



HUMAN DEVELOPMENT IN INDIA: INDEXING ACROSS SELECTED STATES

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Abstract

In this paper we have tried to frame human development index across some selected states in India. For the purpose we have chosen 15 states six of which are above median values and the other nine are below median value. The extent of disparity among some states has been found quite substantial. To raise the human development index, the relatively backward states should endeavour to remove the non-economic bottlenecks along with the economic impediments.

I. Introduction

The concept of human development is as old as the economic thought but its quantitative measurement is of recent origin. The former can be traced to the oriental societies as their objectives have always been to maintain, improve and provide the basic requirements of nutrition, living space and social harmony. Even the ancient scripts such as Arthashastra by Kautilya can be seen as a treatise of human development as it discusses systems of governance that can ensure certain welfare standards to all the sections of population. Similarly, Adam Smith in his *The Wealth of Nations* emphasis on state investment in education and other social areas as, he felt that private entrepreneurs motivated by profit maximization may not make adequate investment in these sectors. At the root of his population of *lassie-faire* lies the intent of the good for common man and he cautions the state that inefficiencies in the system may damage the common cause.

The progress of a nation and its economic development has, therefore, been measured in monetary value and expressed through a common denominator across countries. The GDP or NDP has been considered a reasonably good measure to determine the nation's wealth and economic performance overtime.

The inadequacies of this measure have, however, been noted right from the time of its use for cross- country comparisons. Scholars have pointed out that this one-dimensional estimate does not capture the achievements or failures of the efforts of a society in providing welfare to its people for a large number of reasons. The inadequacy of such comparisons as also the need to define 'development' as a multidimensional and multifaceted concept has, however, been recognized by large segment of policy-makers and researchr all around the globe in the recent decades. This understandably has brought forth the necessity to consider a set of indicators pertaining to the different dimensions of development and their composition into an aggregative index.

A variety of instruments to assess human development have emerged in recent years, which resulted in new sets of measures on development. In some cases, the determinants of developments, rather than being mutually exclusive, are linked in complex ways, resulting in complementarities and synergies. The paper attempts to analyze the human development index in 15 selected states in India using a special approach and tries to compare the indices developed by UNDP in 2004. Further, the paper tries to evaluate the extent of disparity among the states from detailed data analysis and finally tries to search for the path of reducing such disparity through raising the human development indices of the backward states in this regard.

II. Methodology & Choice of Samples

The UNDP human development figures for the year 1991 has been taken for all the Indian States and the median value has been identified as 4185. Six states above the median value while nine states below the median value have been selected as sample states to develop the Human Development Index. The following 15 states as shown in Table 1 have been selected. It shows that 6 states are above median value and 9 states are below median value.

Table 1, Sample States

<i>States above Median Value</i>	<i>States below Median Value</i>
Gujarat	- Bihar (including Jharkhand)
- Haryana	- UttarPradesh(IncludingUttaranchal)
- Maharashtra	- MP (Including Chattisgarh)
- Punjab	- Andhra Pradesh
- Kerala	- Orissa
- Tamil Nadu	- Assam
- Rajasthan	- West Bengal
	- Karnataka



Selecting an appropriate statistical method to arrive at a score for selected variables explaining development

Since in social research surveys the data in most case is ordinal and the units of the variable vary it is difficult to fit sophisticated statistical models. One technique which can be used is to convert each of the cell value to a score. The approach is described in the table below providing a simple example. Let us assume that a sample survey is carried on n cities with m variables with different units. Some of them may be rating in a 5 point scale or a 10 point scale, while others may be a continuous variable like road length and expenditure or number of health facilities in the city. Since the units differ, the first requirement should be to make the data base unit free. The data will look like that in table below which is just a hypothetical one.

The data sets needs to be converted to a score matrix (unit free) without which, the sophisticated statistical techniques cannot be used. This can be done in two ways:

- 1) Method of general normalization – This method involves subtracting the minimum value of each of the variable from the respective response and dividing by the range. Mathematically.
This implies dividing the deviation of a particular value of a cell from the minimum value by the range. Thus each score shows how they vary from the Minimum value with respect to the range.
- 2) However this method is subject to certain limitations. As such Range is not the best measure of dispersion as it covers the two extremes. The second method is known as the Z score transformation or standardization. This implies subtracting the mean value of the variable from each of the cells and dividing by the SD of the variable Mathematically

Table 2,Report about Several Government Services (Hypothetical Data)

	Primary-Schools	Amount of Govt.		
Cities	in the city	Expenditure of	No. of Govt	Road
		Public Health (lakhs) ,	Clinics	(in Km)
1	4	201	10	50,000
2	6	212	5	75,000
3	7	600	2	2,80,000
4	2	800	2	4,00000
5	8	956	4	55,000
6	2	454	3	22,000
7	3	432	9	31,000
8	4	223	10	25,000

In this case each cell will-show the value of the standardized normal variate. In table 2 the second method is applied for conversation. Thus the output has been shown in the converted table.

