Print ISSN : 0972-8813
e-ISSN : 2582-2780

[Vol. 24(1) January-April 2026]

Pantnagar Journal of Research

(Formerly International Journal of Basic and Applied Agricultural Research ISSN : 2349-8765)

G.B. Pant University of Agriculture & Technology
Pantnagar, U.S. Nagar; Uttarakhand, Website : gbpuat.res.in/PJR

PANTNAGAR JOURNAL OF RESEARCH

Vol. 24(1) January-April, 2026

CONTENTS

Tracking nutritional transitions: A comparative study of child malnutrition (0–5 years) trends across districts of Madhya Pradesh

SHALINI CHAKRABORTY*

ICAR-Agriculture Technology Application Research Institute, Jabalpur (M.P.)
**Corresponding author's mail id: shalini17576@gmail.com*

ABSTRACT: Child malnutrition remains a critical public health challenge in India, despite significant economic growth and health interventions over the past few decades. This study was undertaken to understand the district level prevalence and explore the correlates influencing the child malnutrition (0-5 years) in the districts of Madhya Pradesh, India in terms of four nutrition related outcomes, - stunting, wasting, underweight and anaemia with respect to sixteen identified contributing factors like mother's health and education status, child feeding practices and Population and Household Profile. The present study constitutes a secondary data analysis of two round database of NFHSs (NFHS-4 and NFHS-5) with state and districts fact sheets of Madhya Pradesh published by the International Institute for Population Sciences (IIPS). The data for the current study was acquired from the official NFHS repository, accessible through the designated Demographic and Health Survey Program website. From NFHS 4 to NFHS 5, per cent change in stunting, wasting and underweight are 15.55(↓), 26.27(↓) and 23.14(↓) respectively whereas anaemia among children increased by 4.14 per cent (↑). Stunting and anaemia among children under five had a positive ($p<0.01$) correlation with the anaemia among mothers, add to this, severe wasting and anaemia were all prevalent ($p<0.05$) with children of mothers with BMI<18.5 kg/m^2. Population of stunted children could be checked ($p<0.05$) with "educated mothers (more than 10 years of education)". "Exclusive breast feeding" had a significant negative ($p<0.05$) correlation with wasting and anaemia can be minimized by advocating adequate diet along with/without breastfeeding after six months of age($p<0.05$). Sanitation was also considered as a driving force in affecting the nutritional outcomes. The findings of the study indicate that apart from diet and nutrition, socio-economic indicators are equally responsible for malnutrition among children less than five years of age. The study addresses an important public health and development issue—child malnutrition in Madhya Pradesh—which is highly relevant to agricultural, nutritional, and rural development research. The district-level analysis provides useful insights for localized policy interventions and aligns with national nutrition priorities.

Key words: Anaemia, Child feeding practices, Household profile, Stunting, Underweight, Wasting

Despite significant economic growth and health interventions over the past few decades, child malnutrition remains a critical public health challenge in India as country bears the highest number of stunted and wasted children in the world (Biswas, 2022). Both the economy and the healthcare infrastructure in India have shifted, and child malnutrition is a substantial contributor to the country's economic deterioration. Globally, 149.2 million and 45.4 million children under five years old suffered from stunting and wasting, respectively in 202 (WHO, 2020). In worldwide, nearly half of all deaths among children under the age of five years and below were happened due to nutrition related factors (Clark *et al*., 2020). Nutrition is an essential component of health and development, particularly for the growth and overall development of the child (WHO, 2021). But many children do not receive the nourishment they require for survival and growth. Under nutrition manifests itself in a variety of ways, including stunting (low height for age), wasting (low weight for height), underweight (low weight for age), micronutrient deficiencies or insufficiencies (a lack of essential vitamins and minerals) reflects the nutritional condition of children. The consequence of malnutrition is severe, especially among children. Children under five years of age experience multiple burdens of under nutrition. The undernutrition indicators like stunting, wasting, and underweight are the major elements to describe health circumstances in children. Another major indicator of undernutrition is anaemia which is a micronutrient deficiency. Child growth and nutritional development are largely influenced by some immediate and underlying determinants like Mothers' nutritional and educational status of

mother, access to nutrition-specific interventions for the infant; living conditions, including socio-economic, cultural, demographic and climatic factors. Multiple determinants of suboptimal child nutrition and development contribute to the outcomes seen at the district-level (Khan and Mohanty, 2018; Menon *et al*., 2018; Striessnig and Bora, 2020).

Different types of interventions can influence these determinants. Immediate determinants include inadequacies in food, health, and care for infants and young children, especially in the first two years of life. Nutrition-specific interventions such as health service delivery at the right time during pregnancy and early childhood can affect immediate determinants. Underlying and basic determinants include women's status, household food security, hygiene, and socio-economic conditions. Nutrition-sensitive interventions such as social safety nets, sanitation programs, women's empowerment, and agriculture programs can affect underlying and basic determinants.

