

Socio-economic Inequality of Child Immunization in the Eastern and North-Eastern States of India

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Abstract

Child immunization is an important issue for the survival of younger children in India. A recent study by World Health Organization (WHO, 2016) on child immunization pointed out that socio-economic and demographic differences in child immunization coverage have been receiving less attention than that of geographical monitoring within immunization programmes. In India evidence from NFHS (National Family Health Survey) data clearly mentioned that there was a little progress from NFHS 2 (1998-99) to NFHS 3 (2005-06) in full immunization coverage in the country. Children not fully immunized have declined only by two percentage point (from 58% to 56%) during the period. Considering child immunization for the age group 12-23 months, about 71 percent children received full vaccination from household belonging to wealthiest quintile, but the figure is only 26 percent in case of poorest quintile. The study attempts to examine wealth related inequalities across different groups of population and states in the Eastern and North-Eastern regions of the country. Concentration index is applied using NFHS 3 data to measure the wealth related inequalities across the states. Inequalities in childhood immunization are also measured on the basis of some socio-economic and demographic characteristics. The immunization status of children from NFHS 3 data are categorized under five quintiles of wealth index to find out the discrepancies among different social groups in the selected states of the country. The study reports that inequalities are high in the states of Tripura, Manipur and Mizoram. On the other hand, Sikkim, Meghalaya experience minimum level of inequality in child immunization. Similarly, among eastern states, Orissa has the highest inequality than the other Eastern states. However, except Tripura, Mizoram and Manipur all the remaining states in the selected regions experience less inequality in childhood immunization than the all India level.

Introduction

The impact of socio-economic inequality adversely affects children and for this a significant proportion of infant and children suffer from morbidity and mortality during their childhood. The inequalities among different social groups lead to deprivation in various aspects. Maternal deprivation and malnutrition immediately affect the health status of mothers and subsequently that of their newborns. A significant proportion of mothers and children from the disadvantaged groups continue to suffer and die from preventable infections, under-nutrition, and complications related to pregnancy and childbirth. In fact, the children belonging to disadvantaged groups are certainly at higher risk of morbidity and mortality than those born in advantaged groups. The full coverage of immunization is an important issue for the survival of younger children. A recent study by world Health Organization (WHO, 2016) about inequality in child immunization pointed out that socio-economic and demographic differences in child immunization coverage have been receiving less attention than geographical monitoring within the immunization programmes. In India evidence from NFHS (National Family Health survey) data clearly pointed out that there was a little progress from NFHS 2 (1998-99) to NFHS 3 (2005-06) in full immunization coverage in the country. Children not fully immunized have declined only by two percentage point (from 58% to 56%) during the period.

Considering child immunization for the age group 12-23 months, about 74 percent children received full vaccination from household belonging to wealthiest quintile, but the figure is only 25 percent in case of poorest quintile. This percentage differences in the immunization coverage among different socio-economic groups lead to inequalities across different groups of population measured in terms wealth quintiles in NFHS 3 data. Moreover, these level of inequalities in immunization coverage across different wealth quintiles varies across different states of the country.

The present study attempts to examine the inequalities in the immunization coverage of the children aged 12-23 months across different wealth quintiles in the eastern and north-eastern states of India. Inequalities in child health have been documented clearly in the National Family Health Surveys (NFHS) data. There are ample evidences of child health inequalities in terms of its several dimensions like, socio-economic status, mother's educational level, caste, religion, sex, rural-urban

place of residence, state etc.

Previous Literature

To achieve the goals of Universal Immunization Programme (UIP), it is necessary for people to understand the urge of it (immunization), otherwise, the goals of UIP will be far from being achieved (Patra, 2006). Singh (2013) suggested that there should strong integration between the immunization delivery system with the broad health care system and coordination with other health care delivery programmes in order to improve the immunization coverage. The vaccination coverage of Indian children appears to have improved during 1999 to 2013. But there is considerable scope to improve the childhood immunization coverage in the country and there should be regular systematic reviews of the coverage data (Bhatnagar et al.). Mathew (2012) studied that traditionally poor performing states have greater inequality in childhood immunization, although there are significant inequalities within the better performing states based on various socio-economic and demographic factors.

