IIPS Working Paper Series

6

Human Development Indices: Old and New

Sanjay K. Mohanty and Bidyadhar Dehury

(Established in 1956)
Capacity Building for a Better Future

INTERNATIONAL INSTITUTE FOR POPULATION SCIENCES
Mumbai, India
www.iipsindia.org

March 2012

From the Editors' Desk .....

Greetings !!!

The International Institute for Population Sciences has taken a new initiative to bring out a series of working papers based on the projects / studies undertaken by the Institute. The main objective of the working paper series is to disseminate new research ideas, theoretical developments and methodological insights to the national and international research community as quickly as possible. The papers published under this series are peer reviewed by experts in the subject. We hope you will find the working papers interesting and useful.

Dr. T. V. Sekher
Editor, Working Paper Series

Suggested Citation: Mohanty, Sanjay K. and Dehury, Bidyadhar, 2012. "Human Development Indices: Old and New", Working Paper No. 6, International Institute for Population Sciences, Mumbai.

IIPS Working Paper No. 6

Human Development Indices: Old and New

Sanjay K. Mohanty* and Bidyadhar Dehury**

*Associate Professor
Department of Fertility Studies
International Institute for Population Sciences
Email: sanjay@iips.net

**Research Scholar
International Institute for Population Sciences
Email: bidya_dehury@yahoo.com

March, 2012

(Established in 1956)
Capacity Building for a Better Future

INTERNATIONAL INSTITUTE FOR POPULATION SCIENCES
Deonar, Mumbai 400 088, Maharashtra, India
Tel: +91 22 42372400; Fax: +91 22 25563257
E-mail: publicationcell@iips.net
Website: www.iipsindia.org

Human Development Indices: Old and New

Sanjay K. Mohanty and Bidyadhar Dehury

Abstract

In October 2010, the United Nations Development Program (UNDP) disseminated the revised methodology of the Human Development Index (HDI) and added three indices namely, Inequality in Human Development Index (IHDI), the Gender Inequality Index (GII) and the Multidimensional Poverty Index (MPI) to the family of human development indices. These changes were justified on grounds of measuring deprivation, poverty and inequality in the state of human development within and across countries. This paper compares the estimated HDI using the old and new (revised) methodology and examines the feasibility of constructing the new human development indices (IHDI, GII and MPI) in the states of India.

Results indicate that the value of HDI computed using the new methodology is substantially lower than that computed with the old methodology cutting across the states. However, the overall ranks of the states in the new and old HDI are similar. The GII cannot be computed periodically, especially for the smaller states of India and the computation of life table for socio-economic groups would be helpful to disaggregate estimates of HDI and IHDI. The MPI can be computed using data from the National Family and Health Survey 3, but it needs considerable improvement in the conceptualisation and contextualisation of multidimensional poverty indicators.

I. Introduction

In the second half of the 21st century, there has been significant advancement in theoretical understanding and methodological innovation in the field of development studies. The theoretical understanding has shifted from growth oriented approach (by rapid industrialisation) in 1950s and 1960s to the basic minimum need approach (eradication of poverty and hunger) in 1970s, formation and expansion of human capital in 1980s and human development paradigm in 1990s. The human development report, a milestone of human development paradigm, is a regular annual feature since its first publication in 1990 and most widely used for all practical purposes.

Since the launch of first human development report by UNDP in 1990, the human development indices, namely the Human Development Index (HDI), the Gender Development Index (GDI) and the Human Poverty Index (HPI-1, HPI-2) were popular cutting across the disciplines; among academia, researchers, planners and program managers. The concept of human development and the composite indices of human development were integrated into the standard texts of many disciplines and widely used in planning and programme implementation at the sub-national level. A unique feature of these composite indices is the simplicity in measuring the multidimensionality of development. Many of the federal and state governments took active interest and prepared the human development report at the national and sub-national levels.

Despite its popularity, the human development index has been criticized for its narrow focus and non-inclusion of critical dimensions such as employment and environment, arbitrary weighting of the components, possibility of substitution between the dimensions and inability to measure inequality in the distribution of human development within a country (Kelley, 1991; Srinivasan T.N, 1994; Ranis, Stewart and Samman, 2006). The non inclusion of key variables such as political freedom, human rights, environmental sustainability and people's self respect have been listed as the missing dimensions of human development. The possibility of substitution among the three dimensional indices (for example, a decline in life expectancy can be offset by the increase in GDP per capita) has been emphasized. It was also outlined that the components and indicators are not responsive to short term policy changes. The HDR, 2006 stated the need for measuring the inequalities in the human development index for evidence based planning (UNDP, 2006).

Some of these criticisms of the HDI were addressed in the Human Development Report 2010 that brought about major changes in the variables and methodology in the construction of HDI. While applauding the progress in human development during the last two decades, the report outlines the increasing inequality across and within the countries. To capture the growing inequality in human development, it added three indices, namely the Inequality Human Development Index (IHDI), the Gender Inequality Index (GII) and the Multidimensional Poverty Index (MPI) to the family of Human Development Indices. The changes in methodology and the addition of the new indices were justified to capture the distribution of well-being for

inequality, gender equity and poverty (UNDP 2010). Though these indices reflect methodological advancement, little is known about the practical applicability of these indices at the sub-national level. The objective of this paper is to outline the merits and limitations of the variables and the data constraints in the construction of these indices. It also constructs and compares the HDI using both the old and new methodology and compares the relative ranking of Human Poverty Index 1 (HPI 1) and MPI in the states of India. We refer to the index that uses the revised HDI as the new HDI, and the index that uses the unrevised index as the old HDI.

The rest of the paper is divided into three sections. Section I presents the theoretical aspect of constructing the HDI, Section II compares the estimates of HDI using the old and new methodology for the states of India and Section III presents the data constraints in measuring the human development indices.

Section I: Measurement of the Human Development Index – A Theoretical Perspective

We present the indicators used in the construction of the old and new human development indices, data constraints in measuring the IHDI and GDI and the relevance of indicators used in measuring MPI.

Dimensions of the Human Development Indices: Old and New

The old and new HDI used only three dimensions of development, namely, the dimensions of health, knowledge and income. There was no addition to the existing dimensions in the revised HDI. The HDI has often been criticized for its narrow focus and for missing out on critical dimensions like employment and environment.

