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Original Research Article

Spatial determinants of child undernutrition in Chitrakoot: integrating NFHS-5 evidence with district nutrition committee insights

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ABSTRACT

Background: Child undernutrition remains a major public health concern in many districts of rural India, and Chitrakoot represents one of the most persistent high-burden areas. Despite national progress, NFHS-5 shows that 47.5% of children in the district are stunted, 24.8% are wasted, and 12% are severely wasted substantially higher than state and national averages. Understanding the structural and behavioral drivers of this stagnation is essential for strengthening district-level action.
Methods: This study draws exclusively on secondary data, including NFHS-5 district, state, and national fact sheets, supplemented with administrative insights from the District Nutrition Committee (DNC) meeting held in December 2023. A descriptive and comparative analytical approach was used to examine nutrition, IYCF practices, WASH indicators, maternal health, and socio-economic conditions. Interpretation was guided by four established pathways influencing child nutrition: dietary utilization, WASH and infection risk, socio-economic capability, and health system access.
Results: Findings highlight consistently poor complementary feeding, low dietary diversity, and weak exclusive breastfeeding practices. Sanitation coverage remains inadequate, contributing to recurrent infections and high wasting. Maternal capability indicators education, ANC uptake, and IFA adherence are markedly low. Programme gaps identified by the DNC, including stock-outs, irregular VHNDs, and weak convergence, further constrain progress.
Conclusions: Child undernutrition in Chitrakoot is shaped by overlapping vulnerabilities that extend beyond food availability. Addressing these requires integrated action across nutrition, WASH, maternal health, and local governance systems.

Keywords: Chitrakoot, Dietary diversity, IYCF, NFHS-5, Public health nutrition, Socio-economic determinants, Undernutrition, WASH

INTRODUCTION

Child undernutrition remains one of the most persistent development challenges in India, despite decades of economic expansion, targeted welfare programmes, and repeated national policy commitments. Recent global and national assessments emphasise that the burden of undernutrition is now increasingly concentrated in specific geographies and social groups, producing clusters of chronic deprivation rather than uniform national decline.[1,2] Chitrakoot district in Uttar Pradesh exemplifies this pattern. According to NFHS-5, the district records 47.5% stunting, 24.8% wasting, and 41.8% underweight among children under five years levels substantially higher than both the India average (35.5% stunting; 19.3% wasting) and the Uttar Pradesh state average (39.7% stunting; 17.3% wasting).[3-5] Severe wasting, at 12%, remains nearly double the national mean of 7.7%. These trends reflect nutritional vulnerability, driven by overlapping structural, behavioral, and environmental determinants.

Despite improvements in national indicators over the last decade, district-level stagnation persists due to multi-sectoral deficits that impede children's growth. NFHS-5 shows that only 8.4% of children in Chitrakoot receive a minimum adequate diet and merely 41.6% are exclusively breastfed in the first six months of life, both far below national patterns. Literature consistently identifies inadequate complementary feeding, low dietary diversity, and poor utilisation of available food as proximate determinants of stunting in India.[6,7] The food environment, therefore, interacts directly with feeding practices to shape growth outcomes.

Environmental constraints further amplify this vulnerability. Although sanitation coverage in Chitrakoot improved 56.7%, it remains considerably lower than the state (68.8%) and national (70.2%) averages. The strong association between open defecation, recurrent infections, and impaired nutrient absorption central to the "environmental enteropathy" pathway has been extensively demonstrated.[8,9] In districts like Chitrakoot, where poor WASH environments intersect with low dietary adequacy, children face a dual burden of infection and undernutrition.

Socio-economic and capability-related constraints also underpin this high nutritional burden. Only 30% of women in the district have completed 10 or more years of schooling, and clean fuel use remains limited to 31% of households. Evidence shows that maternal education, household wealth, and access to basic amenities collectively explain a large portion of the inequality in child nutritional outcomes.[10,11] These constraints create a capability deficit, limiting households' ability to convert available food and services into improved child nutrition.

Administrative evidence reinforces these findings. The District Nutrition Committee (December 2023) meeting highlighted persistent programme challenges ICDS stock-outs, weak Village Health and Nutrition Day (VHND) coverage, and limited inter-departmental convergence, factors also noted in national evaluations of ICDS and POSHAN Abhiyaan.[12,13] Such implementation gaps weaken the translation of schemes into meaningful improvements on the ground.

Within this context, there is a clear need for spatially grounded, district-level explanatory research that analyses why malnutrition remains entrenched despite programme presence. This paper explores the following central research question: "What structural, behavioural, and environmental factors contribute to the persistent burden of child undernutrition in Chitrakoot?".