The strong son preference attitude of parents over daughters resulting in discrimination and neglect against daughters' health care and immunization outcomes. The North Indian states have exhibited stronger sons' preference as compared to the South Indian states (Dyson and Moore, 1983). The female children in India have 40% higher risk of ill health as compared to male ones and are disadvantaged to receive healthcare services including immunization (Fikree and Pasha, 2004; Filmer, King and Pritchett, 1998). Borooah (2004) studied that female children are significantly less likely to receive full immunization as compared to their male counterpart. Female children in India are more likely to die due to acute respiratory, infectious and parasitic diseases, and viral infections ((Registrar General of India, 2000; World Health Organization, 2006).Female children in India have a significantly lower probability of being fully vaccinated and of being fully vaccinated age-appropriately (Rammohan et al., 2014). Kurz and Johnson–Wetch (1997), studied that male children in India are more likely to be vaccinated and receive health care at a medical facility. The evidence of higher deaths of female children in childhood is usually interpreted as a result of parental discrimination against their daughters in the allocation of food (Behrman,1988) and health care (Rahaman et al., 1982). Pande and Yazbeck (2003) studied that South Indian states have better immunization levels and lower immunization inequalities than many North Indian states.

William Joe (2014) in a study in India found that the vulnerability of immunization coverage was found among female SC/ST (Scheduled Castes and Scheduled Tribes) children from rural areas. There is also evidence of advancement of immunization coverage among rural non- SC/ST male children. Gaudin and Yazbeck (2006) studied that there were heterogeneities between states, rural-urban differentials, gender differentials, and more specifically on wealth-related inequalities in the context of immunization status of children in India. Prusty and Kumar (2014) in a study in India found that full immunization is lower among female than male children in the western region, poor households and among Muslims. Between the period 1992-93 and 2005-06, the disparity in full immunization had narrowed in the northern region, whereas, it had increased in some of the western and southern states of the country. Oster (2009) in a study in India found that improvement in access to vaccination services may increase gender imbalances initially, but with further improvements of vaccination services decrease the gender gap.

Objective of the Study

The study attempts to examine the income related inequality in the context of health care more specifically immunization status of children (that is whether a child is fully vaccinated or not) among children aged 12-23 months in Eastern and North-Eastern states of the country. The main focus of the study is to find out the inequalities on full immunization status children by wealth quintiles in NFHS 3 data in the states of Eastern and North-Eastern regions. Further, it also attempts to explore heterogeneities between states, rural-urban differentials, by caste and religion of household head, education level of women and number of living children. The present study concentrates on the dynamic issue of immunization coverage of the children aged 12-23 months and highlights the issues on how do the inequalities in immunization coverage across wealth quintiles differ from state to state

within the eastern and north eastern regions of the country.

Data and Methodology

This study uses the National Family Health Survey (NFHS-3, 2005-06) data where, information on complete birth history and health care services more specifically immunization coverage of children are provided according to different quintiles of wealth index for all the states of eastern and north eastern regions of the country. Moreover, information on immunization coverage of children aged 12-23 months by rural-urban place of residence is also used from NFHS 4 (2015-16) data.

To measure the child health inequalities among the advantaged and disadvantaged groups, and to determine the magnitude of inequality, a composite index namely, Wealth Index (WI) from NFHS 3 data is used for the study. The wealth index is computed in NFHS-3 data using principal component analysis derived from a set of consumer durables and available facilities of the household, and finally classified into five quintiles of population, the five groups are : poorest, poorer, middle, richer and richest.

The health-indicator or preventive measure used in this study is immunization coverage of children, specifically 12–23 months alive children at the time of survey. Using this immunization data according to different wealth index quintiles, concentration curves and indexes are calculated for each of the selected states to compare the disparities among the states under study.

