Status of Child Health in India: A State Level Analysis

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Abstract

Health is the state of physical, mental and social well-being and does not only mean an absence of illness or disease. Child health is a multi-dimensional issue. In this paper, health status of children is analyzed using several dimensions and indicators to investigate the intensity and inequality which exists across the states in India taking resort to NFHS 3rd and 4th round data and have found that the infant mortality rate, under five mortality rate and malnourished children have significantly decreased overtime. Infant vaccination program, Vitamin A supplement program, maternity care, childhood treatment disease, women literacy rate and maternity care significantly reduces infant mortality rate whereas underage pregnant women do positively and significantly affect the infant mortality rate. In 2015-16, the top five states having the highest percent were Madhya Pradesh, Jharkhand, Bihar, Uttarakhand and Chhattisgarh while Kerala, Jammu and Kashmir, Manipur, Nagaland, and Mizoram had the lowest percent of child mortality and malnourishment.

1. Introduction

Healthy children are more likely to become healthy adult. Health is a basic component of human development, and hence determines society's well-being. It is a means to empower the deprived sections of society and thus an important element in the strategy for poverty alleviation. Thus, in recent years there has been an increased focus on issues that affect children and on improving their health. The vital statistics like crude birth rate, crude death rate, infant mortality rate, and life expectancy at birth provide the base for information on the health status (Sengupta 2016) and human development of any state. Access to preventive and protective health care enhances entitlements of the poor by enabling steady employment, improving productivity and facilitating demographic transition. A country or states performance depends a lot on the health of its populace. Not only does it improve efficiency but it is also an indicator of an all-round performance of the nation. For a country like India where the achievement of better child health is a daunting task, the consequence of ignoring the problem of child health seems very disastrous. The present state of child health situation in India does not present a rosy picture in front of our policy makers. Health is the state of physical, mental and social well-being and does not only

mean an absence of illness or disease. The right to health is closely linked to other fundamental human rights, most notably access to potable water and adequate hygiene. All children have the right to timely access to appropriate health services. Measuring the status of health of a country or a state is a complex process. It is a multifaceted phenomenon which has been difficult to model and estimate. It becomes further complicated due to disparities among various states of India. India is home to the largest number of children in the world, significantly larger than the number in China. The country has 20% of the 0-4-year child population of the world (world population prospects: 2008). The analysis of the situation of children in India would be incomplete without paying attention to the disparities that exist between and within states, and the inequalities that persist among different subgroups of the population.

Literature Review

Bhatia et al (2006) analyzed the concept of demand side financing and recommends piloting of a competitive voucher scheme as a mechanism for RCH services in India. *Borooah et al (2014)* presents econometric estimates regarding the relative strength of personal and household circumstances in determining the likelihood of utilizing the programmer's services. The paper also suggests a trade-off between quality and utilization by hypothesizing that the poor quality of services leads upper-caste mothers to exit the ICDS market and seek these services elsewhere. Maity et al (2019) revealed that the percentage share of underweight, stunted and wasting children have decreased in districts with higher women literacy rate and concentration of AWCs. *GanotraKomal (2016)* explained that India losses its children by institutionalizing child labour in family-based occupations under the age of 14 years and permitting the employment of children in many hazardous occupations. *Maitra P. and Ranjan Ray (2013)* analyzed four interrelated child health indicators in West Bengal namely child malnourishment (measured by the rates of stunting and wasting), prenatal, infant, and child mortality rates and concluded that effective policy interventions are required to delink maternal health from child health. Maity et al (2019) have detected the important vaccinations necessary to overcome serious diseases suffered by the children and have observed that the percentage of children receiving those vaccination in West Bengal have increased in recent time. *SinhaDipa (2015)* explained that the Rapid Survey on Children conducted in 2013–14 shows patchy progress between 2005–06 and 2013–14 in maternal and child health indicators and calls for greater investments in health and nutrition within a more comprehensive approach. Basar et al (2018) considers socio economic as well as demographic factors to be responsible for the incidence of nutritional insecurity. They found that the lack of per capita cultivable land is the major cause of nutritional insecurity in the Jangalmahal Region. Basar et al (2018) observed that the incidence of food insecurity is inversely related to increase in year of schooling, age of the head, per capita cultivable land and is directly related to employment status and choice of consumption basket.

