World Nutrition, September 2026;17(3): 19-25
DOI: https://doi.org/10.26596/wn.202617319-25

WORLD NUTRITION
The Official Journal of the World Public Health Nutrition Association
Journal homepage: https://www.worldnutritionjournal.org
ISSN: 2041-9775

Research Article

From Breast to Bowl: A quasi-experimental, mixed-methods evaluation of peer learning to improve complementary feeding in rural northeastern Ghana

Mohammed Ali[1]*, Zakaria Abotiyire Iddrisu[1], Abubakari Abdul Ganiu Konlan[2], Damata Mohammed Yakubu[3]

[1] Programming, Centre for Development Systems and Services, Tamale, Ghana; [2]Project Management Office, University of New York Field Office, Tamale, Ghana; [3]Public Health Unit, District Health Directorate, Ghana Health Service, Nabdam

OPEN ACCESS

***Corresponding Author**
Ali M.
mohalim74@gmail.com
ORCID: 0000-0003-0930-701X

Article History
Received: April 26, 2026
Reviewed: May 11, 2026
Revised: June 16, 2026
Accepted: July 17, 2026
Published: September 30, 2026

Citation
Ali M., Iddrisu Z.A., Konlan A.A.G., & Yakubu D.M. (2026). From Breast to Bowl: A quasi-experimental, mixed-methods evaluation of peer learning to improve complementary feeding in rural northeastern Ghana. *World Nutrition*, 17(3), September, 19–25. https://doi.org/10.26596/wn.202617319-25

Academic Editor
Ted Greiner, PhD

Copyright © 2026 Ali M. et al. Published by WPHNA. This is an open-access article distributed under the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Highlights/Key Messages

- Child dietary diversity in peer learning groups increased by 24 percentage points.
- In the intervention sites, feeding ⩾3 meals/day increased from 46% to 68% in response to structured facility counseling sessions.
- Caregiver familiarity with food categories and safe preparation increased by 38%(p=0.001).
- Male caregiver engagement increased, reinforcing nutrition habits in the home.

Background
In rural Ghana, the transition from breastfeeding to complementary feeding is critical; however, gaps in maternal and child nutrition services contribute to low dietary diversity, inadequate feeding frequency, limited maternal knowledge, and poor child growth.

Objective
This study evaluates the impact of peer-learning approaches on improving these practices.

Methods
A quasi-experimental mixed-methods design was conducted in Ghana's North East Region, comparing intervention (n=4) and comparison (n=4) communities. Intervention sites implemented peer-learning groups with counseling and caregiver discussions, while comparison sites continued routine practices. A probability sample of 420 caregivers participated. Household surveys assessed dietary diversity, feeding frequency, and maternal knowledge of recommended practices. Facility records documented counseling sessions and staff training. Focus group discussions and key informant interviews were conducted with caregivers and health workers.

Results
Dietary diversity increased by 24 percentage points (pp) in intervention communities versus 3 pp in comparison sites (p=.001). Feeding ⩾3 meals/day rose by 23 pp in intervention areas compared to 4 pp (p<.001). Appropriate knowledge scores improved by 38 pp in intervention sites versus 8 pp in comparison areas (p<.001). Facility counseling use rose from 2.1 to 3.4 sessions/month in intervention areas (t(28)=4.80, p<.001) and from 2.0 to 2.2 in comparison sites. Qualitative narratives confirmed dietary changes, e.g., "We used to give only maize porridge, but now we add groundnut and beans" (32-year-old mother, FGD).

Conclusions
Peer-led education, male caregiver engagement, and strengthened facility support improved complementary feeding. These findings highlight scalable nutrition interventions in Ghana and provide transferable lessons for other low-resource settings.

Keywords: complementary feeding, caregiver practices, northeastern Ghana

Introduction

Infant and Young Child Feeding (IYCF) is one of the key determinants of child survival and nutrition. According to WHO and UNICEF guidelines, exclusive breastfeeding for 6 months, complementary foods introduced at about that age, and continuous breastfeeding for up to 2 years or beyond are desirable (WHO, 2023).

