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Measurement of education achievement in human development: Evidence from India

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This paper analyses the measurement issues in education achievement, and integration of education goals and targets, in the context of human development in India. Measurement issues are distinguished by (a) choice of indicators and variables and (b) data used in estimation/projection/computation of indicators and variables in the global human development reports (HDRs) and in India's national and sub-national HDRs. This analysis establishes the non-comparability of measurement of the education achievement by indicators and variables, and shows a case for integration of education goals and targets between global, national and sub-national levels. Policy implications and imperatives from these analyses of the Indian experiences offer lessons for measurement of education achievement in developing countries.

Human development report, gross enrolment ratio, literacy rate, education achievement in India

INTRODUCTION

The United Nations Development Programme (UNDP) has been preparing the global Human Development Report (HDR) since 1990. Each year, the HDR focuses on a distinct theme that has implications in explaining and measuring of multidimensional nature and process of human development. The HDR presents a concise indicator on the level of human development in each country. This indicator is called Human Development Index (HDI) and is composite of life expectancy, education and GDP indices. Countries are ranked according to the value of the HDI. For instance, UNDP-HDR 2004 (UNDP, 2004) ranks India 127th among 177 countries as per the value of HDI (=0.595). Of the three sub-indices, the value of life expectancy index is highest (=0.64) and is followed by education index (0.59) and GDP index (=0.55). Thus, HDI is indicative of broad source/s of poor or high performance of a country's human development. As the indices are constructed on an annual basis, they serve as useful policy tools for (a) monitoring of nature/direction and magnitude of changes in human development and (b) design and implementation of development policies from the viewpoint of improving human development. In view of above policy benefits, the HDI and its methodology in UNDP-HDRs have been adopted at the national and sub-national (or State) levels in India.[2]

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[2] For instance, the HDR of Karnataka State in 1999 (Government of Karnataka, 1999) showed that the education index (=0.596) contributed to 42.3 per cent of total human development in the State. This contribution is slightly smaller than the contribution of health index (43.8%), but far higher than the contribution of income index (13.9%). Most recently, the report of the High Power Committee on Redressal of Regional Imbalances [Government of Karnataka, 2002a) has constructed the HDI for the reference year 1998. The value of HDI (=0.63) is higher than in 1991 (=0.47). This indicates an improvement in the overall level of human development in the State.

Literacy and enrolment in formal education are the main indicators in the construction of education achievement index (or, in brief, education index throughout). These indicators are measured by variables, depending on the availability of data. Thus, in general, measurement has two dimensions: (a) choice of indicators and variables and (b) data issues (for example, availability of reliable data by sources and years, and nature of data adjustments). Variations in these dimensions, other things remain the same, contribute to spatial and temporal variations in estimated/computed/projected value of education index.

The main objective of this paper is to analyse the measurement of education indicators and variables in India's national and sub-national HDRs, and to compare India's experiences with the UNDP-HDRs. This analysis is intended for three purposes. First, to establish comparability in measurement of education indicators and variables between global and India's national and sub-national HDRs. Second, to demonstrate a case for policy integration in education indicators and variables between global and India's national and sub-national HDRs. Third, to offer India's experiences in the measurement of education indicators and variables, and integration of policy goals and objectives in human development, as lessons to developing countries.

The above implications seem to be underived in the policy and professional literature on India's human development.[3] This is evident, for instance, in Kaur and Misra'(2003) empirical analysis of the nature and impact of education expenditure on educational achievement in 15 non-category states in India during 1985-86 to 2000-01.[4] That is, impact of (a) education spending, (b) extent of economic development (that is, per capita State income), (c) level of development of physical infrastructure (that is, number of schools per 1000 population), (d) social factors (that is, share of girls in secondary enrolment), and (e) other specific indicators (for example, pupil/teacher ratio) are estimated on education indicators (that is, gross enrolment ratio by primary and secondary education and by secondary education) in panel data models. The results show that, when linear functional form is used, the coefficient of all the explanatory variables (or except pupil/teacher ratio) are positive and statistically significant in explaining the variations in gross enrolment ratio of primary and secondary (or secondary) education. The estimated coefficient of education spending shows a smaller magnitude in determining gross enrolment ratio of secondary education, probably due to neglect of private expenditure that is more important for secondary education. [5]

The rest of the paper is organised as follows. Section 2 describes the choice of indicators and variables in India's national and sub-national HDRs in a global perspective. In section 3, data issues in measurement of these educational indicators and variables are analysed. Section 4 highlights India's experiences in integrating education goals and objectives between global, national, regional and departmental levels. Section 5 includes conclusions and implications.

[3] At the global level, measurement issues in human development have been focused on HDI in general, and income index in HDI in particular. This is evident, for instance, in Sagar and Najam (1998).