METHODS

Study design and data sources

This study employed a descriptive analytical design based on secondary data sources to examine determinants of child undernutrition in Chitrakoot district, Uttar Pradesh. The primary dataset was obtained from the National Family Health Survey-5 (NFHS-5, 2020-21) district fact sheet for Chitrakoot. For comparison, relevant indicators from the NFHS-5 Uttar Pradesh state fact sheet and the NFHS-5 India fact sheet were also used.

To contextualise programme implementation challenges, administrative insights from the District Nutrition Committee (DNC) meeting report of December 2023 obtained from Vikas Bhawan, Chitrakoot were reviewed. These records were used only for qualitative interpretation of district-level programme implementation issues.

Study period

The analytical work for this study was conducted between December 2023 and February 2024, during which NFHS-5 data and the DNC meeting report were compiled and analysed.

Selection of indicators

Indicators were selected based on established determinants of child nutrition and included child anthropometric indicators (stunting, wasting, severe wasting and underweight), infant and young child feeding practices (exclusive breastfeeding and minimum adequate diet), maternal health indicators (antenatal care visits and iron–folic acid consumption), and household environmental indicators (sanitation coverage, clean cooking fuel use and women's education). These indicators were organised according to widely recognised pathways influencing child nutrition, including dietary utilisation, WASH and infection risk, maternal capability, and socio-economic conditions.

Statistical analysis

Data were analysed using descriptive and comparative statistical methods. District-level indicators for Chitrakoot were compared with corresponding state and national values to identify disparities in nutrition, feeding practices, maternal health and household conditions. Tables and graphical comparisons were prepared using Microsoft Excel (Microsoft Corporation, USA).

Ethical considerations

The study relied exclusively on publicly available secondary data sources and administrative documents. No human participants were directly involved and no identifiable personal information was used. Therefore, ethical approval was not required.

RESULTS

Nutritional status of children

NFHS-5 shows that Chitrakoot continues to face an exceptionally high burden of undernutrition. Nearly

47.5% of children under five are stunted, 24.8% are wasted, and 12% are severely wasted. These levels far exceed the India averages (35.5% stunting; 19.3% wasting) and the Uttar Pradesh averages (39.7% stunting; 17.3% wasting). Stunting in the district remains almost unchanged from NFHS-4 (50.9%), reflecting persistent chronic deprivation rather than recent decline. Figure 1 compares anthropometric indicators across Chitrakoot, Uttar Pradesh, and India, highlighting the district's consistently higher burden of stunting, wasting, and underweight. The exceptionally high wasting rate almost one in four children, is indicative of acute nutritional stress, recurrent infections, and fragile household food environments. This pattern of nutritional vulnerability, where prolonged exposure to inadequate diets, poor sanitation, and low maternal capability continually undermine child growth. These figures suggest that while national and state-level gains are visible, Chitrakoot remains isolated in a high-burden pocket of deprivation.

A comparative summary of key anthropometric, feeding, WASH, maternal, and socio-economic indicators for Chitrakoot, Uttar Pradesh, and India is presented in Table 1.

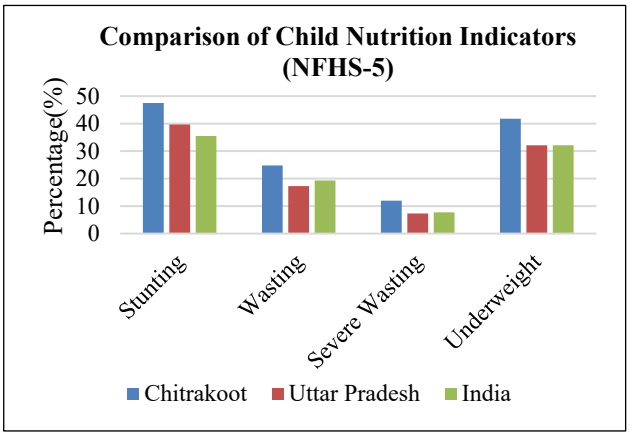

Figure 1: Comparison of stunting, wasting, severe wasting, and underweight across Chitrakoot, Uttar Pradesh, And India (NFHS-5).

Note: Values represent percentages of children under five years

Table 1: Comparison of key nutrition, IYCF, WASH, maternal, and socio-economic indicators: Chitrakoot vs Uttar Pradesh vs India (NFHS-5).