Research Gap

From the existing literature most of the researcher had primarily focused on the infant and child mortality levels. Some of them concentrated on specific immunization programme for child Health. Most of them gave importance to gender gap i.e. girl children discrimination because they fail to access the improved health infrastructure and nutritional support. But they didn't concentrate much on the other crucial aspect of child Health. A detailed critical evaluation of

children health status considering the family health across states in India has not been adequately done. A comprehensive state level analysis is important encompassing all the basic dimensions of Children Health. So, the present work tries to address some of above-mentioned gaps in the existing literature in a systematic manner. Moreover, the concept of Child health can be taken as a multi-dimensional concept. Therefore, in this paper Health status of children is analyzed using several dimensions and indicators. With this end in view, to investigate the intensity and inequality of health status of children across the states in India, we have considered two indicators of multifaceted health status of children.

Child Mortality
- Infant mortality rate (IMR)
- Under-five mortality rate (U5MR)

Child Nourishment
- Percentage of Children under 5 years who are stunted (height-for-age.
- Percentage of Children under 5 years who are wasted (weight-for-height).
- Percentage of Children under 5 years who are severely wasted (weight-for-height).
- Percentage of Children under 5 years who are underweight (weight-for-age).
- Percentage of Children age 6-59 months who are anaemic.

Database
The present study is mainly based on the secondary data. Data has been collected from the National Family and Health Survey i.e. NFHS-3(2005-06) & NFHS-4(2015-16). And have also used states fact sheet reports of NFHS 3 & NFHS-4 of all states of this two round Survey.Here the selection of the indicators is to some extent context specific.

Methodology
The methodology used for the data analysis is simple. All the required statistical tools have been used for effective analysis of the data. The details of the methodology in the study are as follows.
    A) Dimension Index:
It has been used extensively in the human development studies. Dimensional Index is calculated for each Sub indicator of a Corresponding dimensions and then arithmetic mean of all DI of a corresponding Indicator are taken as GDI. To calculate the Dimensional Index minimum and maximum values have been selected for each indicator from all states of India. Performance in each dimension is expressed as a value between 0 and 1 by applying the following general formula:
Dimensional Index (DI), of each indicator is calculated as –

$$DI = \frac{Actual\ value\ - Minimum\ Value}{Maximum\ value\ - Minimum\ Value}$$

$$Group\ Dimensional\ Index\ (GDI) = \sum \frac{Sum\ of\ DI'S}{No\ of\ sub\ indicator}$$

    B) Pooled regression model has been used. The entire data set is a combination of cross section as well as time series data. Strata-12 software packages have been used for

pooled regression analysis**.**

2. Status of Child Health across States of India

The status of child health across states of India is analyzed on the basis of infant mortality rate (IMR), under-five mortality rate (U5MR), stunting, wasted and severely wasted children, underweight children and anaemic children.

2.1 Infant mortality rate (IMR)

IMR is one of the primary indicators of children health status in a specific zone. Data on infant mortality rate has been taken per 1000 live births. Infant mortality is defined as infant (less than one year) deaths per thousand live births. The level of mortality is very high in the first few hours, days & weeks of a child born. In 2005-06, IMR was extremely high (more than 60 percent) in the states namely Uttar Pradesh, Chhattisgarh, Madhya Pradesh, Bihar, Jharkhand, Assam, Arunachal Pradesh, Rajasthanand Odisha. There are only three states where IMR is found to be less than 25 percent. These states were Haryana, Goa and Kerala. In 2015-16, infant mortality rate (IMR) was highest in Uttar Pradesh (more than 60 percentage) followed by Chhattisgarh and Madhya Pradesh. There were only six states where IMR was found to be less than 25 percent. These states were Kerala, Goa, Tamil Nadu, Manipur, Arunachal Pradesh and Maharashtra (Table 1).

2.2 Under-five mortality rate (U5MR)

Another important indicator of children health status is Under-five-mortality rate. The Under-five mortality rate denotes the number of children (0-5 year) born in a specific year who died before reaching the age subjected to current age specific mortality rates per 1000 live births. In 2005-06, U5MR of child varied from 3 per cent (Haryana) to 96 percent (Uttar Pradesh). U5MR was highest in Uttar Pradesh among other states followed by Madhya Pradesh, Jharkhand, Odisha, and Chhattisgarh in 2005-06 whereas it was (U5MR) lowest in Kerala and Goa. In 2015-16, it varied from 3.8 in Haryana to 78 in Uttar Pradesh. Uttar Pradesh remained in the highest position in this regard followed by Madhya Pradesh and Chhattisgarh whereas it was lowest in Kerala, Goa, Manipur, Tamil Nadu and Maharashtra (Table 1).