[4] For descriptive purposes, however, the following indicators are used. First, for international comparisons, (a) public expenditure on education as a percentage of national income and (b) gross enrolment ratio in primary, secondary and tertiary education are used as performance indicators. Second, for inter-state and inter-temporal comparison, (i) education expenditure as a percentage of State income and (ii) composition of education expenditure by primary, secondary and others, and cost recoveries as a percentage of revenue expenditure on education, are used.

[5] In addition, to capture the impact of income levels on education achievement, the States are divided between poor (per capita State income below the national average) and non-poor (per capita State income above the national average). The pooled regression results show that education spending has a larger positive and significant coefficient on (a) primary enrolment in poor states than in non-poor States, and (b) primary education than on secondary education in non-poor States. Thus, public spending has more positive impact on primary enrolment than on secondary enrolment. Inefficient provision of services and poor targeting in poorer States are mentioned as probable reasons for this result.

CHOICE OF EDUCATIONAL INDICATORS AND VARIABLES

The World Bank's World Development Indicators (WB-WDI) provide a framework for identification and measurement of education indicators and variables in international development (World Bank, 2001). Education indicators include education input, participation, efficiency and outcomes. Different variables and their measurement characterise each of these indicators. For instance, expenditure per student is one of the variables of education input indicator and is measured separately by expenditure per student in primary, secondary and tertiary education as a percentage of gross national income per capita. Gross Enrolment Ratio (GER) is one of the variables of education participation indicator and is measured separately by GER in primary, secondary and tertiary education as a percentage of relevant age groups. Number of repeaters is one of the variables of education efficiency indicator and is measured by repeaters as a percentage of total enrolment of students by primary and secondary education. Adult literacy rate is one of the variables of education outcomes indicator and is measured by percentage of male and female literacy. Using the above framework, measurement of education indicators and variables is analysed in global and in India's national and sub-national human development reports.

Choice of indicators and variables in global HDRs

Education indicators and variables and their measurement in the construction of HDI in the UNDP-HDRs are well known. Education outcome (or adult literacy rate) was the single education indicator (or variable) in UNDP-HDR 1990. In UNDP-HDR 1991, the number of variables was increased to 2 with differential weight: 2/3 weight for adult literacy rate and 1/3 weight for mean years of schooling. In UNDP-HDR 1995, mean-years of schooling had replaced combined gross primary, secondary and tertiary enrolment ratio. This replacement added education performance as a new education indicator in the construction of HDI. Subsequently, no change is evident in the nature and number of indicators and variables and their weight.

In addition, the UNDP-HDRs provide additional education variables for measurement of supplementary human development indices. A comparison of additional variables and supplementary indices in UNDP-HDR 1991 and 2004 shows wide diversity in the nature and number of indicators and variables. For instance, 4 (or 6) indicators and 26 (or 23) variables are included in UNDP-HDR 1991 (or 2004). The indicators in UNDP-HDR 1991 include profile of human development and human deprivation, trends in human development, human capital formation and education profile. Literacy and enrolment variables are (a) dominant under the profile of human development and trends in human development and (b) relevant under the human capital formation and education profile. On the other hand, indicators in UNDP-HDR 2004 include commitment to education public spending, literacy and enrolment, technology diffusion and creation, priorities in public spending, gender-related development index and gender inequality in education. Literacy and enrolment variables are dominant under the literacy and enrolment, gender-related development index and gender inequality in education.

An important feature of the additional indicators and variables is their composition of public finance indicators. In the UNDP-HDR 1991, three indicators are listed. First, public expenditure on education as a percentage of GNP. Second, public expenditure on education as a percentage of total public expenditure. Third, public expenditure on primary education as a percentage of all levels of education. On the other hand, this list is modified and extended in UNDP-HDR 2004 by including (a) public expenditure on pre-primary and primary education as a percentage of all levels of education; [6] (b) public expenditure on secondary education as a percentage of all levels

[6] As noted in UNESCO (2002), "pre-primary education refers to programs at the initial stage of organised instruction, which are primarily designed to introduce very young children, usually from age 3 or so, to a school-type environment, i.e. to provide a bridge between home and school. Such programs are variously referred to as infant education, nursery education, pre-school

of education; and (c) public expenditure on tertiary education as a percentage of all levels of education.[7]

In the recent past, the role of education indicators/variables is explicitly noted in global competitiveness of countries. This is evident, for instance, in the hard data-based education indicators in the World Economic Forum's Global Competitiveness Report,[8] International Institute of Management Development's World Competitiveness Yearbook,[9] World Bank's Competitiveness Indicators,[10] International Telecommunication Union's Digital Access Index[11] and World Economic Forum and the World Bank's Network Readiness Index. [12] The most common education variables in these indices include (a) primary and secondary enrolment ratio, (b) average years of schooling, and (c) adult literacy rate. Hence, measurement of human development is contributory to measurement of inter-national competitiveness, as it is related to education variables.