Table 3,Convertingthe AboveTable into Scores

Primary Schools.Amount of Govt.
in the city Expenditure of No. of Govt
Cities Public Health (lakhs) Clinics Road

1	X ₁₁	X ₁₂	X ₁₃	X ₁₄
2	X ₂₁	X ₂₂	X ₂₃	X ₂₄
3	X ₃₁	X ₃₂	X ₃₃	X ₃₄
4	X ₄₁	X ₄₂	X ₄₃	X ₄₄
5	X ₅₁	X ₅₂	X ₅₃	X ₅₄
6	X ₆₁	X ₆₂	X ₆₃	X ₆₄
7	X ₇₁	X ₇₂	X ₇₃	X ₇₄
8	X ₈₁	X ₈₂	X ₈₃	X ₈₄



III. Data Analysis

Aggregation of the Indicators

In earlier studies often a simple average across indicators was used to calculate the final score of development in a city. However two problems are associated with this technique. At the first place there is no justification of applying equal weights to the indicators. Secondly as mentioned earlier most of these indicators that explain development are highly correlated. Or, in other words there is multi-co linearity in the model. The most used statistical way is to use a principal component analysis to arrive a common score. The analysis helps in combining the associated variables and arrives at a composite score.

Developing State Development Indices Using a Limited Number of Variables

In India the Human development report shows the relative positioning of the states based on the calculated Human development index for that particular state. This paper attempts to arrive at similar development indices using lesser number of indicators.

This paper focuses on three basic sectors, namely health, education and poverty eradication in which Govt. has made huge investments across the last decade. Human development indices across these sectors have been calculated separately and finally and overall Human Development index has been calculated across 15 states.

The indicators used each of these three sectors are defined below-

- Health
 - Infant Mortality Rate
 - Immunization Rate
 - Rate of institutional Deliveries
 - Minimum Antenatal Care taken
- Education
 - No. of primary Schools per 1000 population
 - Literacy rate
 - Primary Enrolment Rate
 - Primary schools within a distance of ½ km.
- Poverty
 - Households with Pucca Houses
 - Monthly per capita Consumption Expenditure
 - Households with safe drinking water
 - Percentage of BPL Families

[see Annex 1 for the detailed definitions of each of these indicators]. The data for these indicators for 15 States are shown in Table 4,5,6.

From Table 4 it can be noted that out of these indicators some of them are negatively related to development e.g. % of BPL or infant mortality rate are inversely proportional to the development. Thus it is essential to make these indicators positive. Table 5 shows the indicators proportional to development. It has been done by taking the inverse of the negatively related indicators.

Applying the formula $V = (V_i - V_{MEAN}) / (SD(V))$ the above matrix is converted into a unit free score matrix since each of the indicators are of different dimensions. The score matrix calculated is shown in Table 6.

Now it is crucial to aggregate the indicators and arrive at three different indices

1. Health
2. Education
3. Poverty

These indices will be arrived at using a Principal component analysis. Combining the three indices the Human development index will be compiled. On developing the human development index a simple average of the health, education and poverty index has been taken as three are the primary important for MDGs.

IV. Analytical Discussion on Results

As per the calculations the three indices and the HDI are given in the Table below. The states are arranged in the descending order of the HDI. It is to be noted that some of these states shows a negative sign. This should not be interpreted as negative development but the scale of analysis varies from -3 to +3. The overall Kerala appears to be having the best HD.