2.3 Stunting, Wasted and Severely Wasted children

Stunting is defined as the percentage of children aged 0 to 59 months whose height for age is less. Stunting starts from pre-conception when an adolescent girl and who later becomes mother is undernourished and anaemic; it worsens when infants' diets are poor, and when sanitation and hygiene are inadequate. In India, 48 percent of children under age five years were stunted (too short for their age), 20 percent were wasted (too thin for their height), and 6 percent of children were underweighted in 2005-06. The prevalence of stunting was highest in Uttar Pradesh.Madhya Pradeshon the other hand has the highest levels of wasting and Meghalaya has the highest levels of severely wasted children.The issue of Stunting was higher among children in rural areas than in urban areas. In 2015-16, the prevalence of stunting was highest in Bihar followed by Uttar Pradesh andJharkhand. Even though there has been reduction in the percentage of stunted

children in every state but Bihar had relatively higher percentage than Uttar Pradesh which had the worst condition a decade ago. Jharkhand had the highest percent of children who were wasted and severely wasted. Kerala and Goa managed to have the least percent of stunted children in both 2005-06 and 2015-16. The prevalence of stunting and under-weight has decreased since 2005-06, especially for stunting which declined from 48 percent in 2005-06 to 38 percent in 2015-16. Over this same time period, the prevalence of wasting has remained more or less the same (Table 1).

Table 1 Percentage of IMR, U5MR, Stunted Children and Wasted Children across States in India, 2005-06 and 2015-16

	(IMR)		(U5MR)		stunted		wasted	
Name of the States	2005-06	2015-16	2005-06	2015-16	2005-06	2015-16	2005-06	2015-16
Andhra Pradesh	54	35	63	41	38	31.4	15	17.2
Arunachal Pradesh	61	23	88	33	43.3	29.4	15.3	17.3
Assam	66	48	84	56	46.5	36.4	13.7	17
Bihar	61	48	84	58	55.6	48.3	27.1	20.8
Chhattisgarh	71	54	90	64	52.9	37.6	19.5	23.1
Goa	14	13	20	13	25.6	20.1	14.1	21.9
Gujarat	50	34	61	43	51.7	38.5	18.7	26.4
Haryana	9.5	9.3	3	3.8	45.7	34	19.1	21.2
Himachal Pradesh	36	34	42	38	38.6	26.3	19.3	13.7
Jammu & Kashmir	45	32	51	38	35	27.4	14.8	12.1
Jharkhand	69	44	93	54	49.8	45.3	32.3	29
Karnataka	43	28	54	32	43.7	36.2	17.6	26.1
Kerala	15	6	16	7	24.5	19.7	15.9	15.7
Madhya Pradesh	69	51	93	65	50	42	35	25.8
Maharashtra	37	24	46	29	46.3	34.4	16.5	25.6
Manipur	30	22	42	26	35.6	28.9	9	6.8
Meghalaya	44	30	70	40	55.1	43.8	30.7	15.3
Mizoram	34	40	53	46	39.8	28	9	6.1
Nagaland	38	29	65	37	38.8	28.6	13.3	11.2
Odisha	65	40	91	49	45	34.1	19.6	20.4
Punjab	42	29	52	33	36.7	25.7	9.2	15.6
Rajasthan	65	41	85	51	43.7	39.1	20.4	23
Sikkim	34	29	40	32	38.3	29.6	9.7	14.2
Tamil Nadu	30	21	35	27	30.9	27.1	22.2	19.7
Tripura	51	27	59	33	35.7	24.3	24.6	16.8
Uttarakhand	42	40	56	47	44.4	33.5	18.8	19.5
Uttar Pradesh	73	64	96	78	56.8	46.3	14.8	17.9
West Bengal	48	27	59	32	44.6	32.5	16.9	20.3
India	57	41	74	50	48	38.4	19.8	21
Maximum	73	64	96	78	56.8	48.3	35	29
Minimum	9.5	6	3	3.8	24.5	19.7	9	6.1

Sources: NFHS (2005-06) and (2015-16)