We classify the differences in the old and new HDI into three categories:

i) change of variables

ii) change of lower and upper limit of the variables

iii) change in methodology to compute the dimensional and human development index.

For the purpose of comparison, the variables and the methodology used in the computation of HDI are presented in tabular form (Table 1).

a. Dimensional Index of Health:

In the dimension of health, both the indices (old and new HDI) used the life expectancy at birth; the summary measure of health. The justification of life expectancy at birth in representing the health dimension is on the grounds of intrinsic value of longevity, association of long life with adequate nutrition, good health and education and its linkages with other valued goals (UNDP 1990). In the new index, the lower bound of life expectancy has reduced from 25 to 20 years and the upper bound has reduced from 85 to 82.5 years. The lower limit of life expectancy (new) of 20 years was based on long run historical trends and the upper limit was based on the observed values of Japan (2010). This was essentially changed to integrate the observed values of life expectancy at birth across the globe. The methodology in construction of dimensional index of health remained the same.

Table 1: Methodology used to construct the old and new Human Development Index

Dimensions / HDI	Indicator (Old HDI, 1990-2009)	Methodology (Old HDI, 1990-2009)	Indicators (New HDI, 2010)	Methodology (New HDI, 2010)
Health	Life expectancy at birth (e^0_0)	$I_{Health} = e^0_{0,i}$ -25/(85-25)	Life expectancy at birth (e^0_0)	$I_{Health} = e^0_{0,i}$ -20/(82.5-20)
Income	GDP Per capita in purchasing power parity (US $)	Dimension index of income = $\frac{\text{Log}(GDP_i) - \log(100)}{\text{Log}(40{,}000) - \text{Log}(100)}$	GNI per capita (PPPUS$)	Dimension index of income = $\frac{\ln(GNI_i) - \ln(163)}{\ln(108{,}211) - \ln(163)}$
Knowledge	1. Adult Literacy Rate 2. Gross Enrolment Ratio (GER)	Step 1: i) Adult literacy Index= (ALR_i-0) /100 ii) GER index= (GER_i-0) /100 Step 2: Index of knowledge ($I_{Knowledge}$) = 2/3 (Adult literacy index) + 1/3 (GER index)	1. Mean years of schooling 2. Expected years of schooling	i) $I_{Knowledge}1$ = Mean Years of schooling - 0 / (13.2-0) ii) $I_{Knowledge}2$ = (Expected years of schooling* – 0) / (20.6-0) in school-year t $I_{Knowledge} = \frac{\sqrt{I_{Knowledge}1 * I_{Knowledge}2} - 0}{0.951 - 0}$
HDI	1/3 (I_{Health} +$I_{Knowledge}$ + I_{Income})			$\sqrt[3]{I_{Health} * I_{Knowledge} * I_{Income}}$

*Expected years of schooling = $\Sigma E_{ti} / P_{ti}$

E_{ti} = Enrolment of the population of age i (i=a, a+1,.....) , P_{ti}= Population of age i in school-year t

In the Indian context, life expectancy at birth at the state level is usually provided by the Sample Registration System (SRS) and is used in compiling the state level human development report. Some researchers used indirect methods (from the CEB and CS and UN MORTPACK) or the regression method (Mohanty and Ram 2010) to estimate life expectancy at the district level

b. Dimensional Index of Income:

In the income domain, while the old HDI used the GDP per capita, the new HDI used the GNI per capita. The replacement of GNI per capita to GDP per capita may be considered an improvement at the national level. However, the differences in GDP per capita and GNP per capita are small in the Indian context (2753 Vs 2870 US$ in 2007) and may not affect the index value of income. The methodology to quantify the income dimension did not change. The log of income, which gives lower weightage to a higher value and higher weightage to a lower value was used. This is on the basis premise that a minimum income is needed for a decent standard of living and that income is not the sum total of human existence. However, there may be some problems in estimating the State National Product Per capita in India. At the state level, the variable published is the State Domestic Product Per capita (SDPP), usually compiled by the respective state offices. The adjustments to the net factor income are usually not done to the state estimates on SDPP. Hence the variable may have limited utility at the state level unless data are provided by adjusting the net factor income.

With respect to the lower and upper limits, the lower limit in the income domain increased from $100 to $163 (Zimbabwe 2008), while the upper limit has increased from $40,000 to $108,211 (UAE, 1980). The new HDI used the ln of GNIPCI, while the old HDI used the log of GDPPCI. The changes in the variables, upper and lower limits and the methodology has reduced the dimensional index value of income by an order of 0.10-0.13 for India, but the overall ranking of the states remains unchanged.

c. Dimensional Index of Knowledge

There were fundamental changes with respect to the methodology used in the construction of the dimensional index of knowledge. In the old HDI, the knowledge index was created by assigning two third weight to adult literacy and one third

weight to the Gross Enrolment Ratio (GER). In the new index, the variables are replaced by “mean years of schooling” and “expected years of schooling”. The mean years of schooling was calculated for people 25 years and older who received some education in their life time. Given the increase in the level of education, it may be useful to change the variable in the context of developed countries. In case of India, the level of adult literacy was 63% in 2005-06 and so the change of variables may not help much. Moreover, collecting data on the literacy level of individuals in a census or survey is relatively easier than collecting data on the years of schooling as the respondent may find it difficult to comprehend and recall. In this context, it is required that the census and surveys may need to modify the instrument to capture the years of schooling by age.

The second variable used in the construction of the new HDI is “expected years of schooling”. Expected years of schooling is defined as “the number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrolment rates were to stay the same throughout the child’s life”. Expected years of schooling are calculated for children in the age group, 6 to 18 who are currently enrolled in school. The main objective of this indicator is to know the overall level of development of an educational system in terms of the average number of years of schooling that it offers to the eligible population, including those who never enter school (UNESCO 2009). For a child of a certain age ‘a’, school life expectancy is calculated as the sum of the age specific enrolment rates for the levels of education specified.

Mathematically, $SLE_a^t = \sum_{i=a}^{n} E_i^t \Big/ P_i^t$

E^t_i = Enrolment of the population at age i (i=a, a+1,.....n.)