While studying the socio-economic disparities of a group of population, generally the negative effect of the indicators are considered (as it is done in the earlier studies). It's a well known fact that inequality is much more among the vulnerable segment of population and the negative effect of the social indicator is also much more among the poorer sections. In the present study, if we would consider the fully immunized children, the number would be less for the vulnerable children. For this reason, we have considered “not fully immunized children” in the analysis of concentration curves and indices and for which number is more for the poorest segment of the children and the inequality in immunization has gone against the poorer children. On the other hand, if we would consider the “fully immunized children” in the analysis of concentration curves and indices, we would not get the appropriate measure of inequality in immunization status of children.

Findings

Table 1(a) : Percentage of children aged 12-23 months who received full vaccinations before the survey by background characteristics in East Indian states (NFHS-3, 2005-06 and NFHS 4, 2015-16)

Background Characteristics		East Indian States			
		Bihar	Jharkhand	Orissa	West Bengal
Sex	Male	37.9	38.2	48.9	61.6
	Female	27.1	32.1	54.9	66.5
No. of Living Children	1	41.5	39.8	61.8	69.1
	2	41.6	47.5	54.2	61.1
	3	33.3	26.0	31.3	67.2
	4+	19.6	23.1	36.0	56.1
Place of Residence (NFHS 3)	Urban	45.5	51.5	52.8	70.1
	Rural	31.3	29.8	51.4	62.4
Place of Residence (NFHS 4)	Urban	59.7	67.0	75.0	77.7
	Rural	61.9	60.7	79.2	87.1
Mother's Education	No Education	22.0	25.5	35.6	52.4

	Primary	51.0	21.7	45.1	71.4
	secondary	61.7	65.5	75.5	72.4
	Higher	100.0	80.0	73.3	83.3
Religion	Hindu	36.0	38.2	52.2	67.8
	Muslim	18.8	27.1	75.0	58.2
	Other Religions	0.0	30.6	40.0	100.0
Caste/Tribe	SC	23.9	26.5	59.0	60.9
	ST	100.0	30.8	31.5	72.0
	OBC	35.6	38.3	58.9	70.6
	General	35.9	40.0	57.1	66.7
Wealth Index	Poorest	16.0	23.9	38.8	54.6
	Poorer	31.0	41.5	56.7	61.6
	Middle	34.6	27.3	66.7	74.7
	Richer	60.7	62.5	60.5	69.0
	Richest	80.8	78.3	66.7	78.1
	Total	32.9	34.8	51.8	64.0

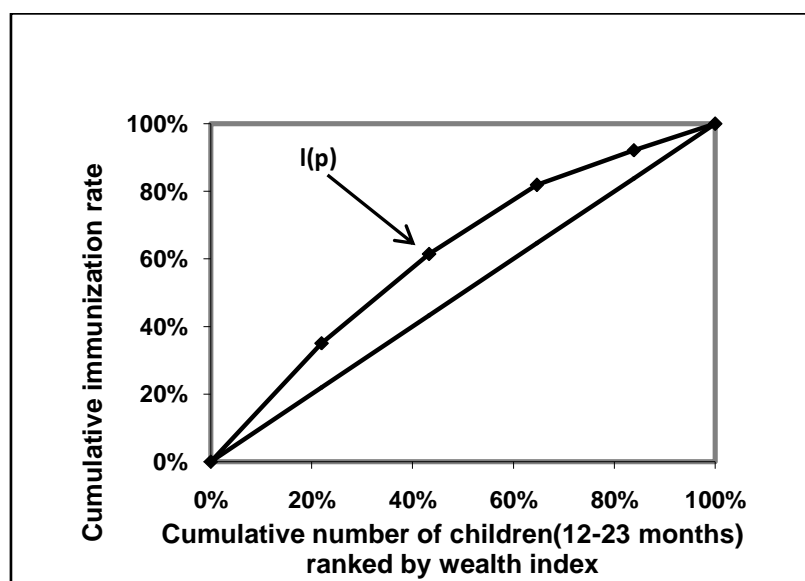
Table 1(b) : Percentage of children aged 12-23 months who received full vaccinations before the survey by background characteristics in North-Eastern States (NFHS-3, 2005-06 and NFHS 4, 2015-16)