2.4 Underweight Children

The indicator of underweight (weight for age) together with the indicator of stunting (height for age), wasting (weight for age) and severely wasted (weight-for-height) reveals a better picture of nutritional status of children. Nutrition problem are substantial in every state in India. Table 2 represents state wise percentage of children who were underweight. In 2005-06, it varied from 60 percent in Madhya Pradesh to 19.7 percent in Sikkim. Among the states, underweight was highest in Bihar and Jharkhandwhereas it was lowest in Sikkim follow by Mizoram, Kerala, and Manipur. In 2015-16, percentage of underweight children varied from 11.9 per cent in Mizoram to 47.8 per cent in Jharkhand. Even though Kerala and Goa had the least percentage of stunted and wasted children but it had relatively higher percentage of underweight children. Among the four worst performing states in 2005-06, two states were still in the top position in 2015-16 namely Bihar and Jharkhand and the remaining two states were Madhya Pradesh and Uttar Pradesh whose condition has improved considerably (Table 2).

Table 2 Percentages of Severely Wasted, Underweight and Anaemic Children across States in India, 2005-06 and 2015-16

	Severely Wasted		Underweight		Anaemic	
Name of the States	2005-06	2015-16	2005-06	2015-16	2005-06	2015-16
Andhra Pradesh	6.4	4.5	30	31.9	71	58.6
Arunachal Pradesh	6.1	8	32.5	19.5	56.9	50.7
Assam	4.0	6.2	36.4	29.8	69.4	35.7
Bihar	8.3	7.0	55.9	43.9	78	63.5
Chhattisgarh	5.6	8.4	47.1	37.7	71.2	41.6
Goa	5.6	9.5	25	23.8	38.2	48.3
Gujarat	5.8	9.5	44.6	39.3	69.7	62.6
Haryana	5.0	9	39.6	29.4	72.3	71.7
Himachal Pradesh	5.5	3.9	36.5	21.2	54.4	53.7
Jammu & Kashmir	4.4	5.6	25.6	16.6	58.5	43.3
Jharkhand	11.8	11.4	56.5	47.8	70.3	69.9
Karnataka	5.9	10.5	37.6	35.2	70.3	60.9
Kerala	4.1	6.5	22.9	16.1	44.5	35.6
Madhya Pradesh	12.6	9.2	60	42.8	74	68.9
Maharashtra	5.2	9.4	37	36	63.4	53.8
Manipur	2.1	2.2	22.2	13.8	41.1	23.9
Meghalaya	19.9	6.5	48.8	29	63.8	48
Mizoram	3.6	2.3	19.9	11.9	43.8	17.7
Nagaland	5.2	4.2	25.2	16.8	NA	21.6
Odisha	5.2	6.4	40.7	34.4	65	44.6
Punjab	2.1	5.6	24.9	21.6	66.4	56.6
Rajasthan	7.3	8.6	39.9	36.7	69.6	60.3
Sikkim	3.3	5.9	19.7	14.2	58.1	55.1

Tamil Nadu	8.9	7.9	29.8	23.8	64.2	50.7
Tripura	8.6	6.3	39.6	24.1	62.9	48.3
Uttarakhand	5.1	6	42.4	39.5	73.9	63.2
Uttar Pradesh	5.3	9	38	26.6	60.7	59.8
West Bengal	4.5	6.5	38.7	31.5	61	54.2
India	6.4	7.5	42.5	35.7	69.4	58.4
Maximum	19.9	11.4	60	47.8	78	71.7
Minimum	2.1	2.2	19.7	11.9	38.2	17.7

Sources: NFHS (2005-06) and (2015-16)

2.5. Anaemic Children
Anemia is characterized by lack of adequate amount of hemoglobin in the blood. Anemia in young children results in increased morbidity from infectious diseases, and it can result in impairments in coordination, cognitive performance, behavioral development, language development and scholastic achievement.Thus, prevalence of anemic is considered as an indicator to assess the nutritional status of children. In India, percentage of anemic children has declined considerably from 69.4 per cent in 2005-06 to 58.4 percent in 2015-16. Among the states, percentage of anemic children varied from 38.2 percent in Goa to 78 percent in Bihar in 2005-06 whereas in 2015-16, Mizoram had relatively lesser percentage of anemic children and Haryana had the highest percentage. Every state showed a reduction in the percentage of anemic children over the considered decade except Goa where there was increment in the percentage by 10 percent point. (Table 2).