Malnutrition and infection are caused by inadequate, premature, or delayed initiation of complementary feeding (UNICEF, 2025). The incidence of exclusive breastfeeding in Ghana has stagnated despite decades of advocacy; only 52.6% of infants under six months are exclusively breastfed. In addition, 41.8% of infants under 6 months of age experienced delayed initiation of breastfeeding, occurring after the first hour of life (Ghana Statistical Service, 2024).

Complementary feeding practices are also subpar, with fewer than half of children aged 6–23 months receiving a minimally acceptable diet (Ghana Statistical Service et al. 2022). In the North East Region, stunting has been estimated to affect over 30% of children younger than five years, and anaemia has been reported to be higher than 40% (Saaka & Hammond, 2025). Poverty and food insecurity lead to over-dependence on starchy staples and, along with other unhealthy practices, lead to low quality of the diet (Saaka & Hammond, 2025). Community-based education and counselling are thus necessary, but they are inadequately supported, and staff are overworked (Ali & Ali, 2025). The high prevalence of malnutrition is attributed to poor feeding practices and inadequate service delivery in health facilities (Abebe et al., 2017). Among the predictors of feeding adequacy are diet diversity, maternal education, and socio-economic status (Ogbo et al., 2017), while interventions delivered by health workers have been shown to improve overall health (Abebe et al., 2017).

In contrast to most previous research, the present study examines the combined impact of peer learning approaches and facility support. It provides contextual evidence on how families transition to complementary feeding and how care strategies can be improved in rural settings through counselling, training, and education.

Materials and Methods

Study Design and Setting

This quasi-experimental mixed-methods study explored complementary feeding practices and facility support among mothers of 6–23-month-old children in Ghana's North East Region (Bunkprugu, Mamprugu Moaduri, Yunyoo, and Chereponi). Conducted from June 2023 to May 2024, the study compared the intervention and comparison groups and incorporated qualitative inquiry to provide contextual understanding, as described by Shadish et al. (2002).

Intervention and Comparators

Intervention: The intervention was embedded into the routine child welfare services of the Ghana Health Service in four districts. The study targeted mothers of children aged 6–23 months and Community-Based Health Planning Services (CHPS) staff, mainly community health nurses and enrolled community health volunteers. Three key intervention packages were implemented as follows:

- Peer learning: This involved assisting mothers and caregivers to learn recommended feeding practices, share experiences, participate in group discussions, and provide mutual support to each other with the aim of improving child health and nutritional status. As part of the peer learning approach, child health and nutrition sessions occurred every two weeks during welfare clinics, home visits, and through facilitation of food preparation demonstrations of locally available, affordable and nutritious foods. As part of the intervention, we realised that many women traders travelled to local markets to sell their wares, sometimes for a couple of days. Their children were mostly left in the care of their husbands, fathers-in-law, siblings, and their mothers-in-law. Thus, males became a part of those engaged in the counselling sessions.
- Counselling Sessions: The intervention differed from standard care by incorporating structured counselling sessions delivered twice per month in health facilities and during home visits. These sessions were added to routine services, which otherwise provided only infrequent or ad hoc advice.
- Health and nutrition education, including counselling, was delivered to each caregiver, covering the dietary composition (food groups), portion sizes, and safe food preparation. Implementation was monitored by facility records, caregiver reports, and random spot checks; attendance registers and monthly logs were used to quantify fidelity.
- Staff Training and Support: CHPS staff and volunteers received three in-person training sessions during the intervention period, as well as ongoing mentorship from district, regional, and teaching hospital coaches.

