International Journal of Financial Management and Economics

P-ISSN: 2617-9210
E-ISSN: 2617-9229
Impact Factor (RJIF): 5.97
IJFME 2025; 8(2): 1063-1067
www.theeconomicsjournal.com
Received: 26-08-2025
Accepted: 28-09-2025

Pranga Paramita Pradhan
SACT-Teacher, Mugberia Gangadhar Mahavidyalaya, Bhupatinagar, Purba Medinipur, West Bengal, India

Dr. Chandni Nath
Assistant Professor, Department of Economics, YBN University, Ranchi, Jharkhand, India

Corresponding Author:
Pranga Paramita Pradhan
SACT-Teacher, Mugberia Gangadhar Mahavidyalaya, Bhupatinagar, Purba Medinipur, West Bengal, India

Assessing the impact of integrated child development services (ICDS) on maternal and child nutrition: A comparative study of rural and urban anganwadi centres in Purba Medinipur, West Bengal

Pranga Paramita Pradhan and Chandni Nath

DOI: https://www.doi.org/10.33545/26179210.2025.v8.i2.644

Abstract
Maternal and child health remains a cornerstone of India's public health agenda, with the Integrated Child Development Services (ICDS) serving as the principal platform for delivering nutrition, health, and preschool education. This cross-sectional, comparative study assessed the awareness, participation, and nutritional outcomes of pregnant mothers and preschool children across rural and urban Anganwadi Centres (AWCs) in Purba Medinipur district, West Bengal. A total of 1,041 beneficiaries including 957 children and 84 pregnant women were evaluated using structured interviews, anthropometric measurements, and haemoglobin testing. Data analysis employed SPSS 26.0, with descriptive statistics, ANOVA, and Chi-square tests applied. Results revealed moderate ICDS utilization, with approximately 35 % of mothers accessing nutrition and health services. Urban mothers exhibited slightly higher mean weight and haemoglobin levels, while both groups showed borderline anaemia (≈11 g/dL). Child growth patterns indicated 62.85 % normal (Green Zone) in urban and 55.71 % in rural areas, with no statistically significant difference ($\chi^2 = 1.98$; $p = 0.159$). Despite improved outreach, undernutrition and anaemia persist, particularly in rural regions. The study underscores the need for enhanced nutrition education, consistent supplement supply, capacity-building of Anganwadi workers, and digital monitoring to strengthen ICDS performance and achieve equitable maternal-child health outcomes.

Keywords: Anaemia, anganwadi centres (AWCS), child nutrition, integrated child development services (ICDS), maternal health, nutritional assessment, urban-rural comparison, West Bengal

Introduction
Maternal and child health remains a foundational element of public health, influencing population survival and development. Worldwide, pregnant women and children under six are particularly vulnerable to malnutrition and disease when health interventions are inadequate (UNICEF, 2021) [26]. In India, chronic undernutrition, anemia, and disparities in healthcare access continue to contribute significantly to maternal and child mortality (IIPS & ICF, 2021) [8]. To address these issues, the Government of India launched the Integrated Child Development Services (ICDS) in 1975 the world's largest community-based program for maternal and child welfare (MWCD, 2022) [16]. ICDS delivers six essential services: supplementary nutrition, immunization, health check-ups, referral services, preschool education, and health and nutrition education, primarily through Anganwadi Centres (AWCs). These centres serve as community hubs where pregnant women receive nutrition supplements, antenatal care, and counseling, while children benefit from immunization support, growth monitoring, and early education (World Bank, 2018) [28].
Despite its wide reach, ICDS utilization remains uneven across regions due to socio-economic, cultural, and administrative barriers. Many pregnant women underutilize services owing to poor awareness, irregular food supply, and inadequate counseling (NITI Aayog, 2015; Singh *et al*., 2021) [19, 25]. Among children, although registration is high, attendance and consistent nutrition intake depend on income, maternal education, and AWC proximity (Kumar *et al*., 2019) [10]. State-level variations are marked better outcomes occur where governance, infrastructure, and women's empowerment are stronger (Kumbhakar *et al*.,

2024) [9]. Regular participation in ICDS correlates with reduced low-birth-weight rates, improved maternal nutrition, and greater awareness of child-feeding practices (Avula *et al*., 2015) [2]. Similarly, children attending ICDS regularly exhibit better nutritional and developmental outcomes (Rao & Kaul, 2018) [23].