## 3. Group Dimension Index of Child Mortality across States of India
The Dimension Index (DI) of each indicators of Child mortality and Nourishment are calculated for the years 2005-06 and 2015-16. The indicators of child mortality as mentioned above were IMR and U5MR whereas the indicators of nourishment are stunted, wasted, severely wasted, underweight and anaemic. After taking the average of all DI of the dimensions, we obtain Group Dimension Index (GDI). With the help of GDI value, we obtained the rank of the states in 2005-06 and 2015-16. Here, greater value of GDI implies that the states were having higher percentage of child mortality and undernourished children and lower value implies that the state have lower percentage of child mortality and undernourished children. Highest value corresponds with rank 1(Table 3).

Table 3 Group Dimension Index of Child Mortality and Nourishment across states in India, 2005-06 and 2015-16

	2005-06				2015-16			
	Mortality	Nourishment	Total	Rank	Mortality	Nourishment	Total	Rank
Andhra Pradesh	0.67	0.41	0.49	16	0.5	0.49	0.49	16
Arunachal Pradesh	0.86	0.42	0.55	12	0.34	0.46	0.42	19
Assam	0.88	0.45	0.58	10	0.71	0.47	0.54	12
Bihar	0.84	0.78	0.8	3	0.73	0.78	0.77	4
Chhattisgarh	0.95	0.61	0.71	5	0.82	0.64	0.69	6
Goa	0.13	0.21	0.19	28	0.12	0.48	0.38	22
Gujarat	0.63	0.59	0.6	9	0.51	0.79	0.71	5
Haryana	0	0.53	0.38	22	0.03	0.68	0.49	17
Himachal Pradesh	0.42	0.43	0.42	18	0.47	0.33	0.37	24
Jammu & Kashmir	0.54	0.31	0.38	21	0.45	0.3	0.34	25
Jharkhand	0.95	0.81	0.85	2	0.67	0.97	0.88	1
Karnataka	0.54	0.5	0.51	13	0.38	0.76	0.65	8
Kerala	0.11	0.21	0.18	29	0.02	0.27	0.2	28
Madhya Pradesh	0.95	0.87	0.89	1	0.8	0.84	0.83	2
Maharashtra	0.45	0.48	0.47	17	0.32	0.7	0.59	10
Manipur	0.37	0.19	0.24	27	0.29	0.1	0.16	29
Meghalaya	0.63	0.86	0.8	4	0.45	0.55	0.52	13
Mizoram	0.46	0.22	0.29	25	0.58	0.06	0.21	27
Nagaland	0.56	0.18	0.29	26	0.42	0.19	0.26	26
Odisha	0.91	0.51	0.63	8	0.6	0.54	0.56	11
Punjab	0.52	0.27	0.34	23	0.4	0.4	0.4	20
Rajasthan	0.88	0.54	0.64	7	0.62	0.72	0.69	7
Sikkim	0.39	0.25	0.29	24	0.39	0.37	0.38	23
Tamil Nadu	0.33	0.43	0.4	20	0.29	0.48	0.43	18
Tripura	0.63	0.52	0.55	11	0.38	0.4	0.39	21
Uttarakhand	0.54	0.48	0.5	15	0.58	0.6	0.59	9
Uttar Pradesh	1	0.58	0.7	6	1	0.69	0.78	3
West Bengal	0.6	0.46	0.5	14	0.37	0.55	0.5	15

*Sources:* NFHS (2005-06) and (2015-16)

Figure 1 Rank of the states across the states in India, 2005-06
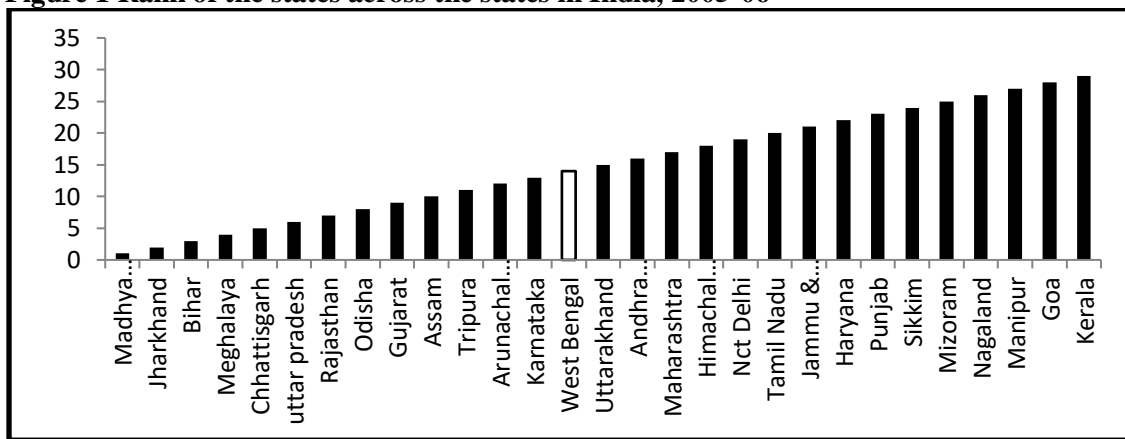
Sources: Author's calculation