Choice of indicators and variables in India's national and sub-national HDRs

Table 1 presents a summary of education participation and outcomes indicators in the construction of HDI in India's national and sub-national HDRs. First, unlike in the UNDP-HDRs, total literacy rate is used in the national and in all the State level HDRs. Second, weight given to the literacy is the same in both national and sub-national HDRs in India, as in UNDP-HDRs. Third, GER in India's HDRs differs from the UNDP-HDRs by exclusion of tertiary enrolment. At the same time, marked difference are evident in inclusion of higher secondary enrolment between national and sub-national HDRs and between sub-national HDRs. Fourth, Maharashtra HDR is a special case for using mean years of schooling rather than GER, as in UNDP-HDR 1991.

Interestingly, in India's national and State level HDRs, education finance variables are listed separately from the education indicators. For instance, in India's national HDR 2001, education expenditure indicators (under Governance indicators, however) include education expenditure ratio and as a part of public expenditure ratio, development expenditure ratio and social sector expenditure ratio.[13] In the context of Karnataka HDR 1999, education finance variables are related to: (i) sectoral outlay for general education by primary education, secondary education, university and higher education, adult education and language development; (ii) education budget by revenue

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education, kindergarten, or early-childhood education" (p.306). Anganwadi Centres (under the Integrated Child Development Scheme in the Department of Women and Child Welfare) are a typical example for pre-primary education in India.

[7] In general, public expenditure here refers to total public finance (i.e. capital expenditure + current expenditure) devoted to education by federal, regional and local level of governments.

[8] Under human resource and technology indicators: (a) Average years of schooling - Average years of schooling by population age 25 and up; (b) Primary education - Primary education enrolment indicator; (c) Secondary education - Secondary education enrolment indicator; and (d) Tertiary education - Tertiary education enrolment indicator.

[9] Under Economic Performance Indicators: (a) Total public expenditure on education as a percentage of GDP; (b) Pupil-teacher ratio in primary education; (c) Pupil-teacher ratio in secondary education; (d) Secondary school enrollment - Percentage of relevant age group receiving full-time education; (e) Higher education achievement - Percentage of population that has attended at least tertiary education for persons 25-34; and (f) Illiteracy - Adult (over 15 years) illiteracy rate as a percentage of population.

[10] Under Human Capital and Intellectual Capital Indicators: (a) Literacy rate (Growth in literacy rate: percent); (b) Primary school enrolment (percent of school-aged children); (c) Secondary school enrolment (percent of school-aged children); (d) Tertiary school enrolment (percent of school-aged children); (e) Secondary technical enrolment (percent of secondary enrolment); (f) Science graduates (percent of total graduates); (g) Scientists and technicians (number per 1000 people); and (h) average research and development expenditure as a percent of GNP.

[11] Under Infrastructure and Knowledge Indicators: (a) Primary, secondary and tertiary enrolment level; and (b) adult literacy.

[12] Under Social Capital Micro Index: (a) No schooling in the total population; and (b) average years of schooling in the total population.

[13] This implies that education finance indicators are treated as part of human development finance indicators. This is also evident at the international level, for instance, in the UNDP-HDR 1991 (UNDP, 1991) in terms of public expenditure ratio, social allocation ratio, social priority ratio and human expenditure ratio.

and capital expenditure; (iii) education outlays, i.e., share of education in annual plan outlay by State sector and District sector and share of education in non-plan expenditure; and (iv) total State expenditure on education, share of expenditure on education in total expenditure, and share of expenditure on education as a percentage of total State Income. Of these variables, (i) and (iv) are relevant in other State level HDRs, such as, Himachal Pradesh HDR 2002. In the case of Tamil Nadu HDR 2003, public expenditure on education per student by levels of education is used and role of private sector and international funding (for example, World Bank, UNESCO and UNICEF) for education is noted. Expenditure indicators are not highlighted in Madhya Pradesh HDR 2002 and Rajasthan HDR 2002. Thus, in general, financing of education is a neglected issue in India's sub-national HDRs.

