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MATERNAL SOCIOECONOMIC FACTORS, CHILDCARE PRACTICES, AND THEIR ASSOCIATION WITH NUTRITIONAL OUTCOMES OF UNDER-FIVE CHILDREN IN DASS LOCAL GOVERNMENT AREA, BAUCHI STATE, NIGERIA

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ABSTRACT

Background: Child undernutrition remains a critical public health challenge in sub-Saharan Africa, where maternal caring capacity, including knowledge, time allocation, and socioeconomic resources, is a key determinant of child nutritional outcomes. However, context-specific data from high-burden areas such as Bauchi State, Nigeria, are scarce.

Methods: A community-based cross-sectional study was conducted among 267 mother-child dyads selected by systematic random sampling from ten wards of Dass Local Government Area, Bauchi State, Nigeria. Data on sociodemographic characteristics, child-care practices, and mothers' working status were collected using a structured questionnaire. Anthropometric measurements were converted to z-scores using World Health Organization growth standards. Associations were examined using Spearman's rank correlation.

Results: Nearly a quarter of mothers (23.2%) were aged 21-25 years, 32.6% were full housewives, and 52.8% earned ≤N10,000 monthly. Exclusive breastfeeding for the first six months was practiced by only 40.8% of mothers, while 47.2% initiated complementary feeding between 7 and 13 months. Overall, 93.3% of children had normal weight-for-age, but 6.0% were severely stunted and 3.3% were mildly underweight. Spearman's correlation revealed significant associations between maternal working time ($r = 0.182$, $p = 0.049$), maternal nutritional knowledge ($r = 0.184$, $p = 0.024$), maternal occupation ($r = 0.167$, $p = 0.042$), maternal education ($r = 0.187$, $p = 0.022$), monthly income ($r = 0.173$, $p = 0.034$), and child-care practices/nutritional status.

Conclusion: Mothers' working hours, income level, and educational status are significantly associated with the nutritional status of their under-five children. Integrated poverty-reduction strategies, improved maternal nutrition education, and workplace-based childcare support are urgently needed to reduce malnutrition in this vulnerable population.

Keywords: Childcare practices; Maternal factors; Nutritional status; Under-five children; Dass Local Government Area; Nigeria

Child undernutrition remains one of the most pressing public health challenges in low- and middle-income countries, with particularly devastating consequences in sub-Saharan Africa (SSA) [1,2]. Globally, undernutrition contributes to nearly half of all deaths among children under five years of age, and SSA bears a disproportionate burden, accounting for two out of every five stunted children and more than one quarter of all wasted children worldwide [3,4]. In Nigeria, the

situation has worsened over the past decade: the prevalence of stunting among under-fives rose from 37% in 2018 to 40% in 2023, underweight increased from 22% to 27%, and wasting from 7% to 8% [5,6]. Currently, Nigeria has an estimated 35 million malnourished children under five, including 14 million stunted and three million wasted, placing the country first in Africa and second globally for the number of stunted children [7,8]. In northern Nigeria, where insecurity, displacement, and economic shocks have converged, the crisis is even more acute; Médecins Sans Frontières reported that nearly 300,000 children with severe acute malnutrition were admitted to outpatient units in northern Nigeria in 2024 alone, accounting for more than half of its global caseload [9].

The role of maternal "caring capacity" has been increasingly recognised as a critical determinant of child nutritional outcomes [1,10]. The UNICEF framework identifies three essential components for child nutrition: food security, health services, and care practices [2,3]. Among these, care practices, including breastfeeding, complementary feeding, hygiene, and health-seeking behaviour, are most directly influenced by mothers' time, knowledge, and resources [11,12]. A growing body of evidence confirms that maternal education, income, and workload significantly affect child nutritional status [13,14]. A recent systematic review and meta-analysis of 49 studies from SSA found that low maternal education was associated with a 55% higher risk of underweight in children (OR = 1.55; 95% CI 1.17-2.04) [1,2]. Similarly, a cross-sectional study in Zamfara State, Nigeria, reported that malnutrition was significantly associated with caregiver education ($p = 0.001$), household income ($p < 0.001$), and feeding practices ($p = 0.002$) [12,14].