The ranking of states on the basis of percentage of child mortality and nourishment in 2005-06 and 2015-16 are shown in figure 1& 2. In 2005-06, the top five states having the highest percent of child mortality and nourishment were Madhya Pradesh, Jharkhand, Bihar, Meghalaya and Chhattisgarh. Among them three states remained in the top five states namely Madhya Pradesh, Jharkhand and Bihar while another two states were Uttarakhand and Chhattisgarh in 2015-16. Whereas Jharkhand replaced Madhya Pradesh implying that the relative condition of Jharkhand has deteriorated. The bottom five states were Kerala, Goa, Manipur, Nagaland, and Mizoram in 2005-06. In which four states still remain in better position and only Jammu & Kashmir replaced Goa in 2015-16. The condition of Goa has deteriorated in this regard as its rank has reduced from 28th to 22nd whereas West Bengal's position increased from 14th to 15[th]over the decade.

Figure 2 Rank of the states in India, 2015-16
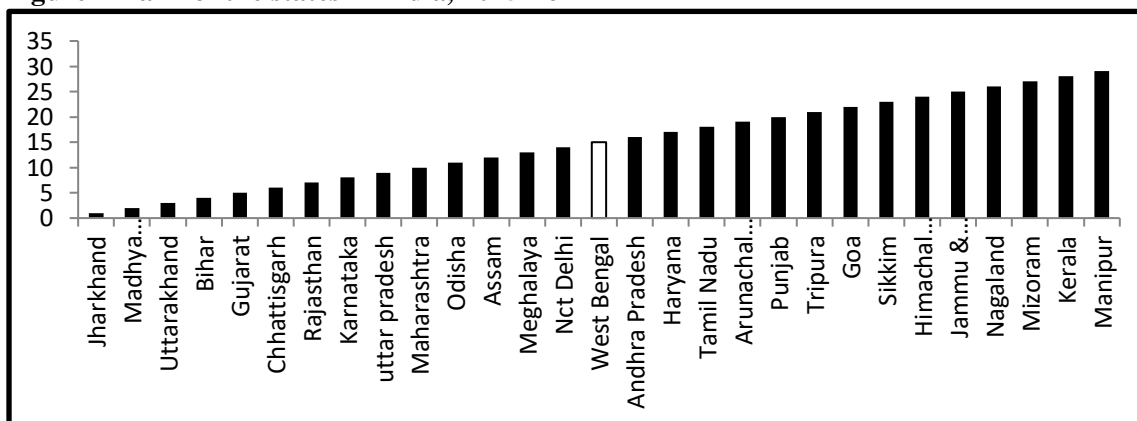
Sources: Author's calculation

4. Analysis of Child Mortality and Nourishment

To analyze the status of child health across states in India,pooled data regression model is used. Due to availability of data only for two distinct years this model will be more appropriate. In the present study, the data consist of 28 states for the years 2005-06 and 2015-16. Here we have considered Group Dimension Index of infant vaccination program, women literacy rate, maternity care, treatment of child disease, percentage of underage pregnant women and underweight women as independent variable.Along with these variables we have also considered time dummy variable (TD) to check whether the overtime status of child health has increased or not. These variables are selected based on the perception that they have considerable impact on the variation in child health and also on the basis of the availability of data. No serious problem of multicollinearity was observed in the correlation coefficient matrix obtained by considering all the dependent and the independent variables. Thus, we proceed further by framing the model and analyzing it.