Background Characteristics		North Eastern Region								All India
		Arunachal Pradesh	Assam	Manipur	Meghalaya	Mizoram	Nagaland	Sikkim	Tripura	
Sex	Male	32.5	29.9	52.0	32.8	50.6	21.0	72.9	53.5	47.9
	Female	24.7	34.1	41.6	33.7	41.4	20.7	66.7	45.8	44.5
Number of Living Children	1	41.9	47.1	63.5	37.2	37.5	25.9	81.6	59.3	56.6
	2	41.2	29.9	48.3	35.6	52.9	25.0	68.6	51.4	52.5
	3	20.7	11.4	38.5	34.1	55.2	13.2	65.6	28.6	39.8
	4+	14.0	23.8	29.0	27.7	37.5	19.5	52.2	27.3	26.3
Place of Residence NFHS 3	Urban	51.3	32.4	59.5	35.0	57.5	36.2	86.4	58.8	59.9
	Rural	21.2	32.1	43.3	33.0	37.2	17.0	66.7	48.5	41.2
Place of Residence NFHS 4	Urban	44.2	70.9	74.3	81.4	49.8	41.6	81.4	64.2	63.9
	Rural	36.4	44.4	61.7	58.5	51.3	33.4	83.7	51.2	61.3
Mother's Education	No Education	20.5	15.9	24.7	25.4	14.3	11.3	51.1	19.2	28.1
	Primary	21.7	23.5	35.9	33.3	25.0	5.1	76.5	36.4	43.8
	secondary	38.6	46.2	53.5	38.5	54.6	28.8	80.0	73.2	61.5
	Higher	85.7	77.8	73.8	44.4	72.7	68.2	66.7	50.0	79.9

Religion	Hindu	40.0	38.9	66.5	36.4	0.0	36.8	66.7	56.4	49.2
	Muslim	33.3	19.8	32.6	0.0	0.0	4.0	66.7	23.1	39.7
	Other Religions	22.1	26.1	29.5	33.5	46.4	20.4	74.5	0.0	40.9
Caste/Tribe	SC	20.0	33.3	52.9	25.0	0.0	15.8	100.0	44.8	43.8
	ST	22.3	37.2	23.5	33.2	46.7	21.4	77.1	37.5	32.2
	OBC	44.4	43.1	58.3	0.0	0.0	14.7	65.6	66.7	44.4
	General	34.1	30.4	60.1	33.3	0.0	30.0	62.5	55.0	57.6
Wealth Index	Poorest	5.9	11.1	10.0	17.2	0.0	2.2	75.0	9.5	24.8
	Poorer	20.8	31.4	18.6	20.0	14.3	6.2	76.5	37.5	32.3
	Middle	33.3	44.3	45.3	48.4	42.9	20.5	61.9	64.0	47.9
	Richer	42.9	50.0	58.7	36.4	36.4	33.0	69.4	60.0	56.8
	Richest	56.5	50.0	82.5	50.0	75.0	66.7	81.5	87.5	74.1
	Total	28.2	31.7	47.2	33.3	46.4	20.9	70.5	50.0	46.3

Table 1(a) and 1(b) show that sex disparity in full immunization is not very prominent across the states, but in Orissa, West Bengal, Assam and Meghalaya female children were more fully vaccinated than male children. As number of living children increases the rate of immunization sharply falls. But in West Bengal, Meghalaya and Mizoram the effect of this characteristic is very negligible. It is expected that due to easy accessibility and availability of health care facilities, urban children are more fully immunized than their rural counterpart. This disparity is found to be more in the states of Arunachal Pradesh, Jharkhand, Nagaland and Sikkim. It is obvious that mother's education has the most important role for their children's health. So, as the education level of mother increases immunization rate also sharply increases. But in West Bengal and Sikkim education level of mother has lesser impact upon child immunization.

Figure 1



Muslim children are less likely to be fully immunized than Hindu children in most of the states in the selected regions. But in the states of West Bengal and Sikkim religion has been found less important in determining the immunization status of children. In West Bengal, Sikkim and Assam, caste is not observed to be a barrier in child immunization differentials. But in the states, namely, Bihar, Jharkhand, Arunachal Pradesh and Meghalaya SC children are found to be disadvantaged than

the general caste children. The ST children are vulnerable in the context of full immunization coverage across the states and also at the national level.