Madhya Pradesh is one of the Indian states struggling to overcome malnutrition. Madhya Pradesh has the highest number of malnourished children; nutrition indices are comparable with sub-Saharan Africa. MP is a nutrition-sensitive state. Several problems afflict the state due to the poor nutrition indices, especially that of children and women. Therefore, there is a need in the state to find out the demographic, environmental, and socio-economic factors that significantly influence the childhood malnutrition which helped in planning and implementation of policies & programs. The findings from the study may help policy makers, public health researchers and health workers in better understanding of the dynamic nature of the child malnutrition across districts of MP and gives insight into the factors influencing its prevalence.

The objectives of the study were (1) to understand the district level prevalence of four nutrition related outcomes, - stunting, wasting, underweight and anaemia and (2) to explore the correlates influencing the child malnutrition (0-5 years) in the districts of Madhya Pradesh, India with respect to sixteen identified contributing factors like mother's health and education status, child feeding practices and Population and Household Profile.

MATERIALS AND METHODS

Study setting, design and population

The present study constitutes a secondary data analysis of two round database of NFHSs (NFHS-4 and NFHS-5) with state and districts fact sheets of Madhya Pradesh published by the International Institute for Population Sciences (IIPS, 2017; IIPS, 2021). The data for the current study was acquired from the official NFHS repository, accessible through the designated Demographic and Health Survey Program website(www.nfhsiips.in). The National Family Health Survey (NFHS) is a large-scale, cross-sectional, and multi-round survey conducted in India with the aim of collecting essential information and emerging issues related to health, nutrition, and family welfare for India and each state/union territory(UTs) (Kapur and Suri, 2020).For the comparative study, the district level percentage of all the study variables were collected for fifty districts of India for both the periods (2015-16 and 2019-21) using corresponding fact sheets. For identifying the correlates of child malnutrition for the period 2019-21, additional 17 predictor variables information at district level were collected using NFHS-5 District fact sheets. The predictor variables considered in this study were chosen based on the extensive literature survey (Khan and Mohanty, 2018; Menon *et al*., 2018; Striessnig and Bora, 2020; Gupta and Santhya, 2020; Rode, 2015) which helped in getting an insight about the action to be taken in each district and their relationship with socio-demographic indicators. Details about variables used in this study are provided in Table 1. The prevalence of child undernutrition indicators along with 95 % confidence interval (CI) was determined at district level for both the NFHSs.

Statistical Analysis

Descriptive statistics such as mean, standard deviation (SD), minimum, maximum, and Coefficient of variation for each variable included

in the study (that are collected from NFHS-4 and NFHS-5 fact sheets) were calculated to understand the detailed nature of the variables included in the study. Pearson's correlation coefficient has been used to check the association between the outcome variable and the predictor variables considered in the study from NFHS-5). Based on the significant nature of the association of predictor variables with outcome variable (positive or negative), predictor variables were grouped into 2 groups for further analysis.