Maternal employment presents a double-edged sword [15,16]. On one hand, income from maternal employment can improve household purchasing power and access to nutritious food. On the other hand, long working hours reduce the time available for childcare, including breastfeeding, meal preparation, and hygiene practices [13,15,17]. A study from Ibadan found that mothers who worked fewer than six hours daily had better child-feeding knowledge (OR = 1.87) and hygiene practices than those who worked longer hours [11,15]. Evidence from Uganda similarly highlighted that while maternal employment provides income for better nutrition, it often comes at the cost of reduced childcare time [18,19]. In Bauchi State, where over 61% of children aged 6-23 months are undernourished and 61.7% of under-fives are stunted [20,21], understanding the specific pathways through which maternal factors influence child nutrition is urgently needed to design effective interventions [17,22]. Although numerous studies have examined maternal care practices in urban and rural Nigeria, none have focused specifically on Dass Local Government Area of Bauchi State [11,14]. Understanding the local context, including mothers' working hours, income levels, educational attainment, and childcare practices, is essential for developing realistic, culturally appropriate behaviour-change messages [23,24]. This study therefore aimed to evaluate the caring capacity of mothers and its association with the nutritional status of under-five children in Dass Local Government Area, with the goal of informing targeted nutrition programmes in this high-burden setting [12,17].

MATERIALS AND METHODS

Study design

This was a community-based cross-sectional descriptive study conducted in Dass Local Government Area (LGA), Bauchi State, Nigeria.

Study area

Dass LGA is one of 20 LGAs in Bauchi State, with an estimated population of 89,943 according to the 2006 national census [22]. The area is semi-urban, predominantly inhabited by farmers and traders, and faces significant challenges with child malnutrition, as recent reports indicate that Bauchi State has one of the highest burdens of child undernutrition in Nigeria [20,21,12].

Study population

The study population comprised mothers with children under five years of age residing in Dass LGA [11,14]. Mothers of children aged 0-59 months were included; fathers and children older than five years were excluded [2].

Sample size determination

The minimum sample size was determined using Cochran's formula for cross-sectional prevalence studies [25]: $n = Z^2 \times p \times (1 - p) / d^2$.

Based on an estimated malnutrition prevalence (p) of 11% in Dass LGA (from the 2006 national estimate), the complementary probability (q) = 1 - p = 0.89; the Z-score for a 95% confidence level = 1.96 (standard value for 95% CI); and the margin of error (d) = 5% = 0.05.

$Z^2 = (1.96)^2 = 3.8416$; $p \times q = 0.11 \times 0.89 = 0.0979$; Numerator = $3.8416 \times 0.0979 = 0.3761$; $d^2 = (0.05)^2 = 0.0025$; $n = 0.3761 / 0.0025 = 150.44$. Rounding to the nearest whole number, n = 150.

A cluster-based design was used, and the sample size was inflated by a design effect to account for intra-cluster correlation (similarity of children within the same ward). Standard design effect values for nutrition surveys in Nigeria typically range from 1.5 to 2.0 [26,27,28]. A systematic random sampling technique was used, selecting approximately 27 respondents from each of the ten wards to achieve the target sample size [17,12], and the design effect was calculated as $DEFF = 1 + (m - 1) \times \rho$, where m is the average cluster size ($267 \div 10 = 26.7 \approx 27$) and ρ is the intra-cluster correlation coefficient (estimated at 0.03 for malnutrition in this population). Thus, $DEFF = 1 + (27 - 1) \times 0.03 = 1 + 0.78 = 1.78$.