According to the Ministry of Women and Child Development (2023) [17], participation exceeds 70% in Tamil Nadu and Himachal Pradesh but remains below 55% in Bihar and Uttar Pradesh due to poor facilities and social constraints. Nationally, around 60-65% of children access supplementary nutrition and about 50-55% attend preschool activities (NFHS-5, 2021) [8]. Regional data reveal persistent gaps: in Gujarat, AWCs suffer from weak training and follow-up (Chudasama *et al*., 2015) [6], while in West Bengal, undernutrition persists in 28-34% of children despite literacy-linked improvements (Sarkar *et al*., 2018; Maity *et al*., 2019) [24, 13]. Urban slums remain underserved due to mobility and low service quality.

As undernutrition accounts for nearly 68% of under-five deaths in India (UNICEF, 2021) [26], enhancing ICDS participation is crucial. The program strengthens antenatal care, reduces anemia, and improves child survival and cognitive development (Planning Commission, 2011; UNICEF India, 2022). It also fosters gender equity and community empowerment. Yet, systemic issues staff shortages, inconsistent supplies, and weak supervision limit impact. Strengthening infrastructure, coordination with health services, and public awareness are essential (MoWCD, 2023). Against this background, the present study evaluates the awareness and participation of pregnant mothers and preschool children in ICDS centres in Purba Medinipur district, West Bengal, highlighting disparities and determinants across rural and urban contexts.

Methodology

The present study adopted a cross-sectional, comparative design to assess the nutritional status and service utilization of pregnant mothers and preschool children enrolled in the Integrated Child Development Services (ICDS) program. It aimed to compare rural and urban Anganwadi Centres (AWCs) in terms of maternal anthropometry, haemoglobin levels, and child growth indicators, identifying disparities in nutrition and program coverage.

Study Area and Population

The research was carried out in two administrative blocks one urban and one rural selected for their accessibility and active ICDS operations. A total of 1,041 beneficiaries participated, including 957 preschool children (492 rural, 465 urban) and 84 pregnant mothers (48 rural, 36 urban). Participants were identified from ICDS records and verified during field visits.

Sampling and Inclusion Criteria

A purposive sampling technique ensured inclusion of active ICDS beneficiaries. Only those attending the AWC at least twice monthly for six months were included, while non-consenting or chronically ill participants were excluded.

Data Collection and Measurements

Data were collected through field observation, structured interviews, anthropometric assessments, and record reviews using a pretested semi-structured schedule. Information on socio-demographic factors, diet, and ICDS service use was gathered from mothers or caregivers. For mothers, age, weight, height, BMI, and haemoglobin (via HemoCue method) were measured per WHO guidelines. For children, age, weight, and height were compared with WHO Child Growth Standards, classifying growth into Green (normal), Yellow (moderate), and Red (severe undernutrition) zones.

Data Analysis

Data were analyzed using SPSS 26.0. Descriptive statistics summarized variables, while ANOVA tested group differences and Chi-square tests examined associations between location and nutritional status, with significance at $p<0.05$.

Ethics

Approval was obtained from the District ICDS Office; informed consent was secured from all mothers. Ethical principles of confidentiality, voluntary participation, and non-invasive measurement were strictly maintained.

Results

In the study area, 492 preschool children and 48 pregnant mothers were registered under ICDS in rural zones, while 465 children and 36 mothers were enrolled in urban areas. Among the children, 60 % in rural and 50 % in urban areas were regular beneficiaries. Middle-class families constituted 57 % of rural and 64 % of urban participants, and over half of all respondents lived within 400 meters of their Anganwadi Centres (AWCs), indicating generally good geographical accessibility. The participation of the beneficiary has been depicted in Figure 1 and Table 1.