Table-4,Data for the Above Indicators

State	IMR/ 1000 live births	Instltu- tional Delivery (%)	Fu.ll Vaccina- tion (12-23) months %	Miuuuun Antenatal Care taken (%)	No. of Primary Schools/ 1000 popula- tion	Enrol- ment Rate (6 to 11 years)	Literacy Rate	Primary Schools within .5Kmin Rural India (%)	BPL (%)	House- holds with Pucca Houses (%)	Monthly per capita onsump- tion Expendi- ture(Rs)	House- holds with safe drinking water (%)
Kerala	42.00	93.00	82.60	86.40	2.20	93.10	90.90	84.07	25.40	67.70	152.74	18.89
Maharashtra	74.00	52.80	76.30	74.90	3.97	69.10	76.90	93.60	25.00	74.70	125.95	68.49
Tamil Nadu	54.00	79.80	74.60	95.40	4.91	77.40	73.50	98.81	35.00	64.10	118.98	67.42
W. Bengal	62.00	40.40	43.50	82.40	5.28	45.90	68.60	84.19	35.70	68.10	118.98	81.98
Punjab	74.00	37.50	69.20	89.90	4.84	64.40	69.70	98.51	11.80	89.10	147.11	92.74
Karnataka	74.00	51.10	57.10	74.90	3.82	61.00	66.60	93.47	33.20	67.20	116.66	71.68
Bihar	75.00	14.70	9.00	57.80	3.97	34.30	47.00	77.51	55.00	64.30	93.88	58.76
Gujarat	78.00	46.40	47.00	72.70	2.86	62.30	69.10	97.90	24.20	80.00	130.78	69.78
AP	55.00	50.00	55.90	81.50	5.34	53.00	60.50	95.57	22.20	66.50	104.24	55.08
Haryana	52.00	22.30	63.20	79.70	4.06	62.20	67.90	96.71	25.10	90.00	140.18	74.32
Assam	92.00	17.60	9.20	51.70	8.62	46.00	63.30	80.20	40.90	45.90	99.81	45.86
Rajasthan	87.00	21.70	16.60	52.10	4.88	38.90	60.40	88.01	27.40	85.70	110.90	58.96
Uttar Pradesh	99.00	15.70	18.80	51.40	4.21	36.70	56.30	73.15	40.90	73.10	95.64	62.24
Madhya Pradesh	133.00	20.40	17.90	55.00	8.18	47.70	63.70	89.23	42.50	58.20	92.38	53.10
Orissa	125.00	22.90	43.30	74.30	9.66	41.70	63.10	79.07	48.60	59.00	96.53	39.07
Source: See Annex 1.												

Table 5												
Data for the Above Indicators Positively Transformed												
State	Non IMR (%)	Institu- tional Delivery (%)	Full Vaccina- tion (12-23) months %	Minimum Antenatal Care taken (%)	No. of Primary Schools / 1000 population	Enrolment Rate (6 to 11 years)	Literacy Rate	Primary Schools within O.SKm in Rural India (%)	Non BPL (%)	Households with Pucca Houses (%)	Monthly per capita Consump- 'tion Expendi- ture(Rs)	House- holds with safe drinking water (%)
	95.80	93.00	82.60	86.40	2.20	93.10	90.90	84.07	74.60	67.70	152.74	18.89
Maharashtra	92.60	52.80	76.30	74.90	3.97	69.10	76.90	93.60	75.00	74.70	125.95	68.49
Tamil Nadu	94.60	79.80	74.60	95.40	4.91	77.40	73.50	98.81	65.00	64.10	118.98	67.42
W. Bengal	93.80	40.40	43.50	82.40	5.28	45.90	68.60	84.19	64.30	68.10	118.98	81.98
Punjab	92.60	37.50	69.20	89.90	4.84	64.40	69.70	98.51	88.20	89.10	147.11	92.74
Karnataka	92.60	51.10	57.10	74.90	3.82	61.00	66.60	93.47	66.80	67.20	116.66	71.68
Bihar	92.50	14.70	9.00	57.80	3.97	34.30	47.00	77.51	45.00	64.30	93.88	58.76
Gujarat	92.20	46.40	47.00	72.70	2.86	62.30	69.10	97.90	75.80	80.00	130.78	69.78
AP	94.50	59.00	55.90	81.50	5.34	53.00	60.50	95.57	77.80	66.50	104.24	55.08
Haryana	94.80	22.30	63.20	79.70	4.06	62.20	67.90	96.71	74.90	90.00	140.18	74.32
Assam	90.80	17.60	9.20	51.70	8.62	46.00	63.30	80.20	59.10	45.90	99.81	45.86
Rajasthan	91.30	21.70	16.60	52.10	4.88	38.90	60.40	88.01	72.60	85.70	110.90	58.96
Uttar Pradesh	90.10	15.70	18.80	51.40	4.21	36.70	56.30	73.15	59.10	73.10	95.64	62.24
Madhya Pradesh	86.70	20.40	17.90	55.00	8.18	47.70	63.70	89.23	57.50	58.20	92.38	53.10
Orissa	87.50	22.90	43.30	74.30	9.66	41.70	63.10	79.07	51.40	59.00	96.53	39.07
Source: See Annex												



Table- 6,Data Converted into Scores

	IMR/ live births	Insitu- tional Deliver (%)	Full Vaccina tion (12-23 months %)	Minimum Antenat Care taken (%)	No. of Primary Schools/ 1000 popula- tion	Enrol- ment (6 to 11 years)	Literac Rate	Primary Schools within 0.5Kmi Rural India	Non BPL (%)	House- holds with Pucca Houses (%)	Monthly per Consum lion Expendi- ture(Rs)	House holds with drinking water (%)
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Table 7,Three Separate Indices and the HDI