Indicator	Chitrakoot (NFHS-5), %	Uttar Pradesh (NFHS-5), %	India (NFHS-5), %
Stunting (under 5)	47.5	39.7	35.5
Wasting (under 5)	24.8	17.3	19.3
Severe wasting	12.0	7.3	7.7
Underweight (under 5)	41.8	32.1	32.1
Exclusive breastfeeding (0-6 months)	41.6	59.7	63.7
Minimum adequate diet (6-23 months)	8.4	6.1	11.3
Improved sanitation coverage	56.7	68.8	70.2
Clean cooking fuel use	31.2	49.5	58.6
Women with 10+ years of schooling	30.2	39.3	41.0
4+ ANC visits	30.3	42.4	58.1
IFA 100+ days during pregnancy	13.4	22.3	44.1
Health insurance coverage	17.4	15.9	41.0
Women who use internet	Very low (exact %)	30.6	33.3 (approx.)
Children treated with ORS (diarrhoea)	Low (exact % not shown)	50.7	60.6
Children treated with zinc (diarrhoea)	Very low (exact % not shown)	28.5	32.6

Note: Data are sourced from the NFHS-5 District Fact Sheet: Chitrakoot (2020-21), NFHS-5 Uttar Pradesh Fact Sheet, and NFHS-5 India Fact Sheet issued by the Ministry of Health and Family Welfare. Child anthropometric indicators represent percentages of children aged under five. Feeding indicators include exclusive breastfeeding for children for 0-6 months and minimum adequate diet for children 6-23 months. Sanitation and clean fuel refer to improved household facilities. Maternal indicators include women aged 15-49 years with 10 or more years of schooling, antenatal care (4+ visits), and iron-folic acid (IFA) consumption. Health insurance refers to household coverage under any scheme. Values suppressed in district fact sheets due to small sample size are reported qualitatively

Infant and Young Child Feeding (IYCF) gaps

Early feeding practices show substantial deficits. Exclusive breastfeeding stands at 41.6%, far below the India average of 63.7% and the Uttar Pradesh average of 59.7%. Even more concerning is dietary adequacy: only 8.4% of children aged 6-23 months receive a minimum adequate diet. This is among the lowest levels recorded in the state and well below the national average of 11.3%. These values signal what the conceptual framework terms "coverage without utilization." Despite widespread awareness of campaigns and ICDS services, complementary feeding practices remain extremely inadequate. NFHS-5 also shows delayed introduction of complementary food, limited frequency of meals, and poor dietary diversity highlighting structural dietary monotony and strong cereal dependence in households. DNC minutes from December 2023 reinforce this gap, noting irregular counselling on IYCF during Village Health and Nutrition Days (VHNDs) and inconsistent

food demonstrations.[13] The committee recorded low attendance of caregivers at VHND events, stock-outs of take-home rations, and limited monitoring of complementary feeding practices. These administrative gaps partly explain why theoretical coverage does not translate into effective behaviour change.

Dietary diversity and household food environment

NFHS-5 findings on the minimum adequate diet reflect a broader challenge in the household food environment. Dietary diversity remains poor across rural Uttar Pradesh, but Chitrakoot performs even below the state's mean. Limited inclusion of animal protein, pulses, fruits, and vegetables results in dietary monotony, a key constraint identified in nutrition literature. The conceptual model of food utilisation pathway underscores that even when staple food availability is adequate, poor diversity weakens nutrient intake. DNC officials noted that many families rely heavily on cereals due to affordability and seasonal constraints. The minutes highlight seasonal food shortages, particularly in monsoon months, where wage fluctuations limit access to diversified foods. Furthermore, the absence of regular counselling by frontline workers on local nutritious food sources such as eggs, green leafy vegetables, and pulses reduces opportunities for behaviour change. Comparing Chitrakoot with India and Uttar Pradesh strengthens this interpretation: while dietary adequacy is low nationally (11.3%), Chitrakoot's 8.4% is indicative of deeper socio-economic constraints and limited capability for improved utilisation of food. Figure 2 presents cross-district comparisons for key determinants feeding practices, WASH, maternal indicators, and socio-economic capacity illustrating Chitrakoot's multi-dimensional disadvantage.