However, the information given in table 1(a) and 1(b) is an approximation of the Socio-economic phenomenon of the selected states of the country. The present study mainly focuses on how the utilization of child health care facility like immunization differ from one state to other in eastern and also north eastern region of the country according to socio-economic status of population based on Wealth Index.

Fig. 1 provides the example of a concentration curve. Here we have plotted the immunization status of children according to their households' economic status (i.e., wealth index) and the sample is divided into five quintiles (poorest, poorer, middle, richer and richest). The child immunization rates are calculated for each of the wealth quintile. The immunization concentration curve is represented here as $L(p)$, which shows the cumulative proportion of immunization on the y-axis against the cumulative proportion of children on the x-axis ranked by the wealth index and begins with the most disadvantaged group of children.

It is observed from Figure 1 that when $L(p)$ coincides with the diagonal line (line of equality), all children enjoy the equal immunization rates irrespective of their socio-economic status. So, if $L(p)$ lies above the diagonal line, inequalities in immunization favour the better-off group of children. This type of inequality may be called as "pro-rich" inequalities in immunization. When the $L(p)$ lies below the 45 degree line, it may be termed as "pro-poor" inequalities in immunization. Moreover, how far the $L(p)$ lies below or above the diagonal line, more the degree of inequality in immunization rates across the wealth quintiles.

Concentration Index

The concentration index is defined as twice the area between the concentration curve, $L(p)$, and the line of equality. The concentration index takes values between -1 and $+1$. The Value is negative when the curve is above the diagonal line and positive when it is below the diagonal line. Its negative value implies that the inequality in immunization coverage is concentrated among disadvantaged group of children and opposite is the case for its positive value. So, in the case where there is no inequality in immunization status of children, the concentration index is zero. Conventionally, 'Concentration Index' is denoted by the term 'C'. Let, ' n ' denote the sample size, and ' T ' is the number of socioeconomic groups, f_t is the proportion of sample in the t -th group, then C can be presented as (Wagstaff, 2000):

'C'. Let, n denote the sample size, ' T ' is the number of socioeconomic groups, f_t is the proportion of the sample in the t -th group, then C can be presented as (Wagstaff, 2000):

$$C = \frac{2}{\mu} \sum_{t=1}^T f_t \mu_t R_t - 1 \quad (1)$$

Where, $\mu = \sum_{t=1}^T f_t \mu_t$ is the overall mean of immunization rate and μ_t is the mean value of immunization rate amongst the ' t 'th group. The term R_t is its relative rank in the ' t 'th group and may be defined as,

$$R_t = \sum_{\gamma=1}^{t-1} f_{\gamma} + \frac{1}{2} f_t \quad (2)$$

Equation 2 indicates the cumulative proportion of the population up to the midpoint of each group interval. Since, in the present study immunization coverage of children are derived from the survey data and hence subject to sampling variation. For this reason, it is needed to calculate the standard error in order to get the concentration index C. The Variance of 'C' is given by (Kakwani et al., 1997):

$$\text{Var}(\hat{C}) = \frac{1}{n} \left[\sum_{i=1}^T f_i a_i^2 - (1+c)^2 \right] + \frac{1}{n \mu^2} \sum_{i=1}^T f_i \sigma_i^2 (2R_i - 1 - C)^2 \quad (\text{Eq.3})$$

Where, σ_i^2 is the variance of μ_i ,

$$a_i = \frac{\mu_i}{\mu} (2R_i - 1 - C) + 2 - q_{i-1} - q_i \quad (\text{Eq.4})$$

$$q_i = \frac{1}{\mu} \sum_{\gamma=1}^i \mu_\gamma f_\gamma \quad (\text{Eq.5})$$

Which is the ordinate of L(p), $q_0 = 0$, and $p_i = \sum_{\gamma=1}^i f_\gamma R_\gamma$, is the cumulative percentage of the sample ranked by wealth index status in group 't'.