Timeline of Actions Taken by the Intervention

- Month 1 – Baseline survey and facility evaluations; household listing and sampling
- Month 2 – Staff training and preparation; creation of educational materials; cultural adaptation of the training materials.
- Months 3–10 – Intensive counselling and caregiver education workshops; routine supervision and refresher training.
- Month 6 – Midline monitoring of implementation and early outcomes.
- Month 11 — Post-survey and qualitative research (FGDs, interviews).
- Month 12 — Data analysis and dissemination.

Comparators: Mothers and health workers at comparison sites continued with routine child welfare services only, without biweekly education, structured monthly counselling, or enhanced staff training and mentorship.
Sampling

Quantitative component

Four CHPS compounds and eight communities were selected as research sites: Gbegbani (Bimbagu & Ngaama), Kpatorigu (Kpatorigu & Kikaayire), Bumbrunga (Garmkuka & Bumbrunga), and Yunyoo (Nasuan & Tambong). The communities were chosen to represent ethnic, cultural, and geographic diversity, varied health facility coverage, and differing levels of food security and feeding preferences

(Saaka & Hammond, 2025).

In each of the four study districts, two communities (one intervention and one comparison) were randomly selected within the catchment of each randomly selected CHPS zone. In each community, households with eligible children (6–23 months old) were listed by community volunteers, and systematic sampling was performed. One eligible caregiver was randomly selected from each participating household. The sampling interval was determined by dividing the total number of eligible households by the appropriate sample size; a random starting point was chosen, and every nth household was selected until the target was reached. Purposive inclusion of health facilities serving the communities and convenience sampling of health workers were applied.

The estimated sample size required was determined using the formula for comparing two proportions (Lwanga & Lemeshow, 1991). It was estimated that 93 mothers per group were needed, based on expected endline adequate complementary feeding rates of 55% in the intervention and 35% in the comparison (95% confidence, 80% power). This sample size increased to 210 mothers after adjusting for the cluster design effect (×2) and a 10% non-response rate, yielding n = 420.

Qualitative component

A purposive subset of respondents was invited to participate in focus group discussions and in-depth interviews, aiming to balance across age, gender, and socio-economic categories.

A total of 40 health workers were purposively sampled from the 8 Community-Based Health Planning and Services (CHPS) compounds. The sample comprised 8 nurses, 10 midwives, 8 nutrition officers, and 10 community health workers, all of whom were actively engaged in child feeding counselling and maternal health services. Inclusion required that participants were present at the CHPS facility during the research team's visit and were directly involved in service delivery. Structured audits were conducted, and qualitative interviews captured service delivery perspectives. Details of the sampling procedure are presented in Table 1.

Data Collection Methods

Quantitative: Structured pre- and post-intervention caregiver questionnaires adapted from WHO (2008). IYCF indicators were used to assess dietary diversity, feeding frequency, and mothers' knowledge. Counselling, staff capacity, and the availability of nutrition materials were documented with facility audits (Saaka & Hammond, 2025).

Qualitative: FGDs with mothers, in-depth interviews with health workers, and key informant interviews with community leaders were conducted using semi-structured interview guides adapted from WHO community counselling tools (WHO, 1993) and previous IYCF studies (Abebe et al., 2017; Ogbo et al., 2017). These tools assessed perceptions, barriers to, and facilitators of complementary feeding. Standardised observational checklists, informed by WHO counselling quality standards, were later used to observe, assess, and plan steps to improve the fidelity of counselling delivery and engagement, as well as the behaviour of mothers taking part in the counselling session (WHO, 2023). Semi-structured guidelines standardised FGDs and interviews (Abebe et al., 2017; Ogbo et al., 2017).