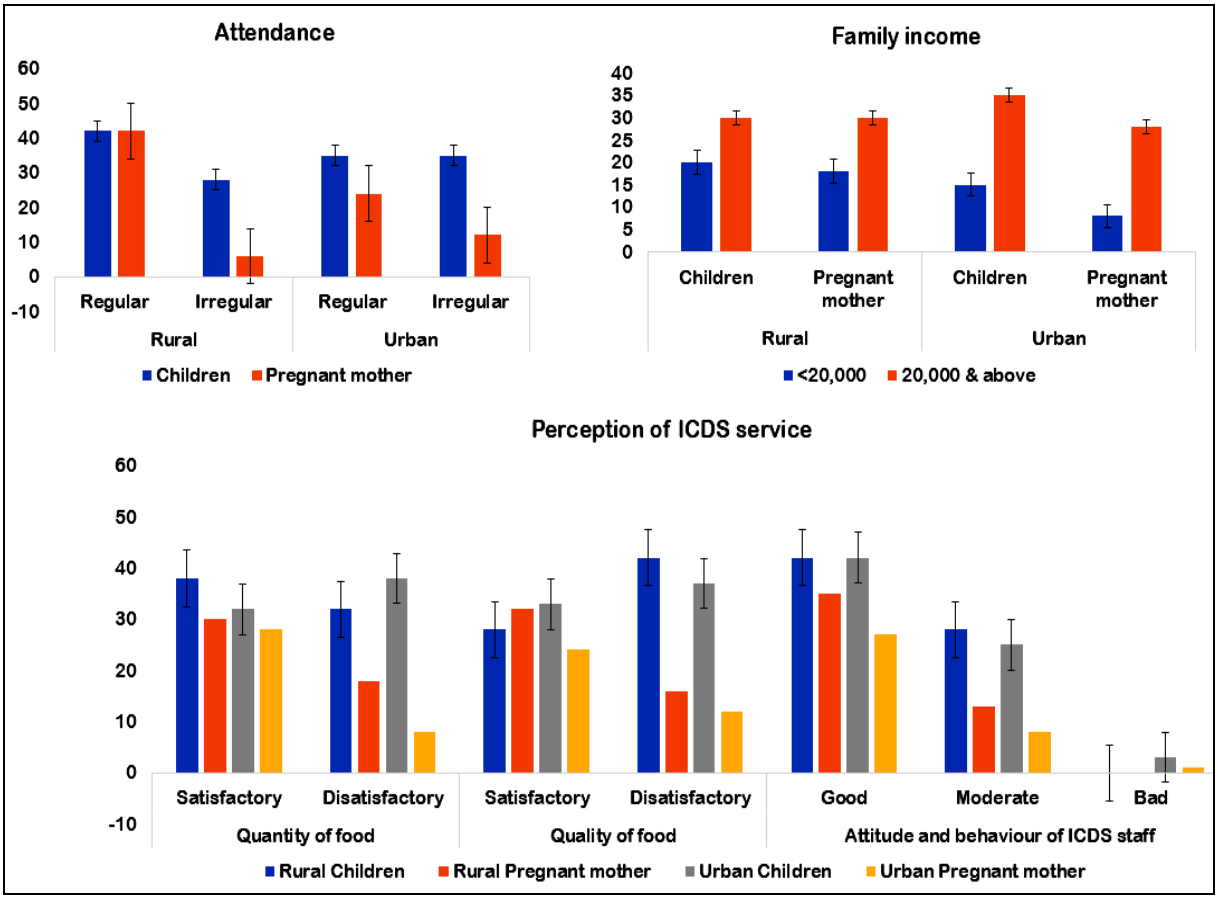

Fig 1: Discrepancy in acquiring the ICDS facilities

Table 1: Descriptive statistics of the pregnant mother underwent the ICDS

Parameters	Urban			Rural		
	IQR	Mean ± SD	95% CI	IQR	Mean ± SD	95% CI
Age (yr)	5.25	25.31±3.69	24.24 - 26.38	5	22.94±2.94	22.08 - 23.79
Weight(kg)	6	49.31±4.41	48.03 - 50.59	8	48.04±5.51	46.44 - 49.64
Height(cm)	5.25	151.19±3.04	150.3 - 152.07	6	149.63±3.99	148.46 - 150.79
BMI	2.94	21.45±2.2	20.81 - 22.09	3.59	21.48±2.34	21.48±2.34
Haemoglobin	0.93	11.22±0.8	10.98 - 11.45	1.03	11.1±0.94	10.83 - 11.38
	%			%		
Nutritious Food	35.2			34.69		
Supplementary Medicine	34.18			34.18		
Health Checkup	30.61			31.12		

