Prevalence Of Severity Of Child Malnutrition Under Age 5 In India: A State Wise Analysis

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ABSTRACT

The present study seeks to draw the attention of policy makers towards critical state of Child health across Indian States and union territories and aims to offer recommendations for formulating nuanced policies targeted to reduce severe child malnutrition using the insights from unit level data of rounds 4 and 5 of National family health survey of India (NFHS 2015-16 to NFHS 2019-21). As per the 5th round of National family health survey (NFHS-5, 2019-21), 5 percent of children under age 5 in India remained stunted, wasted and underweight. The study found that during 2015-16 (4th round) to 2019-21 (5th round), there was 7 percent decline in prevalence of severity of child malnutrition. The study recognizes Meghalaya and Bihar as having the highest percentage of severely stunted children, while Chandigarh and Kerala report the lowest. In addition, this study identifies Gujarat and Maharashtra have the uppermost percentage of children affected by severe wasting, whereas Chandigarh and Puducherry have the lowest. The western most state, Gujarat records the highest percentage of underweight children followed by Bihar, while Manipur and Mizoram report the lowest. Finally, the study suggests that States and U.T.s having critical status of child malnutrition should strengthen Mid-Day Meal, Poshan Abhiyaan and Integrated child development services (ICDS) while improving Immunization, maternal care and sanitation. The lagging states must adopt the best practices of Chandigarh and Kerala.

Keywords: Child Health, Health, Inequality, Government Policy, Child Care

1. INTRODUCTION

The Oxford dictionary, provides two different meanings of the term "Capital" in. One is "Wealth, in the form of money or other assets owned by a person or organization or available for a purpose such as starting a company or investing," and the another is "A valuable resource of a particular kind." Education was considered as most vital form of human capital in the economic research, historically. since it creates income as well as other "returns." (Currie, 2020). Nevertheless Grossman's (1972) innovative work abstracting health as a form of human capital, child health has conventionally been thought of as something that affected adult outcomes mainly by impacting education. In recent years, however, child health as early as in the prenatal period has gradually been understood to be a valuable form of human capital in its own right, with its own significant contributions to future adult health and productivity. In this context, the satisfactory Child Nutrition in any country is considered as an essential for the long run growth, productivity enhancement of the society people, poverty decrease and good human capital development. (*Grossman 1972*, n.d.). Given this reputation of Child health as human capital (important for endogenous growth of developing countries), it is crucial to get in depth picture of Child malnutrition (threat to child health) in India since India is performing well in terms of economic indicators however, its performance in Child health indicators is not matching well to the extent as economic growth trajectory. India showed a slight improvement in the Global Hunger Index but still behind (111th rank out of 125 countries) to its neighboring countries and shows a serious level of hunger in the children of India. As per the economic survey of India, the per capita income of India has grown 21.38 percent from 2015-16 to 2019-20 i.e., from ₹77659 to ₹94270. The net national income has grown 23 percent during 2015-16 to 2019-20. Based on this analysis, it can be stated that the economic performance of India has improved in the past five years but India is still lacking to achieve the targets set by the World Health Organization for 2025 i.e., a 40 percent reduction in the number of children under 5 who are stunted, 30 percent reduction in low birth weight, no increase in childhood overweight

and reduce and maintain childhood wasting to less than 5 percent. (WHO, Global targets:2025). With this justification, the present study proposes to examine prevalence of severity of malnutrition among children under age 5 in Indian States and U.T.s.

2. REVIEW OF LITERATURE

(Siddiqa et al., 2023), (Prasetyo et al., 2023), (Banu et al., 2023), (Lakshmanasamy, 2022) (Chakraborty & Ghosh, 2020) highlighted the impact of different determinants of Child health like health parental education, mother education, household economic status, family income, mothers' nutritional knowledge, rate of a child's dietary diversity, women's dietary diversity, coverage in immunization, and reproductive healthcare, children of squatters, extracurricular sports activities. (Protano et al., 2017), (Ijarotimi, 2013), (Gulati, 2010), (Mahgoub et al., 2006), (Skoufias Ifpri & C, 1998), (Wolfe & Behrman, 1982) observed that developing nations have relatively high rates of childhood malnutrition, especially in Africa and South Asia. The most significant risk factors have been determined to include several things, including poverty, inadequate child-feeding habits, lower age marriage, inappropriate facilities for vaccination, a lack of nutrition education among nursing moms or other caregivers, abnormal substance abuse (Ambadekar & Zodpey, 2017), and subpar healthcare facilities. (Yadav et al., 2024) has found the strong association of household food insecurity and dietary diversity with child malnutrition. The biological, social, cultural, economic, and morbidity factors (Sharma, 2019) that determine malnutrition include economic development (Singh et al., 2019), poverty (Pathak & Singh, 2011), age, birth weight, length of time breastfed, mother's BMI (Khan & Mohanty, 2018), father's BMI (Corsi et al., 2016), gender of the family head, place of residence, type of house (Bhadoria et al., 2017), toilet facilities, level of education of the mother (Chaudhuri et al., 2023) and father, person caring for the child, frequency of cough and diarrhea, and intake of milk and dairy products. The impact of unobserved heterogeneity at the cluster (village) level, such as variations in costs and the range and Caliber of healthcare services offered within the neighborhood of the home. (Mahapatra et al., 2021) found that "districts facing the double burden of climate vulnerability and child malnutrition suggests that most of these districts and states are characterized by poor health infrastructure in rural areas, low literacy, rudimentary sanitation, and poverty." Higher household income in rural areas seems to have a favorable impact on girls' long-term health condition, as measured by height-for-age Z-scores but a detrimental impact on weight-for-height Z-scores, which serve as a proxy for short-term health status (De & Chattopadhyay, 2019). On the other hand, in urban regions, neither the father's educational attainment nor his income seems to be important determinants of the increase in growth achievement of boys and girls. In rural areas, the mother's educational attainment does not significantly connect with height for age; nevertheless, in urban areas, it is linked to low growth attainment for males and higher growth attainment for girls, whereas (Thomas et al., 1991) showed the positive impact of mother's education on child's height. The review of these repetitive and representative studies related to developing countries in this context motivated to investigate the child malnutrition status and factor affecting it in Indian States and Union Territories. The next section of the study deals to describe the data sources and research methodology used to analyze the set objectives.

Data Sources and Research Methodology

The study has used the unit-level data of rounds 4 and 5 of National family health survey (NFHS). To analyze the prevalence of severity of child Malnutrition of child under age-5 in India, the criterion given by W.H.O. has been used. The analysis has been divided into two steps. In the first step, the study identifies the undernutrition (deficiencies) or overnutrition (excesses in nutrient intake) level of children in Indian states and union territories and the progress of states and U.T.s to reduce undernutrition and overnutrition between rounds 4 and 5 of National family health survey (NFHS). Undernutrition is measured by stunting, wasting, and being underweight while overnutrition is measured by overweight. A child is considered as underweight if their weight-for-age Z-score (Z-Score: The deviation of an individual's value from the median value of a reference population, divided by the standard deviation of the reference population) is below -2 SD from the WHO Child Growth Standards median. A child is called wasted if weight-for-height Z-score is below -2 SD from the WHO Child Growth Standards median. If child's height-for-age Z-score is below -2 standard deviations (SD) from the WHO Child Growth Standards median then the child is considered as stunted. The child is overweight if Z-score of weight-for-height greater than 2 standard deviations above WHO Child Growth Standards median. In the second step, the present study measures severely stunted, severely wasted, severely underweight as severely malnourished (presence of oedema of both feet) children; i.e., Height-for-age Z-Score, Weight-for-height Z-Score and weight-for-age Z-Score is below–3 SD respectively in Indian states and U.T.s. **(WHO, 2006: https://www.who.int/publications/i/item/924154693X).** The criterion/cut-offs is/are given in the table below:

Table 1: WHO, Criteria/Cut-offs to determine Child Malnutrition

Indicators of Child Malnutrition	Under age 5 Years
Stunting	Length for age Z-score <- 2 SD
Wasting	Weight for length Z-score <- 2 SD

Underweight	Weight for age Z-score <- 2 SD
Severely Stunted	Length for age Z-score <- 3 SD
Severely Wasted	Weight for length Z-score <- 3 SD
Severely Underweight	Weight for age Z-score <- 3SD

Source: WHO, 2006: https://www.who.int/publications/i/item/924154693X

The state-wise Categorization has been determined using the following criteria given in the table 2 as under:

Table 2 Prevalence thresholds and corresponding labels for stunting, wasting and underweight

| Prevalence thresholds (in percent)		
Labels	Stunting	Wasting and Underweight
Very Low (VL)	Less than 2.5	Less than 2.5
Low (L)	2.5 to less than 10	2.5 to less than 5
Medium (M)	10 to less than 20	5 to less than 10
High (H)	20 to less than 30	10 to less than 15
Very High (VH)	Equal to or more than 30	Equal to or more than 15

Source: UNICEF, WHO, World Bank Group (2019). Joint Child Malnutrition Estimates.

In addition, the study has used the Gini Coefficient and Lorenz Curve to analyze the regional (states and union territories wise) child malnutrition inequality. The Gini Coefficient is a measure of regional spatial inequality within a population, ranging from 0 (perfect equality) to 1 (perfect inequality). (World Bank, 2022). Also the study has used double burden criteria of WHO, to measure the coexistence of undernutrition (stunting, wasting, underweight) and overnutrition (overweight, obesity). Wells, J. C. K., Sawaya, A. L., Wibaek, R., Mwangome, M., Poullas, M. S., Yajnik, C. S., & Demaio, A. (2020).

3. RESULTS AND DISCUSSION

This section presents the results related to child malnutrition status in Indian states and union territories. Also, it includes the discussion related to the determinants or factor affecting to the child malnutrition in Indian states and union territories.

Figure:1 Progress of indicators of child malnutrition in India (NFHS4 to NFHS 5)
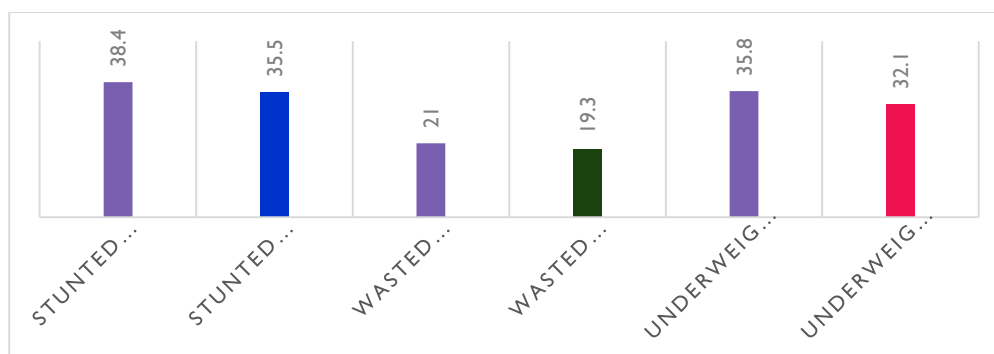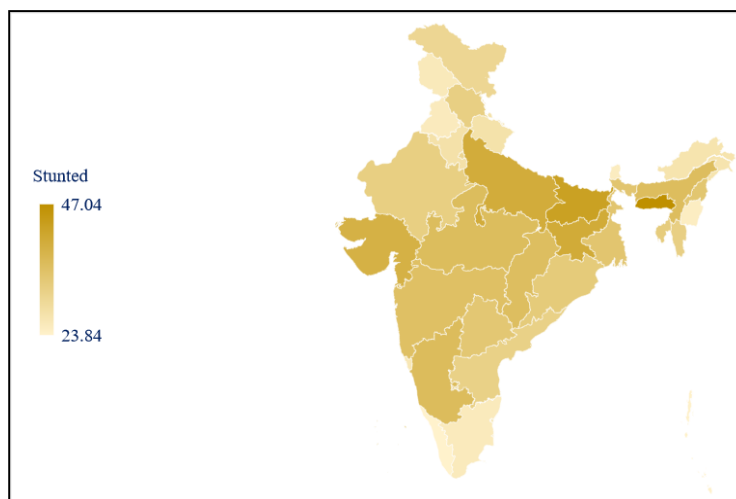

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 1 shows the percentage of children under 5 affected by stunting, wasting, and underweight in India, a comparison between NFHS-4 and NFHS-5. Wasting records decline from NFHS-4 to NFHS-5 i.e., 1.7 percent while stunting and underweight records very minor changes i.e., 2.9 percent and 3.7 percent. The minor improvement in the indicators of child malnutrition speaks that the problems of deprivation, inadequate maternal health, sanitation, and food diversity still creating the trap.
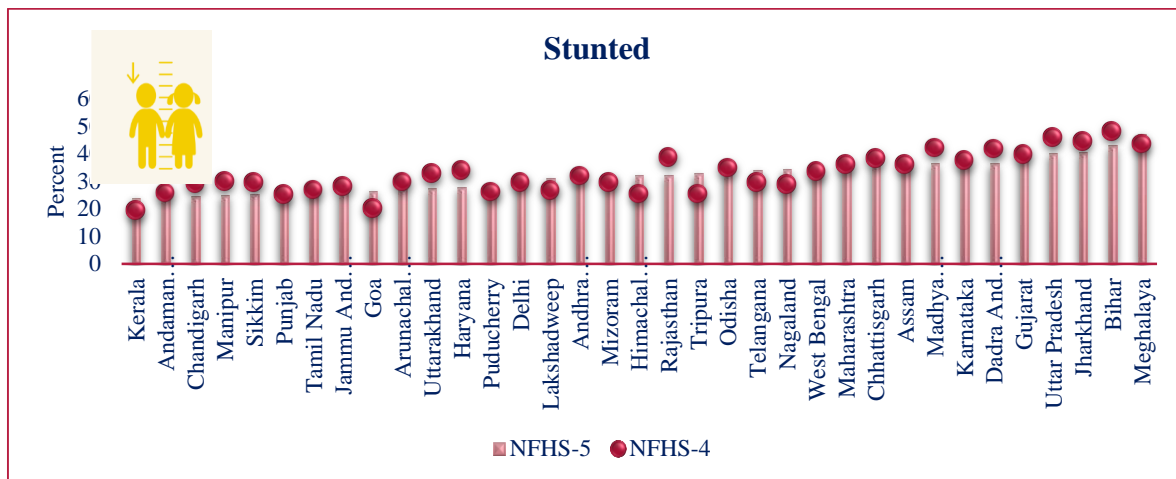
Figure 2: Progress of Children under 5 affected by Health Deprivation in Indian States (NFHS4 to NFHS 5)
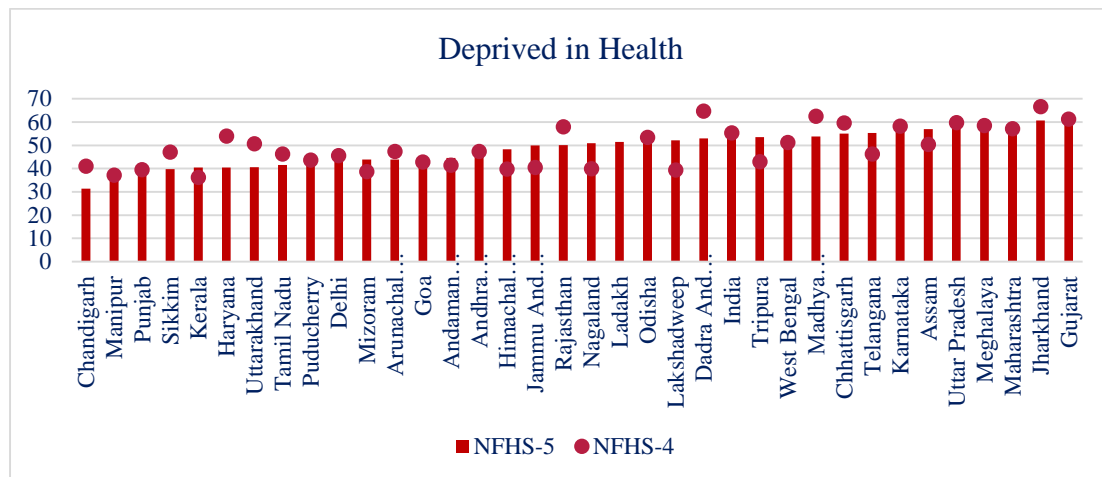
Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 2 shows the percentage of children under 5 affected by health deprivation in Indian States during NFHS-4 and NFHS-5. Chandigarh and Manipur have the lowest percentage of children with health deprivation while Gujrat and Jharkhand have the highest percentage of health-deprived children as per NFHS-5 in India. Haryana made the highest improvement in children's health, i.e., 13.47 between NFHS-4 and 5 in India. The condition of child health in some states got worse instead of improved i.e. Andaman & Nicobar Island, Andhra Pradesh, Assam, Goa, Gujrat, Himachal Pradesh, Jammu & Kashmir, Kerala, Lakshadweep, Maharashtra, Mizoram, Nagaland, Telangana, Tripura and, West Bengal. Assam, Bihar, Chhattisgarh, Gujrat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Telangana, Uttar Pradesh, and, West Bengal are the states showing child health deprivation even higher than the national average of India in NFHS-5. The States like Jharkhand, Bihar, Uttar Pradesh, Chhattisgarh, and Madhya Pradesh having highest percentage of child health deprivation due to insufficient access to food, poor healthcare access, and poor maternal health. Also, the Covid-19 posed the several challenges like disrupted health services, nutrition programs and distorted vaccination which became the cause of poor child health in the states like Goa, Maharashtra and West Bengal. The hilly and remote regions of North east states do not have health facilities. The improvement in child health in some states can be devoted to states policies and their nutrition programs like in Haryana. The states like Kerala and Himachal Pradesh, traditionally strong in healthcare.

