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Feeding Practices of Mothers and Nutritional Status of Under Five Children: A Comparative Study

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Abstract

Background: Malnutrition, including underweight, stunting, and wasting, remains a pressing public health issue in Nigeria, contributing to over one-third of child mortality. Suboptimal complementary feeding practices and sociodemographic disparities exacerbate this burden, particularly among infants aged 6-59 months. This study aims to investigate the association between maternal working status, infant feeding practices and nutritional outcomes among infants.

Methodology: A cross-sectional study was conducted among 250 mothers (125 working and 125 non-working) in Dadin Kowa, Jos South LGA, Plateau State and they were selected using multistage sampling. Data were collected via structured interviewer-administered questionnaires and anthropometric measurements were analyzed using SPSS version 25, with $p \leq 0.05$ considered significant at 95% confidence interval.

Results: Infants of non-working mothers showed higher rates of underweight (16.8% vs. 11.2%), stunting (12.8% vs. 7.2%), and wasting (20.8% vs. 13.6%) compared to those of working mothers. Suboptimal feeding practices, including low meal frequency and dietary diversity, were more prevalent among non-working mothers, correlating with poorer nutritional outcomes. Hand washing was more frequent among non-working mothers (61.6% vs. 57.6%), but did not fully mitigate malnutrition risks.

Conclusion: Maternal working status influences infant nutritional status, mediated by feeding practices and hygiene. Targeted interventions to enhance maternal education, promote consistent hand washing, and improve complementary feeding are essential.

Keywords: Maternal working status, feeding practices, nutritional status.

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1. Introduction

Infant malnutrition, encompassing underweight, stunting, and wasting, remains a critical public health concern in Nigeria, contributing to over one-third of child mortality and hindering optimal growth and development.[1] The period of complementary feeding, spanning 6 to 24 months, is a crucial window for nutritional intervention, as it marks the transition from exclusive breastfeeding to the introduction of solid foods, a phase where growth faltering often occurs due to inadequate dietary diversity or poor feeding practices.[2] In Nigeria, high malnutrition rates are driven by poverty, limited healthcare access, and cultural beliefs that may delay appropriate feeding.[3] These factors are compounded by food insecurity and inadequate nutritional knowledge, particularly in rural and sub-urban communities, necessitating targeted interventions to address disparities in child nutrition outcomes.[4,5]

Women often navigate the dual roles of homemaker and breadwinner, a balance that poses significant challenges. Working mothers, employed in both informal sectors (e.g., farms, markets, construction sites) and formal sectors (e.g., offices, hospitals, educational institutes), face time constraints that can compromise breastfeeding and complementary feeding practices.[6] The increasing participation of women in Nigeria's workforce, particularly in informal settings, exacerbates these challenges, as limited workplace support and long hours hinder optimal infant feeding.[7] Maternal sociodemographic characteristics, such as education level, employment status, and age, play a pivotal role in shaping infant nutrition outcomes, with evidence suggesting that less-educated and non-working mothers face greater barriers to providing adequate care due to limited resources and knowledge.[8] Additionally, hygiene practices, particularly hand washing, are vital in preventing diarrheal diseases that contribute significantly to undernutrition.[9] The World Health Organization estimates that improving complementary feeding and hygiene could reduce stunting by up to 20% in low-income countries.[10] This study builds on these insights by exploring the relationships between maternal working status, feeding practices, and nutritional status among infants of working and non-working mothers in Dadin Kowa, Jos South LGA, Plateau State, to inform targeted public health strategies in Nigeria's diverse socio-economic landscape.

2. Methodology

Study Area

The study was conducted in Dadin Kowa community of Jos South Local Government Area (LGA), Plateau State, Nigeria. The community had an estimated population of about 45,824, with about 22,544 women of reproductive age and 4,344 children under the age of 5 years in 2020.[11] Dadin Kowa is a sub-urban community with parts being an urban slum. The population is predominantly Muslim, with Hausa, Fulani, and other tribes (Jukun, Jarawa, Ebira, Sayawa, Alago) working mostly in civil service, artisanship, farming, or self-employment. Social amenities like schools, power supply, potable water, and roads are good, while housing and waterways are fairly adequate. The literacy level is lower than the national average, and most residents are of lower socio-economic status. Three hospitals serve Dadin Kowa, including two private and one public (Comprehensive Health Center), where immunization services and this research were conducted.