Model-1

Here we have regressed infant mortality rate on infant vaccination program, women literacy rate, percentage of underage pregnant women and underweight women and have also considered time dummy. The Pooled Regression Model is specified as follows:

$$IMR_{it} = \alpha_0 + X1_{it} + X2_{it} + X3_{it} + X4_{it} + TD + \varepsilon_{it} - - - -(1)$$

Where,

IMR = percentage of Infant Mortality Rate across states in India

α_0 = constant

X1 = Group Dimension Index of infant vaccination program

X2 = women literacy rate

X3 = percentage of underage pregnant women

X4 = percentage of healthy women

TD = time dummy (takes '0' for 2005-06 and '1' for 2015-16)

'I'=1 to 28 (28 states of India)

't'= 1 ,2 (2005-06 and 2015-16)

ε_{it} = Random error term

Table 4 Results of Pooled Regression Model to Explain the Variation of IMR

	Coefficient	Std. Err.	T stat	P>t	
X1	-0.316	0.101	-3.14	0.003	Number of observations = 56,
X2	-0.617	0.125	-4.95	0.000	F (5, 50) = 17.62
X3	0.111	0.294	-0.38	0.070	Prob > F = 0.0000
X4	-0.171	0.167	-1.02	0.311	R-squared = 0.628
TD	-16.842	3.818	-4.41	0.000	Adjusted R-squared = 0.593
Constant	129.569	12.046	10.76	0.000	

Here,infant vaccination program, women literacy rate and time dummy variable are negatively and significantly related to the infant mortality rate whereas underage pregnant women positively and significantly affects the infant mortality rate. It implies that if the infant vaccination

programme and women literacy rate increases then infant mortality rate will decrease. Statistical significance of time dummy variable implies that infant mortality rate has significantly decreased overtime. If underage pregnant women increase then infant mortality rate will also increase. Model is also found to be statistically significant. (Table 4)

Model-2

Here we regress under five mortality rates on under five ages child vaccination program, Vitamin-A supplementation, women literacy rate, percentage of underage pregnant women overweight women and materiality care in the last five years. We have also considered a time dummy. The Pooled Regression Model is specified as follows

$$U5MR_{it} = \alpha_0 + X1_{it} + X2_{it} + X3_{it} + X4_{it} + X5_{it} + X6_{it} + TD + \varepsilon_{it} \qquad (2)$$

Where,

U5MR = percentage of Under Five Mortality Rate across states in India

α_0 = constant

X1 = Group Dimension Index of under-five ages child vaccination program

X2 = percentage of children under five years received vitamin- A supplementation.

X3 = women literacy rate

X4 = percentage of underage pregnant women (15-19 years)

X5= percentage of healthy women

X6 = Group Dimension Index of materiality care in last five years.

TD = time dummy (takes '0' for 2005-06 and '1' for 2015-16)

'I'=1 to 28 (28 states of India)

't'= 1 ,2 (2005-06 and 2015-16)

ε_{it} = Random error term

Table 5 Results of Pooled Regression Model to Explain the Variation of U5MR

Variables	Coefficient	Std. Err.	T stat		
X1	-0.509	0.181	-2.81	0.007	
X2	-0.330	0.196	1.68	0.098	
X3	-0.724	0.171	-4.23	0.000	Number of observations = 56
X4	-0.510	0.411	-1.24	0.220	F (7, 48) = 16.75
X5	-0.241	0.218	-1.1	0.275	Prob > F = 0.0000
X6	-24.702	16.677	-1.48	0.014	R-squared = 0.7010
TD	-32.348	8.338	-3.88	0.000	Adjusted R-squared = 0.6592
Constant	185.492	19.345	9.59	0.000	

This model executes that under five ages child vaccination program, vitamin supplement program, women literacy rate, materiality care and time dummy variable are negatively and significantly related to the under-five mortality rate implying that if the Under-five ages child vaccination program, Vitamin-A supplement program, women literacy rate and maternity care increase then under five mortality rates will decrease. Statistical significance of time dummy variable implies that under five mortality rates have significantly decreased overtime. (Table 5)

Model 3

Here we regress percent of malnourished children on under five ages child vaccination program, Vitamin-A supplementation, childhood treatment for disease, women literacy rate, percentage of underage pregnant women, percentage of women below the body mass index, overweight women and materiality care in the last five years. We have also considered time dummy. The Pooled Regression Model is specified as follows:

$$Y_{it} = \alpha_0 + X1_{it} + X2_{it} + X3_{it} + X4_{it} + X5_{it} + X6_{it} + X7_{it} + X8_{it} + TD + \varepsilon_{it} \qquad (3)$$

Where,

Y_{it} = percentage of Malnourished children across states in India

α_0 = constant

X1 = Group Dimension Index of under-five ages child vaccination program.

X2 = percentage of children under five years received vitamin- A supplementation.

X3 = Group Dimension Index of childhood treatment disease.