Figure 3: Percentage of Children under 5 affected by Stunting in India

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 4: Trends of Children under 5 affected by Stunting in India, NFHS-4 to NFHS-5 (Progress)

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 3 and 4 show trends of children under 5 affected by stunting in India during NFHS-4 and NFHS-5. Meghalaya and Bihar have the highest percentage of stunted children while Kerala and Andaman & Nicobar Island have the lowest percentage of stunted children in NFHS-5 in India. In all states, government tried to reduce stunting in under age 5 children but in some states i.e. Goa, Tripura, Himachal Pradesh, Kerala, Nagaland, Lakshadweep, Telangana, Puducherry, Meghalaya, Mizoram, Delhi, West Bengal and, Punjab, percentage of stunted children has increased between NFHS-4 to NFHS-5 in India. Haryana made the highest progress in reducing stunting in under-age 5 children.
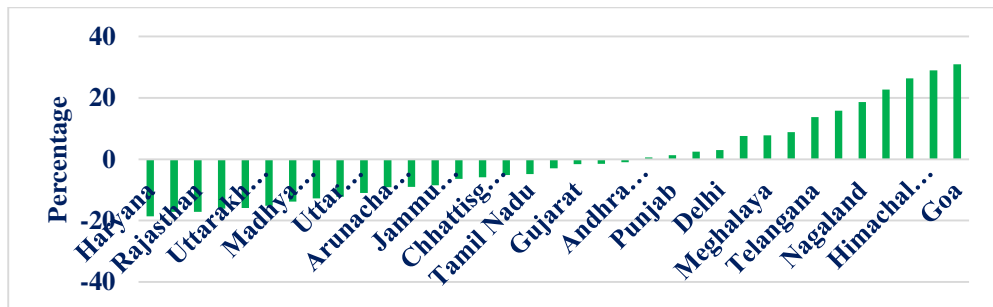
Table 1: State/UT wise percentage point change in Stunting Children under 5 Years between NFHS-4 and NFHS-5

STATES	NFHS-4	NFHS-5	CHANGE	NFHS-4	NFHS-5
Andaman And Nicobar I	25.81	24.15	-6.43	H	H
Andhra Pradesh	31.97	31.67	-0.94	VH	VH
Arunachal Pradesh	29.91	27.2	-9.06	H	H
Assam	36.12	36.33	0.58	VH	VH
Bihar	48.33	43.04	-10.95	VH	VH
Chandigarh	29.21	24.52	-16.06	H	H
Chhattisgarh	38.42	36.15	-5.91	VH	VH
Dadra And Nagar Havel	41.87	36.53	-12.75	VH	VH
Delhi	29.74	30.62	2.96	H	VH
Goa	20.21	26.47	30.97	H	H
Gujarat	39.87	39.23	-1.61	VH	VH
Haryana	34.09	27.77	-18.54	VH	H
Himachal Pradesh	25.41	32.11	26.37	H	VH
Jammu And Kashmir	28.27	25.87	-8.49	H	H
Jharkhand	44.66	40.64	-9.00	VH	VH
Karnataka	37.61	36.52	-2.90	VH	VH
Kerala	19.42	23.84	22.76	M	H

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Lakshadweep	26.83	31.08	15.84	H	VH
Madhya Pradesh	42.22	36.42	-13.74	VH	VH
Maharashtra	36.15	35.62	-1.47	VH	VH
Manipur	30.1	24.94	-17.14	VH	H
Meghalaya	43.64	47.04	7.79	VH	VH
Mizoram	29.81	32.07	7.58	H	VH
Nagaland	28.95	34.34	18.62	H	VH
Odisha	34.92	33.14	-5.10	VH	VH
Puducherry	26.21	28.53	8.85	H	H
Punjab	25.25	25.6	1.39	H	H
Rajasthan	38.86	32.22	-17.09	VH	VH
Sikkim	29.62	25.14	-15.12	H	H
Tamil Nadu	27	25.71	-4.78	H	H
Telangana	29.8	33.91	13.79	H	VH
Tripura	25.43	32.81	29.02	H	VH
Uttar Pradesh	45.92	40.31	-12.22	VH	VH
Uttarakhand	32.88	27.65	-15.91	VH	H
West Bengal	33.58	34.41	2.47	VH	VH