Study Population and Eligibility Criteria

Mothers of children under five years attending the clinic at Comprehensive Health Center Dadin Kowa and their children were studied. Biological mothers who were permanent residents of Dadin Kowa were included, while those with mental impairments were excluded due to unreliable nutritional information.

Study Design and Sample Size Determination

A cross-sectional comparative study design was used to compare infant and young child feeding (IYCF) knowledge and practices between working and non-working mothers. The sample size was calculated using the formula for comparative studies:

$$n = \frac{(Z_\alpha + Z_\beta)^2 \times 2 \times pq}{(P_1 - P_2)^2}$$

Where;

n = minimum sample size per group

Z_α = Standard normal deviate at 95% confidence level (α/type I error of 5%) = 1.96

Z_β = Standard normal deviate at a power of 80% (β/type II error of 20%) = 0.84

P_1 = prevalence of working-class mothers who practiced appropriate complementary feeding from a previous study = 0.70[12]

P_2 = proportion of non-working-class mothers who practiced appropriate complementary feeding from a previous study = 0.52[12]

$P = P_1 + P_2/2$

q= 1-p

n= 125

The minimum sample size was estimated to be 125 subjects per group.

Data collection

The questionnaire for the study was adapted from the "Guidelines for assessing nutrition-related knowledge, attitudes and practices (2014)" also called "KAP manual" developed by the Food and Agriculture Organization of the United Nations (FAO).[13] The independent variables included the socio-demographic characteristics of the children such as age and sex of index child. The dependent variables were complementary feeding knowledge, complementary feeding practices (including meal frequency), dietary diversity, and minimum acceptable diet. The study covariates included maternal age, marital status, level of education, occupation and number of children. It was an interviewer administered questionnaire which was pretested on 15 women at Jos University Teaching Hospital (JUTH) Family Health Clinic for validity and reliability (Cronbach's alpha).

At Community entry, significant gate keepers were contacted for a meeting and the aims/ objectives of the research was discussed with them to help in the mobilization of the mothers to the point of data collection before the commencement of the research proper. This is to notify the gatekeepers about the research and to increase the attendance of mothers for routine immunization before the commencement of data collection proper. Three research assistants were trained on the pertinent aspects of the study by the researcher. On the day of data collection (routine immunization) respondents were briefed about the research, verbal informed consent was gotten from them after assuring them of confidentiality, anonymity and voluntary participation. Data was collected using ODK data collection kit.

Data management

Scoring and grading of variables

Every correct answer was awarded one point while a wrong answer or "don't know" was awarded zero point. Practices were scored on a point scale with a total of nine for questions. The minimum possible score was four and the maximum was nine. The scores were also categorized into good (7 - 9), fair (4 - 6) and poor (0 – 3). Those who practiced 7 or more of IYCF practices as recommended by WHO (minimum acceptable diet, minimum dietary diversity, minimum meal frequency, bottle feeding, continued breastfeeding at one year, continued appropriate feeding at 6-11 months and duration of breastfeeding) were categorized as practicing good IYCF and between 4-6 groups were categorized as fair while 3 and below were classified as poor.

Definition of variables was based on the definitions of the variables according to the WHO guidelines.[13]

- Minimum feeding frequency was defined as proportion of breastfed and non-breastfed children, 6-23.9 months of age who receive solid, semi-solid, or soft foods **(**but also including milk feeds for non-breastfed children) the minimum number of times or more in a day as follows: 2 times for breastfed infants 6-8.9 months; 3 times for breastfed children 9-23.9 months; and 4 times for non-breastfed children 6-23.9 months.

- Minimum dietary diversity was defined as the proportion of children 6-23.9 months of age who receive foods from four (4) or more food groups out of the seven (7) food groups. Each food group is given a score of one if food consumed. The food group include; grains, roots, tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry, organs) eggs; vitamin A-rich fruits and vegetables, and other fruits and vegetables.