Table 2: Percentage distribution of children (aged 12 - 23 months) and distribution of not fully immunized children by Wealth Index quintile in the eastern and north-eastern states of India (NFHS 3)

States in the Regions	Percent of children by Wealth Index					Percent of Children not fully immunized				
	According to Wealth Index Quintiles					According to Wealth Index Quintiles				
	1	2	3	4	5	1	2	3	4	5
Eastern States										
Bihar	32.9	33.3	16.5	11.8	5.5	84.0	69.0	65.4	39.3	19.2
Jharkhand	57.7	13.4	10.8	10.5	7.5	76.1	58.5	72.7	37.5	21.7
Orissa	44.7	17.6	16.8	11.2	9.7	61.2	43.3	33.3	39.5	33.3
West Bengal	30.9	30.7	20.1	11.8	6.5	45.4	38.4	25.3	31.0	21.9
North-Eastern States										
Arunachal Pradesh	21.8	30.8	19.2	13.5	14.7	94.1	79.2	66.7	57.1	43.5
Assam	25.9	37.8	21.9	9.4	5.0	88.9	68.6	55.7	50.0	50.0
Manipur	2.8	19.9	36.4	29.5	11.4	90.0	81.4	54.7	41.3	17.5
Meghalaya	12.9	31.1	28.4	19.6	8.0	82.8	80.0	51.6	63.6	50.0
Mizoram	4.0	9.3	18.5	36.4	31.8	100.0	85.7	57.1	63.6	25.0
Nagaland	9.7	31.3	28.4	22.2	8.4	97.8	93.8	79.5	67.0	33.3
Sikkim	2.9	12.2	30.2	35.3	19.4	25.0	23.5	38.1	30.6	18.5
Tripura	17.8	20.3	42.4	12.7	6.8	90.5	62.5	36.0	40.0	12.5
All India	20.4	20.9	21.2	19.8	17.8	75.2	67.7	52.1	43.2	25.9

The Wealth Index (WI) is an important criterion to estimate the social disparities. On the other hand, Concentration Index (CI) meets the necessary requirements to measure the inequalities in the immunization status of children. So, keeping in view the study objective, we apply Wealth Index (WI) to construct the Concentration Index (CI) and which helps to identify the magnitude and dimension of inequalities based on child immunization in selected states of country. **Table 2** presents the distribution of children by different quintiles of wealth index and distribution of children not fully immunized children for different quintiles of wealth index based on NFHS-3 data. The data shows that there is large variation in the distribution of not fully immunized children (aged 12-23 months) across the wealth quintiles and across the selected states. In the states of Arunachal Pradesh, Assam,

Meghalaya and Tripuramore than 12 percent of children belong to the lowest quintile. On the other hand, in the four eastern states of India more than 30 percent of children belong to lowest quintile. In the states of Mizoram and Sikkim large proportion of children belong to highest quintile. But in the eastern states only less than 10 percent children belong to highest quintile. Similarly, in the states of Assam, Meghalaya, Nagaland and Tripura of north-eastern region less than 10 percent children belong to the highest quintile.

Table 2 also presents the extent of inequalities among children (in terms of percentage) those who were not fully immunized in eastern and north-eastern states of India. In most of the states except Sikkim of NE states and West Bengal of eastern **states**, there is a large gap between the lowest and highest quintiles for the children not fully immunized. The children of poorest quintileexperienced the highest percentage not fully immunizedin all the eastern and north eastern states of India except West Bengal and Sikkim. The interesting thing is that in the states of West Bengal and Sikkim the immunization rates across different wealth quintiles have less variations than the other states, which implies that in these two states immunization coverage are less dependent on socio-economic status of children.

The data report that children not fully immunized sharply decline from the poorest quintile to the richest quintile in majority of the eastern and north-eastern states. In general, it can be interpreted thatin most of the states,the immunization coverage of the children born in poor households are worse of as compared to those who born into better-off households. Therefore, the distribution of children not fully immunized from lower to upper quintile steadily decline along the scale of wealth index. In the Fig. 2(a) and 2(b)) on the horizontal axis, percentage of cumulative number of children (aged 12-23 months) are plotted according to wealth index quintiles. Similarly, on the vertical axis, percentage deviation of immunization concentration curve (CC) are plotted on the basis of the 45 degree diagonal line.