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 5: Percentage of point change in stunted children under 5 years from NFHS-4 to NFHS-5 in India
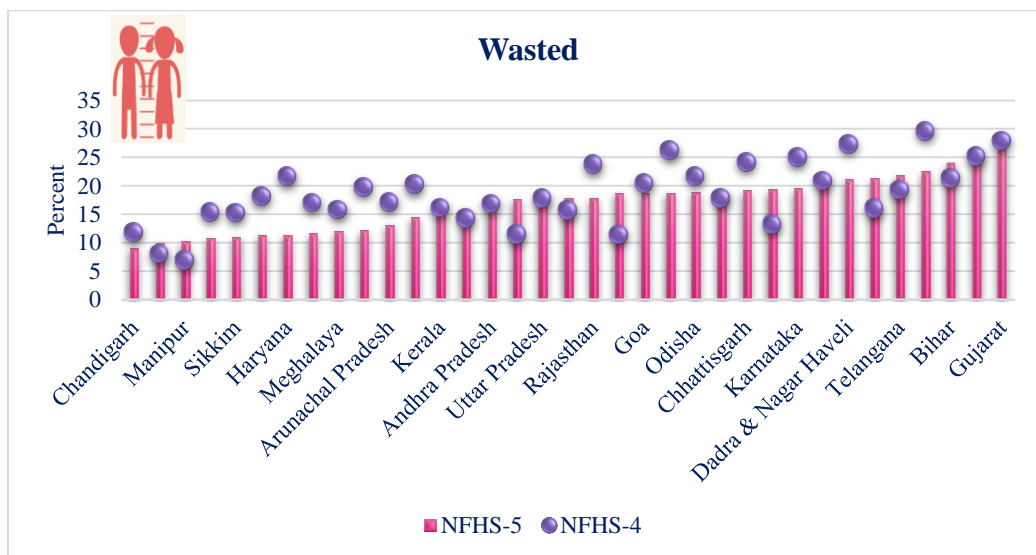

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Table 1 and Figure 5 show the percentage point change of stunted children under age 5 between NFHS-4 and NFHS-5 in Indian States and Union Territories. Andhra Pradesh, Assam, Bihar, Chhattisgarh, Dadra Nagar Haveli, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Rajasthan, Uttar Pradesh and West Bengal are having very high (VH) percentage of stunted children under age 5 i.e., between NFHS-4 and NFHS-5 there is no improvement in these 15 states. In some states like Telangana, Tripura, Delhi, Himachal, Lakshadweep, Mizoram and Nagaland the situation has become worse. However, some states, Haryana, Manipur and Uttarakhand have improved to reduce the percentage of stunted children under age 5 between NFHS-4 and NFHS-5.

Figure 6: Percentage of severely stunted children in NFHS-4 and NFHS-5 in India
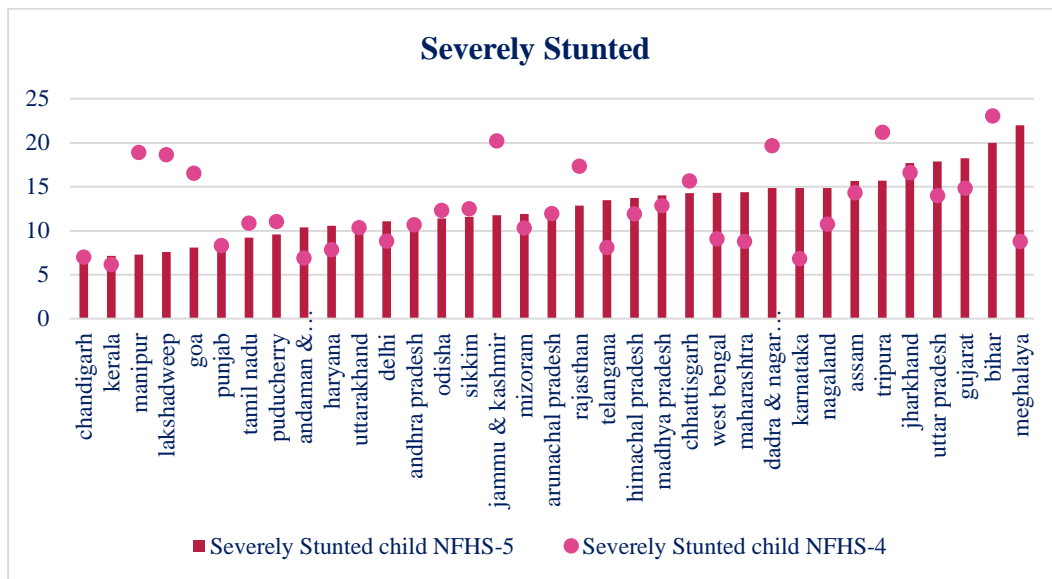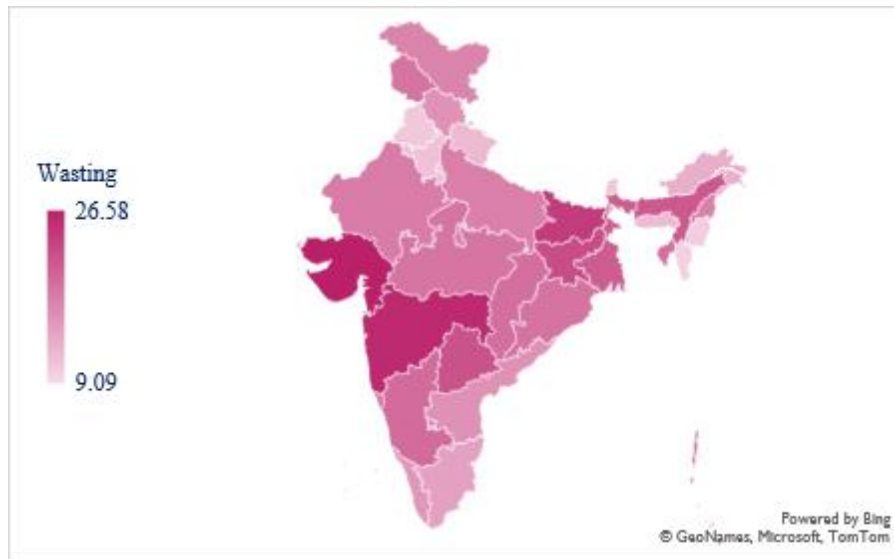

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 6 shows the percentage of severely stunted children under age 5 in NFHS-4 and NFHS-5 in India. Meghalaya and Bihar had the highest number of severely stunted children while Chandigarh and Kerala had the lowest number of severely stunted children in NFHS-5 in India. Most of the states i.e. Meghalaya, Gujrat, Uttar Pradesh, Jharkhand, Assam, Nagaland, Karnataka, Maharashtra, West Bengal, Madhya Pradesh, Telangana, Himachal Pradesh, Mizoram, Andhra Pradesh, Delhi, Arunachal Pradesh, Uttarakhand, Haryana, Andaman & Nicobar Island, Punjab, Kerala and, Chandigarh experienced an increasing number of severely stunted children. Manipur made the highest improvement and Meghalaya had the worst situation from NFHS-4 to NFHS-5.

Figure 7: Percentage of Children under 5 affected by Wasting in India, NFHS-4 & NFHS-5

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 7 shows the percentage of children under age 5 affected by wasting in India. Gujrat and Maharashtra had the highest number of wasted children while Chandigarh and Mizoram had the lowest number of wasted children in NFHS-5 in India. The highest progress was made by Haryana i.e. 47.52 percent in reducing the number of children affected by wasting in India from NFHS-4 to NFHS-5. Mizoram, Assam, Lakshadweep, Manipur, Nagaland, and, Jammu & Kashmir were worst performing states in which wasting among children was increased in NFHS-5 instead of decreasing.