Table 1. Education indicators and variables in India's national and State level HDRs

Level and year of HDR	Measurement of education indicators and variables
National HDR	
India's HDR 2001	Literacy rate (weight=0.35): Proportion of literates to the population in the age group of 7 years and above Estimated Adjusted Intensity of Formal Education in years (weight=0.65): Weighted average of the enrolled students from Class I to Class XII (where weight equal to 1 for class I, 2 for Class II and so on), adjusted by proportion of total enrolment to population in age group 6-18
Sub-national HDRs	
Karnataka HDR 1999	Literacy rate (age 7+) with 2/3 weight. Combined gross primary and secondary (Classes I to X) enrolment ratio with 1/3 weight
Maharshtra HDR 2002	Literacy rate (age 7 +) with 2/3 weight Mean years of schooling (Standard 1 to Standard 7) with 1/3 weight
Madhya Pradesh HDR 2002	Literacy rate (age 6 +) with 2/3 weight Combined school level enrolment (ages 6-14) with 1/3 weight
Tamil Nadu HDR 2003	Literacy rate (age 7+) with 2/3 weight. Combined gross enrolment ratio for primary, middle, high and higher secondary schools with 1/3 weight
Rajasthan HDR 2002	Literacy rate (age 6 +) with 2/3 weight Combined school level enrolment (ages 6-14) with 1/3 weight
Himachal Pradesh HDR 2002	Literacy rate (age 7 +) with 2/3 weight. Combined gross primary and secondary (Classes I to X) enrolment ratio with 1/3 weight
Sikkim HDR 2001	Literacy rate (age 7+) with 2/3 weight Combined gross primary, secondary and higher secondary enrolment ratio with 1/3 weight
Punjab HDR 2004	Literacy rate (age 7+) with 2/3 weight. Combined primary school enrolment ratio with 1/3 weight
West Bengal HDR 2004	Literacy rate (age 7+) with 2/3 weight. Combined primary school enrolment ratio with 1/3 weight
Nagaland HDR 2004	Literacy rate (age 7+) with 2/3 weight. Combined primary, secondary and higher secondary school enrolment ratio with 1/3 weight
Assam HDR 2003	Literacy rate (age 7+) with 2/3 weight. Combined primary and middle school (Class I to Class VIII) enrolment ratio with 1/3 weight
Orissa HDR 2004	Literacy rate (age 7+) with 2/3 weight. Combined gross enrolment ratio (6-14 years) with 1/3 weight
Gujarat HDR 2004	Literacy rate (age 7+) with 2/3 weight. Combined gross enrolment ratio (6-14 years) with 1/3 weight

Source: Compiled from Government of India (2002), Government of Karnataka (1999), Government of Maharashtra (2002), Government of Madhya Pradesh (2002), Government of Tamil Nadu (2003), Government of Rajasthan (2002), Government of Himachal Pradesh (2002), Government of Sikkim (2001), Government of Punjab (2004), Government of West Bengal (2004), Government of Nagaland (2004), Government of Assam (2003), Government of Orissa (2004) and Mahatma Gandhi Labour Institute (2004).

It should be emphasised that measurement of above education finance variables is limited to public expenditure on education. Thus, the role of private institutional expenditure on the provisioning of educational services, and household expenditure accessing of educational services

are ignored.[14] Lack of time series data on private institutional and household expenditure is the major reason for its non-inclusion in the HDRs. [15]

DATA ISSUES

Data issues on education indicators and variables present another measurement dimension in human development. Data issues are related to nature and sources of data and method (including timing) of its collection; and methodology for estimation/computation and projection of indicators. In the ultimate analysis, comparability education index in human development calls for uniformity in indicators and variables as well as in data issues. In what follows, the data issues are presented by global and by India's national and sub-national HDRs.

Data issues in global HDRs

Estimated and projected adult literacy rate and gross enrolment ratio by the UNESCO are bases for construction of education index for India in UNDP-HDRs.[16] This is evident in different forms of cited sources of data in the UNDP-HDRs. For instance, UNESCO is cited as a primary source of data on literacy and enrolment in HDR-1990 (UNDP, 1990: p.189) and HDR-1992 (UNDP, 1992: p.216]. In HDR-1994, key to indicators distinguished UNESCO as the only source of data (UNDP, 1994: pp.118-119). Since 1995, reference to data is given in terms of correspondence on adult literacy rates and gross enrolment ratios, based on UNESCO's estimations and projections.[17]

Table 2 presents the estimates of education variable for India in UNDP-HDRs from 1990 through 2004. It is apparent that variation in adult literacy rate and gross enrolment ratio is marked by estimated rate/ratio and reference year of the estimate.[18] Thus, for instance, the estimates are not comparable with the decadal census figures (for example, the adult literacy rate is equal to 40.8% in Census of India 1981, 48.5% in Census of India 1991 and 61.3% in Census of India 2001) or with national sample survey estimates (for example, 54.3% based on NSSO 52nd Round 1995-96).[19]

Data issues in India's national and sub-national HDRs

India's national HDR in 2001 and sub-national HDRs since 1999 present divergent data issues. This is evident in Table 3.

