

State level achievements of MDG - indicators in India during 1993-94 – 2013-14



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Background of MDG

- Over the last two decades of the twentieth century, world development was threatened by pronounced inequality in the society.
- The United Nations conferences and summits held during that period reflect the same gradually leading to the Millennium Summit in September 2000 to adopt the United Nations ***Millennium Declaration***.
- The Declaration set out a series of ***eight goals*** known as the ***Millennium Development Goals (MDGs)***.

Millennium Development Goals (MDGs)

MDG Goals

- **8 goals** and corresponding **18 targets** were set.
- Targets were further translated into **53 indicators** (48 basic and 5 alternatives).
- **2015** was the deadline for the fulfillment of the targets.

The Indian case

- [India's MDG-framework](#) is based on the 2003 United Nations Development Group (UNDG) guidelines.
- In the context of India's national policies, 12 of the 18 targets are considered.
- As a result 35 of the 53 indicators are required to be monitored for the 12 targets relevant to India.

India's mixed progress

(with respect to 35 indicators)

According to the Government of India 2015 report

- For **goals 3** (Promote Gender Equality and Empower Women) and **8** (Develop a Global Partnership for Development), India's progress is on-track.
- For **goals 2** (Achieve Universal Primary Education) and **4** (Reduce Child Mortality), India is moderately on-track.

- For **goals 6** (Combat HIV/AIDS/Malaria and Other Diseases) and **7** (Ensure Environmental Sustainability), the country's progress is a mixed one – some targets are on-track and some other are moderately on-track.
- For **goals 1** (Eradicate Extreme Poverty and Hunger) and **5** (Improve Maternal Health) some targets are almost off-track.

Motivation of Study

India being a diverse country with 36 States and Union Territories, a very mixed progress of MDG indicators in India does not give any effective idea about the State level variations.

The present paper attempts to carry out a comprehensive analysis taking all the indicators of MDGS (relevant for India) and all the States of India.

Objectives of the Study

1. To rank all the States in terms of values attained for all the 35 indicators in 2003-04 using TOPSIS method.
2. To rank all the States in terms of each of Per Capita NSDP (Net State Domestic Product), ST Population as a % of Total State Population, Total Literacy Rate, in 2003-04 & examine rank correlation of each with 1.
3. To repeat the same exercise for 2013-14 and shed light on the decadal change in the overall situation and related policy implications.

Data

Data on 35 indicators of MDGs for all the States of India (barring Union Territories other than the National Capital Delhi) have been collected from a variety of sources including administrative data compiled by Central Ministries and information gathered from periodic national surveys and censuses carried out by the Government of India. Due to non-availability of State level data for some indicators, a few proxies are taken.

Methodology

1. Indicator Selection
2. MCDM Approach for Analysis
3. Spearman's Rank Correlation Co-efficient

Indicator Selection -

Broad Parameters

- ERADICATE EXTREME POVERTY AND HUNGER
- ACHIEVE UNIVERSAL PRIMARY EDUCATION
- PROMOTE GENDER EQUALITY AND EMPOWER WOMEN
- REDUCE CHILD MORTALITY
- IMPROVE MATERNAL HEALTH
- COMBAT HIV/AIDS, MALARIA AND OTHER DISEASES
- ENSURE ENVIRONMENTAL SUSTAINABILITY
- DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT

Key Consideration Set determining MDG Goal Achievement

Selection of
35 Parameters
KCS

Poverty Headcount Ratio
Poverty Gap Ratio - Rural (MRP Consumption Distribution)
Poverty Gap Ratio - Urban (MRP Consumption Distribution)
Rural % share in consumption of bottom 20% of population (MRP Consumption Distribution)
Urban % share in consumption of bottom 20% of population (MRP Consumption Distribution)
Proportion of Underweight Children(< 3yrs) (%)
Net Enrolment Ratio (Primary)
Proportion of Pupil starting Grade 1 who reaches Grade 5 (Grade V to I Ratio)
Literacy Rate of 15-24 year olds
Gender Parity Index
Gender Gap in the Literacy Rate
Share of Women in Wage Employment in the Non-agricultural Sector
Percentage of seats held by women in Rajya Sabha
Under Five Mortality Rate
Infant Mortality Rate
Proportion of 1 year old (12-23 months) children immunised against measles
Maternal Mortality Ratio (MMR) (Deaths per 100,000 live births)
Proportion of Births Attended by Skilled Health Personnel
HIV prevalence among pregnant women aged 15-24 years (%)