X4 = women literacy rate.

X5 = percentage of underage pregnant women

X6 = percentage of women Body Mass Index below normal.

X7 = percentage of healthy women

X8 = Group Dimension Index of materiality care in last five years.

TD = time dummy (takes '0' for 2005-06 and '1' for 2015-16)

'I' =1 to 28 (28 states of India)

't' = 1 ,2 (2005-06 and 2015-16)

ε_{it} = Random error term

Table 6 Results of Pooled Regression Model to Explain the Variation of Malnourished children

Variables	Coefficient	Std. Err.	T stat	P>t	
X1	-0.003	0.002	-1.36	0.179	Number of observations = 56
X2	-0.004	0.002	1.75	0.087	F (9, 46) = 9.44
X3	-0.270	0.159	1.7	0.097	Prob > F = 0.0000
X4	-0.006	0.002	-2.77	0.008	R-squared= 0.6390
X5	0.004	0.004	0.88	0.385	Adjusted R-squared = 0.5713
X6	0.009	0.003	2.8	0.007	
X7	0.005	0.003	1.48	0.144	
X8	-0.020	0.179	-1.12	0.068	
TD	-0.202	0.088	-2.29	0.026	
Constant	0.855	0.268	3.19	0.003	

This model explains that under five ages child vaccination program, Vitamin-A supplement program, childhood treatment disease, women literacy rate, materiality care and time dummy variable are negatively and significantly related to the malnourished children. Whereas women

BMI below normal and overweight women are positively and significantly related to the malnourished children. If the states have better access to under five ages child vaccination program, Vitamin-A supplement program, childhood treatment disease and increase in materiality care services then percent of malnourished children will decrease in the corresponding states. Higher percent of women literacy rate means that the states have lower percentage of malnourished children. Statistical significance of time dummy variable implies that malnourished children have significantly decreased overtime (Table 6).

5. Concluding Observations

This paper concludes that there has been considerable reduction in infant mortality rate, under five mortality rate and malnourished children overtime. Infant vaccination program, women literacy rate have a significant role in reducing infant mortality rate whereas with the increase in the underage pregnant women there is increase in the infant mortality rate. If the states have better access to Under-five ages child vaccination program, vitamin supplement program, materiality care services and women literacy rate then under five mortality rates will also decrease. If the states have better access to Under five ages child vaccination program, vitamin supplement program, childhood treatment disease, and materiality care services then the percent of malnourished child will decrease in the corresponding states. Higher percent of women literacy rate means the states have lower percentage of malnourished children. If the states have greater percentage of women whose BMI is below normal and overweight women then we can say that percentage of malnourished children will increase in the states. In 2015-16, the top five states having the highest percent were Madhya Pradesh, Jharkhand, Bihar, Uttarakhand and Chhattisgarh while Kerala, Jammu and Kashmir, Manipur, Nagaland, and Mizoram had the lowest percent of child mortality and nourishment. Thus, this paper managed to critically evaluate the status of child health across states of India encompassing all the basic dimensions of Children Health.

6. Policy Recommendation

We have observed that some factors have significant impact on improving child health namely women literacy rate, percentage of healthy women, maternity care, infant vaccination program, treatment of childhood disease etc whereas some variables have adverse impact on child health like percentage of underage pregnant women, percentage of women having BMI below normal etc. In this regard numerous policies can be taken to overcome the problems faced by children in their early age. To mention a few are:

i.   Since women's literacy plays a crucial role in reduction child mortality and also in improving overall health status of a child, policies must be taken to educate as well as to empower women.

ii. As we have seen health of a women has a direct association with the health of the child, therefore necessary programme must be undertaken by the government to improve the health condition of the women including organizing health and awareness programme at regular intervals.

iii. We have also seen that the condition of children are worst in the rural areas as compared to urban areas. Therefore, National Rural Health Mission programme need to be given more

emphasis and its proper implementation need to be addressed at regular interval.

iv. Programme related to child health like child vaccination programme, immunization programme need to be undertaken by the government efficiently.

v. The orthodox believes be it social, religious etc. acts as constraint for children to get the vaccination on time need to be removed by organizing frequent awareness programs and encouraging the mothers to provide their child with the required vaccines.The bitter truth is that numerous policies are already taken by the government in this regard but due to loops in its implementation the target is yet to be achieved. So, focus must be in proper implementation of the programme undertaken for overcoming the mentioned problems.

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