RESULTS AND DISCUSSION

Descriptive measures (such as mean, SD, minimum and maximum) for all the variables considered in the study are provided in Table 1 and figure 1. Results from descriptive analysis revealed that the average values of stunting, wasting and underweight was 35.37(±7.77), 19.26(±4.62), and 33.18 (±5.44) per cent, respectively according to NFHS-5. The prevalence of stunting was as high as 49.50 per cent in Jhabua district whereas it was as low as 18 per cent in Jabalpur district. Ujjain district recorded highest prevalence of wasting i.e. 29.80 per cent while Guna district recorded lowest prevalence (10.10 per cent). Prevalence of underweight was found highest in Burhanpur district i.e. 47.20 per cent whereas it was lowest in Mandsaur district (22.90 per cent). The average values of stunting, wasting and underweight have declined 15.55, 26.27 and 23.14 percent, respectively from NFHS 4 to NFHS 5. One more marker i.e., severe wasting prevalence has also been studied in NFHS 4 and 5 for assessing under nutrition. Prevalence of severe wasting reduced from 9.2 to 6.5 % in Madhya Pradesh. Unlike all these three indicators of under nutrition, spread of anaemia averaged 71.67 per cent (±10.47) which is 4.14 per cent higher than what has been recorded in NFHS-4 i.e., 68.86 with Chhatarpur district recording as high as 87.20 per cent followed by Khandwa district (86.80 per cent) and lowest prevalence was found in Jabalpur district (37.80 per cent). As far as status of other basic and underlying determinants are concerned which affects these indicators, data in table a and figure 2 shows that 23.50±4.05 per cent mothers are having Body Mass Index is below normal i.e., 18.5 kg/m ^{2} which has been declined up to 17.27 per cent compared to values recorded in NFHS-4 (2015-16). The decline is also registered up to 30.47 per cent in the prevalence of women getting married before 18 years of age. The average prevalence of this is 23.26±9.36 per cent according to NFHS 5. On the contrary, there is an increase of 3.90 per cent in the prevalence of anaemia among women aged 15-49 years. There is average 58.24±8.52 per cent women belongs to reproductive age group who are anaemic according to NFHS 5(2019-21) with Bhind district recording as high as 69.9 per cent followed by Morena district (67.5 per cent). Percentage of women with 10 years of schooling have increased up to 37.13 percent from 2015-16 to 2019-21 with average of 27.85±7.18 per cent women are educated. Data in Table 1 and figure 3 revealed that average 8.87±4.37 per cent children are getting adequate diet according to their requirements which was 6.50±3.68 per cent only according to NFHS 4 but there is an improvement in the incidences of early initiation of breastfeeding (within one hour of birth) up to 27.84 percent and exclusive breastfeeding (for the first 6 months) up to 32.55 per cent which are great signs. Household profiles in terms of electricity, improved drinking water sources, improved sanitation facility and clean fuel for cooking has improved during NFHS 4 by 10.01, 6.32, 138.04 and 62.49 percent respectively when compared to NFHS 4 (Table 1 and Figure 1). Figure 2 to 5 illustrates district level prevalence of childhood stunting, wasting, underweight and anaemia in Madhya Pradesh in 2015-16 and 2019-21. These figures are helpful in understanding the district level change in the prevalence of child malnutrition indicators in the 5-year period (2015-16 to 2019-21). These figures are helpful in identifying the high priority districts for tackling the specific malnutrition indicators among 0-5 years children and helps in formulating policies & program implementation accordingly.

The correlation between under nutrition indicators of and its determinants give a clear understanding of the inter relationship between the variable (Table 2). It was observed that stunting ($p<0.01$) and anaemia ($p<0.05$) among children under five had a

Table 1: Descriptive statistics of the variables considered in the present study

Variable	NFHS-4(2015-16)			NFHS-5 (2019-21)			Change, %
	Mean ± SD	Range	CV, %	Mean ± SD	Range	CV, %	
Stunting, %	41.89 ±5.61	52.1 - 32.1	13.38	35.37±7.77	49.5 - 18.0	21.96	-15.55
Wasting, %	26.12±4.91	34.1 - 16.9	18.81	19.26±4.62	29.8 -10.1	23.98	-26.27
Severe wasting, %	9.42±2.43	17.4 - 5.2	25.84	6.69±3.04	18.8 - 2.40	45.41	-28.97
Underweight, %	43.17±5.88	55.0 -30.5	13.62	33.18±5.44	47.2 -22.9	16.40	-23.14
Anaemia among children (age 6-59 months), %	68.86 ± 5.65	(82,54.5)	8.20	71.67±10.47	87.2 - 37.8	14.61	4.14
Mother's nutritional status and education							
BMI<18.5 kg/m^2, %	29.25 ± 5.66	43.9- 18.9	19.34	23.50 ± 4.05	30.5-15.6	17.24	-17.27
BMI ≥25.0 kg/m^2, %	12.60 ± 3.96	23.6- 4.8	31.39	16.02 ± 4.84	31.5- 4.3	30.19	31.42
Women married before age 18 years, %	33.45 ± 10.97	54.5-8.6	32.79	23.26 ± 9.36	46.0 -4.4	40.24	-30.47
Women age 15-19 years already mother or pregnant, %	7.63 ± 4.00	24.0-2.1	52.43	5.19 ± 2.34	13.6-0.6	45.01	-19.08
Anaemic non-pregnant women age 15-49 years (Hb<12.0 g/dL), %	53.61 ± 7.69	69.9-39.6	14.34	55.30 ± 6.94	70.3-37.9	12.56	4.26
Anaemic pregnant women age 15-49 years (Hb<11.0 g/dL), %	55.31 ± 9.37	74.2-37.8	16.94	52.95 ± 9.65	69.8- 35.3	18.22	-1.77
Women age 15-49 years who are anaemic, %	53.69 ± 7.63	69.9-39.7	14.21	55.18 ± 6.75	69.9-38.5	12.24	3.90
Women age 15-19 years who are anaemic , %	54.18 ± 8.77	74.3-35.7	16.19	58.24 ± 8.52	76.5-27.1	14.62	9.18
Women who are literate, %	0	0	0	64.01 ± 8.80	80.3-37.1	13.75	0
Women with 10 or more years of schooling, %	21.13 ± 7.30	42.8-9.3	34.57	27.85 ± 7.18	47.7-15.9	25.81	37.13
Child Feeding Practices							
Children under age 3 years breastfed within one hour of birth, %	35.87 ± 10.08	56.6-17.8	28.11	42.99 ± 10.99	73.2-22.2	25.57	27.84
Children under age 6 months exclusively breastfed, %	57.63 ± 14.40	95.1-26.4	25.00	75.05 ± 9.79	93.6-47.7	13.05	32.55
Children (6-8 months) receiving solid/semi-solid food & breastmilk, %	31.95 ± 10.23	49.2-15.7	32.03	56.9 ± 10.88	64.6-49.2	19.14	0
Breastfeeding children (6-23 months) receiving an adequate diet, %	6.64 ± 4.16	18.0- 0.0	62.61	8.74 ± 4.50	19.9- 0.0	51.51	125.75
Non-breastfeeding children (6-23 months) receiving an adequate diet, %	5.66 ± 5.99	18.2-0.0	105.87	9.73 ± 8.48	15.6-0.0	87.21	-0.50
Total children age 6-23 months receiving an adequate diet, %	6.50 ± 3.68	17.0-0.0	56.58	8.87 ± 4.37	19.0-0.0	49.28	88.83
Population and Household Profile							
Households with electricity, %	89.55 ± 7.10	99.3-70.2	7.93	98.38 ± 1.33	100.0-92.7	1.35	10.01
Households with an improved drinking-water source, %	83.61 ± 10.94	99.6-55.1	13.08	88.25 ± 7.44	99.8-66.1	8.43	6.32
Households using an improved sanitation facility, %	31.27 ± 14.81	75.2-7.7	47.35	64.17 ± 11.76	90.0-40.6	18.32	138.04
Households using clean fuel for cooking, %	25.28 ± 15.94	84.9-4.0	63.04	37.57 ± 16.37	86.9-12.1	43.56	62.49