Three prominent data issues for literacy variable, in contrast with UNDP-HDRs, are as follows. First, all the HDRs in India use the census data for literacy variable. Second, no HDR in India uses adult literacy rate. Third, between sub-national HDRs, use of census data is distinguished between 1991 and 2001. In particular, non-availability of district level and adult literacy data from

[14] Two major sources of survey data on household expenditure on primary and secondary education in India are NSSO (2000), conducted during July 1995-June 1996, and NCAER (1999) conducted during January-July, 1994. The patterns of household expenditure in NSSO are summarised in Panchamukhi (2004).

[15] Prasad and Rao (2002) confirm this for Karnataka State in 1990's. However, Panchamukhi's study on private expenditure on education for late 1980's, as summarised in Chapter IV (B) in Panchamukhi (2004), is not updated subsequently.

[16] For instance, the UNESCO Institute of Statistics (UIS) provides with, among others, India's adult literacy rate (=61%) for 2000-2004 (UNESCO, 2005a). The source of data is Census of India 2001. In fact, the national estimates of literacy or illiteracy differs between countries by data sources, year of estimate, literacy description and mode of data collection. Thus, "the resulting literacy estimates are not comparable and should be used with caution". (UNESCO, 2005b). In the same way, lack of comparability in measurement of global education indicators and variables is self-recognised by the UNDP (UNDP, 1999: p.143).

[17] A description of methodology for estimation and projection of adult literacy is available in UNESCO (1995).

[18] In fact, variations in annual estimate of adult literacy rate are higher (coefficient of variation is equal to 6.84 percent) than combined gross enrolment ratio (coefficient of variation is equal to 1.15 percent) during 1995 to 2004.

[19] These figures are taken from the Government of India (2002), except for Census of India 2001 taken from UNDP (2004).

Census of India 2001 (at the time of preparing the HDRs, however) are the main reasons for using literacy rate from Census of India 1991 in Karnataka, Tamil Nadu and Rajasthan HDRs.

Table 2. Estimates of education variables for India in UNDP-HDRs: 1990 to 2004

Year of UNDP-HDR	Estimated adult literacy rate and reference year of estimate	Estimated mean years of schooling* or combined gross enrolment ratio and reference year of estimate
1990	43.0% - 1985	Not applicable
1991	44.1% - 1985	2.20* - 1980
1992	48.2% - 1990	2.40* - 1990
1993	42.8% - 1990	2.40* - 1990
1994	49.8% - 1992	2.40* - 1992
1995	49.9% - 1992	55% - 1992
1996	50.6% - 1993	55% - 1993
1997	51.2% - 1994	56% - 1994
1998	52.0% - 1995	55% - 1995
1999	53.5% - 1997	55% - 1997
2000	55.5% - 1999	54% - 1999
2001	56.5% - 1999	56% - 1999
2002	57.2% - 2000	55% - 1999
2003	58.0% - 2001	56% - 2000-01
2004	61.3% - 2002	55% - 2001/02

Source: Compiled from UNDP-HDRs – various issues.

Data issues in enrolment variable are remarkable in two respects. First, no measurement of enrolment variable in India's HDRs includes tertiary enrolment due to lack of data.[20] This is in contrast with the enrolment variable in the UNDP-HDRs. Second, measurement of enrolment variable varies between national and sub-national HDRs, and between sub-national HDRs, in terms of nature of data collection (that is, survey versus administrative registery methods), inclusion or exclusion of higher secondary education in computing gross enrolment ratios, and in giving weights for different levels of primary and secondary education. Use of mean years of schooling, instead of GER, singles out Maharastra HDR 2002 from the rest of sub-national HDRs in India.

In essence, three data issues explain non-comparability of education indicators and variables between global and Indian HDRs. First, data on tertiary enrolment is lacking at all levels in India. Second, adult literacy from the census data and total literacy rate for inter-census years are not estimated for India's HDRs. Third, lack of district level data is a major constraint for preparation of India's sub-national HDRs.

Empirical Implications

In view of the above differences in data issues, level of education achievement in Indian HDRs are not comparable with global HDRs. In the same way, education achievement between national and sub-national HDRs, and between sub-national HDRs, are not comparable, notwithstanding they are prepared for the same year.

[20] This is evident in Karnataka HDR in 1999 and Himachal Pradesh HDR in 2002. "Since reliable enrolment figures were not available for tertiary education at the district level, combined enrolment ratios for the primary and secondary levels (classes I to X) have been used" [Government of Karnataka (1999), p.189]. "Enrolment ratios for tertiary levels of education could not be incorporated because of non-availability of the same" [Government of Himachal Pradesh (2002), p.371].