P^t_i= Population of age i in school-year t

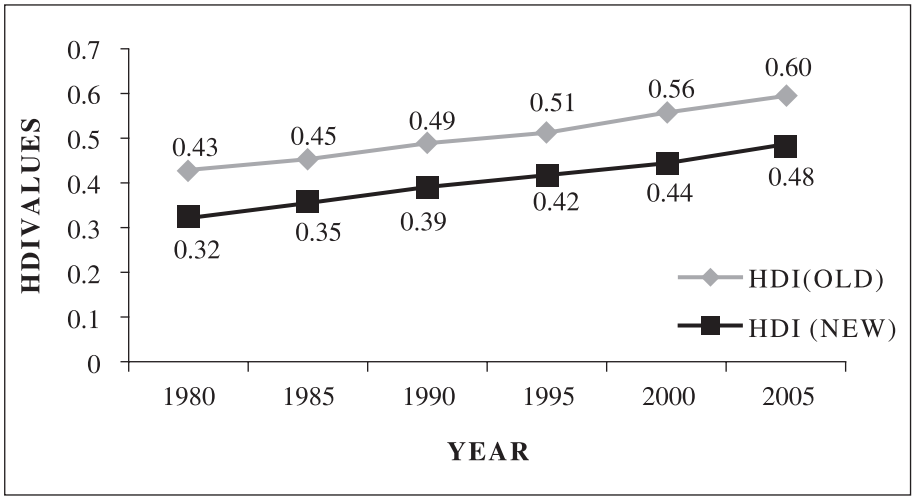
d. Human Development Indices: Old and New

The old methodology used the arithmetic mean, while the new methodology used the geometric mean in computing the HDI. The geometric mean was used because it captures the inequality in the dimensional indices, while the arithmetic mean does not capture it. This is the fundamental rationale of changing the methodology in computing the HDI.

Section II: Estimating the Human Development Index for the States of India

Before estimating the HDI for the states of India using the old and new methodology, we have presented the estimated value of old and new HDI for India over last 25 years (Fig 1). The HDI values are presented in a five year interval.

Figure 1: Trends in the old and new Human Development Index (HDI) in India (1980-2005)



Source: UNDP, Human Development Report, 2009 and 2010

** HDI (new) for the year 1985 is interpolated from 1980 and 1990.*

During 1980-2005, the HDI for India increased by 51% using the new methodology and 40% using the old methodology. The estimated values of HDI in the new methodology are lower than that of the old methodology by an order of 0.10-0.12.

Dimensional Index on Health

We have estimated each of the three dimensional indicators of HDI by using the old and new methodologies of HDI. For comparing HDI by using the old and new methods, we have estimated the life expectancy at birth for the major states of India using the Age Specific Death Rate (ASDR) for 2007 and 2008 and referred the estimates as of 2007. The latest SRS Abridged Life Table is available for 2004 that provides the estimate of life expectancy at birth, therefore we constructed the life table. We have used the average ASDR of two years to avoid fluctuation in

death rate. The UN MORTPACK life table is used to estimate the life expectancy at birth. For the smaller states, we have estimated the life expectancy at birth using the "Brass method" that required information on children ever born and child survival by age of the mother from the National Family and Health Survey 3. The estimated life expectancy at birth was maximum in Kerala (74 years) followed by Goa (73 years) and lowest in the state of Assam (61 years) followed by Madhya Pradesh (62 years). The health indices are represented by I_{health} and shown in Table 2. The changes in the lower and upper limits of life expectancy do not change the index value significantly and can be easily implemented at the sub-national level. We observed that by using the revised methodology, the index value of health has increased marginally in most of the states in India.

Dimensional Index on Income

To obtain the dimensional index on income for the states of India, we have obtained the State Domestic Product Per capita (SDPP) for the year 2007-08 from the Economic Survey, Government of India, 2010-11. We also obtained the GNI per capita and GDP per capita in US$ for 2007 from the World Development Report. We obtained the ratio of GDP and GNI per capita in US$ to GDP per capita for India in rupees to obtain the conversion factor of GDP and GNI per capita. The conversion factor has been multiplied with the SDPP to obtain the income variable expressed in US$. The GDP per capita was US$ 2753 while the GNI per capita was US$ 2870 for 2007. The GNI per capita for India was Rs. 37760 and GDP per capita was Rs. 43817 for 2007-08 (estimated by dividing the GNP at factor cost with mid-year population of 2007-08) (Economic Survey 2010-11). We used the SDPP because SDPP adjusted to net factor income is not available for the states of India. While the dimensional index of income for India was 0.55 in old methodology, it was 0.44 in new methodology. The index value has declined in all the states of India. The relative ranking among states remains the same in the income domain, both in the old and new methodologies.

Table 2: Dimensional index of health and income (old and new) in India

State	Dimension of Health (old and new)			Dimension of Income (old), 2007		Dimension of Income (New), 2007	
	Life expectancy at birth in years, 2007[1]	Index of health- old	Index of health- new	GDP Per capita in US $- old[2]	Index of Income – old	GNI Per capita in US $-new	Index of income – new
Andhra Pradesh	65.56	0.68	0.72	2237	0.52	2706	0.43
Arunachal Pradesh	64.20	0.65	0.70	1819	0.48	2200	0.40
Assam	61.31	0.61	0.65	1382	0.44	1671	0.36
Bihar	65.15	0.67	0.71	696	0.32	842	0.25
Chhattisgarh	62.90	0.63	0.68	1871	0.49	2263	0.40
Delhi	69.80	0.75	0.79	4944	0.65	5981	0.55
Goa	73.00	0.80	0.84	6634	0.70	8025	0.60
Gujarat	66.27	0.69	0.73	2855	0.56	3453	0.47
Haryana	66.38	0.69	0.73	3707	0.60	4485	0.51
Himachal Pradesh	69.64	0.74	0.79	2520	0.54	3048	0.45
Jammu & Kashmir	69.49	0.74	0.78	1521	0.45	1840	0.37
Jharkhand	64.10	0.65	0.70	1252	0.42	1515	0.34
Karnataka	66.19	0.69	0.73	2321	0.52	2808	0.44
Kerala	74.05	0.82	0.86	2708	0.55	3276	0.46
Madhya Pradesh	61.60	0.61	0.66	1203	0.42	1455	0.34
Maharashtra	69.36	0.74	0.78	3082	0.57	3729	0.48
Manipur	70.65	0.76	0.80	1243	0.42	1503	0.34
Meghalaya	65.70	0.68	0.72	1873	0.49	2266	0.41
Mizoram	72.30	0.79	0.83	1770	0.48	2141	0.40
Orissa	62.55	0.63	0.67	1675	0.47	2026	0.39
Punjab	68.33	0.72	0.76	2933	0.56	3548	0.47
Rajasthan	65.89	0.68	0.73	1507	0.45	1823	0.37
Sikkim	72.40	0.79	0.83	2095	0.51	2535	0.42
Tamil Nadu	68.76	0.73	0.77	2561	0.54	3098	0.45
Tripura	70.55	0.76	0.80	1810	0.48	2189	0.40
Uttar Pradesh	62.18	0.62	0.67	1033	0.39	1249	0.31
Uttarakhand	69.05	0.73	0.78	2097	0.51	2537	0.42
West Bengal	68.31	0.72	0.76	2015	0.50	2437	0.42
India	65.47	0.67	0.72	2753	0.55	2870	0.43