The mean age of the pregnant mothers was 25.31±3.69 years in urban and 22.94±2.94 years in rural areas, reflecting a 2.4-year gap consistent with the national trend of earlier conception in rural women due to lower education and early marriage (Kumar *et al*., 2020) [11]. Most belonged to the 15-35-year target age group, showing successful program outreach. Average body weight was 49.31±4.41 kg (urban) and 48.04±5.51 kg (rural), with urban women exhibiting slightly higher and less variable weights, suggesting steadier food and healthcare access. Mean height was 151.19 cm (urban) and 149.63 cm (rural), indicative of chronic intergenerational under nutrition among rural women (Black *et al*., 2013) [4]. Both groups had similar BMI values (≈21.5), suggesting generally normal nutrition levels though possible underweight subgroups remain. These patterns suggest ICDS supplementation has achieved moderate nutritional equity between rural and urban mothers. The mean haemoglobin concentration was 11.22 g/dL in urban and 11.10 g/dL in rural mothers, both near the WHO threshold for anaemia (11 g/dL) (NFHS-5, 2021) [8]. This denotes borderline anaemia across both settings, pointing to widespread iron deficiency despite supplementation. The marginally higher urban average likely reflects better dietary quality and healthcare access. These results emphasize the need for improved iron-folic acid (IFA) compliance and monitoring. Overall service participation was modest: around 35 % for nutrition, 34 % for medicines, and 31 % for health check-ups. While ICDS has achieved considerable outreach, participation remains below desired levels. Rural mothers reported slightly higher health check-up attendance, possibly due to active engagement by Anganwadi Workers and ASHAs, while some urban women appeared to rely on private healthcare, limiting ICDS involvement despite better infrastructure.

Table 2: Analysis of Variance (ANOVA) for parametric variables

	Sphericity Correction	Type III Sum of Squares	DF	Mean Squares	F	p	η^2
Treatment	None	60236	7	8605.14	1023.56	<.001	0.96
	Greenhouse-Geisser	60236	2.54	23713.86	1023.56	<.001	0.96
	Huynh-Feldt	60236	2.73	22049.14	1023.56	<.001	0.96
Residual	None	2295.13	273	8.41			
	Greenhouse-Geisser	2295.13	99.06	23.17			
	Huynh-Feldt	2295.13	106.54	21.54			

A one-way ANOVA revealed highly significant variations among variables for urban mothers ($F = 1023.56$, $p<0.001$; $\eta^2 = 0.96$), highlighting strong interrelations between nutritional and biochemical parameters influenced by socio-economic status and lifestyle. Rural data showed lower variance (sum of squares = 2295.13), indicating greater homogeneity due to shared living and dietary conditions. This suggests ICDS services create relatively uniform outcomes within rural settings, albeit at modest nutritional levels (Table 2).

Table 3: Growth pattern of pre-school children from the study areas

Growth record	Urban (%)	Rural (%)	Chi-square [*p*-value]
Green	62.85	55.71	1.9815 [0.1592]
Yellow	32.85	35.71	
Red	4.28	8.57	

Growth assessment classified children as Green (normal), Yellow (moderate), or Red (severe undernutrition). Urban AWCs recorded 62.85 % Green, 32.85 % Yellow, and 4.28 % Red; rural centers reported 55.71 % Green, 35.71 % Yellow, and 8.57 % Red. The chi-square test ($\chi^2 = 1.98$, $p=0.159$) revealed no statistically significant urban-rural difference. However, the relatively higher proportion of rural children in Yellow and Red zones underscores ongoing nutritional vulnerability. Though statistically nonsignificant, these findings are programmatically important, reflecting disparities in service quality, diet diversity, and household awareness that must be addressed through strengthened ICDS implementation and monitoring (Table 3).