Key Consideration Set determining MDG Goal Achievement

Selection of
35 Parameters
KCS

Condom use rate of the contraceptive prevalence rate among currently married women, 15-49 years (percent)
Condom use during last sex with non-regular partner (percent)
Comprehensive Correct Knowledge about HIV Transmission and Prevention (percent)
Prevalence and Deaths Associated with Malaria
Malaria Incidence Rate(%)
PrevalenceRate per 100000 population and Percentage Died Associated with Tuberculosis
Tuberculosis Cure Rate (Percentage)
Percentage of Forest to total geographic area
Protected Areas to Maintain Biological Diversity (National Park)
Protected Areas to Maintain Biological Diversity (Wild Life Sanctuary)
Protected Areas to Maintain Biological Diversity (Conservation Reserves)
Protected Areas to Maintain Biological Diversity (Community Reserves)
Installed Generating Capacity of Electricity (in GW)
Average SO ₂ µg/ m ³ in residential areas
Households per thousand Using Solid Fuels (Firewoods and Chips + Dung Cake)
Proportion of Population with Sustainable Access to an Improved Water Source
Proportion of Population with Access to Improved Sanitation
Slum Population as percentage of Urban Population
Teledensity -Telephone per 100 Population (in %)
Internet Subscribers per 100 Population
Percentage of Households having computers

Key Consideration Set determining MDG Goal Achievement

MCDM Approach

(Multi Criteria Decision
Making)

- Classification of Parameters
- Normalization
- Weight Determination
- TOPSIS
- State Ranking

MCDM

Classification of Parameters

- Data of input parameters are first classified as positive or negative
- A parameter is considered as positive if increase in its value increases the scope of retailing and vice versa

MCDM

Normalization

- The selected parameters have varying units
- To annul the effect of disparate units the absolute value of the selected parameters have been subjected to Statistical Normalization

$$\text{Normalized Value } N_{ni} = \frac{x_i}{\text{Sq. Rt. of } \{ \sum x_{ni}^2 \}}, i = 1 \text{ to } 35$$

Note : X_{ni} = Absolute value of parameter i for n th state. $n = 1$ to 29 No. of parameters are 35 .

N_{ni} = Normalized value of parameter i for n th state.

MCDM

Weight Determination



- Contrary to Summation Method, parameters are considered to have varying importance and hence varying weight in MCDM Approach
- Shannon's Method have been used to determine the relative weight of selected parameters

$$E(C_{ni}) = \frac{\sum [\text{Ln}\{P(x_{ni})\} * P(x_{ni})]}{- \text{Ln} (\text{No. of Parameters})}$$

$$\text{Weight } W_i = \frac{1 - E(C_{n1})}{\sum \{1 - E(C_{n1})\}}$$

Note : X_{ni} = Absolute value of parameter i for n th state. $n = 1$ to 29 $i = 1$ to 35

$P(x_{ni})$, $E(C_{ni})$ & W_i denotes Probability, Entropy & Weight of parameter i for n th state respectively.