1: Computed from Age Specific Death Rate, SRS 2: Economic Survey

Dimensional Index of Knowledge

To compute the dimensional index of knowledge, data from Census of India, large scale population based surveys and the educational statistics are generally used. Usually, the quality of data on educational statistics is not satisfactory in some states of India. In such cases, census and population based surveys such as NFHS or NSS provides alternative data on educational level of the population. To compute the expected years of schooling and mean years of schooling, data on enrolment for single year age need to be compiled or collected. We have computed the mean years of schooling and age specific enrolment from the unit data of NFHS 3 that referred to the period of 2005-06. In computing the dimensional index of knowledge, the geometric mean of mean years of schooling index and the expected years of schooling index are used. This is the fundamental difference in the set of new human development indices which also resulted in the lower value of the dimensional indices. The index value under the old and new HDI for the education dimension has reduced from 0.65 to 0.42 for the country.

Table 3: Dimensional index of knowledge (old and new) in states of India, 2005-06

State	Dimension of Knowledge- Old, 2005-06			Dimension of Knowledge- New, 2005-06		
	Adult literacy rate[1]	Gross enrolment ratio[1]	Index of knowledge	Mean years of schooling[1]	Expected years of schooling[1]	Index of knowledge
Andhra Pradesh	56.50	70.40	0.61	3.88	9.10	0.38
Arunachal Pradesh	60.09	67.51	0.63	4.20	8.78	0.39
Assam	71.71	75.62	0.73	5.33	9.67	0.46
Bihar	49.28	54.41	0.51	3.56	7.20	0.32
Chhattisgarh	57.50	69.15	0.61	3.77	8.86	0.37
Delhi	82.96	78.02	0.81	8.95	10.25	0.61
Goa	81.80	83.94	0.83	7.34	10.94	0.57
Gujarat	69.12	71.32	0.70	5.34	9.14	0.45
Haryana	65.94	75.11	0.69	5.11	9.74	0.45
Himachal Pradesh	77.26	90.74	0.82	6.35	11.75	0.55
Jammu & Kashmir	61.25	76.29	0.66	5.13	10.00	0.46
Jharkhand	52.29	61.74	0.55	3.95	8.14	0.36
Karnataka	64.45	73.94	0.68	5.08	9.54	0.44
Kerala	88.88	90.63	0.89	7.64	11.74	0.60
Madhya Pradesh	56.39	68.41	0.60	4.10	8.88	0.38
Maharashtra	74.66	77.61	0.76	6.14	9.97	0.5

State	Dimension of Knowledge- Old, 2005-06			Dimension of Knowledge- New, 2005-06		
	Adult literacy rate[1]	Gross enrolment ratio[1]	Index of knowledge	Mean years of schooling[1]	Expected years of schooling[1]	Index of knowledge
Manipur	77.36	75.61	0.77	7.10	9.89	0.53
Meghalaya	67.97	62.43	0.66	4.92	8.15	0.40
Mizoram	92.33	78.66	0.88	6.93	10.05	0.53
Nagaland	72.79	66.39	0.71	5.39	8.85	0.44
Orissa	63.65	65.56	0.64	4.09	8.39	0.37
Punjab	69.88	74.12	0.71	5.66	9.62	0.47
Rajasthan	51.13	66.12	0.56	3.67	8.50	0.36
Sikkim	73.03	72.79	0.73	5.03	9.34	0.44
Tamil Nadu	69.37	85.97	0.75	5.56	11.02	0.50
Tripura	77.42	78.12	0.78	5.25	10.24	0.47
Uttar Pradesh	54.77	67.66	0.59	4.19	8.66	0.38
Uttarakhand	70.22	83.57	0.75	6.03	10.85	0.52
West Bengal	67.05	67.61	0.67	4.86	8.77	0.42
India	62.91	69.90	0.65	4.83	9.00	0.42

1: Computed from NFHS 3

A comparison of HDI using the old and new methodologies indicates a decline in the index value in the range of 0.10-0.16 across the major states of India. The relative ranking in the HDI in seven states of India has remained unchanged.

Table 4: Human Development Index (Old and New) in the States of India

State	HDI value-Old	HDI value-new	Differences in HDI value (Old-new)	Rank in old HDI	Rank in new HDI	Differences in Rank
Goa	0.78	0.66	0.11	1	1	0
Kerala	0.76	0.62	0.13	2	3	-1
Delhi	0.74	0.64	0.09	3	2	1
Mizoram	0.72	0.56	0.16	4	6	-2
Himachal Pradesh	0.70	0.58	0.12	5	4	1
Maharashtra	0.69	0.57	0.12	6	5	1
Sikkim	0.68	0.54	0.14	7	11	-4
Tamil Nadu	0.67	0.56	0.11	8	7	1
Tripura	0.67	0.53	0.14	9	13	-4
Punjab	0.67	0.55	0.11	10	9	1
Uttarakhand	0.66	0.55	0.11	11	8	3