Figure 8: Percentage of Children under 5 affected by Wasting in India, NFHS-5

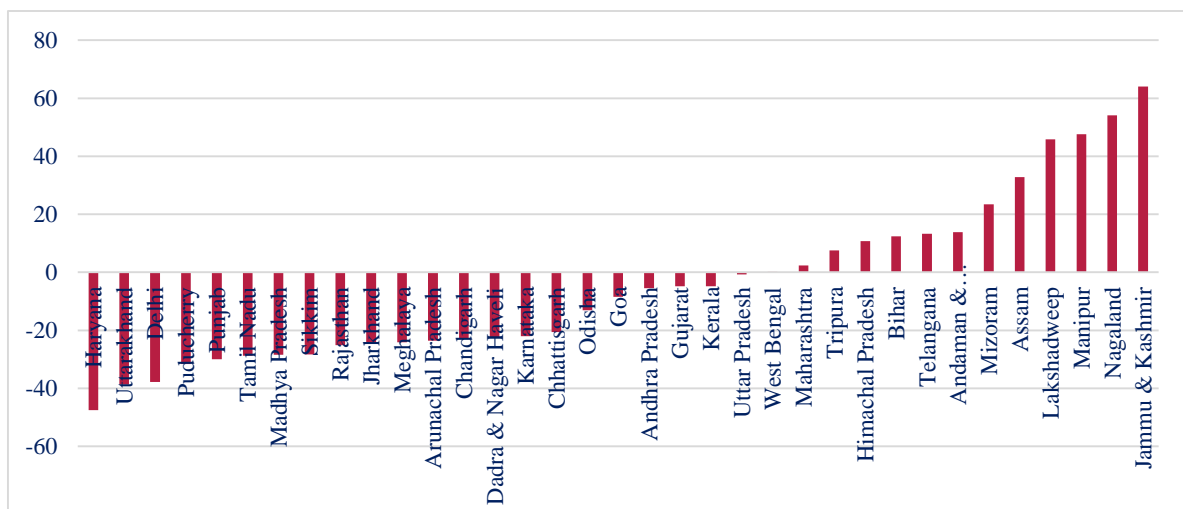**Source: Compiled by the researcher using NFHS-4 and NFHS-5 data**

Table 2: State/UT wise percentage point change in Wasting Children under 5 Years between NFHS-4 and NFHS-5

STATES	NFHS-4	NFHS-5	CHANGE	NFHS-4	NFHS-5
Andaman & Nicobar Island	15.67	17.84	13.85	VH	VH
Andhra Pradesh	16.86	15.94	-5.46	VH	VH
Arunachal Pradesh	17.16	13.12	-23.54	VH	H
Assam	16.04	21.3	32.79	VH	VH
Bihar	21.38	24.04	12.44	VH	VH
Chandigarh	11.8	9.09	-22.97	H	M
Chhattisgarh	24.16	19.18	-20.61	VH	VH
Dadra & Nagar Haveli	27.34	21.19	-22.49	VH	VH
Delhi	18.18	11.3	-37.84	VH	H
Goa	20.47	18.75	-8.40	VH	VH
Gujarat	27.92	26.58	-4.80	VH	VH
Haryana	21.63	11.35	-47.53	VH	H
Himachal Pradesh	14.35	15.9	10.80	H	VH
Jammu & Kashmir	11.4	18.7	64.04	H	VH
Jharkhand	29.66	22.46	-24.28	VH	VH
Karnataka	25.03	19.52	-22.01	VH	VH
Kerala	16.15	15.38	-4.77	VH	VH
Lakshadweep	13.24	19.31	45.85	H	VH
Madhya Pradesh	26.21	18.75	-28.46	VH	VH

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Maharashtra	25.18	25.77	2.34	VH	VH
Manipur	6.94	10.24	47.55	M	H
Meghalaya	15.82	12	-24.15	VH	H
Mizoram	8.01	9.89	23.47	M	M
Nagaland	11.44	17.63	54.11	H	VH
Odisha	21.71	18.87	-13.08	VH	VH
Puducherry	17.06	11.66	-31.65	VH	H
Punjab	15.41	10.79	-29.98	VH	H
Rajasthan	23.81	17.84	-25.07	VH	VH
Sikkim	15.24	10.93	-28.28	VH	H
Tamil Nadu	20.26	14.44	-28.73	VH	H
Telangana	19.26	21.83	13.34	VH	VH
Tripura	17.81	19.16	7.58	VH	VH
Uttar Pradesh	17.77	17.64	-0.73	VH	VH
Uttarakhand	19.81	12.14	-38.72	VH	H
West Bengal	20.91	20.92	0.05	VH	VH

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 9: Percentage of point change in wasted children under 5 years from NFHS-4 to NFHS-5 in India
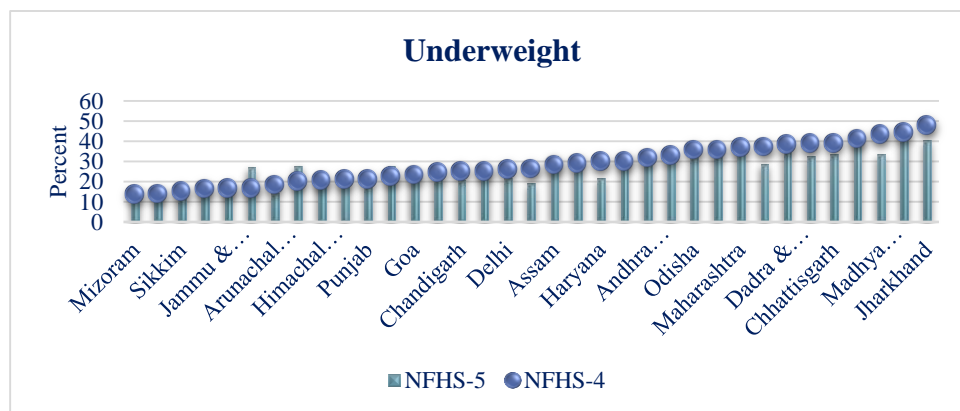

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Table 2 and Figure 9 show the percentage point change of wasted children under age 5 between NFHS-4 and NFHS-5 in Indian states and Union Territories. Andaman & Nicobar, Andhra Pradesh, Assam, Bihar, Chhattisgarh, Dadra Nagar Haveli, Goa, Gujarat, Jharkhand, Karnataka, Kerela, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Telangana, Tripura, Uttar Pradesh and West Bengal are having very high (VH) percentage of wasted children under age 5 i.e., between NFHS-4 and NFHS-5 there is no improvement in these 19 states. In some states like Arunachal Pradesh, Chandigarh, Delhi, Haryana, Meghalaya, Puducherry, Punjab, Sikkim, Tamil Nadu and Uttarakhand have improved to reduce the percentage of wasted children under age 5 between NFHS-4 and NFHS-5.

Figure 10: Percentage of severely wasted children in NFHS-4 and NFHS-5 in India
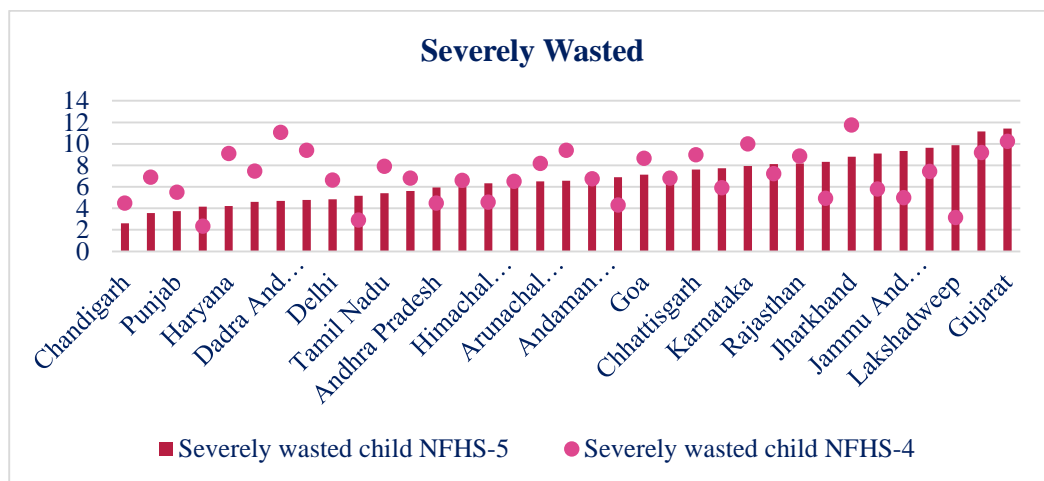
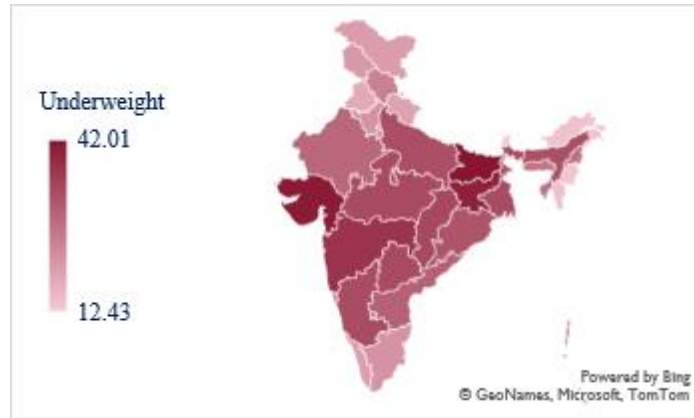**Source: Compiled by the researcher using NFHS-4 and NFHS-5 data**