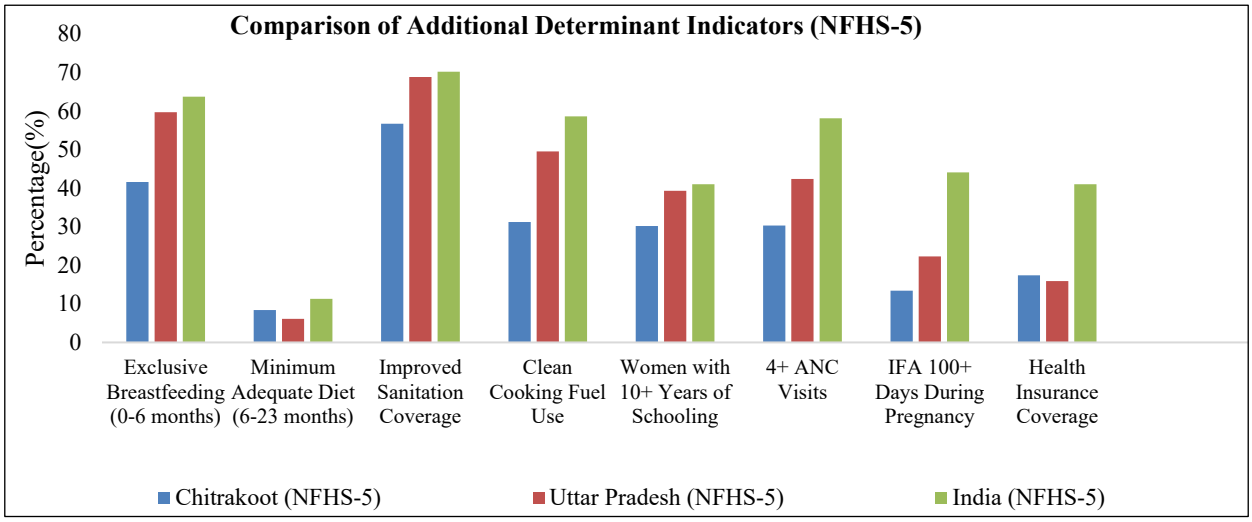

Figure 2: Comparison of IYCF, WASH, maternal health, and socio-economic indicators across Chitrakoot, Uttar Pradesh, and India (NFHS-5).

Note: Indicators are drawn from NFHS-5 district, state, and national fact sheets.

WASH and morbidity risks

WASH deficits form the second major pathway affecting nutrition. Although sanitation coverage in Chitrakoot increased to 56.7%, it remains substantially below the state (68.8%) and national (70.2%) levels. Child morbidity indicators reveal further vulnerabilities: treatment of diarrhoea with ORS and zinc is extremely low (values suppressed due to small sample size), but the fact sheet indicates poor utilisation of these essential therapies. The literature strongly supports the link between sanitation, infection, and growth failure, with several studies demonstrating how open defecation density contributes to the "Asian enigma" lower child height in India compared with poorer African countries.[8,9] In Chitrakoot, repeated infections in early childhood likely intensify wasting, as nutrient intake is lost through diarrhoea and gut inflammation. DNC minutes corroborate this link, highlighting that several blocks reported continued open defecation despite toilet construction, contamination of handpumps, and poor household water storage practices. Weak convergence between Swachh Bharat, ICDS, and Health Departments further reduces the efficiency of WASH nutrition integration, leaving children vulnerable to recurrent illnesses.

Maternal health and women's status

Maternal factors remain deeply influential in determinants of child nutrition. NFHS-5 shows that only 30.2% of women in Chitrakoot have completed ten or more years of schooling, compared with 39.3% in Uttar Pradesh and 41% nationally. Antenatal care is also weak with only 30.3% of mothers receiving four or more ANC visits, far lower than the national average of 58.1%. Iron-folic acid (IFA) intake shows severe deficits: only 13.4% consumed IFA for at least 100 days, compared to 44.1% nationally and 22.3% in Uttar Pradesh. These indicators signal what the conceptual model terms an

intergenerational capability deficit, where low maternal nutrition, limited health knowledge, and early marriage combine to reduce children's growth potential. The DNC minutes document several operational challenges: inconsistent home visits during pregnancy, insufficient monitoring of high-risk pregnancies, and delays in supplying IFA tablets. These administrative weaknesses break the chain of preventive maternal care and contribute to the vulnerability observed in child nutritional outcomes.

Socio-economic capacity constraints

Socio-economic indicators provide insight into deeper constraints on household wellbeing. Only 31.2% of households in Chitrakoot use clean fuel, compared with 49.5% in Uttar Pradesh and 58.6% in India. Health insurance coverage remains very low at 17.4%, limiting access to timely medical care. Internet use among women, an important proxy for empowerment and access to information, remains extremely limited. These indicators align with the conceptual pathway of capability-driven nutritional inequality, where limited education, low purchasing power, and constrained access to services reduce the ability of households to ensure diversified diets, timely care-seeking, and hygienic practices. Poor socio-economic capability thus amplifies other determinants such as poor feeding practices and WASH risks. The DNC minutes further emphasise socio-economic barriers: seasonal migration of labourers, low household purchasing power during agricultural lean seasons, and irregular employment patterns. These factors directly affect food access, dietary quality, and healthcare utilisation.