Table 1. Qualitative Participant Categories and Purposes

Category	Method	Participants	Selection Criteria	Purpose
Focus Group Discussion (FGDs)	8 per district	8–10 mothers in each	To reflect typical age, parity, and socio-economic status	Capture diverse perspectives
Health Workers	40 interviews	Nurses, nutrition officers, CHPS staff	Sample communities, child welfare/nutrition service providers, & facility type	Document frontline service experiences
Community Leaders	8 interviews	Traditional leaders, women's group representatives	Purposive across ethnic groups &	Understand community norms & perceptions of cultural variation in feeding practices

Data analysis

Quantitative data were analysed using IBM SPSS Statistics 28.0 (IBM Corp., Armonk, NY). Descriptive statistics summarised mothers' demographics, feeding practices, and facility characteristics. Chi-square tests compared categorical outcomes (dietary diversity, feeding frequency), while independent t tests assessed continuous measures (counselling sessions). Logistic regression identified predictors of adequate feeding, including caregiver knowledge, counselling exposure, and socio-economic status (WHO, 2023; Saaka & Hammond, 2025). Qualitative data were transcribed, coded, and thematically analysed in NVivo 12 using the UNICEF nutrition framework (UNICEF, 2025) and Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979). Triangulation enhanced validity and clarified mechanisms.

Ethical approval was granted by the Ghana Health Service Ethics Review Committee (ERC-017/12/19-23. Written informed consent was obtained from all participants. Confidentiality and anonymity of the participants were upheld throughout the entire study.

Results

Socio-Demographic Profile of Respondents

The 420 participating caregivers (92% of whom were mothers) were evenly divided between the intervention and comparison groups. They averaged around 28 years of age; 38% had no formal schooling, and another 42% completed primary or junior high school. Table 1 compares the other socio-demographic characteristics of the two groups. While we did not compare them statistically, the two groups are clearly similar.

Table 1. Socio-demographic characteristics of intervention and comparison groups

Characteristic	Intervention (n=210)	Comparison (n=210)	Total (N=420)
Mean age (years)	28.6 ± 6.1	28.2 ± 6.3	28.4 ± 6.2
Primary caregiver: Mother	193 (91.9%)	194 (92.4%)	387 (92.1%)
Education			
No formal	82 (39.0%)	78 (37.1%)	160 (38.1%)
*Primary/JHS**	88 (41.9%)	89 (42.4%)	177 (42.1%)
*SHS** or higher*	40 (19.0%)	43 (20.5%)	83 (19.8%)
Occupation			
Farming	116 (55.2%)	115 (54.8%)	231 (55.0%)
Trading	64 (30.5%)	62 (29.5%)	126 (30.0%)
Others	30 (14.3%)	33 (15.7%)	63 (15.0%)
Children Age/Months			
6–11 months	74 (35.2%)	73 (34.8%)	147 (35.0%)
12–17 months	84 (40.0%)	84 (40.0%)	168 (40.0%)
18–23 months	52 (24.8%)	53 (25.2%)	105 (25.0%)
Gender			
Male	107 (51.0%)	108 (51.4%)	215 (51.2%)
Female	103 (49.0%)	102 (48.6%)	205 (48.8%)
Ethnicity			
Mamprusi	85 (40.5%)	83 (39.5%)	168 (40.0%)
Chikosi	42 (20.0%)	44 (21.0%)	86 (20.5%)
Likpakpa	38 (18.1%)	37 (17.6%)	75 (17.9%)
Bimoba	30 (14.3%)	32 (15.2%)	62 (14.8%)
Others	15 (7.1%)	14 (6.7%)	29 (6.9%)

*JHS = Junior High School; **SHS = Senior High School

Household Practices Related to Complementary Feeding

This similarity held for baseline complementary feeding knowledge and behaviours, as shown in Table 2. Dietary diversity rose from 28% to 52% in intervention communities, compared with 27% to 31% in controls, while feeding frequency and caregiver knowledge also increased significantly. Mothers confirmed the changes: *"They taught us to include groundnuts and beans"* (FGD, 32-year-old mother) and *"[Feeding] three times is better; my boy is more active now"* (KII, 29-year-old father). One other participant said, *"Before, I only gave porridge, but now I add vegetables, and my child eats better"* (FGD, 27-year-old mother). A father underscored the practical aspects: *"We learned that mixing beans with maize makes the food stronger; I see my daughter growing well"* (KII, 34-year-old father). Another participant said, "*Before, I only gave porridge, but now I add vegetables, and my child eats better"* (FGD, 27-year-old mother). A father emphasised the practical impact, stating: *"We learned that mixing beans with maize makes the food stronger; I see my daughter growing well"* (KII, 34-year-old father).