Figure 10 shows the percentage of severely wasted children in NFHS-4 and NFHS-5 in India. Gujrat and Maharashtra have the highest percentage of severely wasted children while Chandigarh and Puducherry had the lowest percentage of severely wasted children in NFHS-4 in India. The highest progress was made by Dadra & Nagar Haveli i.e. 6.38 percent decline in severe wasting from NFHS-4 to NFHS-5 and Lakshadweep was the worst performer with the highest increase in severely wasting children i.e. 6.73 percent from NFHS-4 to NFHS-5 in India. Manipur, Mizoram, Andhra Pradesh, Himachal Pradesh, Nagaland, West Bengal, Uttar Pradesh, Tripura, Telangana, Assam, Jammu & Kashmir, Bihar, Lakshadweep, Maharashtra, and Gujrat were the states/UTs which recorded increment in severely wasting among children from NFHS-4 to NFHS-5 instead of decline.

Figure 11: Percentage of Children under 5 affected by Underweight in India, NFHS-4 and NFHS-5

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 11 shows the percentage of children under age 5 affected by underweight during NFHS-4 and NFHS-5 in India. Bihar and Gujrat had the highest percentage of underweight children while Manipur and Arunachal Pradesh had the lowest percentage of underweight children in NFHS-5 in India. The highest progress was made by Haryana with 28.16 points decline in underweight children and Nagaland was the worst performer by 60 points increase in underweight children from NFHS-4 to NFHS-5 in India.

Figure 12: Percentage of Children under 5 affected by Underweight in India, NFHS-5

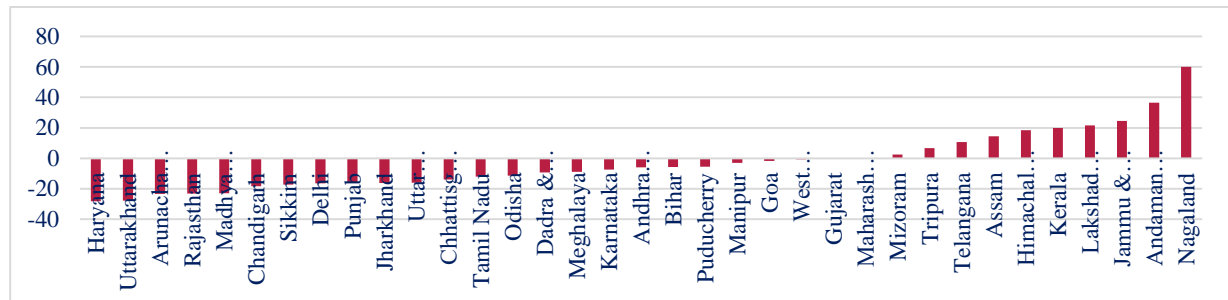Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Table 3: State/UT wise percentage point change in Underweight Children under 5 Years between NFHS-4 and NFHS-5

STATES	NFHS-4	NFHS-5	CHANGE	NFHS-4	NFHS-5
Andaman & Nicobar Island	20.28	27.7	36.59	VH	VH
Andhra Pradesh	31.74	29.85	-5.95	VH	VH
Arunachal Pradesh	18.44	14.11	-23.48	VH	H
Assam	28.43	32.55	14.49	VH	VH
Bihar	44.54	42.01	-5.68	VH	VH
Chandigarh	25.28	20.65	-18.31	VH	VH
Chhattisgarh	39.15	33.72	-13.87	VH	VH
Dadra & Nagar Haveli	38.41	34.87	-9.22	VH	VH
Delhi	26.17	21.89	-16.35	VH	VH
Goa	23.36	22.97	-1.67	VH	VH
Gujarat	41.28	41.17	-0.27	VH	VH
Haryana	30.11	21.63	-28.16	VH	VH
Himachal Pradesh	20.6	24.42	18.54	VH	VH
Jammu & Kashmir	16.66	20.74	24.49	VH	VH
Jharkhand	48.01	40.23	-16.20	VH	VH
Karnataka	35.95	33.26	-7.48	VH	VH
Kerala	16.5	19.8	20.00	VH	VH
Lakshadweep	22.65	27.56	21.68	VH	VH
Madhya Pradesh	43.44	33.45	-23.00	VH	VH
Maharashtra	37.17	37.19	0.05	VH	VH
Manipur	14.04	13.63	-2.92	H	H
Meghalaya	29.2	26.63	-8.80	VH	VH
Mizoram	13.86	14.2	2.45	H	H
Nagaland	16.8	26.88	60.00	VH	VH
Odisha	35.9	31.84	-11.31	VH	VH
Puducherry	21.17	20	-5.53	VH	VH
Punjab	21.23	17.78	-16.25	VH	VH
Rajasthan	37.3	28.66	-23.16	VH	VH

Sikkim	15.03	12.43	-17.30	VH	H
Tamil Nadu	24.59	21.64	-12.00	VH	VH
Telangana	30.19	33.44	10.77	VH	VH
Tripura	25.35	27.03	6.63	VH	VH
Uttar Pradesh	38.86	32.67	-15.93	VH	VH
Uttarakhand	26.31	19.01	-27.75	VH	VH
West Bengal	33.29	33.09	-0.60	VH	VH

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 13: Percentage point change in underweight children under 5 years from NFHS-4 to NFHS-5 in India
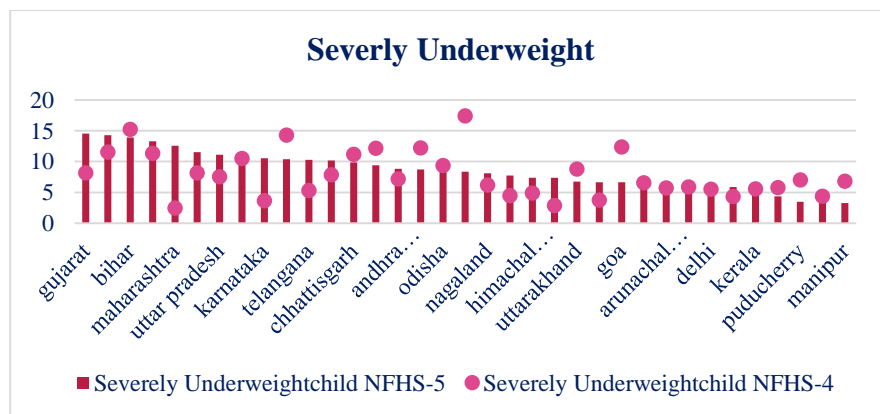

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 8 shows the Percentage of Children under 5 affected by Wasting in India, NFHS-5, Figure 12 shows the Percentage of Children under 5 affected by Underweight in India, NFHS-5.