Results

MCDM

Shannon's Weight Table

2004-05

INDICATORS	SHANNON'S WT. (%) - '04-05
Poverty Headcount Ratio	0.20
Poverty Gap Ratio - Rural (MRP Consumption Distribution)	0.36
Poverty Gap Ratio - Urban (MRP Consumption Distribution)	0.35
Rural % share in consumption of bottom 20% of population (MRP Consumption Distribution)	0.02
Urban % share in consumption of bottom 20% of population (MRP Consumption Distribution)	0.03
Proportion of Underweight Children(< 3yrs) (%)	0.13
Net Enrolment Ratio (Primary)	0.00
Proportion of Pupil starting Grade 1 who reaches Grade 5 (Grade V to I Ratio)	0.04
Literacy Rate of 15-24 year olds	0.02
Gender Parity Index	0.01
Gender Gap in the Literacy Rate	0.19
Share of Women in Wage Employment in the Non-agricultural Sector	0.11
Percentage of seats held by women in Rajya Sabha	2.03
Under Five Mortality Rate	0.15
Infant Mortality Rate	0.16
Proportion of 1 year old (12-23 months) children immunised against measles	0.14
Maternal Mortality Ratio (MMR) (Deaths per 100,000 live births)	0.26
Proportion of Births Attended by Skilled Health Personnel	0.23
HIV prevalence among pregnant women aged 15-24 years (%)	1.34
Condom use rate of the contraceptive prevalence rate among currently married women, 15-49 years (percent)	0.69
Condom use during last sex with non-regular partner (percent)	6.31
Comprehensive Correct Knowledge about HIV Transmission and Prevention (percent)	0.19
Prevalence and Deaths Associated with Malaria	1.98
Malaria Incidence Rate(%)	1.55
PrevalenceRate per 100000 population and Percentage Died Associated with Tuberculosis	0.61
Tuberculosis Cure Rate (Percentage)	0.00
Percentage of Forest to total geographic area	0.60
Protected Areas to Maintain Biological Diversity (National Park)	1.43
Protected Areas to Maintain Biological Diversity (Wild Life Sanctuary)	1.31
Protected Areas to Maintain Biological Diversity (Conservation Reserves)	5.01
Protected Areas to Maintain Biological Diversity (Community Reserves)	7.69
Installed Generating Capacity of Electricity (in GW)	7.68
Average SO ₂ µg/ m ³ in residential areas	7.64

Shannon's Weight Table

MCDM

2013-14

INDICATORS	SHANNON'S WT. (%) - '13-14
Poverty Headcount Ratio	0.35
Poverty Gap Ratio - Rural (MRP Consumption Distribution)	0.51
Poverty Gap Ratio - Urban (MRP Consumption Distribution)	0.56
Rural % share in consumption of bottom 20% of population (MRP Consumption Distribution)	0.01
Urban % share in consumption of bottom 20% of population (MRP Consumption Distribution)	0.92
Proportion of Underweight Children(< 3yrs) (%)	0.79
Net Enrolment Ratio (Primary)	0.01
Proportion of Pupil starting Grade 1 who reaches Grade 5 (Grade V to I Ratio)	0.22
Literacy Rate of 15-24 year olds	0.26
Gender Parity Index	0.00
Gender Gap in the Literacy Rate	0.21
Share of Women in Wage Employment in the Non-agricultural Sector	0.20
Percentage of seats held by women in Rajya Sabha	2.26
Under Five Mortality Rate	0.11
Infant Mortality Rate	0.51
Proportion of 1 year old (12-23 months) children immunised against measles	0.35
Maternal Mortality Ratio (MMR) (Deaths per 100,000 live births)	0.14
Proportion of Births Attended by Skilled Health Personnel	0.05
HIV prevalence among pregnant women aged 15-24 years (%)	0.50
Condom use rate of the contraceptive prevalence rate among currently married women, 15-49 years (percent)	0.68
Condom use during last sex with non-regular partner (percent)	6.30
Comprehensive Correct Knowledge about HIV Transmission and Prevention (percent)	0.15
Prevalence and Deaths Associated with Malaria	1.96
Malaria Incidence Rate(%)	1.60
PrevalenceRate per 100000 population and Percentage Died Associated with Tuberculosis	0.52
Tuberculosis Cure Rate (Percentage)	0.00
Percentage of Forest to total geographic area	0.69
Protected Areas to Maintain Biological Diversity (National Park)	1.25
Protected Areas to Maintain Biological Diversity (Wild Life Sanctuary)	1.21
Protected Areas to Maintain Biological Diversity (Conservation Reserves)	4.13
Protected Areas to Maintain Biological Diversity (Community Reserves)	7.67
Installed Generating Capacity of Electricity (in GW)	7.65
Average SO ₂ µg/ m ³ in residential areas	7.62

MCDM

TOPSIS

- TOPSIS considers the best and the worst solution. For a particular parameter, the positive (best value) and the negative (worst value) ideal is selected from the normalized values of all states

- The distance from the ideal values are calculated next

Distance from PI, $d(S_n, S_+) = \text{Sq. Rt. Of } [\sum \{W_i(N_{ni} - PI)\}^2]$

Distance from NI, $d(S_n, S_-) = \text{Sq. Rt. Of } [\sum \{W_i(N_{ni} - NI)\}^2]$

Technique for Order Preference by Similarity to Ideal Solution

Note : N_{ni} = Normalized value of parameter i for nth state.