Discussion

The study highlights crucial insights into the nutritional and health status of ICDS beneficiaries, revealing significant rural-urban disparities. While most pregnant women maintained normal BMI, indicating success in supplementary nutrition, the persistence of mild anaemia in both groups reflects a "double burden of malnutrition" adequate caloric intake but poor micronutrient quality (Bhutta *et al*., 2013) [3]. Addressing this requires improving dietary diversity through fortified foods, locally sourced iron- and protein-rich ingredients, and stronger adherence to iron-folic acid (IFA) therapy. Urban women's slightly higher age and stature indicate better access to education and healthcare, whereas early conception among rural women underscores social and cultural constraints. Comparable BMI across groups suggests ICDS has somewhat reduced nutritional inequality, but participation limited to about one-third remains a major concern. Service availability alone does not ensure utilization; awareness gaps, inconvenient timings, and social taboos reduce engagement.

Persistent anaemia despite supplementation indicates irregular IFA supply, weak counseling, and poor monitoring. Strengthening collaboration between ICDS and health initiatives like Anemia Mukt Bharat, ensuring continuous IFA supply, and using portable haemoglobinometers can improve outcomes. Urban results ($\eta^2 = 0.96$) show strong interlink ages among nutrition indicators, necessitating targeted strategies especially for urban slums that face service fragmentation despite proximity. In contrast, rural areas benefit more from community-based measures such as kitchen gardens, food fortification, and collective nutrition education.

Low utilization (≈30-35%) stems from poor food perception, staff shortages, restrictive norms, and logistical issues. A dual strategy improving supply reliability and stimulating demand is vital. Recommended interventions include:

- Enhanced nutrition education using affordable local foods;
- Streamlined IFA and calcium supply chains;
- Mobile-based digital monitoring via POSHAN Tracker;
- Stronger coordination among ICDS, NHM, and AMB;
- Micro-planning for high-risk clusters (urban slums, remote villages);
- Empowered Anganwadi and ASHA workers through training and incentives;
- Behavioral-change communication using self-help groups and local media.

Improving maternal nutrition is key to breaking intergenerational undernutrition cycles, aligning with SDGs 2, 3, and 5 (Zero Hunger, Good Health, Gender Equality).

Child Growth and Nutrition: Comparative analysis revealed that about 63% of urban and 56% of rural children fell in the Green Zone, reflecting marginally better growth in urban areas. Although statistically non-significant, the trend indicates better literacy, sanitation, and healthcare access in cities (Kumar *et al*., 2021) [12]. Higher rural representation in Yellow and Red zones highlights vulnerabilities tied to poverty, limited diet diversity, and irregular rations (Chudasama *et al*., 2019) [7]. Strengthening Anganwadi Workers' capacity through refresher training, improved supervision, and digital record systems is crucial.

Urban-rural differences mirror broader socio-economic inequities. Locally tailored nutrition programs like kitchen gardens and region-specific menus can promote dietary diversity and acceptance. Enhanced community participation and modernized digital monitoring will ensure early detection of undernutrition and timely intervention, advancing ICDS effectiveness across both settings.

Conclusion

Overall, the study reaffirms ICDS as a cornerstone of India's maternal and child welfare system, with measurable achievements in equitable reach and moderate nutritional improvement. However, the persistence of mild anaemia, partial participation, and lingering undernutrition among children especially in rural areas underscores the need for quality-focused reforms. Future efforts should emphasize nutrition diversity, data-driven monitoring, capacity-building of frontline staff, and greater community participation. Through such enhancements, ICDS can more effectively translate its massive outreach into tangible health gains, advancing India toward the dual goals of maternal well-being and child nutrition security.