Table 3 and Figure 13 show the percentage point change of underweight children under age 5 between NFHS-4 and NFHS-5 in Indian states and Union Territories. Andaman & Nicobar, Andhra Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Dadra Nagar Haveli, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerela, Lakshadweep, Madhya Pradesh, Maharashtra, Meghalaya, Puducherry, Punjab, Odisha, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttar Pradesh, Uttarakhand and West Bengal are having very high (VH) percentage of underweight children under age 5 i.e., between NFHS-4 and NFHS-5 there is no improvement in these 31 states and U.T.s. In some states like Arunachal Pradesh, Sikkim have improved to reduce the percentage of underweight children under age 5 between NFHS-4 and NFHS-5.

Figure 14: Percentage of severely underweight children in NFHS-4 and NFHS-5 in India
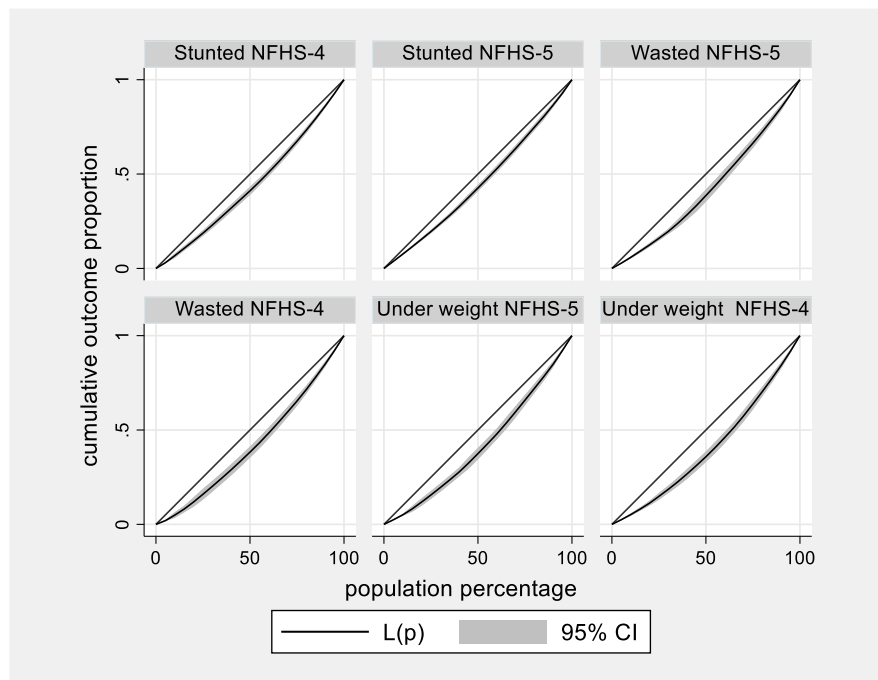

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 14 shows the percentage of severely underweight children under age 5 during NFHS-4 and NFHS-5 in India. Gujrat and Jharkhand had the highest percentage of severely underweight children while Manipur and Mizoram had the lowest percentage of severely underweight children in NFHS-5 in India. Jammu & Kashmir was the best performer with a 9.07 percent decline in severely underweight children and Maharashtra was the worst performer with a 10.12 percent increase in severely underweight children from NFHS-4 to NFHS-5.

**Table 4: Gini-Coefficient of Regional Inequality of Child Malnutrition**

Status	NFHS-4	NFHS-5
Stunted	0.122	0.101
Wasted	0.165	0.156
Underweight	0.190	0.167

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 15: Regional inequality in stunted, wasted, and, underweight children under age 5 in India

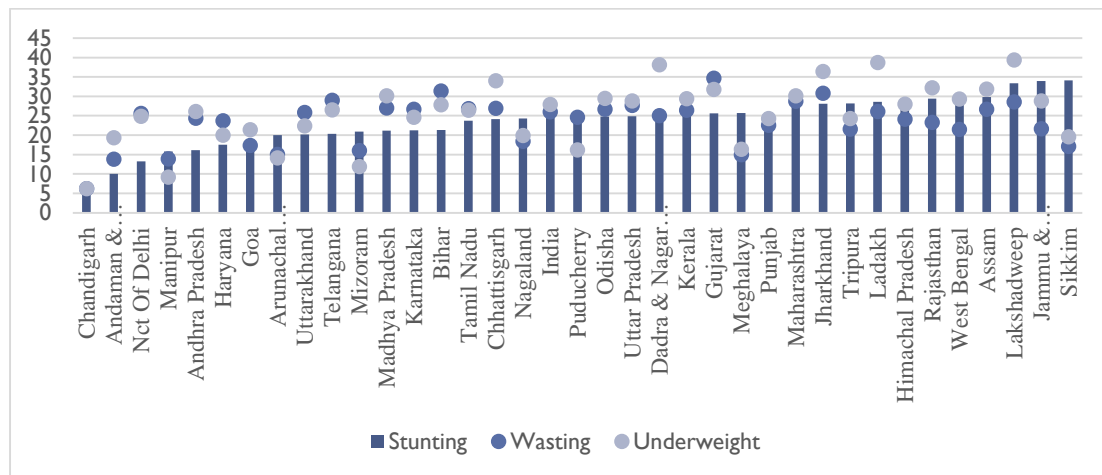**Source: Compiled by the researcher using NFHS-4 and NFHS-5 data**

Figure 15 shows inequality in stunted, wasted, and underweight children in various states/UTs in India. Inequality declined in all three forms of malnutrition in India but stunted and underweight declined more while wasted recorded only minor changes from NFHS-4 to NFHS-5.

Figure 16: percentage of children under 5 affected Double Burden during NFHS-4 to NFHS-5 in India
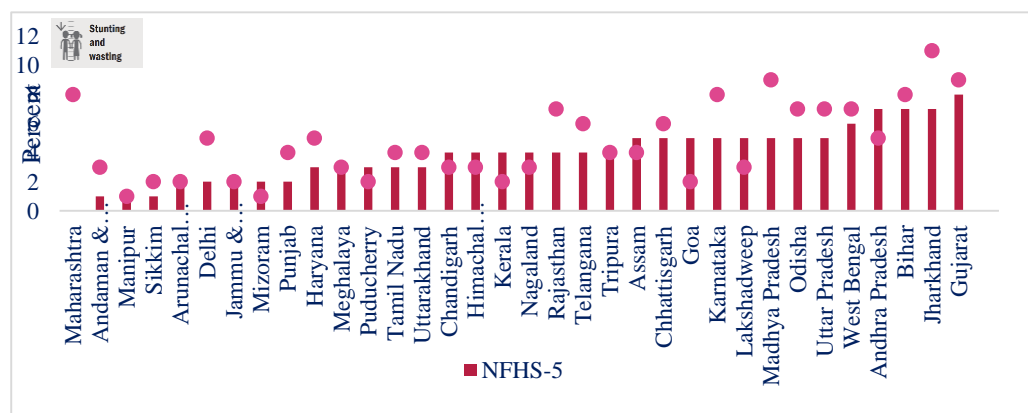
Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Table 4 shows the Gini-Coefficient, Table 5 shows the Percentage of children affected by Malnutrition in India, Table 6 shows the States/UTs with double burden of stunting and wasting. Figure 16 shows the percentage of children under age 5 affected by the double burden of stunting and wasting in NFHS-4 and NFHS-5 in India. Gujrat and Jharkhand had the highest number of children affected by this double burden while Maharashtra and Andaman Nicobar Island had the lowest number of children affected by the same in NFHS-5 in India. Mizoram, Puducherry, Chandigarh, Himachal Pradesh, Kerala, Nagaland, Assam, Goa, Lakshadweep, and Andhra Pradesh were the states/UTs that recorded an increase in the double burden of stunting and wasting from NFHS-4 to NFHS-5. Maharashtra made the highest improvement in this double burden by reducing it to zero in NFHS-5.