Health System and Programme Gaps (DNC integration)

Beyond household-level determinants, programme implementation issues significantly influence nutrition outcomes. The DNC meeting (December 2023) documented several systemic shortcomings: 1) ICDS stock-outs of take-home rations (THR), eggs, and supplementary nutrition, 2) Low VHND coverage, with several sessions cancelled due to staffing gaps, 3) Poor cross-department convergence, especially between ICDS, Health, and Panchayati Raj, 4) Inadequate growth monitoring, with irregular MUAC screenings, 5) Limited supervision and follow-up for severely wasted children, 6) Lack of real-time reporting and weak accountability mechanisms.

These administrative insights align with national evidence showing that ICDS and POSHAN Abhiyaan face implementation bottlenecks in low-development districts.[12] In Chitrakoot, programme deficiencies weaken the fourth conceptual pathway health system access and quality, reducing the potential of schemes to prevent or address undernutrition.

The mismatch between programme coverage (e.g., high enrolment in ICDS) and outcomes (persistent stunting) reinforces the interpretation that structural deficits and weak service delivery together explain the district's high burden. This confluence of supply-chain issues, behavioural barriers, and limited institutional coordination creates an environment where children remain at heightened risk despite the presence of multiple schemes. The major programme and system-level constraints identified through NFHS-5 and DNC records are summarised in Table 2.

Table 2: Summary of programme and system gaps identified in Chitrakoot (NFHS-5 and DNC administrative insights).

Domain	Identified gaps
ICDS service delivery	Frequent stock-outs of Take-Home Rations (THR), eggs, and supplementary nutrition
Inconsistent distribution cycles	
Limited monitoring of AWW centers	DNC minutes (December 2023) documented repeated supply shortages and irregularities in distribution.
VHND (village health and nutrition day) coverage	Cancelled or postponed sessions in several villages
Low attendance by mothers and caregivers	
Inadequate counselling on IYCF and maternal health	Reported by frontline workers during DNC review; NFHS-5 shows low IYCF uptake.
Growth monitoring and screening	Irregular MUAC screening
Poor follow-up of severely wasted children	
Limited referral linkages for SAM cases	DNC minutes highlighted gaps in weighing scale availability, MUAC tapes, and follow-up mechanisms.
Convergence across departments	Weak coordination between ICDS, Health, PRI, and Swachh Bharat teams
Lack of joint planning for VHNDs, sanitation drives, and maternal counselling	DNC review noted minimal cross-departmental review and absence of shared monitoring tools.
Maternal health services	Low IFA adherence due to supply gaps

Continued.

Domain	Identified gaps
Irregular home visits by ASHAs/ANMs	
Limited early identification of high-risk pregnancies	NFHS-5 shows poor IFA intake (13.4%) and ANC 4+ visits (30.3%).
Sanitation and WASH integration	Persisting pockets of open defecation
Contaminated handpumps in select villages	
Limited behaviour-change follow-up post toilet construction	DNC team noted need for joint IEC activities; NFHS-5 sanitation remains low (56.7%).
Behaviour Change Communication (BCC)	Inadequate food demonstrations
Limited caregiver engagement	
Messages not tailored to local dietary patterns	Poor complementary feeding and minimum adequate diet support NFHS-5 findings (only 8.4%).
Data monitoring and accountability	Limited real-time reporting
Weak supervision structures	
Delayed review meetings	DNC minutes indicate delayed data compilation and weak cross-verification of records.
Health insurance and financial access	Low coverage limits ability to seek timely care
High OOP expenses for critical episodes	NFHS-5 shows only 17.4% households insured in Chitrakoot.

Note: Programme gaps summarised from the District Nutrition Committee Meeting Minutes, Chitrakoot (30th December 2023) and aligned with NFHS-5 Chitrakoot, Uttar Pradesh, and India fact sheets. The table synthesises recurrent issues affecting nutrition service delivery, health system functioning, and cross-sectoral convergence

DISCUSSION

The findings from NFHS-5 and the District Nutrition Committee (DNC) collectively illustrate that Chitrakoot's undernutrition burden is not the result of a single deficit but emerges from the interaction of structural, environmental, behavioural, and socio-economic constraints. This section interprets these multidimensional patterns through a conceptual lens informed by global nutrition scholarship and district-level evidence.