Table 3. Database of education variables in India's HDRs

Year of HDR	Source of basic data, reference year, and level of disaggregation	
	Literacy variable	Gross enrolment ratio or mean years of schooling variable
National HDR		
India's HDR 2001	Census of India 2001 for the national level as well as for 25 States and 7 Union Territories	Computed at the national level and for 25 States and 7 Union Territories by using the enrolment data and estimated population (age group 6-18 years) from the Sixth All India Educational Survey by the National Council for Educational Research and Training in 1993.
Sub-national HDRs		
Karnataka HDR - 1999	Census of India 1991 for the State level and for 20 districts	Computed at the State level and 20 districts by using the enrolment data in 1991 from Commissioner of Public Instruction, Department of Primary and Secondary Education, Government of Karnataka, and child population in the age group of 6-16 years from the Census of India 1991.
Maharashtra HDR - 2002	Census of India 2001 for the State and 35 districts	Computed by using mean years of schooling for the State and 35 districts in 1999-00 from the enrolment data in the Directorate of Economics and Statistics.
Madhya Pradesh HDR - 2002	Census of India 2001 for the State as well as for 45 districts	Computed for the State and 45 districts from the child to child, and habitation to habitation, of children in the State in 2000 under Lok Sampark Abhiyan by the Rajiv Gandhi Shiksha Mission, Government of Madhya Pradesh.
Tamil Nadu HDR - 2003	Census of India 1991 for the State level and for 29 districts	Computed for the State and 29 districts by using enrolment data in 1998-99 from the Education Department, and estimated school age population (using Census of India 1991 data for share of school age population) by the Department of Economics and Statistics, Government of Tamil Nadu .
Rajasthan HDR - 2002	Census of India 1991 for the State and 32 districts	Estimated for the State and 32 districts by using the (a) enrolment rate in 1994-95 from the Department of Education, Government of Rajasthan, and (b) applying share of children in age group 6-14 in Census of India 1991 to the estimated population in 1994-95.
Himachal Pradesh HDR - 2002	Census of India 2001 for the State and 12 districts	Computed for the State and 12 districts by using the (a) actual enrolment data in 1999-00 from the Department of Primary and Secondary Education, and (b) estimated school age population by the Planning Department, Government of Himachal Pradesh.
Sikkim HDR - 2001	Census of India 2001 for the State and 4 districts	Computed for the State and 4 districts by using data on weighted average enrolment ratio in 1998 with following weight: 10% for primary enrolment ratio, 40% for secondary enrolment ratio, and 50% for higher secondary enrolment ratio.
Punjab HDR - 2004	Census of India 2001 for the State level and for 17 districts	Computed at the State level and 17 districts by using the primary enrolment data in 1999 from Directorate of Public Instruction (Schools), and estimated number of children in school going age from the projected populations by age group 6-14 years from the Census of India 1991 and 2001.
West Bengal HDR 2004	Census of India 2001 for the State level and for 18 districts	Estimated at the State level and 18 districts by using primary school enrolment rate in 1995, based on the school enrolment rate provided by the 52nd Round National Sample Survey of the National Sample Survey Organisation for age group 6-14 years.
Nagaland HDR 2004	Census of India 2001 for the State level and for 8 districts	Computed for the State and 8 districts by using actual enrolment data up to higher secondary level in 2002 from the Department of Economics and Statistics (Government of Nagaland), and by applying the proportion of population in the age group 6-18 in Census of India 1991 to the total population in Census of India 2001. The resultant figures is called enrolment ratio in 2001.
Assam HDR 2003	Census of India 2001 for the State level and for 23 districts	Computed for the State and 23 districts by using data on enrolment of students from Class I through Class VIII in 1991 as a percentage of child population in the age group 6-14 from the Census of India 1991.
Orissa HDR 2004	Census of India 2001 for the State level and for 30 districts	Combined gross enrolment ratio (age 6-14) years in 2003-04 is obtained for the State and 30 districts, as estimated by the Office of the District Primary Education Programme (DPEP), Government of Orissa.
Gujarat HDR 2004	Census of India 2001 for the State level and for 25 districts	Per cent attending school (age 6-14) in 1999-00 for the State, as estimated from the NSS 55th Round of National Sample Survey by the National Sample Survey Organisation. Per cent attending school (age 6-14) in 1991 for the district, as per Census of India 1991.

Source: Same as in Table 1.

Since 1990, UNESCO's methodology has provided estimates of annual adult literacy rate and combined GER for India in UNDP-HDRs. Reference year for most of the adult literacy estimates is for inter-census years. For GER, the reference year is less than five years to the HDRs' publication year. Nevertheless, no reference to this important methodology, or explanation for its inapplicability, seems to have figured in India's HDRs. In fact, UNESCO's methodology is of utmost relevance for improving the measurement and enhancing empirical validity of education indicators and variables in India's HDRs.

INTEGRATION OF POLICY GOALS AND TARGETS

The goals and targets for education indicators are set at global, national, and State level HDRs and vision documents. In addition, the goals and targets are set at the Departmental level. These goals and targets are analysed below for the purpose of finding their integration at different levels.

