values are in terms of absolute figures like number of literates or number children enrolled or number of children completing a level of education, these two methods cannot be applied for measuring disparities. This is a caution for those who intend to use these methods of measuring disparities.

If we have a series of observations e.g. literacy rates of all the districts of a state or enrolment rates of all the states of the country and we have to measure the inter-district literacy disparities or inter-state enrolment disparities, the above mentioned two methods may not be applicable. In such cases we can measure the extent variations in the literacy rates of the districts of the state or the extent of variations in the enrolment ratio of the

states. In such cases any measures of central tendencies may be used. However in this regard the following two methods may be more useful.

Coefficient of Variation

When a series of observations is given on one variable we can measure the extent of variation in these observations by applying this method. This method concentrates on relative variation and it can be calculated by the following formula.

$$\text{Coefficient of variation (C.V.)} = \frac{\sqrt{\frac{\sum (\bar{X} - X_i)^2}{n}}}{\bar{X}}$$

Where \bar{X} is the average

X_i is the i-th observation

$i = 1.2.3.....n$ and

‘n’ is the number of observations

This formula for calculating the Coefficient of Variation (C.V.) can also be written as follows.

$$\text{Coefficient of variation (C.V.)} = \frac{\sqrt{\frac{n \sum X_i^2 - (\sum X_i)^2}{n}}}{n \bar{X}}$$

where \bar{X} is the average

X_i is the i-th observation

$i = 1.2.3.....n$ and

'n' is the number of observations

In very simple terms the Coefficient of Variation is nothing but the ratio of Standard Deviation and Mean i.e.

$$\text{Coefficient of variation (C.V.)} = \frac{\text{Standard Deviation}}{\text{Mean}}$$

While measuring the variation by using this method the interpretation of the result may be like this. The calculated value of C.V. will be generally between zero and one. In case of perfect equality i.e no disparity at all the value of CV will be zero, which means there is no variation in the series of observation. However the calculated value, if it is not zero, will show the extent of variation in the series of observations. Higher the calculated value of Coefficient of Variation, greater the degree of variation in the observed values. Thus if we measure the Coefficient of Variation for two sets of observations, e.g. the district wise male literacy and district wise female literacy, we can compare the values for these sets of observations and find out whether the inter-district variations are more in case of male literacy or in the female literacy.

Gini Coefficient

Out the several methods used for measuring disparities this is the method that is widely used to represent the extent of inequality. The inequality is measured by the following formula

$$\text{Gini Coefficient (G)} = 1 + \frac{1}{n} - \frac{2}{n^2} \cdot \bar{X} (X_1 + 2.X_2 + 3.X_3 + \dots + nX_n)$$

where n is the number of observations in the series

\bar{X} is the average of observed values

$X_1, X_2, X_3 \dots$ are the observed values and

$X_1 > \text{ or } = X_2 > \text{ or } = X_3 > \text{ or } = \dots > \text{ or } = X_n$ (this vitually means that the observed values are to be arranged in descending order.

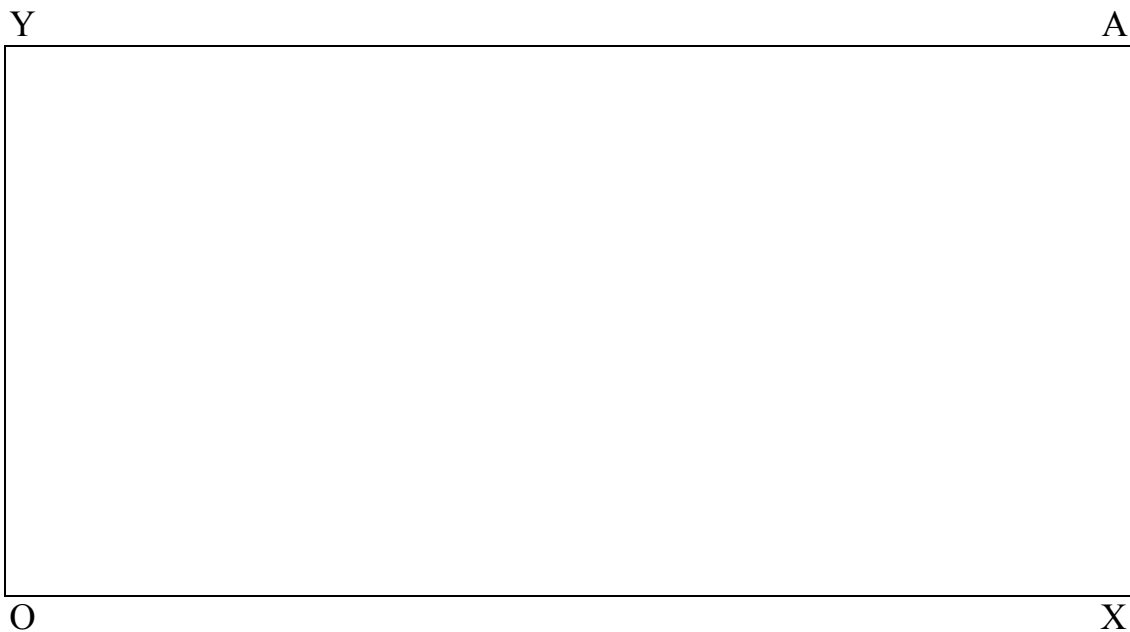
In order to apply this method of measuring inequalities first we will have to arrange the observed values in descending order.

It may therefore be kept in view that the highest observed value may be taken as X_1 and the lowest observed value may be kept as X_n in case there are 'n' observations in the series.

The Gini Coefficient also measures the extent to which there are variations in the observations. If the calculated value is zero it will show that there is no variation. Further higher the value of G will show higher the extent of variation in the observed values of the series.

Lorenz Curve

We often associate a distribution curve which is associated with the Gini ratio. The curve is known as the LORENZ curve. It can be depicted as given in the following diagram.



In the abovementioned diagram OA is the line of perfect equality. This line shows that there is a perfectly equal distribution of observed values in the series. Further the distance between any corresponding points between

the line of perfect equality OA and the actual curve OEA measures the degree of departure from the equal distribution. Further the area shown between the line of perfect equality and the actual curve shows the extent of variation between the observed values, which is calculated by the formula mentioned above for the calculation of Gini Coefficient.

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