Persistent high burden despite extensive scheme coverage

One of the central paradoxes highlighted in the results is the persistent high burden of stunting (47.5%) and wasting (24.8%) in Chitrakoot despite the presence of long-standing child nutrition programmes. This reflects a wider pattern observed in many high-burden districts of central India, where programme infrastructure exists but outcomes stagnate. National literature notes that many Indian districts experience "hidden vulnerability," a situation where basic services are nominally available but utilisation, quality, and behavioural uptake remain weak.[15]

The DNC minutes revealed shortcomings in supply chains, take-home ration (THR) distribution, VHND coverage, and growth monitoring. These inefficiencies weaken the conversion of services into improved outcomes. Earlier national evaluations have similarly identified long-standing structural weaknesses in ICDS delivery, especially in rural, high-burden districts, where programme reach does not guarantee impact.[16] The gap between availability and effective utilisation mirrors what NFHS-5 shows at the national level: despite near-universal ICDS coverage, only 11.3% of Indian children receive a minimum adequate diet, and in Chitrakoot this drops to 8.4%. The persistence of undernutrition in such environments suggests that infrastructure alone cannot address entrenched vulnerabilities; rather, districts require deeper, multi-sectoral strengthening.

NFHS-5 insights through a spatial lens

Although NFHS-5 does not provide block-level data, national and state analyses reveal that malnutrition is spatially clustered, often aligning with patterns of rural underdevelopment, low institutional reach, and ecological disadvantage.[15,17] Evidence from low social development index states similarly shows pronounced spatial heterogeneity, with rural districts exhibiting structurally higher odds of undernutrition.[17] Chitrakoot sits squarely within the broader "central tribal and forest-agriculture belt," an area repeatedly identified as a hotspot for stunting, underweight, and poor maternal health indicators.

NFHS-5 state and national comparisons clearly position Chitrakoot as an outlier, performing below the Uttar Pradesh average for stunting (39.7%), wasting (17.3%), ANC coverage, dietary adequacy, and women's education. Spatial disadvantage is reflected in administrative evidence as well: the DNC identified several hard-to-reach villages with limited road connectivity, seasonal flooding, and poor access to frontline workers. Such geographies commonly have weaker supply chains, limited market access for diverse foods, and reduced exposure to health and nutrition counselling factors that reinforce undernutrition in spatially marginalised areas. Spatial epidemiological studies indicate that ecological barriers, including terrain and altitude, significantly elevate stunting risk in rural districts.[18]

Additionally, spatial clustering of poor WASH outcomes is well documented in rural India and contributes significantly to district-level nutrition differentials.[8] Chitrakoot's lower sanitation coverage (56.7%) compared with the state (68.8%) and national (70.2%) averages places children in a high-exposure environment, aligning with the broader spatial epidemiology of environmental enteropathy. Geospatial analyses of NFHS data demonstrate strong district-level clustering of child malnutrition, independently of household wealth gradients.[19]

Interactions of food security, WASH, and women's capability

The results also show that undernutrition in Chitrakoot is the outcome of reinforcing interactions between food security, WASH conditions, and women's capability. The conceptual interpretation emphasises that food security is necessary but not sufficient for improved child nutrition. When dietary intake is undermined by poor sanitation and repeated infections, the body's ability to utilise nutrients becomes impaired. This relationship aligns with international evidence showing that exposure to open defecation, contaminated environments, and broader WASH-related ecological stressors can negate the benefits of even adequate dietary intake.[9,20]

In Chitrakoot, inadequate dietary diversity, heavy cereal dependence, and low complementary feeding frequency limit the quality of children's diets. Even if households secure enough calories, the low intake of animal protein, green vegetables, and micronutrient-rich foods results in poor nutrient profiles. This is compounded by WASH-related morbidity, which increases the risk of wasting and severe wasting.

Women's capability acts as a critical mediating factor. Only 30% of women in Chitrakoot have completed 10 or more years of schooling, and IFA consumption remains extremely low. Evidence consistently shows strong associations between maternal education, autonomy, and child nutrition outcomes.[6,10] When women lack information, decision-making power, and control over dietary choices, children are less likely to receive diverse, timely, and adequate foods. Clean fuel usage, health insurance coverage, and internet access indicators of household capability also lag behind state and national averages, further reinforcing nutritional inequality.

Taken together, these interactions create an ecological system where low dietary adequacy, poor sanitation environments, and low maternal capability reinforce each other, producing high levels of chronic and acute undernutrition.