Table 4 lists the goals and targets of the education sector in the (a) United Nations' Millennium Development Goals (MDGs), (b) Government of India's 10th Five Year Plan, (c) India Vision 2020 by the Planning Commission, and (d) Future Vision and Current Action of the Government of Karnataka.[21]

A comparison of the above goals and targets imply the following. First, education goals and targets are most focused on primary and secondary education, or education participation and outcomes indicators are most influenced by achievement of goals and targets for the primary and secondary education. Thus, goals and targets of primary and secondary education have direct impact on human development. Second, education participation and outcomes indicators are most important in development goals and targets at the international, national and the State level. As these indicators are of importance for achieving human development, there exists complementarity between goals and targets of economic development and human development at all levels of development. This establishes a case for integration of education goals and targets between international, national and State levels.

Another important aspect of policy integration in India's human development is evident, for instance, at the departmental level in Karnataka State. The structure of primary and secondary education in Karnataka State is as follows. The elementary education is composed of 8 years of schooling: Lower Primary Schooling (Class I through Class V)[22] and Higher Primary Schooling (Class VI and Class VIII).[23] The secondary education is of 4 years in duration: lower secondary (or high) schooling (Class IX and Class X) and higher secondary schooling or Pre-University or Vocational education (Class XI and Class XII).

[21] Another important attempt to set education goals at the international level is evident in the Dakar Framework (UNESCO, 2002) The adopted goals include (a) ensuring that by 2015 all children, particularly girls, children in difficult circumstances and those belonging to ethnic minorities, have access to and complete free and compulsory primary education of good quality; (b) achieving a 50% improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults; and (c) eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality. It is apparent that goal (a) and (b) are the same as in the MDGs for education sector.

[22] This structure is effective from 2001-02 with the inclusion of Class 5 in the lower primary education.

[23] This structure is effective from 2003-04 with the inclusion of Class 8 in the upper primary education.

Table 4. Education goals and targets in development reports and vision documents

	Goals	Target	Indicators
1. Millennium Development Goals	Achieve universal primary education	Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.	Net enrollment ratio in primary education; Proportion of pupils starting grade 1 who reach grade 5; Primary completion rate; Literacy rate of 15 to 24-year-olds.
	Promote gender equality and empower women	Eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015.	Ratio of girls to boys in primary, secondary and tertiary education; Ratio of literate females to males among 15-to-24-year-olds.
2. Monitorable targets for the education sector in the national 10th Five Year Plan of India		All children in school by 2003; All children to complete 5 years of schooling by 2007; Reduction in gender gap in literacy by at least 50% by 2007; Increase in literacy rates to 75% within 2002-03 to 2006-07.	
3. India Vision Document: Development Indicators Current level (target for 2020)			1. Male adult literacy rate: 68 (96)% 2. Female adult literacy rate: 44 (94)% 3. Net primary school enrolment ratio 77.2 (99)% 4. Public expenditure on education as % of GNP 3.2 (4.9)%
4. Karnataka: Future Vision and Current Action		Achieve 100% literacy by the year 2005.	

Source: Compiled from (a) http://www.developmentgoals.org/Education.htm, (b) http://www.undp.org.in/ihdg.htm, (c) Government of India (2004), and Government of Karnataka (2000).

The Departmental Medium Term Fiscal Plan (DMTFP) of the Department of Primary and Secondary Education in the Government of Karnataka is an important policy approach to link between objectives, goals and finances of primary and secondary education in the State. [24] The Plan is prepared on annual basis and provides with details, among others, on objectives and goals, and current achievements and future targets for performance indicators. Table 5 summarises the select objectives, goals, current achievements and future targets in the DMTFP 2003.

The objectives and goals of the Department include specific indicators of education input, participation, outcomes and efficiency. In particular, the indicators reflect the policy concern with (a) enhancement of literacy rates, enrolment of students, and achievement levels in public examinations; and (b) reduction in disparities in gender and social groups, and spatial disparity in enrolment and achievements in public examinations.

It should be emphasised that increase in enrolment is aimed to be achieved in three ways: increase in gross enrolment ratio, increase in survival rate and reduction in out-of-school children. The achievement levels are to be improved by targeting a higher pass per cent in Class VII and in Class X. Achievement in gender, social and regional disparity is targeted at reducing the gap in per cent of out-of-school children and pass per cent in Class X, between (a) boys and girls, (b) total and SC students, (c) total and ST students, and (d) the State and northeastern region.

[24] The bases for setting these goals and targets are evident in Government of Karnataka (2002b).