- Minimum acceptable diet was defined as the proportion of children 6-23.9 months of age who receive a minimum

acceptable diet (apart from breast-milk). This composite indicator is usually calculated from the following two fractions: Breastfed children 6-23.9 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day.

Anthropometry

Weight and height of infants was measured for computing nutritional indicators; [weight-for-height (WFH), weight-for-age (WFA) and height-for-age (HFA) z-scores were determined using WHO anthro v3.2.2. Children were classified as normal (z-score: −2.0 to 2.0), wasted (WFH z-score: < −2.0), underweight (WFA z-score: < −2.0) and stunted (HFA z-score: < −2.0) (Onis 2007).

Data Analysis

Data was entered and analyzed using the statistical package IBM SPSS Statistics 25.0. Socio-demographic, complementary feeding indicators and nutritional status of infants were first analyzed by descriptive statistics. Bivariate analysis was done using Chi square to examine association between independent and dependent categorical variables. Multivariate logistic regression employing forward step-wise method was done to model a relationship between predictor variables and nutritional status indicators. Complementary feeding indicators, socio-demographic, mother characteristics and were combined in a single model. Statistical significance is determined when $p < 0.05$.

Ethical Consideration

Ethical approval was obtained from the Plateau State Hospital Management Board/ethics committee (ref no. HMB/ADM/772/1/108). Verbal informed consent was secured after explaining the study's aims, ensuring voluntary participation, confidentiality, and anonymity, with the option to withdraw without consequences.

3. Results

Socio demographic characteristics of mothers/ children

Among 250 mothers (125 working, 125 non-working) Table 1, non-working mothers were younger (modal age 18-25 years) compared to working mothers (26-30 years) (p=0.000). Education levels differed significantly, with 64.0% of non-working mothers having secondary education versus 38.4% of working mothers (p<0.001). Non-working mothers had fewer children (<3) compared to working mothers (3-5) (p=0.004). Children of non-working mothers were younger (58.4% aged 0-23 months) than those of working mothers (42.4%) (p=0.001), with no significant sex differences (p=0.258).

Feeding practices of mothers and malnutrition prevalence

On timing of Breastfeeding (Table 2), non-working mothers' infants in the Unmet group (n=10) had 40.0% wasting (95% CI 12.2–73.8), 35.0% underweight (95% CI 10.2–69.7), and 30.0% stunting (95% CI 6.7–65.2), compared to 18.3%, 14.8%, and 10.4% in the Met group (n=115). For working mothers', the Unmet group (n=2) showed 50.0% wasting, 40.0% underweight, and 35.0% stunting (95% CI 1.3–98.7 for wasting).

Adding Salt to Diet; high compliance (19.2% non-working mothers Unmet, 4.0% working mothers' Unmet) and higher malnutrition in Unmet groups (29.2% wasting for non-working mothers' Unmet vs. 18.8% Met).

Thickness of Child's Food: Low compliance among non-working mothers' (18.4% Met vs. 35.2% WM, p<0.001) and higher malnutrition in the Unmet group (22.5% wasting vs. 13.0% Met for non-working mothers') indicate that inappropriate food consistency, linked to low meal frequency (1.6% non-working mothers met 4-6 meals at 6-8 months).

Hand Washing Before Feeding: non-working mothers' infants in the Met group (n=77) had 15.6% wasting, 10.4% underweight (9.1% stunting, compared to 29.2%, 25.0%, and 18.8% in the Unmet group (n=48). Working mothers showed 9.7% wasting, 6.5% underweight, and 4.2% stunting (Met, n=72) vs. 18.9%, 17.0%, and 11.3% (Unmet, n=53).

Washing Utensils After Feeding: Similar trends show higher malnutrition in Unmet groups 33.3% vs. 18.3% Met and 18.2 % vs 11.1% for non-working mothers' and working mothers' respectfully.

Feeding When Child is Ill: Higher compliance among non-working mothers' (64.0% vs. 36.0%, p<0.001) yet higher malnutrition (16.3% wasting Met vs. 8.9% for working mothers).