Table 2: Correlation among the various indicators of nutritional status of children under five years of age and child feeding practices, mother's health and education status and household profile

Variables	Stunting	Wasting	Severe wasting	Underweight	Anaemia
Wasting	-0.20				
Severe wasting	-0.02	0.77**			
Underweight	0.56**	0.38**	0.32*		
Overweight	0.15	0.33*	0.60**	0.14	
Anaemia (6-59 months children)	0.42**	-0.13	0.24	0.01	1.00
Women BMI<18.5 kg/m^2	0.06	-0.17	-0.33*	0.10	-0.35*
Women BMI ≥25.0 kg/m^2	-0.27	-0.19	-0.17	-0.51**	0.08
Women married before age 18 years	0.22	-0.23	-0.08	-0.11	0.27
Anaemic non-pregnant women age 15-49 years (Hb<12.0 g/dl)	0.42**	-0.20	-0.01	0.20	0.37*
Anaemic pregnant women age 15-49 years (Hb<11.0 g/dl)	0.11	-0.26	-0.08	-0.04	0.27
Anaemic Women age 15-49 years	0.42**	-0.21	-0.02	0.19	0.36*
Anaemic Women age 15-19 years	0.36	0.02	0.20	0.18	0.52**
Women who are literate	-0.32*	0.04	-0.09	-0.23	-0.22
Women with 10 or more years of schooling	-0.29*	0.15	-0.07	-0.13	-0.15
Children under age 3 years breastfed within one hour of birth	-0.19	-0.12	-0.09	-0.14	-0.17
Children under age 6 months exclusively breastfed	0.13	-0.32*	-0.14	-0.02	0.21
Breastfeeding children age 6-23 months receiving an adequate diet	0.25	0.01	0.11	0.27	0.37*
Total children age 6-23 months receiving an adequate diet	0.09	0.00	-0.05	0.06	0.28
Households with electricity	-0.29*	-0.09	-0.01	-0.23	0.09
Households with an improved drinking-water source	-0.10	0.16	0.22	-0.04	0.09
Households using an improved sanitation facility	-0.35*	0.07	0.01	-0.14	0.02

*Indicates significance at p<0.05 % level of significance; **Indicates significance at p<0.01 % level of significance

positive correlation with the anaemia among mothers. Add to this, wasting and anaemia were all prevalent (p<0.05) with children of mothers with BMI<18.5 kg/m2. Population of stunted children could be checked (p<0.05) with "educated mothers (more than 10 years of education). Exclusive breast feeding had a significant (p<0.05) negative correlation with "wasting" and anaemia can be minimized by advocating adequate diet along with/ without breastfeeding after six months of age(p<0.05). Sanitation was also considered as a driving force in affecting the nutritional outcomes. Stunting in children decreased significantly (p<0.05) in households with appropriate sanitation and electricity facilities.