In Figure 2(a), the concentration curves for all the four eastern states lie below the all India inequality curve which implies that the inequality in immunization coverage is more at national level than the four eastern states. Among the four eastern states, Orissa has the highest inequality in immunization coverage as compared to the remaining states in the same region. Among the north eastern states, the concentration curves (Figure 2(b)) for Tripura lies furthest (followed by Manipur and Mizoram) from the line of equality (horizontal axis)and hence shows highest inequality than the other north eastern states. On the other hand, Sikkim has the lowest inequality as indicated by the concentration curve. The curve for all India lies in the middle position of the figure. The curves for states like Sikkim and Meghalaya lie much below than the All India curve, indicating less inequality in the Immunization coverage of the children. The three states, namely, Tripura, Manipur and Mizoram have higher inequality in immunization coverage of children than the all India average and inequality of the remaining north-eastern states are below the national level.

Concentration Curves

Figure 2(a): Concentration Curves for childrennot fully immunized in Eastern states of the country (NFHS 3, 2005-06)

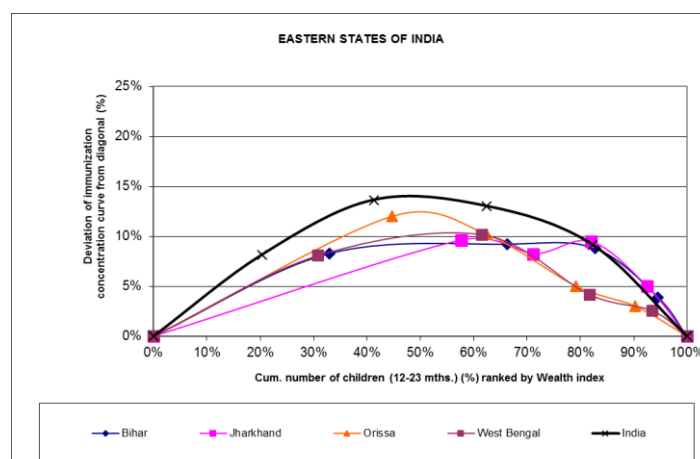


Figure 2(b): Concentration Curves for children not fully immunized in North-Eastern states of the country (NFHS 3, 2005-06)

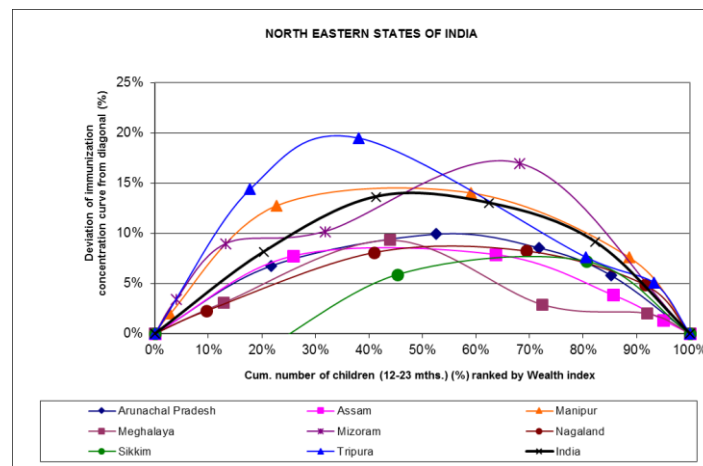


Table 3: Concentration Indices, standard errors and t - values for the children not fully vaccinated in different states of east and north-east India (NFHS 3, 2005-06)