State	HDI value-Old	HDI value-new	Differences in HDI value (Old-new)	Rank in old HDI	Rank in new HDI	Differences in Rank
Haryana	0.66	0.55	0.11	12	10	2
Manipur	0.65	0.53	0.12	13	14	-1
Gujarat	0.65	0.53	0.11	14	12	2
West Bengal	0.63	0.51	0.12	15	17	-2
Karnataka	0.63	0.52	0.11	16	15	1
Jammu & Kashmir	0.62	0.51	0.11	17	16	1
Meghalaya	0.61	0.49	0.12	18	19	-1
Andhra Pradesh	0.60	0.49	0.11	19	18	1
Assam	0.59	0.47	0.12	20	21	-1
Arunachal Pradesh	0.59	0.48	0.11	21	20	1
Odisha	0.58	0.46	0.12	22	23	-1
Chhattisgarh	0.58	0.47	0.11	23	22	1
Rajasthan	0.56	0.46	0.11	24	24	0
Madhya Pradesh	0.54	0.44	0.10	25	26	-1
Jharkhand	0.54	0.44	0.10	26	25	1
Uttar Pradesh	0.53	0.43	0.10	27	27	0
Bihar	0.50	0.39	0.11	28	28	0
India	0.63	0.51	0.12			

The ranking of states in HDI has reduced by four in the states of Sikkim and Tripura and by two in the state of Mizoram and West Bengal. Uttarakhand moved three steps upward while the states of Haryana and Gujarat have moved up two steps. The states of Delhi, Himachal Pradesh, Maharashtra, Tamil Nadu, Punjab, Chhattisgarh, Karnataka, Jammu and Kashmir, Andhra Pradesh, Arunachal Pradesh and Jharkhand have moved one step each in the overall ranking. The correlation coefficient of the old HDI value and new HDI value is high (0.98). The estimated HDI value for India and its states are close to the estimates of Suryanarayana et al (2011) (0.51 Vs 0.50) though they have used different data sources for the income and knowledge dimensions. The second India Human Development Report (2011) outlined an increase in HDI for the sub-groups of population and it was largely contributed by the increase in the education dimension

III. Data Gap in constructing Human Development Indices in India

This section outlines the data constraints in computing the Human Development

Index (HDI), Inequality in the Human Development Index (IHDI), Gender Inequality Index (GII) and the Multidimensional Poverty Index (MPI) in India.

a. Data Constraints in measuring HDI at the sub-national level

Though we have computed the HDI for the states of India, we outline the problems in computing such indices for the smaller states and districts in India. The computation of the dimensional index of health using life expectancy at birth is feasible for the smaller states and districts in India. There are some efforts to provide the estimates of infant mortality, child mortality and life expectancy using the children ever born and children surviving data from DLHS. In the education domain, the gathering of data by the National Census and population based surveys such as National Sample Surveys need to be improved. Usually, the Census of India and NSS collect data on the educational level under different categories (illiterate, literate but less than primary etc). This classification does not help to compute the mean years of schooling and the expected years of schooling. To compute such a variable, one needs to collect information on the mean years of schooling of each member. Large scale population based surveys such as NFHS and DLHS provide information on the mean years of schooling. The challenge remains in measuring the income dimension of the Human Development Index. We have used the SDPP for the state level and it is difficult to obtain such estimates at the district level. Further, the estimation of SDPP adjusting to net factor income is not available for any states.

b. Data Constraints in measuring the Inequality in Human Development Index (IHDI)

The inequality human development index (IHDI) was developed to measure the inequality in the state of human development across and among the countries. The IHDI is derived from the Atkinson (1970) family of inequality measures. It is defined as $A= 1-g/ \mu$ where g is the geometric mean of the distribution and μ is the arithmetic mean of the distribution (UNDP 2010). The IHDI equals the HDI when there is no inequality across people but is less than the HDI as inequality rises.

The key question is whether the IHDI can be computed for the states of India using the existing data source. The HDR 2010 (Page 219) reports that IHDI is not association sensitive. It requires complete data on each individual from a single

survey which is not currently possible. At present, the life expectancy at birth and the SDPP/consumption expenditure are provided from different data sources. There is no unique large scale reliable data set that provides comprehensive information. We know the limitations of obtaining the SDPP/income data segregated by sex, social and economic groups. There is a similar problem with respect to life expectancy at birth. In this context, it is suggested that to integrate the indicators of HDI in large scale population based survey or take a special round survey of NSSO on the theme of "Human Development".

However, the report also suggests that the IHDI may be drawn from alternative source of data to obtain the distribution of each dimension. The distributions have different units- income and years of schooling across individuals while life expectancy at birth across age intervals. Suryanarayan et al (2011) using the consumption expenditure and mean years of schooling from NSS and the life expectancy from SRS constructed the IHDI for states of India. However, to construct the IHDI for smaller states and in district level is not feasible within the existing data. There is a need to generate life table for smaller states and districts of India to arrive such estimates.

c. Data Constraints in measuring Gender Inequality Index (GII)

The GII was developed to reflect women's disadvantage in three dimensions, reproductive health, empowerment and the labour market. It uses the maternal mortality ratio (MMR), adolescent fertility rate (ASFR), share of parliamentary seats held by each sex, attainment of secondary and higher education and the labour market participation rate. The estimation of MMR for the states of India is not provided periodically due to the sensitivity of the estimates. It requires a fairly large sample and the SRS provides the estimates only for the major states of India but not periodically. Even a large scale population based survey like NFHS 3 does not provide the estimates of MMR at the state level owing to lower sample size (IIPS and Macro International 2007). Hence, the reliable and periodic estimation of MMR is a major challenge in the construction of GII. However, the other indicators can be compiled from NFHS and other large scale surveys at the sub-national level.

d. Construction of Multidimensional Poverty Index (MPI)

Though the concept of multidimensional poverty has been acknowledged cutting

across the disciplines, the estimation of multidimensional poverty suffers from both theoretical and methodological challenges. The theoretical challenges include contextualising the dimensions and indicators and the methodological issues include the fixing of a cut off point for the poor and non-poor, aggregation of multiple dimensions into a single index, weighting of dimensions and the unit of analyses (Alkire and Foster 2009; Alkire 2007). There have been a number of studies on the measurement, application and limitations of multidimensional poverty during the last two decades (Sahn and Stifel 2000; Bourguignon and Chakravarty 2003; Calvo 2008; Srinivasan and Mohanty 2008; Booysen, Maltitz and Rand 2008; Mohanty 2011). Alkire and Santosh (2010) have developed the Multidimensional Poverty Index (MPI) and estimated the MPI for 104 developing countries using household level data. They have used a set of ten indicators in three key dimensions of education, health and living standard, assigned equal weight to each dimension and equal weight to the variables within the dimension. A cut-off of 3 was used to distinguish between the poor and non-poor. The MPI is defined as the product of multidimensional poverty head count ratio (H) and the intensity (breadth) of poverty (A).