Role of Rural Healthcare Facilities in Supporting Mothers

Counselling sessions increased by 60% per month (from 2.1 to 3.4) in intervention facilities (t=4.8, p<0.01), while controls showed little change (2.0 to 2.2). The availability of IEC materials grew in intervention sites from 25% to 85% versus 28% to 30% in controls ($\chi^2 = 22.6$, $p < 0.001$). Staff counselling expertise improved from 41% to 78%, compared with a modest rise in controls (39% to 44%) ($\chi^2 = 19.3$, $p < 0.001$). Mothers said that they had seen an evolution from routine measurements to interactive counselling: *"They're sitting with us now and tell us what food we're going to give the child"* (24-year-old mother, FGD, Cherepone). Health workers highlighted the visual aids: "We will now show pictures to the mothers on how to cook and keep the children well fed" (35-year-old nurse, KII, Bunkprugu). Training also increased staff confidence: *"We can answer questions with more confidence. What to feed, how to feed, and when to feed the child is stressed"* (40-year-old officer, KII, Mamprugu Moaduri).

Table 2. Nutrition and mothers' knowledge outcomes: Baseline vs. Endline

Indicator	Intervention Communities		Comparison Communities		χ^2 / t-test	p-value
	Baseline	Endline	Baseline	Endline		
Minimum dietary diversity (≥4)	28%	52%	27%	31%	χ^2=12.4	0.001
Feeding frequency (≥3 meals/day)	46%	68%	45%	49%	χ^2=15.7	<0.001
Caregiver knowledge score ≥70%	32%	70%	30%	38%	χ^2=18.2	<0.001
Male Caregiver Participation in Feeding	13%	22%	12%	14%	χ^2 = 4.9	0.03

Practical Home and Facility Support Strategies:

Mothers appreciated the help, mentioning family involvement and follow-up as essential. As one mother put it, *"Men will support us in purchasing groundnuts or fish if the teaching is also given to fathers" (*FGD, Mamprugu-Moaduri). Another added, *"Increase the visits of health workers... we remember to practise what they taught"* (FGD, Bunkprugu).

Health workers stressed the importance of visual aids and continuous training to reinforce messages. One nurse explained: "The posters and guides ***should not be stopped. When absent, caregivers quickly forget and justify their absence at the sessions to these materials***" (38-year-old nurse, KII, Chereponi District). Another health worker reflected on changes in practice: *"Before this training, I was telling mothers, 'Feed well,' but now I tell them how to mix the porridge with vegetables"* (42-year-old male community health officer, KII, East Mamprusi District). Mothers also recognised the role of peer support in maintaining these practices: *"When you are reminded by other mothers, then you know to add beans or greens to the porridge"* (30-year-old mother, FGD, West Mamprusi District). One younger participant highlighted the empowerment aspect: ***"Now I can teach my sister how to prepare the food better, not only wait for the nurse"*** (FGD, 24-year-old mother, East Mamprusi District).

Discussion

This study examined the effects of peer learning and systemic facility-support intervention on complementary feeding practices among children aged 6–23 months in rural districts of Ghana's North East Region. The intervention combined structured caregiver education sessions, peer-to-peer learning groups, and facility-based reinforcement through health worker counselling and visual aids, ensuring both household and institutional support for improved feeding practices.

Using a quasi-experimental mixed-methods design, it differed from most evaluations by including qualitative interviews and focus groups that captured both caregiver and health care worker experiences. The inclusion of those strands enabled convergence and complementarity, addressing personal habits and structural obstacles to child nutrition (UNICEF, 2025; Saaka & Hammond, 2025), reinforcing an understanding of the effects of context-specific interventions. This mixed-methods triangulation strengthens internal validity and provides richer insights into the mechanisms of change.