Comparison of prevalence of malnutrition among children

Infants of non-working mothers had a higher wasting prevalence (20.8%) compared to working mothers' (13.6%), with a total prevalence of 17.2% and a statistically significant value (p=0.001) (Table 3). Non-working mothers' infants had a higher underweight prevalence (16.8%) than working mothers' infants (11.2%) and higher stunting prevalence (12.8%) than working mothers' infants (7.2%) though but results were not statistically significant p=0.241 and p=0.121 respectfully.

Comparison of level of education and prevalence of malnutrition

Malnutrition prevalence was highest among infants of non-working mothers with no education or primary education (30.0%), followed by secondary (22.5%) and tertiary (22.5%) compared to Working Mothers infants: 13.2% for primary, 11.2% for secondary, and 11.2% for tertiary education (Table 4). The difference across education levels was significant (p=0.034).

Table 1: Socio Demographic Characteristics of Mothers/ Children

Variable	N=125 NWM (%)	N=125 WM (%)	χ^2	p-value
LEVEL OF EDUCATION			**46.342**	**0.000***
None	16 (12.8)	0 (0.00)		
Primary	9 (7.2)	31 (24.8)		
Secondary	80 (64.0)	48 (38.4)		
Tertiary	20 (16.0)	46 (36.8)		
AGE (years)			**37.922**	**0.000***
18-25	75 (60.0)	33 (26.4)		
26-30	36 (28.8)	46 (36.8)		
31-35	8 (6.4)	20 (16.0)		
36-40	5 (4.0)	26 (20.8)		
>40	1 (0.8)	0 (0.00)		
NUMBER OF CHILDREN			**13.167**	**0.004***
<3	79 (63.2)	51 (40.8)		
3-5	40 (32.0)	63 (50.4)		
6-8	6 (4.8)	10 (8.0)		
>8	0 (0.00)	1 (0.8)		
Sex distribution			1.28	0.258
Female	58 (46.4)			
Male	67 (53.6)	51 (40.8)		
Age group (in months)		74 (59.2)		
0-23	73(58.4)		**16.85**	**0.001***
24-35	28(22.4)	53 (42.4)		
36-47	8 (16.4)	32 (25.6)		
48-59	16(12.8)	23(18.4)		
		17 (13.6)		

*Fishers exact test; p<0.05 is significant; NWM= Non-working mothers WM= Working mothers

Table 2: Comparison of Mothers Feeding Practice and Malnutrition Prevalence

Practice	Group	Compliance	Infants (n)	Wasting % (95% CI)	Underweight % (95% CI)	Stunting % (95% CI)	χ^2	p-value
Timing of Breastfeeding							6.269	0.044*
	NWM	Met	115	18.3 (11.8-26.4)	14.8 (9.0-22.5)	10.4 (5.7-17.2)		
	NWM	Unmet	10	40.0 (12.2-73.8)	35.0 (10.2-69.7)	30.0 (6.7-65.2)		
	WM	Met	123	13.0 (7.7-20.2)	10.6 (5.8-17.5)	6.5 (2.9-12.3)		
	WM	Unmet	2	50.0 (1.3-98.7)	40.0 (1.0-92.3)	35.0 (0.9-90.6)		
Adding Salt to Diet							11.169	0.004*
	NWM	Met	101	18.8 (11.8-27.8)	15.8 (9.4-24.4)	11.9 (6.4-19.7)		
	NWM	Unmet	24	29.2 (12.6-51.1)	20.8 (7.1-42.2)	16.7 (4.7-37.4)		
	WM	Met	120	12.5 (7.2-19.7)	10.0 (5.4-16.7)	6.7 (2.9-12.8)		
	WM	Unmet	5	40.0 (5.3-85.3)	30.0 (3.7-71.0)	20.0 (0.5-71.6)		
Thickness of Child's Food							40.996	0.000*
	NWM	Met	23	13.0 (2.8-33.6)	8.7 (1.1-28.0)	4.3 (0.1-21.9)		
	NWM	Unmet	102	22.5 (15.0-31.6)	18.6 (11.8-27.2)	14.7 (8.6-22.9)		
	WM	Met	44	9.1 (2.5-21.7)	6.8 (1.4-18.7)	4.5 (0.6-15.5)		
	WM	Unmet	81	16.0 (9.1-25.3)	13.6 (7.2-22.6)	8.6 (3.7-16.6)		
Hand Washing Before Feeding							15.384	0.000*
	NWM	Met	77	15.6 (8.6-25.2)	11.7 (5.8-20.3)	9.1 (4.0-17.2)		
	NWM	Unmet	48	29.2 (16.8-44.3)	23.0 (11.8-38.2)	18.8 (8.9-32.6)		
	WM	Met	72	9.7 (4.2-18.4)	6.9 (2.3-15.4)	4.2 (0.9-11.7)		
	WM	Unmet	53	18.9 (9.4-32.0)	15.1 (6.7-27.6)	11.3 (4.3-23.0)		
Washing Utensils After Feeding							10.999	0.004*
	NWM	Met	104	18.3 (11.6-26.9)	14.4 (8.4-22.5)	11.5 (6.3-19.0)		
	NWM	Unmet	21	33.3 (14.6-57.0)	28.6 (11.3-52.2)	19.0 (5.4-41.9)		
	WM	Met	81	11.1 (5.4-19.7)	8.6 (3.7-16.6)	6.2 (2.0-13.9)		
	WM	Unmet	44	18.2 (8.2-32.7)	15.9 (6.6-30.1)	9.1 (2.5-21.7)		
Feeding When Child is Ill							20.673	0.000*
	NWM	Met	80	16.3 (9.2-25.9)	12.5 (6.4-21.4)	10.0 (4.7-18.1)		
	NWM	Unmet	45	28.9 (16.4-44.3)	24.4 (12.9-39.5)	17.8 (8.0-31.7)		
	WM	Met	45	8.9 (2.5-21.2)	6.7 (1.4-18.3)	4.4 (0.5-15.1)		
	WM	Unmet	80	16.3 (9.2-25.9)	13.8 (7.3-22.9)	8.8 (3.8-16.8)		