Mathematically, MPI = H.A

Where, H=q/n, q is the number of people who are multidimensional poor and n is the total population

$A= \sum_{1}^{q} C$ /qd

Where, c is the total number of weighted deprivations the poor experience and d is the number of component indicators considered.

The estimates of MPI are said to be robust, capture the multiple deprivations and disseminated in the 2010 Human Development Report. In the Indian context, all the variables used in the construction of MPI are available in the NFHS 3 data set. However, the analyses of such survey data need conceptualisation, expertise in analyses, and correct interpretation of results. Such indices are good for high quality research but are difficult to popularise at the local level, which is one of the objectives of the UNDP and the HDR.

We have some observations on the use of variables in defining the MPI itself. The variables used in defining the health dimension in MPI are: at least one member is malnourished in the household and there has been the death of one child or more in the household. But information on malnourished adults or children of the household was available only in the last round of NFHS (2005-06). While the information on weight for age for children under-five years and of married women in the age group 13-49 was available only for selected states in NFHS 1, such information was collected for all the states in 1998-99 in NFHS 2. In 2005-06 (NFHS 3), the height and weight of men in the age group 15-59 were included along with those of women and children. Hence, none of the surveys has complete information on the nutritional status of all the members in a household. Given that about half of the children in the country are underweight, it is advisable to provide data on the severity of under-nutrition say, severe underweight than prescribing for all members of the household. In fact, this will lead to an increase in the percentage of the multidimensional poor. Similarly, the death of one or more children in the family does not reflect the current mortality scenario in the country. For example, a woman who is 49 years now experienced child loss soon after marriage (say when she was 18 years old). There has been a lot of improvement in mortality experience in the last 31 years, and hence the variable that one or more children had died may not be a good variable to capture recent changes in mortality. It would have been better to consider child loss in the last five years so as to capture child death in recent years.

The variables used in the education domain are: no one completed five years of schooling and at least one child of school-going age was not enrolled in school. It is possible to compute these variables using large scale population based surveys. However, a certain proportion of households do not send their children to school or the child is out of school as he/she is not interested in studies. This may not be entirely attributed to poverty though low education and poverty are highly correlated. Similarly, the MPI uses six indicators to reflect the domain of income/living condition (electricity, access to drinking water, access to sanitation, dirt floor, use dirty cooking fuel, household has no car and owns at most one of the following - bicycle, motorcycle, radio, refrigerator, telephone and television). While electricity is a community variable, a large proportion rural households (rich and poor farmers) use by-products of cultivation such as firewood and dung for cooking.

With respect to consumer durables, it is hard to say whether the limited number of economic proxies can really reflect the economic status of the household. The correlation of economic proxies and consumption expenditure is weak in India and hence may not truly reflect the economic condition of the household (Srivastava and Mohanty 2010). Because of these limitations, multidimensional poverty was estimated at 70% for the country. Given the limitations of the variable, the MPI needs to be contextualised and reworked with the unit data. Such changes require research skill to analyse large scale population based survey data. Mohanty (2011) has addressed some of these issues and estimated multidimensional poverty at 50% for the country.

According to UNDP report, the MPI said to supplant the HPI-1 as MPI can be disaggregated by social groups and regions. We have computed the HPI-1 for the states of India and compared it with the MPI for 18 states of India (Table 5). The HPI-1 is compared with the MPI estimates of Alkire and Santosh (2010). Results showed that only for two states, Kerala and Gujarat, the relative rank of MPI and HPI-1 has not been changed. A larger change in rank was observed in West Bengal (reduced by five) and Andhra Pradesh (increased by three). The relative ranking in the states of Maharashtra and Bihar has been reduced by two, while it has reduced by one in Chhattisgarh, Himachal Pradesh, Karnataka, Orissa and Uttar Pradesh. The states of Haryana, Jammu and Kashmir, Punjab and Rajasthan have moved two steps, while Jharkhand, Madhya Pradesh and Tamil Nadu have each moved one step higher in the overall ranking. The MPI is said to supplant the HPI-1, but it adds little to the understanding of multidimensional poverty dynamics.

Table 5: Human Poverty Index 1 and Multidimensional Poverty Index in India

States	Probability at birth of not surviving to age 40 (times 100) (P_1), 2007[1]	Adult illiteracy rate (P_2), 2005-06[2]	A decent standard of living (P_3), 2005-06		HPI-1	MPI, 2010[3]	HPI-1 rank	MPI rank	(HPI rank) – (MPI rank)
			Under weight[2]	Without safe drinking water[2]					
Andhra Pradesh	12.64	43.5	32.5	67.5	31.24	0.211	12	9	3
Bihar	14.9	50.72	55.9	44.1	37.68	0.499	16	18	-2
Chhattisgarh	14.97	42.5	47.1	52.9	34.35	0.387	14	15	-1
Gujarat	12.26	30.88	44.6	55.4	25.86	0.205	7	7	0
Haryana	13.52	34.06	39.6	60.4	25.98	0.199	8	6	2

States	Probability at birth of not surviving to age 40 (times 100) (P_1), 2007[1]	Adult illiteracy rate (P_2), 2005-06[2]	A decent standard of living (P_3), 2005-06		HPI-1	MPI, 2010[3]	HPI-1 rank	MPI rank	(HPI rank) – (MPI rank)
			Under weight[2]	Without safe drinking water[2]					
Himachal Pradesh	10.7	22.74	36.5	63.5	20.77	0.131	2	3	-1
Jammu & Kashmir	9.8	38.75	25.6	74.4	28.62	0.209	10	8	2
Jharkhand	13.36	47.71	56.5	43.5	42.73	0.463	18	17	1
Karnataka	11.78	35.55	37.6	62.4	27.67	0.223	9	10	-1
Kerala	3.95	11.12	22.9	77.1	19.10	0.065	1	1	0
Madhya Pradesh	18.25	43.61	60.0	40.0	38.26	0.389	17	16	1
Maharashtra	9.52	25.34	37.0	63.0	21.05	0.193	3	5	-2
Orissa	16.16	36.35	40.7	59.3	30.18	0.345	11	12	-1
Punjab	10.63	30.12	24.9	75.1	21.68	0.120	4	2	2
Rajasthan	14.23	48.87	39.9	60.1	36.35	0.351	15	13	2
Tamil Nadu	9.8	30.63	29.8	70.2	22.82	0.141	5	4	1
Uttar Pradesh	16.44	45.23	42.4	57.6	33.36	0.386	13	14	-1
West Bengal	8.95	32.95	38.7	61.3	25.18	0.317	6	11	-5
India	13.25	37.09	42.5	57.5	29.07	0.296			