Kerala	3.52	3.30	2.86	2.36	0.00	3.57	4.45	1.28	2.60	1.79	3.04	0.00
Maharashtra	2.28	1.61	2.62	1.58	0.84	2.11	3.03	2.40	2.64	2.36	1.69	2.77
TamilNadu	3.06	2.75	2.55	2.97	1.28	2.62	2.69	3.01	1.76	1.49	1.34	2.71
W. Bengal	2.75	1.08	1.34	2.09	1.46	0.70	2.19	1.30	1.70	1.82	1.34	3.52
Punjab	2.28	0.96	2.34	2.60	1.25	1.83	2.30	2.98	3.80	3.54	2.76	4.12
Karnataka	2.28	1.54	1.87	1.58	0.77	1.62	1.99	2.39	1.92	1.75	1.22	2.94
Bihar	2.25	0.00	0.00	0.43	0.84	0.00	0.00	0.51	0.00	1.51	0.08	2.22
Gujarat	2.13	1.34	1.48	1.44	0.31	1.70	2.24	2.91	2.71	2.80	1.94	2.84
AP	3.02	1.49	1.82	2.03	1.49	1.14	1.37	2.63	2.88	1.69	0.60	2.02
Haryana	3.14	0.32	2.11	1.91	0.88	1.69	2.12	2.77	2.63	3.62	2.41	3.09
Assam	1.59	0.12	0.01	0.02	3.04	0.71	1.65	0.83	1.24	0.00	0.37	1.50
Rajasthan.	1.78	0.30	0.30	0.05	1.27	0.28	1.36	1.74	2.43	3.27	0.93	2.23
Uttar Pradesh	1.32	0.04	0.38	0.00	0.95	0.15	0.94	0.00	1.24	2.23	0.16	2.42
Madhya Pradesh	0.00	0.24	0.35	0.24	2.83	0.81	1.69	1.89	1.10	1.01	0.00	1.91
Orissa	0.31	0.35	1.33	1.54	3.53	0.45	1.63	0.70	0.56	1.07	0.21	1.13
Source: See Annexl												

Human development indices on the three different indicators are shown separately in the Chart I. Chart II shows the overall development index.

To substantiate our finding an additional analysis has been done. The following table shows the state wise HDI developed by us and the HDI for the same states generated by Planning Commission.

The concept and usage of HDI is not limited to the absolute value but concentrates to show the relative positioning of the States. A Rank Correlation (Spherrnan's Rho) has been calculated and the results are tabulated below.

It can be clearly seen that the two indices of the states based on two techniques shows a close correlation of .664 which is statistically significant at 99 per cent confidence level.

V. Conclusion

From the foregoing analysis we can find that the extent of disparity among states is apparently quite substantial which is corroborated by the HDI for the same states by Planning Commission as the rank correlation coefficient is significant at the 99 per cent level of significant. However, the states which are below median value are not situated in the same situation. The social economic and political scenario of U.P. (Excluding Uttaranchal) Karnatak and West Bengal is almost at par with the states above median value. During the period of structural reform many impediments which hindered the process of human development have been gradually reduced. As for example, in case of west Bengal the major hindrances for its overall growth process including that of the social sectors after independence was freight equalization policy. After the removal of that policy its development potential is raised substantially. Similarly the social sector development potential of Karnataka and U.P. is expected to be high. But the situation of the other six states viz. Bihar (including Jharkhand), M.P. (including Chattisgarh), Andhra Pradesh, Orissa, Assam, Rajasthan still lack the immediate potential for improving their human development index. But this impediment is not always due to economic factors. Their social attitude and political turmoil often bring difficulties in achieving the target of improving human development index. Thus along with economic factors if those states try to remove the barrier of non-economic factors, the disparities may be reduced substantially.



Annex - I

A. Definitions of the Indicators and Source

IMR (Infant Mortality Rate) - Infant mortality rate is defined as the number of deaths per 1000 live births- NFHS 1998-99.

Institutional Delivery - Birth in any Public or private health facility including nongovernmental organization- NFHS 98-99.

Full Vaccination - Children are fully vaccinated if they have received BCG, Measles and 3 doses DPT and Polio-NFHS 98-99.

Minimum Antenatal Care taken - If two doses of TT injection is taken during Pregnancy - NFHS - 1998-99 No of Primary Schools per 1000 population - MHRD Survey, 1998.

Age Specific Enrolment rate - Age Specific Enrolment Rate = (Estimated enrolment in all age group/ Estimated Child Population in-that age group)* 100 - Census 2001.

Literacy Rate-Proportion of literates above age 7 - Census 2001.

Schools within ½ Km (Only for Rural population) - All India Educational Survey NCERT.

BPL- Percentage of people earning less than US \$ 1 per day - Planning Commission, India.

Households with Pucca Houses - NSS 50th round (CSO).

Monthly per capita consumption - Per Capita Monthly consumption expenditure - NSS 50th Round.

Households with safe Drinking Water - NSS 52nd Round.

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