Using a design effect of 1.78 (a commonly used multiplier for community-based cluster surveys in Nigeria), the adjusted $n = 150 \times 1.78 = 267$. The final sample size of 267 was therefore obtained as $n = (Z^2 \times p \times q / d^2) \times DEFF = (3.8416 \times 0.11 \times 0.89 / 0.0025) \times 1.78 = 150.44 \times 1.78 \approx 267$, giving a final sample size of 267 mother-child dyads. This ensures adequate statistical power while accounting for the cluster-based sampling design used in the 10 wards of Dass LGA.

Sampling technique

A systematic random sampling technique was used: approximately 27 respondents were selected from each of the ten wards in the LGA, giving a total of 267 participants [17,12].

Data collection

Data were collected using a structured, interviewer-administered questionnaire that captured information on socio-economic characteristics, child-care practices, and mothers' working status [15,13,18]. Anthropometric measurements were taken following standard procedures [2,10]. Weight was measured to the nearest 0.1 kg using a standing scale for children who could stand and a bassinet scale for infants. Height or recumbent length was measured to the nearest 0.1 cm using a stadiometer (for children able to stand erect) or an adjustable calibrated flat board (for infants and those unable to stand) [2,4].

Data analysis

Anthropometric data were analysed using World Health Organization (WHO) Anthro software, and nutritional status was classified according to WHO Child Growth Standards using z-scores: weight-for-age (underweight), height-for-age (stunting), and weight-for-height (wasting) [1,2,4]. Descriptive statistics (frequencies, percentages, means, and standard deviations) were computed using Statistical Package for the Social Sciences (SPSS) version 25.0 [5,24]. Spearman's rank correlation coefficient was used to test associations between maternal variables (working time, nutritional knowledge, occupation, education, monthly income) and child nutritional status, with statistical significance set at $p < 0.05$ [11,13,17].

Ethical considerations

Ethical approval was obtained from the Health Research and Ethics Committee of the Dass Local Government Area, followed by permission from community heads [10,14]. Written informed consent was obtained from all participating mothers after explaining the study objectives to them. Participation was voluntary and confidential.

RESULTS AND DISCUSSION

Results

Table 1: Socio-economic background of respondents (mothers)

Variables	Frequency (N)	Percentage (%)
Mother's age (years)		
15-20	61	22.8
21-25	62	23.2
26-30	52	19.5
31-35	57	21.3
≥36	35	13.1
Occupation		
Housewife	87	32.6
Civil servant	13	4.9
Trading	46	17.2
Farming	66	24.7
Others	55	20.6
Education		
Primary	101	37.8
Secondary	75	28.1
Tertiary	36	13.5
Islamic	59	22.1
None	13	4.9
Monthly income (Naira)		
1,000-10,000	141	52.8
11,000-20,000	36	13.5
21,000-30,000	21	7.9
31,000-40,000	18	6.7
Not definite	52	19.5
Marital status		
Married	201	75.3
Never married	21	7.9
Divorced	21	7.9
Widow	11	4.1
Separated	13	4.9
Total	267	100

Table 1 shows the socio-economic profile of 267 mothers. Most were young adults, with 23.2% aged 21-25 years and 22.8% aged 15-20 years. Occupation-wise, 32.6% were housewives, while farming (24.7%) and trading (17.2%) were common. Education was low: 37.8% had only primary education, 22.1% had Islamic education, and 4.9% had none, with only 13.5% attaining tertiary education. Over half (52.8%) earned ₦10,000 or less monthly. Most (75.3%) were married.