1: Computed from SRS, 2: Computed from NFHS 3, 3: Alkire and Santos (2010)

IV. Discussion and Conclusion

The HDR report released by UNDP in October 2010 disseminated the changes in the much used index of development, that is, HDI and added three more indices to the family of Human Development Indices. The changes in methodology and inclusion of new indices aimed at capturing the growing inequality in the state of HDI within and across countries. These indices are good for cross country comparison but are handicapped by data source at the sub-national level. We have discussed the feasibility of constructing these indices for the states of India with the existing data set. There are certain issues that need attention to make operational the use of these indicators at the state or sub-national level.

The construction of HDI (both old and new) is possible but it adds little to the understanding of human development. The fundamental criticism of missing dimensions is not addressed in the new index. At least one dimension, for instance, unemployment among young people would have been added value to the popular

index. Today, for both developing and developed countries, unemployment and under employment are the most critical challenges, which did not find place either in HDI or in MPI. Unemployment among the educated young is very high, but this problem has been neglected both by policy and research. Many with higher education are unemployed or doing petty jobs for decades with little or no security. The unemployment rate among educated young people (with 12 years of unemployment and more) in six states of India was high and it should find a place in the Human Development Index (IIPS and Population Council 2010).

Also, the computation of HDI by social and economic groups is handicapped by disaggregation of SDPP and the life expectancy by such groups. Life expectancy at birth has not been provided for the smaller states of India and segregating life expectancy at birth by social or economic groups to gauge inequality is not feasible. We are constrained by the SDPP estimates which are not obtained for rural and urban areas, by sex and social and economic groups. Given the sensitivity and the complexity involved in collecting income data, hardly any survey in India has succeeded in collecting and publishing reliable data on household income. There are some indirect methods of estimating the life expectancy and income for the districts of India, but these estimates and methods need to be discussed and analyzed thoroughly before being put into practice. Obtaining district level information (as some of the state specific human development report did) will be useful for illustrating the spatial pattern of inequality in human development. The only dimension for which the statistical system can improve is the education dimension. Both the variables used in the construction of the knowledge dimension can easily be incorporated into various surveys. In fact, large scale population based surveys such as the NFHSs and DLHS have been successful in collecting these indicators for the national and state levels.

With respect to the IHDI, the HDR report 2010 outlined the limitations of IHDI and stated that it was not possible to obtain complete information on each individual from any single survey. However, the estimates using alternate sources can be made. But to obtain the IHDI for socio-economic groups, there is a need to provide the life table not only by sex but also by few other characteristics such as education and income. The problem is similar with respect to the Gender Inequality Index. It used the Maternal Mortality Ratio (MMR) which was hard to obtain. Even the large scale population based survey like the NFHS 3 did not provide the estimates

of MMR at the state level. The SRS provides data on MMR but not periodically and cautions while using this indicator. Hence, such indices cannot be computed regularly and beyond the state level.

The only index that is possible to compute from the existing unit data is the MPI. However, the conceptualisation of MPI needs to be debated discussed and improved before implementation. We observe the followings on MPI. First, it may be mentioned that the practice of measuring multidimensional poverty is not new in India. Since the first Below Poverty Line (BPL) Survey, households living below the poverty line have been identified using this concept (Sundaram 2003). Second, given the uncertainty in conducting population based surveys, we doubt whether the MPI can be computed further. Third, the MPI in its present form that yields an estimate of 70%, needs to be debated and discussed. We need to conceptualise the indicator carefully and provide estimates, or it will mislead policy. On the other hand, though under-nutrition is rampant in the country, we have a limited understanding on the contextual determinants of under-nutrition. Many children from even the rich households are underweight and recommending such a variable in the MPI may not be useful.

We conclude that the use of these indices at the sub-national level must be carefully thought over, debated and discussed. Otherwise, the changes in methodology and variables may create more confusion in the minds of planners and mislead program managers. We also suggest integrating the variables specified in the HDI into large scale population based surveys so as to popularise their use. Variables such as work and unemployment should be integrated into the conceptualisation of MPI. In its present form, the family of Human Development Indices is an outcome of good quality research, but has limited practical applicability for planning and program implementation. We recommend a periodic survey of human development by the NSSO.

References

Alkire S. and Santosh M. (2010). "Acute Multidimensional Poverty: A New index for developing countries", Oxford Poverty & Human Development initiative (OPHI) Working paper 38, Oxford Department of International Development, University of Oxford.

Alkire S and Foster J. (2009). "Counting and Multidimensional Poverty Measures", Oxford Poverty & Human Development Initiative (OPHI) working paper 7.5, Oxford Department of International Development, University of Oxford.

Alkire S. (2007). "The Missing Dimensions of Poverty Data: Introduction to the Special Issue", Oxford Development Studies, 35 (4), 347-359.

Atkinson,A. (1970). "On Measurement of Inequality" *Journal of Economic Theory* 2(3):244-63

Booysen F; Michael Von Maltitz and Gideon Du Rand. (2008). Using an Asset Index to Assess Trends in Poverty in Seven Sub-Saharan African Countries", *World Development*, 36(6), 1113-1130.

Bourguignon, F and Chakravarty, S.R.(2003). "The Measurement of Multidimensional Poverty", *Journal of Economic Inequality*, 1(1), 25-49.

Calvo Cesar. (2008). "Vulnerability to Multidimensional Poverty: Peru, 1998-2002", *World Development,* 36(6), 1011-1020.

International Institute for Population Sciences (IIPS) and Macro International. (2007). *National Family Health Survey (NFHS 3), 2005-06; India: Volume I.* Mumbai: IIPS.

International Institute for Population Sciences (IIPS) and Population Council. (2010). *Youth in India: Situation and Needs 2006-2007*.Mumbai:IIPS

Institute of Applied Manpower Research and Planning Commission, Govt of India (2011). "India Human Development Report 2011: Towards Social Inclusion"

Kelley A.C. (1991). "The Human Development Index: Handle with Care", *Population and Development Review*, 17(2): 315-324.