Figure 17: Percentage of children from 0-6 months affected by stunting, wasting, and, underweight in India

Source: Compiled by the researcher using NFHS-4 and NFHS-5 data

Figure 17 shows the percentage of children from zero to 6 months affected by stunting wasting and underweight in India. Chandigarh had the lowest number of stunting, wasting, and underweight children while Sikkim had the highest number of children affected by stunting, Gujrat had the highest number of children affected by wasting and Lakshadweep had the highest number of children affected by underweight in India.

Discussion about major reasons of Child Malnutrition in Different States and U.T.s in India

This section of the study describes the causes of child malnutrition in different States and U.T.s and seeks to provide major recommendations for the state policies.

Table 5: Reasons for different Status of Stunted and Severely Stunted across States/U.T. s of India

Indicators	States	Reasons
High Stunting	Meghalaya, Bihar	Poor level of nutrition, high level of poverty, inadequate healthcare access, High open defecation rates leading to infections and malabsorption
Severely Stunting	Meghalaya, Bihar	
Low Stunting	Kerala, Andaman & Nicobar Islands	Strong healthcare infrastructure, better maternal care, higher literacy rate
Lowest Severe Stunting	Chandigarh, Kerala, Manipur	Higher female literacy, better antenatal care, Kerala's focus on community healthcare and urban advantages for Chandigarh U.T.
Increased Stunting	Goa, Tripura, Himachal Pradesh, Kerala, Nagaland, Lakshadweep, Telangana, Puducherry, Meghalaya, Mizoram, Delhi, West Bengal, Punjab	Policy delays, migration, food insecurity,

Increasing Severe Stunting	Gujarat, Uttar Pradesh, Jharkhand, Assam, Nagaland, Karnataka, Maharashtra, West Bengal, Madhya Pradesh	Droughts and floods affected food security like in Assam and West Bengal
Highest Improvement in Stunting	Haryana	Effective policy implementation, better maternal and child nutrition programs.

Source: Global Nutrition Report, (2021) and state level reports

Table 6: Reasons for different Status of Wasted and Severely Wasted across States/U.T. s of India

Indicators	States	Reasons
Highest Wasting	Gujarat and Maharashtra	Poor maternal health and nutrition, Inadequate breastfeeding and complementary feeding practices
High Severe Wasting	Gujarat and Maharashtra	
Lowest Wasting	Chandigarh and Mizoram	Better socio-economic conditions and higher literacy rates, Strong public healthcare infrastructure with effective maternal and child nutrition programs, High awareness of maternal and child health, Effective government intervention in tribal health programs
Lowest severe Wasting	Chandigarh & Puducherry	
Increased Wasting	Mizoram, Assam, Lakshadweep, Manipur, Nagaland, Jammu & Kashmir	Geographic isolation and poor supply chain management for food and healthcare, Conflict-related disruptions in certain regions affecting food security, High flood vulnerability leading to food insecurity and displacement in Assam
Increased severe Wasting	UP, Bihar, Maharashtra, Gujarat	
Worst Performer in reducing severe Wasting	Lakshadweep	Dependency on food imports, leading to supply disruptions in Lakshadweep
Best Progress in Reducing Wasting and severe Wasting	Haryana, Dadra & Nagar Haveli	Effective implementation of nutrition schemes like Poshan Abhiyan and ICDS, Improvements in maternal healthcare services and institutional deliveries, Strengthening of community-level health interventions.

Source: Global Nutrition Report, (2021) and state level reports

Table 7: Reasons for different Status of underweight and Severely Underweight across States/U.T. s of India

Indicators	States	Reasons
Highest percentage of Underweight		High poverty, food insecurity, Poor maternal health and low levels of female literacy, Inadequate healthcare infrastructure and low immunization coverage, Poor sanitation and high incidence of diarrheal diseases, Cultural factors affecting child nutrition and feeding practices, Limited healthcare access in tribal and remote areas in Jharkhand, Low female
Highest percentage of severe Underweight	Bihar and Gujarat Jharkhand and Gujarat	

		literacy and awareness regarding child nutrition.
Lowest percentage of Underweight	Manipur and Arunachal Pradesh	Better dietary diversity due to traditional food habits, Strong community-based healthcare initiatives, Lower population density, reducing strain on resources, High literacy rates and better awareness about nutrition, High literacy rates leading to better maternal awareness about child nutrition, Cultural dietary habits rich in proteins and essential nutrients, better breastfeeding practices and access to healthcare services.
Lowest Severe underweight	Mizoram	
Increased Wasting	Nagaland, Maharashtra	Decline in food security due to economic disruptions, Reduced access to healthcare and nutrition services, Impact of migration and displacement on child health, Possible underreporting in previous NFHS rounds, leading to sudden increase in NFHS-5
Increased severe Wasting		
Worst Performer in reducing Underweight, severe underweight		
Best Performer in Reducing underweight	Jammu & Kashmir	Effective implementation of government nutrition schemes like Poshan Abhiyan, improved maternal health indicators due to awareness campaigns, Strengthened government interventions in child and maternal health.

Source: Global Nutrition Report, (2021) and state level reports

4. CONCLUSION AND POLICY IMPLICATIONS

On the above analysis it can be concluded that to achieve the set target of "Developed India by 2047" for which India has made tremendous efforts i.e., to be on the path of required growth trajectory, India has focused on almost all economic and social parameters. However, it has not made significant progress in lowering the rate of malnutrition among children of Indian states and U.T.s. i.e., still missing the invisible problem. Currently, about 53.6 percent of children are suffering from Malnutrition in India. India is moving too slowly to reach the global targets (SDG 2; Zero Hunger and SDG 2.2; to end all forms of Malnutrition by 2025) as is not sufficient to attain the target. Finally, the present study has explored the vital areas (different states/ regions of India) of severe child malnutrition problem where policymakers can endeavor to reduce the percentage of children suffered from health deprivations/ all kind of health problems among children. The study bridges the gap to explore different dynamic determinants of Child health as per the different scenarios prevailing in different states and U.T.s of India. The study insights about child malnutrition in Indian states/U.T. s have provided valuable policy implications in context of all different kind of states. The states/U.T.s having poor status of child nutrition, they should focus to strengthen Integrated child development services (ICDS), Mid-Day Meal, and Poshan Abhiyaan programs. In addition, these programs should be focused to improve maternal care, proper immunization of child, and sanitation facilities. The lagging states should replicate the best practices from Kerala, Chandigarh and other states and invest more in primary healthcare. The child health is fundamentally related to the mother's health first; therefore, states should strengthen women's education and their

empowerment initiatives. The states having highest Wasted and underweight children they should focus to enhance outreach of Anganwadi's centers in rural areas. To improve the child nutrition in hilly states, the government should improve supply chain mechanics for essential nutrition. All states and union territories should ensure to implement behaviour change communication (BCC) campaigns for better infant feeding practices. The states having double burden of child malnutrition like Gujarat and Jharkhand should ensure income equality and access to nutrition for all. The states/ U.T.s having lowest double burden of child malnutrition like Maharashtra and Andaman & Nicobar Island should ensure continuous monitoring, last-mile health service delivery and evaluation of nutrition programs.

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