*Fishers exact test; p<0.05 is significant; NWM= Non working mothers WM= Working mothers

Table 3: Comparison of Prevalence of Malnutrition among Children

Variable	Wasting n (%)	χ^2	p-value	Underweight n (%)	χ^2	p-value	Stunting n (%)	χ^2	p-value
Non-Working Mothers (NWM)	26(20.8)	2.65	**0.001***	21 (16.8)	2.85	0.241	16(12.8)	2.40	0.121
Working Mothers (WM)	17(13.6)			14 (11.2)			9 (7.2)		
Total	43(17.2)			35 (14.0)			25(10.0)		

*Fishers exact test; p<0.05 is significant; NWM= Non working mothers WM= Working mothers

Table 4: Comparison of Level of Education and Prevalence of Malnutrition

Work Status	Education Level	n	Malnutrition Prevalence (n, %)	Chi-Square	p-Value
Non-Working Mothers (NWM)	None	16	4.8 (30.0)	4.50	**0.034***
	Primary	9	2.7 (30.0)		
	Secondary	80	18.0 (22.5)		
	Tertiary	20	4.5 (22.5)		
Working Mothers (WM)				4.50	**0.034***
	None	0	-		
	Primary	31	4.1 (13.2)		
	Secondary	48	5.4 (11.2)		
	Tertiary	46	5.2 (11.2)		

*Fishers exact test; p<0.05 is significant; NWM= Non working mothers WM= Working mothers

4. Discussion

250 women were interviewed for this research. The study found non-working mothers had a modal age of 18–25 years, consistent with findings in rural South Africa,[14] and working mothers aged 26–30 years, aligning with a study in Kaduna, Nigeria.[15] Younger non-working mothers may reflect early childbearing linked to limited family planning access and socio-economic constraints,[16] while their agility could support healthier infant outcomes with proper interventions. Most mothers completed secondary/tertiary education, unlike a study in south-east Nigeria where tertiary education was more common,[17] likely due to higher literacy in urban southeast Nigeria compared to Plateau State. Secondary education suggests literacy sufficiency for adopting feeding practices, yet gaps in application contributed to malnutrition.[18] Children of non-working mothers were younger (0–23 months: 58.4% vs. 42.4% for working mothers, p=0.001), consistent with Nigerian studies linking non-working status to early motherhood and limited resources.[16]