Rather than simply reporting on dietary diversity and feeding frequency improvements, this study highlights how caregiver awareness and practice shifts reflected deeper behavioral change in intervention communities. The findings are consistent with those of earlier research on complementary feeding in Ghana (Issaka et al., 2018). They also respond to recent calls for caregiver-focused approaches to address feeding problems in northern Ghana (Saaka and Hammond, 2025). This analysis underscores the importance of context-specific strategies. The unique contribution of this study is its integration of quantitative outcomes with qualitative insights from a quasi-experimental analysis of an intervention. Mothers reported shifting from starchy porridge to meals including legumes and vegetables, demonstrating statistically significant progress, illustrated with lived experiences that are often absent in purely survey-based studies. This convergence of numbers and narratives strengthens internal validity and enriches interpretation, showing that feeding practices evolve not only through knowledge gains but also through social reinforcement and facility support.

The study demonstrated tangible changes and positive perceptions among mothers and health workers. Posters, pictorial tools, and counselling sessions were noted as practical supports in qualitative accounts. These findings align with WHO recommendations on the use of visual aids in nutrition counselling and reinforce the role of low-cost educational materials in sustaining behaviour change.

Approaches such as peer-learning groups and cooking demonstrations emerged as critical facilitators, resonating with findings that community-based interventions enhance practices (WHO, 2023). As others have found, peer groups increased confidence, reinforced facility counselling, and promoted mutual support in rural settings where food choices are socially influenced (UNICEF, 2025; Saaka & Hammond, 2025). Mothers explained that exposure to diverse recipes motivated adoption, reinforcing culturally embedded social reinforcement for sustainable change. This suggests that peer learning is not only effective but also scalable, provided it is supported by structured facility counselling and ongoing staff mentorship.

Techniques to enhance household and facility support included involving male caregivers in educational sessions, ongoing staff training, and providing counselling materials to health centres. These approaches draw on evidence for multi-level interventions (UNICEF, 2025; WHO, 2023); this study adds nuance by indicating that mothers valued both male participation and routine health worker visits. These bottom-up insights can direct future tailored interventions to meet community needs and preferences. Linking facility counselling to community education likely reinforced messaging on complementary feeding. Overcoming obstacles such as poverty and cultural taboos, supplemented by facilitators such as peer groups and male involvement, provides pathways toward sustainable child nutrition in rural Ghana. However, challenges such as resource constraints, limited staff capacity, and persistent food insecurity remain, and future studies should explore the cost-effectiveness and long-term sustainability of such interventions.

Conclusions

This study examined the effect of an intervention on household practices and health facility support during complementary feeding for children aged 6–23 months in Ghana's Northeast Region. Integrated interventions, including facility counselling and community education, as well as efforts to enhance dietary diversity and feeding frequency and to improve mothers' knowledge, were implemented. Qualitative and quantitative investigations suggested that the intervention increased counselling capacity and resources. Caregivers indicated a greater preference for food demonstrations and peer learning than for other techniques. While challenges such as poverty, food insecurity, and cultural norms remain, the present study, by drawing on the lived experiences of caregivers (including males) and feedback from practitioners, adds evidence supporting context-specific nutrition plans.

Recommendations

Both our quantitative and qualitative findings strengthen the case for scaling up facility-based nutrition counselling in rural Ghana. The Ministry of Health and the Ghana Health Service should strengthen their focus on household and community health. Staff training should be institutionalised within District Health Directorates to ensure the consistent availability of counselling materials and supportive supervision. Peer learning and cooking demonstrations can be promoted through community-based organisations, women's groups, and NGOs to enhance the success of behaviour change initiatives.