There was a remarkable decrease in the prevalence of all nutritional indices stunting, wasting, severe wasting and underweight except anaemia in children under five from NFHS-4 to NFHS-5. These findings indicates that the goal of National Nutrition Mission (NNM) regarding the prevalence of underweight will be achieved soon up to 25 %, whereas low decline rate in prevalence of wasting shows the delay to achieve the wasting goal of NNM soon. After the implementation of the National Rural Health Mission (NRHM) program, chronic under nutrition declined at a 0.8 % faster annual rate and at 1.6 % annually in normal focus states in post-NRHM period (Soni *et al*.,2022). This analysis identified several consistent predictors of anaemia among children in Madhya Pradesh. These factors include mothers with BMI<18.5 kg/m^2, anaemic mothers having Hb less than 12 g/dl of blood and feeding practices of child. Previous research has also identified these factors as significant predictors of childhood anaemia (Jembere *et al*., 2020). However, this analysis demonstrated that these factors are consistent over time, and hence should be addressed through programs to accelerate the reduction of anaemia.

Likewise, this analysis proved that stunting among children under five years of age is significantly affected by anaemia status of the child and mother's educational status. Stunting is also affected by other predictors like sanitation facilities available in the household. Childhood stunting being one of the

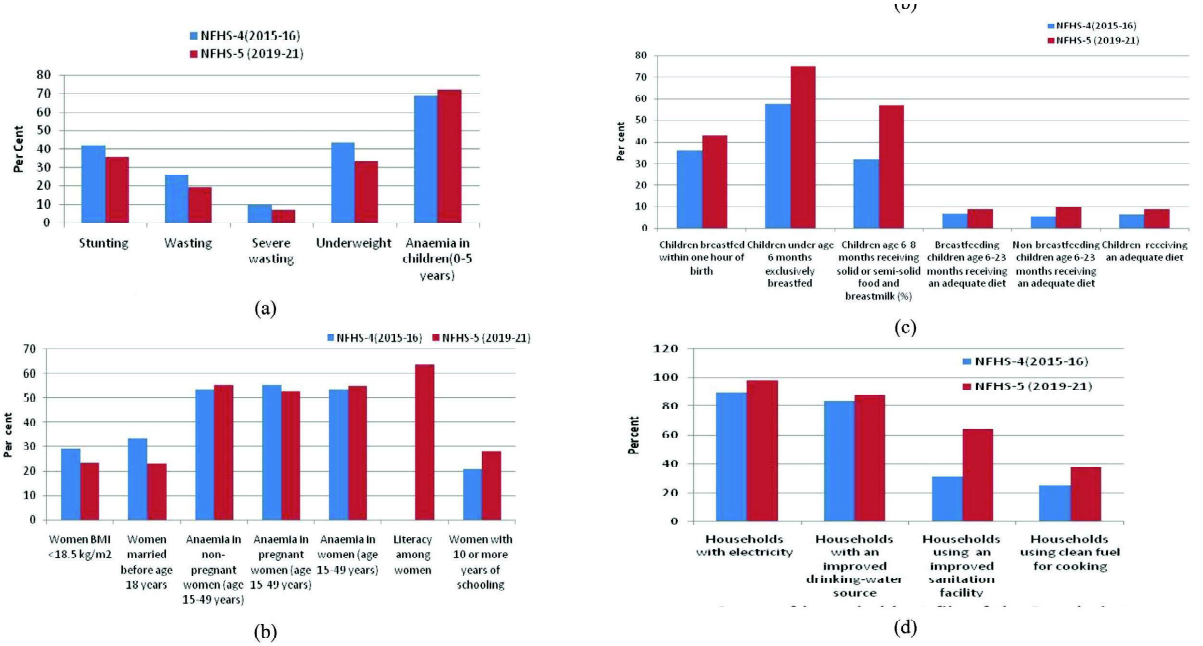


Fig. 1: Graphical representation for (a) Nutritional status of children (0-5 years) (b) Status of mother's health and education (c) Status of child feeding practices (d) Status of household profile, in Madhya Pradesh