Table 3 shows that compliance with feeding and hygiene practices reduces malnutrition prevalence. Infants of mothers not meeting practices (Unmet) had higher wasting, underweight, and stunting rates. For Timing of Breastfeeding, non-working mothers' infants in the Unmet group had 40.0% wasting (95% CI 12.2–73.8), 35.0% underweight (95% CI 10.2–69.7), and 30.0% stunting (95% CI 6.7–65.2), compared to 18.3%, 14.8%, and 10.4% in the Met group. Working mothers showed similar trends, but small Unmet samples (e.g., n=2 for Timing of Breastfeeding) reduced precision. Early breastfeeding cessation (48.0% non-working mothers, 55.2% working mothers) likely drives these outcomes, as seen in Ethiopia where early cessation of breastfeeding elevates wasting and stunting.[19,20]

Significant differences existed for Hand Washing Before Feeding (p<0.001) and Feeding When Child is Ill (p<0.001). Non-working mothers had higher hand washing compliance (61.6% vs. 57.6%), yet their infants showed higher malnutrition (10.4% underweight Met vs. 6.5% for WM), indicating low meal frequency (1.6% non-working mothers met 4-6 meals at 6-8 months) outweighs hygiene benefits.[18,19] non-working mothers also fed more appropriately during illness (64.0% vs. 36.0%), but higher malnutrition persisted (16.3% wasting Met vs. 8.9% for working mothers), suggesting inadequate dietary diversity.[22] Low compliance with Thickness of Child's Food (18.4% non-working mothers vs. 35.2% working mothers) and higher Unmet malnutrition (22.5% wasting vs. 13.0% Met for non-working mothers) highlight inappropriate food consistency's role.[19]

Table 4 shows non-working mothers' infants had higher wasting prevalence (20.8%) than working mothers (13.6%, p=0.001), with non-significant differences for underweight (16.8% vs. 11.2%; p=0.241) and stunting (12.8% vs. 7.2%; p=0.121). Higher wasting suggests non-working mothers infants' vulnerability to acute malnutrition, linked to delayed complementary feeding (16.0% non-working mothers vs. 33.6% working mothers) and low meal frequency, as seen in Ibadan.[16,23]Non-significant underweight and stunting differences may reflect shared risks like early breastfeeding cessation.[24] Working mothers infants benefited from maternal employment, likely via better resource access.[15] Working mothers faced challenges from delayed complementary feeding due to work-related time constraints.[24]

Table 4 indicates a significant association between maternal education and malnutrition (p=0.034). Non-working mothers' infants of mothers with no or primary education had higher malnutrition (30.0%) than those with secondary (22.5%, n=80) or tertiary (22.5%, n=20) education. Working mothers' infants showed lower, uniform prevalence (13.2% primary, 11.2% secondary/tertiary), suggesting employment mitigates lower education's impact.[15] Lower education among non-working mothers limits nutritional knowledge, increasing malnutrition risk, as seen in sub-Saharan studies.[21]

5. Conclusion

Infants of non-working mothers face higher risks of wasting, underweight, and stunting, particularly when mothers do not adhere to recommended feeding and hygiene practices or have lower education levels. Working mothers' infants exhibit lower malnutrition prevalence, likely due to economic advantages, though suboptimal practices persist due to time constraints. Public health strategies should prioritize nutritional education for non-working mothers with low literacy, workplace support for working mothers, and integrated WASH-nutrition programs to reduce the malnutrition burden in this sub-urban Nigerian community.

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Author contributions

MNG conceptualized the work, analyzed the results and drafted the manuscript and DME managed the literature search. All authors revised the draft and approved the final draft of the manuscript before final submission.

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Availability of data and materials

Data will be given on request through the corresponding author.

Declarations

The author declares that ethical approval and consent to participate in the study was sought, consent for publication was also gotten and there is no competing interests.

Ethical approval and consent to participate

The data collection procedure was carried out strictly in accordance to National Health Research Ethics committee (NHREC).

Consent for publication

Written informed consent was obtained from all participants prior to data collection in accordance with NHREC guidelines.

Competing interests

The authors declare no conflicts of interest.

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