PI & NI denotes positive and negative ideal

MCDM

TOPSIS (Relative
Closeness)

- The Relative Closeness to Ideal is calculated for a state as shown below

$$\text{Relative closeness} = \frac{d(S_n, S_+)}{\{d(S_n, S_+) + d(S_n, S_-)\}}$$

- The assessment criterion of TOPSIS is that the smaller the value of the “Relative Closeness”, the more preferred is the alternative, S_n

Note : Value of Relative Closeness varies between 0 to 1.

MCDM

TOPSIS (Relative

Closeness Table 2004-05)

Relative Closeness Table (2004 - 05)				
STATES	$d(S_k, S_+)$	$d(S_k, S_-)$	$d(S_k, S_+) + d(S_k, S_-)$	$\frac{d(S_k, S_+)}{\{d(S_k, S_+) + d(S_k, S_-)\}}$
ANDHRA PRADESH	378.28	3812.7	4190.94	0.0903
ARUNACHAL PRADESH	437.14	3756.0	4193.11	0.1043
ASSAM	1393.44	2797.6	4191.04	0.3325
BIHAR	113.08	4156.8	4269.93	0.0265
CHATTISH GARH	2100.60	2088.5	4189.08	0.5014
DELHI	129.39	4176.8	4306.18	0.0300
GOA	135.99	4131.8	4267.84	0.0319
GUJRAT	989.51	3200.0	4189.53	0.2362
HARYANA	533.98	3667.9	4201.85	0.1271
HIMACHAL PRADESH	71.78	4186.2	4257.95	0.0169
JAMMU & K	57.71	4185.9	4243.65	0.0136
JHARKHAND	2137.70	2051.9	4189.63	0.5102
KARNATAKA	698.20	3495.2	4193.36	0.1665
KERALA	117.73	4163.6	4281.30	0.0275
MADHYA PRADESH	1060.92	3128.6	4189.57	0.2532
MAHARASTRA	600.15	3589.2	4189.37	0.1433
MANIPUR	131.17	4157.2	4288.35	0.0306
MEGHALAYA	353.13	3857.5	4210.61	0.0839
MIZORAM	167.85	4069.5	4237.40	0.0396
NAGALAND	133.66	4150.0	4283.66	0.0312
ORISSA	4187.23	51.2	4238.48	0.9879
PUNJAB	129.18	4186.5	4315.65	0.0299
RAJASTAN	128.59	4166.2	4294.81	0.0299
SIKKIM	1098.69	3091.4	4190.08	0.2622
TAMIL NADU	122.84	4186.0	4308.85	0.0285
TRIPURA	327.41	3876.3	4203.75	0.0779
UTTAR PRADESH	284.79	3930.7	4215.49	0.0676
UTTARANCHAL	254.56	3949.7	4204.27	0.0605
WEST BENGAL	106.28	4175.0	4281.31	0.0248

CONCLUSION

Two rank correlations are found to be statistically significant :

- Between TOPSIS Rank 2013-14 & TOPSIS Rank 2003-04 implying a consistency in the process of progress for the States regarding all the indicators of MDGs taken together
- Between TOPSIS Rank 2003-04 & ST Pop Percent Rank 2003-04 (but not between TOPSIS Rank 2013-14 & ST Pop Percent Rank 2013-14) implying a gradual process of social inclusion over the decade.

LIMITATIONS OF STUDY

Per Capita Net State Domestic Product and Total Literacy Rates do not have significant connection MDG indicators.

There might be some other important factor playing a larger role but not captured in the present study – The political leadership at State & Centre.

However, measurability of political leadership needs to be explored in future.

Thank You ...