States of the Regions	CI	Rank	SE (CI)	t (CI)
Eastern States				
Bihar	-0.132	4	0.074	-1.80
Jharkhand	-0.118	8	0.083	-1.43
Orissa	-0.130	5	0.019	-6.76
West Bengal	-0.119	7	0.032	-3.78
North-Eastern States				
Arunachal Pradesh	-0.130	6	0.039	-3.32
Assam	-0.111	10	0.024	-4.54
Manipur	-0.200	3	0.073	-2.75
Meghalaya	-0.089	11	0.024	-3.75
Mizoram	-0.201	2	0.089	-2.27
Nagaland	-0.114	9	0.058	-1.97
Sikkim	-0.065	12	0.075	-0.87
Tripura	-0.229	1	0.071	-3.25
All India	-0.179		0.054	-3.33

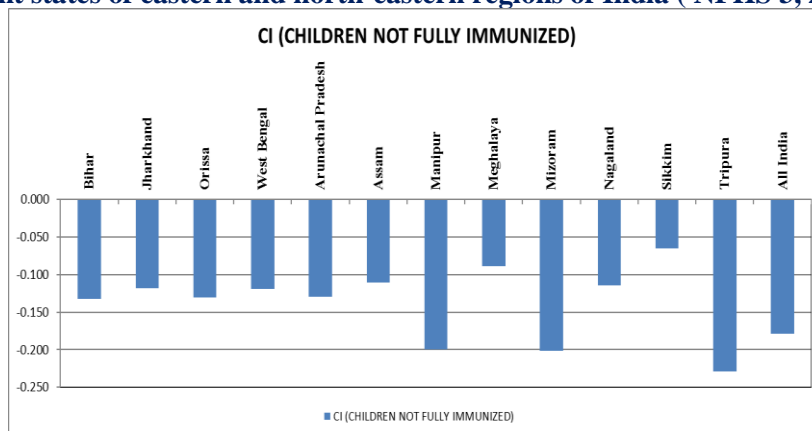
The concentration curves shown above give us an idea about the gross estimate of inequality in immunization status of children across the selected states. Using the concentration curves, we can compare the difference of inequality among the states and also with the national average. But Table 3 shows the state wise estimates of the concentration indices for the children not fully immunized along with its standard errors and corresponding t-statistics. The inequalities in the immunization status of children aged 12-23 months of the selected states may be ranked on the basis of the concentration index.

The values of concentration indices for the children not fully immunized in respect of the eastern and north-eastern states and also at the all India level consistently give the negative values which imply that the burden of inequality in child immunization are among the poorer segment of the population.

Among the states in the regions under concern, in Tripura, Mizoram and Manipur inequalities are higher than the all India level and in the remaining states of the selected regions, inequalities are lower than the all India level. Inequality in Immunization is lowest in the state of Sikkim and it is

highest in the state of Tripura. The inequalities in immunization on the basis of the concentration indices, the states in the eastern region are in the middle position. On the basis of the bar diagram derived from the concentration indices, the inequalities in childhood immunization of the states in selected regions may be ranked in order of magnitude of inequality. Figure 3 also describes the same things which was described in Table 3.

Figure 3: Bar Diagram of Concentration Indices for the children not fully immunized in different states of eastern and north-eastern regions of India (NFHS 3, 2005-06)



Conclusions

In this study, attempt has been made whether there is differences in the context of full immunization coverage among children aged 12–23 months across socio-economic characteristics and among advantaged and disadvantaged groups of population in the selected states of eastern and north-eastern regions of the country. The study reports that region-wise and across socio-economic and demographic characteristics the gap of full immunization among different groups of population has widened in many states of the selected regions. Above all, mother's education is found to be more significant role in improving immunization outcome of the children. Scheduled Tribe, Muslims and the population residing in rural areas were vulnerable in the coverage of full immunization.

In India, average health condition of people have improved substantially, but it does not necessarily mean that the health services has reached equally to all sections of people in the society. Also it cannot guarantee about the equal improvement in health conditions among and within different regions or states in the country. Although India has achieved high level of economic growth and development, but still it could not ensure egalitarian distribution and accessibility of beneficial social services to all sections of population. Special efforts are needed to reach poorer section in our society to deliver affordable health care and allied services. In a nut shell, poverty is the main cause of all sorts of backwardness, and to strengthen the immunization coverage of children, poverty related routes have to be removed from the society.

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