Reference

1. Arora NK, Gupta P, Agrawal A. Nutrition programs in India: policy, programmatic and implementation issues. Indian J Pediatr. 2020;87(7):565-573.
2. Avula R, Frongillo EA, Arabi M, Sharma S, Schultink W. Enhancements to nutrition program in India: lessons from the implementation of the Integrated Child Development Services (ICDS). Matern Child Nutr. 2015;11(S1):39-53.
3. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, *et al*. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? Lancet. 2013;382(9890):452-477.
4. 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):427-451.
5. Chattopadhyay A. Role of the Integrated Child Development Services scheme in combating malnutrition in India: an appraisal. Soc Change. 1999;29(2-3):27-41.
6. Chudasama RK, Patel UV, Verma PB. Evaluation of Integrated Child Development Services program in Gujarat, India: role of Anganwadi workers. Indian J Public Health. 2015;59(2):91-97.
7. Chudasama RK, Kadri AM, Verma PB. Impact evaluation of nutrition and health education under ICDS project in western India. Indian J Community Med. 2019;44(1):12-17.
8. International Institute for Population Sciences (IIPS), ICF. National Family Health Survey (NFHS-5), 2019-21: India report. Mumbai: Ministry of Health and Family Welfare, Government of India; 2021.
9. Kumbhakar M, Saha A, Sen A. Comparative analysis of ICDS performance and its socio-economic determinants in Indian states. J Soc Econ Dev. 2024;26(1):113-128.
10. Kumar A, Singh A, Kumar K. Impact of Integrated Child Development Services on child nutrition: evidence from India. Child Youth Serv Rev. 2019;104:104395.
11. Kumar S, Gupta R. Maternal age at conception and associated socio-economic factors: a study in rural India. J Health Manag. 2020;22(2):157-169.
12. Kumar P, Singh R, Mohanty SK. Socio-economic determinants of child growth in India: an urban-rural perspective. BMC Public Health. 2021;21:1345.
13. Maity S, Roy A, Pal D. Evaluation of nutritional status among ICDS beneficiaries in West Bengal: a district-level analysis. Indian J Nutr Diet. 2019;56(2):145-156.
14. Malik A, Singh J, Chauhan S. Role of Anganwadi workers in strengthening the ICDS scheme: a case study of North India. Indian J Community Health. 2019;31(3):408-414.
15. Mathew G. Public participation and decentralized governance in India: learning from ICDS and Panchayati Raj. IDS Bull. 2001;32(2):91-98.
16. Ministry of Women and Child Development (MWCD). Annual report 2021-22. New Delhi: Government of India; 2022.
17. Ministry of Women and Child Development (MWCD). Poshan Tracker and ICDS performance report 2022-23. New Delhi: Government of India; 2023.
18. Mukherjee A, Rome S. Quality of supplementary nutrition in ICDS: a critical appraisal. Econ Polit Wkly. 2017;52(19):23-27.
19. NITI Aayog. Evaluation report on Integrated Child Development Services (ICDS) scheme. New Delhi: Development Monitoring and Evaluation Office, Government of India; 2015.
20. NITI Aayog. Transforming nutrition in India: POSHAN Abhiyaan progress report. New Delhi: Government of India; 2021.
21. Patel V, Rahman A, Jacob KS. Maternal and child health in India: achievements and gaps in nutrition and health policy. Lancet Reg Health Southeast Asia. 2020;2:100015.
22. Rani M, Jain M, Singh P. Supplementary nutrition and health outcomes under ICDS: evidence from rural Uttar Pradesh. Indian J Public Health Res Dev. 2018;9(10):165-171.
23. Rao N, Kaul V. India's Integrated Child Development Services: promoting early childhood development and school readiness. The Hague: Bernard van Leer Foundation; 2018.
24. Sarkar S, Dutta S, Banerjee A. Nutritional assessment of children under ICDS in rural West Bengal. Int J Community Med Public Health. 2018;5(4):1512-1518.
25. Singh A, Pathak PK, Chauhan RK. Inequalities in maternal health and nutrition service utilization in India: role of ICDS. Public Health Nutr. 2021;24(6):1235-1246.
26. UNICEF. The state of the world's children 2021: on my mind - promoting, protecting and caring for children's mental health. New York: United Nations Children's Fund; 2021.
27. UNICEF. Annual report 2022: progress for every child. New York: United Nations Children's Fund; 2022.
28. World Bank. Delivering early childhood development services: Integrated Child Development Services in India. Washington (DC): World Bank Group; 2018.