Table 5. Goals and targets of primary and secondary education in Karnataka State

Goals	Performance targets from 2002-03 (actual level) to 2006-07 (targeted level)
1. Enhance literacy rates	
	1.1. Increase in literacy rate from 67.04% in 2001 to 80% by 2004-05
2. Ensure that all children complete eight years and enable 80% of those who complete eight years to pursue secondary schooling, and acquire the knowledge, skills and qualifications for further education or for employment	
	2.1. Reduction in per cent of children aged 6-14 who are out-of-school from 7.38% to 0%
	2.2. Increase in survival rate of class 1 children reaching class 5 from 88.82% to 100%
	2.3. In crease in survival rate of class 1 children reaching class 8 from 48% to 85%
	2.4. Increase in survival rate of class 1 children reaching class 10 from 41.35% to 80%
	2.5. Increase gross enrolment ratio in classes 1 to 10 from 84.5% to 100%
3. Increase achievement levels	
	3.1. Increase in pass% in class 7 from 94.96 in 2002-03 to 100
	3.2. Increase pass per cent in class 10 from 55.57% in 2002-03 to 65%
4. Reduce income, gender, caste, religious, rural and regional gaps in enrolments, retention, completion, achievement and progression to higher education	
	4.1. Reduction in gap in per cent of out-of-school children between boys and girls from 0.4% to 0%
	4.2. Reduction in gap in per cent of out-of-school children between total and SC from 2% to 0%
	4.3. Reduction in gap in per cent of out-of-school children between total and ST from 5% to 0%
	4.4. Reduction in gap in per cent of out-of-school children between State and NE region from 6.19% to 0%
	4.5. Reduction in gap in pass per cent in class 10 between boys and girls from 4.75% to 0%
	4.6. Reduction in gap in pass per cent in class 10 between total and SC/ST from 14.20% to 2%
	4.7. Reduction in gap in pass per cent in class 10 between State and NE region from 10.98% to 0%

Notes: SC (or ST) refers to scheduled castes (or tribes), and NE refers to north-eastern.
Source: Compiled from Government of Karnataka (2003).

In essence, the objectives and goals of the Department of Primary and Secondary Education are ultimately aimed at improving the education participation, outcome and efficiency indicators. These indicators are of crucial importance for education achievement in State's human development. This establishes a case for integration of education goals and targets between international, national, State and departmental levels in India.

CONCLUSIONS AND IMPLICATIONS

This paper analyses the measurement of education indicators and variables in the context of human development in India. Using the framework in WB-WDI and UNDP-HDRs, measurement of education indicators and variables in India's national and sub-national level HDRs are distinguished. Further, policy integration in terms of education goals, targets and objectives are highlighted at global, national, regional and departmental levels with special reference to Karnataka State. These analyses lead to the following conclusions and policy implications.

First, the nature of education indicators used in the construction of HDI in India's national and sub-national human development reports correspond with the UNDP-HDRs. At the same time, measurement of education indicators in terms of literacy and enrolment variables differs from the UNDP-HDRs. This difference is mainly attributable to lack of (a) data on tertiary enrolment, (b) estimate of adult literacy from the census data and literacy rate for inter-census years, and (c) district level data on education indicators and variables. These differences call for improvement in data collection and estimation of education indicators and variables as pre-conditions for refinement of measurement of education achievement in India's HDRs and to establish comparability with global HDRs on empirical grounds. In this regard, applicability of UNESCO's methodology for estimation and projection of India's adult literacy rates and combined GER deserves to be explored for future preparation of India's HDRs at the national and sub-national levels.

Second, additional education variables lack comparability (in terms of nature and number of variables) (a) between global and India's national and sub-national HDRs, (b) between India's

national and sub-national HDRs, and (c) between India's sub-national HDRs. This implies that measurement of additional education variables is unique to each HDR. In future, however, collection of additional variable should be focused to measurement of education indicators and variables (for instance, as given in Table 1). This shall broaden the nature and scope of measurement of education achievement in the process of India's national and sub-national human development.

Third, India's experiences present a mix of measurement divergences and policy integration in education goals and targets between global, national and sub-national HDRs. In fact, the policy integration provides a basis to resolve the divergences in measurement of education achievement index in human development at all levels. Otherwise, education achievement index, as a policy instrument for monitoring the achievement of education goals and targets, will remain less useful for India's policy makers.

Fourth, private corporate and philanthropic organizations (for example, Infosys Foundation, The International Society for Krishna Consciousness (ISKCON), Azim Premji Foundation) have extended various support facilities for India's primary education in regard to library, computer education, nutritious food scheme and quality education schemes. These sources of private sector financing are not integrated in human development for lack of published data. Thus, policy attention is needed for measurement of private education sector's financing to India's human development.

The above conclusions and implications for India are of relevance for other developing countries for (a) improvement of measurement of education indicators and variables in their national and sub-national HDRs, and (b) integration of global, national and sub-national education goals and targets in human development.

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