Chitrakoot in comparison with India and Uttar Pradesh

The comparative analysis with Uttar Pradesh and India highlights the depth of Chitrakoot's challenges. While the state itself remains high-burden, Chitrakoot performs worse on multiple indicators: stunting, wasting, IYCF practices, maternal education, clean fuel usage, and ANC coverage. These deviations are not minor; they suggest that Chitrakoot sits at the extreme end of the distribution even within an already vulnerable state.

At the national level, divergence becomes wider. For instance: 1) Exclusive breastfeeding: 41.6% in Chitrakoot vs. 63.7% in India, 2) Minimum adequate diet: 8.4% vs. 11.3%, 3) ANC 4+ visits: 30.3% vs. 58.1%, and 4) Women 10+ years schooling: 30.2% vs. 41%.

NFHS-5 national patterns show gradual improvement in stunting, wasting, maternal health indicators, and WASH access. However, Chitrakoot shows stagnation or only marginal change from NFHS-4, suggesting that broader national progress has not yet permeated district-level realities. This is consistent with literature emphasising that aggregate reductions in malnutrition can mask "pockets of deprivation," especially in socially marginalised rural districts.[21,11]

Policy discussion: moving beyond calorie sufficiency

The evidence underscores the need for policy approaches that extend beyond food supplementation or calorie-based strategies. The limitations of a siloed approach are clear: even with ICDS coverage, children in Chitrakoot continue to receive diets that lack diversity and essential nutrients, while WASH-related infections undermine the nutrient absorption process.

Nutrition, WASH, health, agriculture, and women's development departments operate in parallel rather than in coordination. DNC minutes show limited cross-department planning and weak joint monitoring. Stronger convergence through integrated planning of VHNDs, sanitation drives, and maternal health initiatives can enhance the efficiency of service delivery.

Dietary monotony and inadequate complementary feeding often stem from entrenched norms. Regular food demonstrations, mother's group engagement, and household counselling tools currently inconsistent need revival. Evidence suggests that behaviour change communication is as important as food access.

Maternal education, adolescent nutrition, and safe mobility for health services must be central to policy action. Enhanced access to secondary education, targeted IFA distribution, and improved counselling during ANC and PNC visits can break the intergenerational cycle of deprivation.

Overall, the findings highlight that Chitrakoot's nutrition landscape is shaped by overlapping deficits dietary inadequacy, WASH risks, socio-economic constraints, and health system gaps. Addressing only one determinant is insufficient; the district requires a layered, systemic

response that links food, health, sanitation, and women's empowerment into a unified strategy.

CONCLUSION

The analysis demonstrates that child undernutrition in Chitrakoot remains a deeply entrenched challenge shaped by the intersection of dietary inadequacy, poor sanitation environments, socio-economic constraints, and health system limitations. NFHS-5 findings stunting at 47.5%, wasting at 24.8%, and severe wasting at 12% position the district among the most nutritionally vulnerable areas in Uttar Pradesh and far below national trajectories. The consistently low adequacy of complementary feeding, limited exclusive breastfeeding, and poor dietary diversity reinforce a pattern of chronic food utilisation deficits rather than food availability shortages. Environmental determinants further intensify vulnerability. Despite improvements, sanitation coverage remains insufficient to interrupt the cycle of infection and undernutrition; a relationship well supported in national and global evidence. Maternal education, healthcare utilisation, and access to basic amenities also remain low, contributing to intergenerational constraints on child growth. Socio-economic capacity reflected in low clean fuel use, limited health insurance coverage, and restricted information access adds another layer of disadvantage. Administrative insights from the District Nutrition Committee highlight operational weaknesses, including stock-outs, irregular VHND sessions, and poor convergence between departments. These gaps weaken programme effectiveness and reduce the potential of existing schemes to address the underlying drivers of undernutrition.

Overall, the evidence suggests that reducing undernutrition in Chitrakoot requires a multi-sectoral, capability-enhancing, and context-sensitive strategy one that integrates WASH improvements, dietary diversification, maternal empowerment, and strengthened service delivery. Addressing these interlinked determinants is essential for achieving sustained reductions in malnutrition in high-burden rural districts.

Recommendations

There is a need to strengthen community-level awareness regarding appropriate infant and young child feeding practices, maternal nutrition, and sanitation behaviours. Targeted behaviour change communication and improved counselling during Village Health and Nutrition Days (VHNDs) can play a critical role in improving nutrition outcomes in high-burden rural districts.