To address gender stereotypes and ensure equitable resource allocation for mothers and children, it is important to encourage greater involvement of fathers in child nutrition and caregiving. This can be supported by the Department of Social Welfare and traditional leaders, who

play a vital role in shaping community norms. Solutions to prevent rural child malnutrition should be led by the Ministry of Food and Agriculture and implemented in close coordination with the health, nutrition, and agriculture sectors, complemented by structural interventions from partners such as UNICEF, WHO, and WFP.

Author Contributions

M.A.: Conceptualization; Methodology; Supervision; Validation; Writing – original draft preparation; Critical review and editing; Z.A.I.: Conceptualisation; Investigation; Data Curation; Formal Analysis; Visualisation. A.A.G.K.: Data collection; Investigation; Writing – review and editing; D.M.Y.: Methodology support; Data collection; Data validation; Writing – review & editing. All authors have read and approved the final version of the paper and its submission and have given consent for publication.

Declaration of Generative AI and AI-Assisted Technologies in Scientific Writing

The authors used Grammarly only as a spell-check tool and to improve the overall clarity of expressions in the manuscript.

Acknowledgements

The authors are indebted to all respondents in this study and to the members of the District Health Management Teams in the target districts.

Data Availability Statement

The data underlying this study will be made available upon reasonable request.

Funding

This study was partly supported by Centre for Development Systems and Services, a local NGO operating in the North-East Region, Ghana.

Conflict of Interest

The authors declare that they have no conflicts of interest.

Publisher's Note: *All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher. The publisher remains neutral with regard to jurisdictional claims.*

REFERENCES

Abebe, Z., Haki, G. D., & Baye, K. (2017). Health extension workers' knowledge and counselling skills on complementary feeding in Ethiopia. *Food and Nutrition Bulletin, 38*(4), 560–569. https://doi.org/10.1177/0379572117723136

Ali, M., & Ali, R. B. (2025). Feeding practices and nutritional outcomes in neonates with sepsis in rural health facilities of Northern Ghana: A mixed-methods analysis. *International Journal of Research and Scientific Innovation.* https://doi.org/10.51244/IJRSI.2025.1215PH000225.7

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.

Ghana Statistical Service. (2024). *Ghana Demographic and Health Survey 2024*. Accra: GSS.

Ghana Statistical Service, Ghana Health Service, & ICF. (2022). *Ghana Demographic and Health Survey 2022*. Accra, Ghana, and Rockville, Maryland, USA: GSS, GHS, and ICF.

Issaka, A. I., Agho, K. E., Page, A., Burns, P., & Dibley, M. J. (2018). Determinants of inadequate complementary feeding practices in West Africa. *Maternal & Child Nutrition, 14*(1), e12577. https://doi.org/10.1111/mcn.12577

Lwanga, S. K., & Lemeshow, S. (1991). *Sample size determination in health studies: A practical manual*. Geneva: World Health Organization. https://doi.org/10.14302/issn.2574-612X.ijpr-17-1753.

Ogbo, F. A., Page, A., Idoko, J., Claudio, F., & Agho, K. E. (2017). Trends in complementary feeding indicators in Nigeria, 2003–2013. *BMJ Open, 7*(10), e016317. https://doi.org/10.1136/bmjopen-2017-016317

Saaka, M., & Hammond, C. (2025). Poor complementary feeding practices and high prevalence of malnutrition in northern Ghana. *International Journal of Child Nutrition, 11*(2), 101–115.

Shadish, W. R., Cook, T., D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.

UNICEF. (2025). *Child Nutrition Report 2025*. New York: UNICEF.

WHO. (1993). *Counselling for maternal and child nutrition: Community counselling tools*. Geneva: World Health Organization.

WHO. (2008). *Indicators for assessing infant and young child feeding practices: Part 1 definitions*. Geneva: World Health Organization.

WHO. (2023). *Infant and young child feeding: Guiding principles for complementary feeding of the breastfed child.* Geneva: World Health Organization.