Michael Grimm, Kenneth Harttgen, Stephan Klasen and Mark Misselhorn.(2006). "A Human Development Index by Income Groups", UNDP Occasional Paper.

Ministry of Finance .(2010). "Economic Survey (2009-10)", Government of India", *Oxford University* Press.

Mohanty SK. (2011)."Multidimensional Poverty and Child Survival in India". *PLoS ONE* 6(10): e26857. doi:10.1371/journal.pone.0026857

Mohanty S.K. and F. Ram. (2010). "Life Expectancy at Birth among Social and Economic Groups in India", IIPS Research Brief No 13.

Planning Commission, Government of India. (2007). "Poverty Estimates for 2004-05", accessed on line: http://planningcommission.nic.in/news/prmar07.pdf accessed on 10 march 2012.

Ranis G., F.Stewart and E. Samman. (2006). "Human Development: Beyond the HDI, QEH", Working Paper Series- QEHWPS135, 2006.

Registrar General of India. (2007). "Sample registration system statistical report 2007", Ministry of Home Affairs, Government of India, New Delhi.

Registrar General of India. (2008). "Sample registration system statistical report 2008", Ministry of Home Affairs, Government of India, New Delhi.

Sahn,D.E; and Stifel, D.C.(2000). "Poverty Comparison Over-Time and Across Countries in Africa". *World Development,* 28(12), 2123-2155.

Srinivasan K and Mohanty S.K. (2008). "Household Deprivation and Its Linkages with Reproductive and Child Health Care and Health Outcome", *Economic Political Weekly*, 43 (48), 67-76.

Srinivasan T.N . (1994). "Human Development: A New Paradigm or Reinvention of the Wheel?", American *Economic Review*, 84 (2): 238-243.

Srivastava A and Mohanty S.K. (2010). "Economic Proxies, Consumption Expenditure and Health Estimates", *Economic Political Weekly*, 45 (16):55-63.

Sundaram, K. (2003). "On Identification of Households Below Poverty Line: Some Comments on the Proposed Methodology", *Economic and Political Weekly*, XXXVIII (9): 896 -902, March 1-7, 2003.

Suryanarayana H. M, Agarwal A and Prabhu K.S .(2011). "Inequality Adjusted Human Developmnet Index for India's States", UNDP, New Delhi, India

UNDP . (1990). Human Development Report, Oxford University Press, New York.

UNDP (1991). Human Development Report, Oxford University Press, New York.

UNDP. (2005). Human Development Report, Oxford University Press, New York.

UNDP. (2006). Human Development Report, Oxford University Press, New York.

UNDP. (2009). Human Development Report 2009, Palgrave Macmillan, New York.

UNDP . (2010). Human Development Report 2010, Palgrave Macmillan, New York.

UNESCO 2009, *Educational Indicators, Technical Guidelines.*

United Nations Population Division. (2003). "MORTPAK for Windows, Version 4.0". United Nations, New York.

World Bank. (2008). "International Comparison Programme: World Development Indicators, accessed online: http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD" accessed on 10 March 2012

International Institute for Population Sciences

International Institute for Population Sciences was established in 1956 by the UN, Government of India and the Sir Dorabji Tata Trust as a premier Institute for training and research in Population Studies for developing countries in the Asia and Pacific Region. It is the training centre for population studies for the ESCAP Region, recognised by the United Nations Fund for Population Activities (UNFPA). Now the institute is an autonomous institution under the administrative control of the Ministry of Health and Family Welfare, Government of India. It offers regular academic courses, at graduate and post graduate level; conducts research and training programms; and provides consultancy to Government and Non-governmental organisations. The Institute was awarded deemed university status in 1985 and since then the PhD programme also initiated at the institute.

Besides teaching regular courses, the Institute has from time to time, conduct short-term courses for various organizations covering various themes and issues. The courses have been sponsored by the WHO, Department of Family Welfare, Asian Development Bank, Nordic center, John Hopkins University and so on. The University Grants Commission sponsored refresher courses have also been organized at IIPS.

The Institute conducts research using its own resources and through external funding. The externally funded projects are usually initiated at the request of the concerned agencies. These are generally large-scale surveys, requiring primary data collection. It is worth mentioning that all the three rounds of nationwide DHS surveys of India - National Family Health Surveys I, II & III- were conducted by the Institute at the request of Government of India with the financial assistance of USAID and UNICEF and the technical assistance provided by ORC Macro and the East-West Centre, USA. Another major project undertaken by the Institute is the District Level Household and Facility Survey (DLHS - RCH), conducted at the behest of Ministry of Health and Family Welfare with World Bank funding. Currently the Institute has been appointed as the nodal agency for the Concurrent Evaluation of National Rural Health Mission (NRHM) for all the states of India.

Prof. F. Ram
Director & Senior Professor

Policy Implications

- Though the values of HDI computed using the new methodology are substantially lower than those computed with the old methodology, the overall ranks of the states in the new and old HDI are similar. For the sub-national (district) level, alternative methodology may be used depending on data. The construction of life table for smaller states, districts and selected socio-economic groups would be helpful to estimate the HDI indices at disaggregated level.
- The Census of India, National Sample Surveys and other surveys that collect data on the level of education under broad categories may collect data on the mean years of schooling of each member that may be used in constructing the knowledge dimension of HDI.
- We suggest that to move from the estimation of money-metric poverty to multidimensional poverty. The MPI can be computed using data from the large scale population based surveys such as the National Family and Health Survey 3 but needs improvement in the conceptualisation and contextualisation of multidimensional poverty indicators.
- The existing database is not sufficient to compute the IHDI and GDI for the states of India. There is need to undertake a comprehensive population based survey at regular intervals that provides information on the key dimensions of human development including education, income and health. We suggest conducting a special round of Human Development Survey within the existing statistical system.

Vision Vision "To position IIPS as a premier teaching and research Institution in population sciences responsive to emerging national and global needs based on values of inclusion, sensitivity and rights protection".

Mission "The Institute will strive to be a centre of excellence on population, health and development issues through high quality education, teaching and research. This will be achieved by (a) creating competent professionals, (b) generating and disseminating scientific knowledge and evidence, (c) collaboration and exchange of knowledge, and (d) advocacy and awareness."