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REFERENCES

1. Swaminathan S, Hemalatha R, Pandey A, Kassebaum NJ, Laxmaiah A, Longvah T, et al. The burden of child and maternal malnutrition and trends in its indicators in the states of India: The Global Burden of Disease Study 1990-2017. Lancet Child Adolesc Health. 2019;3(12):855-70.
2. Victora CG, Christian P, Vidaletti LP, Gatica-Domínguez G, Menon P, Black RE. Revisiting maternal and child undernutrition in low-income and middle-income countries: Progress towards 2030. Lancet. 2021;397(10282):1388-99.
3. International Institute for Population Sciences (IIPS) and ICF. National Family Health Survey (NFHS-5), 2020-21: Chitrakoot District Fact Sheet. Ministry of Health and Family Welfare, Government of India; 2021. Available at: https://dhsprogram.com/pubs/pdf/OF43/UP_Chitrakoot.pdf. Accessed on 17 May 2025.
4. Ministry of Health and Family Welfare, Government of India. International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-5), 2020-21: Uttar Pradesh Fact Sheet, 2021. Available at: https://planning.up.nic.in/Go/SDG/Uttar_Pradesh_NFHS-5%20fact%20sheet.pdf. Accessed 01 January 2026.
5. International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-5), 2020–21: India Fact Sheet. Ministry of Health and Family Welfare, Government of India; 2021. Available at: https://dhsprogram.com/pubs/pdf/OF43/India_National_Fact_Sheet.pdf. Accessed on 17 May 2025.
6. Corsi DJ, Mejía-Guevara I, Subramanian SV. Risk factors for chronic undernutrition among children in India: Estimating relative importance, population attributable risk and fractions. Soc Sci Med. 2016;157:165-85.
7. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and

middle-income countries. Lancet. 2013;382(9890):427-51.
8. Spears D. Open defecation and childhood stunting in India: An ecological analysis of new data from 112 districts. PLoS One. 2013;8(9):e73784.
9. Spears D. Exposure to open defecation can account for the Indian enigma of child height. J Dev Econ. 2020;146:102277.
10. Rao N, Kaushal N, Subramanian SV. Trends in the prevalence and social determinants of stunting in India, 2005–2021: Findings from three rounds of the National Family Health Survey. BMJ Glob Health. 2023;8(11):e012966.
11. Dolui M, Singh R, Kumar A. Decomposing social groups differential in stunting among under-five children in India. Sci Rep. 2024;14(1):21534.
12. Menon P, Avula R, Kohli N, DataDENT India Team. Tracking India's progress on addressing malnutrition and multisectoral actions. International Food Policy Research Institute (IFPRI); 2020.
13. Department of Women and Child Development, Vikas Bhawan Chitrakoot. District Nutrition Committee (DNC) Meeting Minutes: December 2023. Government of Uttar Pradesh; 2023.
14. Ministry of Health and Family Welfare, Government of India. International Institute for Population Sciences (IIPS). National Family Health Survey (NFHS-4), 2015-16: India Fact Sheet, 2017. Available at: https://dhsprogram.com/pubs/pdf/fr339/fr339.pdf. Accessed 01 January 2026.
15. Menon P, Headey D, Avula R, Nguyen PH. Understanding the geographical burden of stunting in India: A regression-decomposition analysis of district-level data from the 2015-16 NFHS. Matern Child Nutr. 2018;14(4):e12620.
16. World Bank. India's undernourished children: A call for reform and action. Washington, DC: World Bank; 2006.
17. Vishwakarma M. Child undernutrition: Spatial heterogeneity and determinants in low social development index states of India. J Res Health Sci. 2025;25(1):e00638.
18. Phad SB, Goli S, Deshpande A. Geographical altitude and stunting among children aged under five years in India: Evidence from a national survey. BMJ Nutr Prev Health. 2024;7(1):e000895.
19. Liou L, Kim R, Subramanian SV. Identifying geospatial patterns in wealth disparity in child malnutrition across 640 districts in India. Spatial Spatio-temporal Epidemiol. 2020;34:100354.
20. Parikh P, Karim K, Paulose J, Factor-Litvak P, Nix E, Nur FA. Linkages between environmental factors (WASH and climate) and food and nutrition security: A review. J Water Sanit Hyg Dev. 2021;11(6):902-16.
21. Ghosh K, Chakraborty AS, Haloi B, Zakir S. Spatial clustering of malnutrition and anemia among reproductive women and its associated risk factors in India: Evidence from NFHS-5. Food Nutr Bull. 2024;45(1):1-17.

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