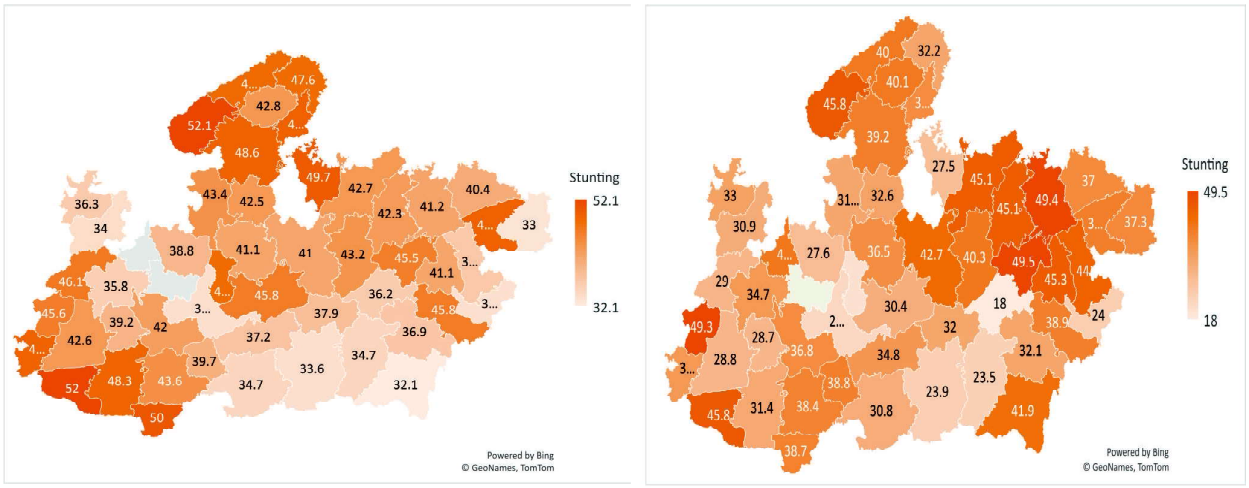
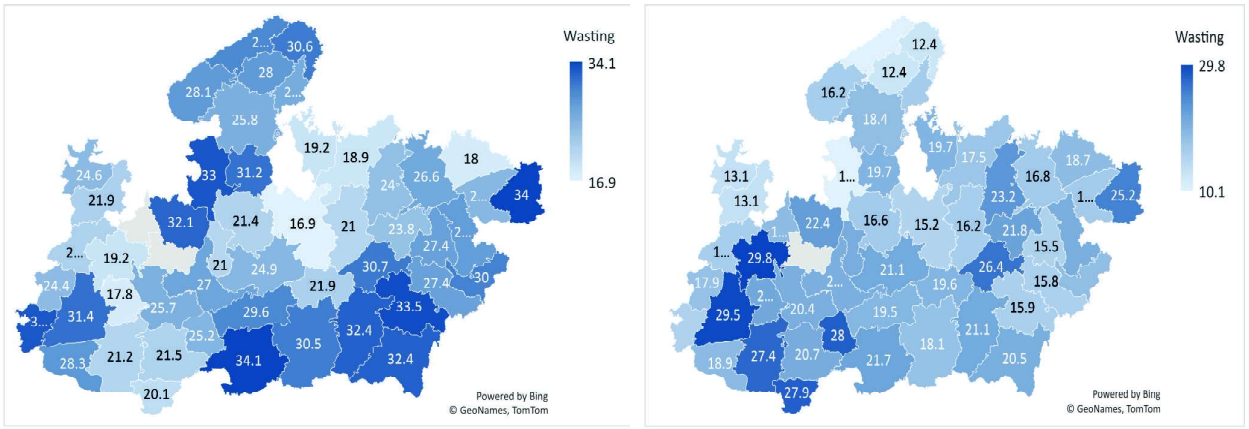


Fig. 2: District level prevalence of childhood stunting in Madhya Pradesh during (a) 2015-16 (NFHS-4) and (b) 2019-21 (NFHS-5)

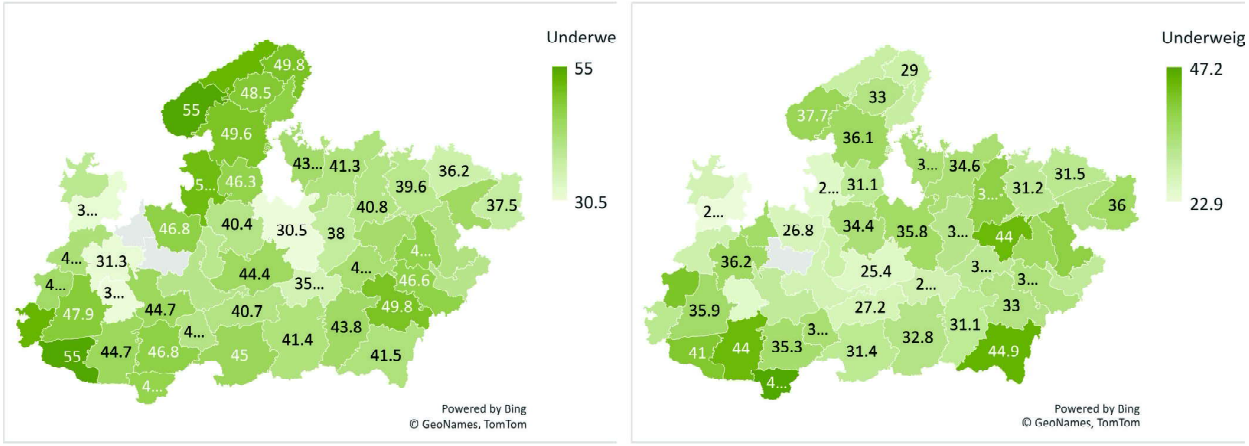
indicators of child nutritional status, indicates the chronic malnutrition (WHO, 2013). By providing nutrition education to mothers to promote optimal feeding practices among young children (aged 6–23 months), short term morbidities can be prevented. Child undernutrition indicators were observed and various predictors based on socio and biomedical characteristic of child nutrition were found significant in the India in earlier rounds of NFHS (Khan and Mohanty, 2018). Over the years, the overall prevalence of stunting and underweight decreased among poor and non-poor in EAG states (Kumar and Paswan, 2021).

The various indicators of undernutrition were significantly associated with child feeding practices



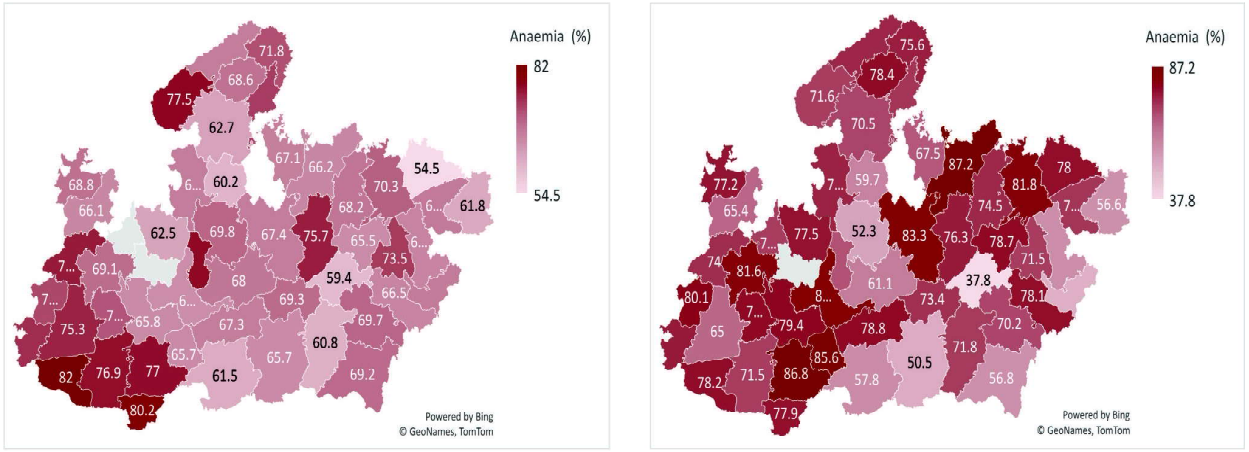
(a) (b)

Fig. 3: District level prevalence of childhood wasting in Madhya Pradesh during (a) 2015-16 (NFHS-4) and (b) 2019-21 (NFHS-5)



(a) (b)

Fig. 4: District level prevalence of underweight children in Madhya Pradesh during (a) 2015-16 (NFHS-4) and (b) 2019-21 (NFHS-5)



(a) (b)

Fig. 5: District level prevalence of anaemia in children in Madhya Pradesh during (a) 2015-16 (NFHS-4) and (b) 2019-21 (NFHS-5)

and maternal health and education. In the present study, stunting is mainly affected by the immediate and underlying factors. Household wealth index was the highest contributor to inequality in stunting followed by the mother's education and nutritional status which is in lines with the current study (Kumar and Paswan, 2021). There was an increase in number of educated mothers over the years. Mothers with no formal education fell from 66 % in 1992 to approximately 25 % in 2015. Hence the maternal education– based disparities in acute undernutrition declined specially in high-focus states (Soni *et al*., 2022). A strong positive correlation was reported between prevalence of anaemia and child feeding practices in earlier studies (Chakraborty, 2025). A study on Prevalence and determinants of severe malnutrition among children under five in aspirational districts of India revealed that improving nutrition programs, raising awareness among mothers, and providing socio-economic support, especially in rural areas can reduce the odds of severe malnourishment among children (Hussain *et al*., 2025).

CONCLUSION

The findings of the study indicate that apart from diet and nutrition, socio-economic indicators are equally responsible for malnutrition among children less than five years of age. Numerous districts have seen a rise in the prevalence of stunting, wasting, underweight and anaemia in Madhya Pradesh and some of the districts are improving with their nutritional indices. The finding of the present study suggests that strengthening of district-focused programs is required for sustainable outcomes. The present study would be helpful to target intervention programs and schemes aimed at eliminating child malnutrition, particularly in hotspot clusters.

Massive outreach activities should be promoted to spread the message of utility and acceptance of locally grown and produced agricultural/forest commodities for curbing food insecurity and hidden hunger. Identification of local nutritious crops like soybean and millets and incorporation in the local menus for daily consumption while not affecting the overall acceptability of the food; introducing underutilized fruits e.g. bael, karonda, aonla, tamarind, jamun, etc. which are native to M.P.: promoting biofortified crops for combating micronutrient deficiencies are some of the promising steps that can effectively address the issue of child malnutrition.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the support of the data provided by Demographic and Health Surveys.

REFERENCES

Biswas, M. (2022). Identifying geographical heterogeneity in associations between under-five child nutritional status and its correlates across Indian districts. *Spatial Demography,* 10(2):143-187.

Chakraborty S. (2025) Analyzing the prevalence and patterns of malnutrition among children under five years of age in India and Madhya Pradesh. *Journal of Community Mobilization and Sustainable Development*, 20(1); 284-290.

Clark, H., Coll-Seck, A.M., Banerjee, A., Peterson, S., Dalglish, S.L., Ameratunga, S., Balabanova, D., Bhan, MK., Bhutta, Z.A., Borrazzo, J., Claeson, M., Doherty, T., El-Jardali, F., George, A.S., Gichaga, A., Gram, L., Hipgrave, D.B., Kwamie, A., Meng, Q., Mercer, R., Narain, S., Nsungwa-Sabiiti, J., Olumide, A.O., Osrin, D., Powell-Jackson, T., Rasanathan, K., Rasul, I., Reid, P., Requejo, J., Rohde, S..S, Rollins, N., Romedenne, M., Sachdev, H.S., Saleh, R., Shawar, Y.R., Shiffman, J., Simon, J., Sly, P.D., Stenberg, K., Tomlinson, M., Ved, R.R., Costello, A. (2020)/ A future for the world's children? A WHO-UNICEF-Lancet Commission. *Lancet,* 395(10224):605-658.

Gupta, A.K. and Santhya, K.G. (2020) Proximal and contextual correlates of childhood stunting in India: A geo-spatial analysis. *PLoS One*, 15(8): e0237661.

Hussain, D., Barnwal, J. and Sharma, S. (2025). Prevalence and determinants of severe malnutrition among children under five in aspirational districts of India. *BMC Public Health,* 25:4136.

International Institute for Population Sciences. (2017) *National Family Health Survey (NFHS- 4)*. 2015–16: 2. Mumbai, India.

International Institute for Population Sciences (IIPS) and ICF. (2021) *National Family Health Survey (NFHS-5)*. 2019-21: Volume I. Mumbai, India.

Jembere, M., Kabthymer, R.H. and Deribew, A. (2020) Determinants of anaemia among children aged 6 to 59 months in Dilla town, Southern Ethiopia: A facility-based case control study. *Global Pediatric Health*, 7:2333794x20974232.

Kapur, K. and Suri, S. (2020). Towards a Malnutrition-Free India: Best Practices and Innovations from POSHAN Abhiyaan. ORF Special Report.

Khan, J. and Mohanty, S.K. (2018). Spatial heterogeneity and correlates of child malnutrition in districts of India. *BMC Public Health*, 18(1):1027.

Kumar, R. and Paswan, B. (2021) Changes in socio-economic inequality in nutritional status among children in EAG states, India. *Public Health Nutrition*, 24(6):1304–1317.

Menon, P., Headey, D., Avula, R. and Nguyen, P.H. (2018). Understanding the geographical burden of stunting in India: a regression-decomposition analysis of district-level data from 2015–16. *Maternal and Child Nutrition*, 14(4): e12620.

Rode, S. (2015) Child malnutrition and low access to health care facilities in Mumbai metropolitan region. *Global Journal of Science Frontier Research*, 15(E2): 49-59.

Soni, A., Fahey, N., Bhutta, Z., Li, W., Moore Simas, T. Somashekhar Nimbalkar, S. and Allison, J. (2022) Association of trends in child undernutrition and implementation of the National Rural Health Mission in India: A nationally representative serial cross-sectional study on data from 1992 to 2015. *PLOS Medicine* 19(4): e1003957.

Striessnig, E. and Bora, J.K. (2020). Under-five child growth and nutrition status: Spatial clustering of Indian districts. *Spatial Demography*, 8(1):63-84.

WHO (2013) Updates on the Management of Severe Acute Malnutrition in Infants and Children. World Health Organization, 6-54.

World Health Organization (2020). The UNICEF/ WHO/The World Bank Group Joint Child Malnutrition Estimates: levels and trends in child malnutrition: key findings of the 2020 edition.

World Health Organization (2021). The global strategy for women's, children's and adolescent's health (2016–2030) survive, thrive, transform. https://www.who.int/data/maternal-newborn-child-adolescent-ageing/global-strategy-data.

Received: January, 24, 2026
Accepted: April, 26, 2026