Table 2: Child-care practices of respondents

Variables	Frequency (N)	Percentage (%)
Exclusive breastfeeding duration		
0-6 months	109	40.8
7-13 months	87	32.6
14-20 months	41	15.4
≥21 months	30	11.2
Age of introducing complementary feeding		
0-6 months	121	45.3
7-13 months	126	47.2
14-20 months	20	7.5
Breastfeeding frequency (per day)		
Once	59	22.1
Twice	59	22.1
Thrice	91	34.1
More than thrice	58	21.7
Child suffered from disease (past period)		
Yes	267	100
Type of illness		
Diarrhoea	199	74.5
Respiratory infections	27	10.1
Measles	25	9.4
Others	16	6.0
Knowledge of protein-energy malnutrition		
Yes	89	33.3
No	178	66.7
Perceived cause of protein-energy malnutrition		
Low food intake	64	24.0
Lack of protein foods	53	19.9
Excess energy foods	52	19.5
Illness	98	36.7
Total	**267**	**100**

Table 2 summarises key child-care practices. Exclusive breastfeeding for the recommended 0-6 months was practiced by only 40.8% of mothers, while 11.2% continued exclusive breastfeeding beyond 21 months, potentially delaying the introduction of complementary foods. The majority of mothers (47.2%) introduced complementary feeding at 7-13 months, which aligns with WHO recommendations. Almost all children (100%) had suffered from at least one illness in the preceding period, with diarrhoea being the most common (74.5%), a finding similar to other studies in northern Nigeria. Regarding knowledge of protein-energy malnutrition, 66.7% of mothers had no knowledge of this condition, and only 33.3% could correctly identify it, reflecting poor nutrition literacy.

Table 3: Mothers' working status and child-care arrangements

Variables	Frequency (N)	Percentage (%)
Self-employed		
Yes	151	56.6
No	116	43.4
Working hours per day		
4 hours	36	13.5
4-6 hours	94	35.2
6-8 hours	43	16.1
Over 8 hours	94	35.2
Breastfeeding frequency per day		
Once	41	15.4
Twice	109	40.8
Thrice	85	31.8
More than thrice	32	12.0
Primary caregiver during work		
Crèche	78	29.2
Grandmother	53	19.9
Self (child accompanies mother)	105	39.3
Others (neighbours, etc.)	31	11.6
Total	**267**	**100**

Table 3 shows that more than half of the mothers (56.6%) were self-employed. Over a third (35.2%) worked 4-6 hours per day, while another 35.2% worked over 8 hours daily. The majority (40.8%) breastfed their infants only twice per day, and only 12.0% breastfed more than three times daily, well below the recommended 8-12 times. Regarding childcare during work, 39.3% cared for children themselves, 29.2% used a crèche, 19.9% relied on grandmothers, and 11.6% used neighbours or others.

Table 4: Anthropometric indices of under-five children (WHO z-score classification)

Indicator	Normal (%)	Mild (%)	Moderate (%)	Severe (%)
Weight-for-age (underweight)	93.3	3.3	2.0	1.4
Height-for-age (stunting)	90.0	1.3	2.7	6.0
Weight-for-height (wasting)	94.0	2.7	2.0	1.3

The anthropometric assessment (Table 4) revealed that the majority of children had normal nutritional indices. However, a substantial minority exhibited varying degrees of undernutrition: 3.3% were mildly underweight, 2.0% moderately underweight, and 1.4% severely underweight. Stunting was more prevalent: 1.3% mild, 2.7% moderate, and 6.0% severe. Wasting was less common: 2.7% mild, 2.0% moderate, and 1.3% severe.

Table 5: Spearman's rank correlation between maternal variables and child nutritional status

Variables	r-value	p-value
Working time of mothers and childcare	0.182	0.049
Mother's nutritional knowledge and childcare	0.184	0.024
Mother's occupation and childcare	0.167	0.042
Mother's education and nutritional status of child	0.187	0.022
Monthly income and childcare/nutrition	0.173	0.034

Significance level: $\alpha = 0.05$.

Spearman's rank correlation (Table 5) demonstrated statistically significant, though weak to moderate, associations between several maternal factors and child nutritional outcomes. Maternal working time was significantly associated with childcare practices ($r = 0.182$, $p = 0.049$). Mothers' nutritional knowledge was significantly correlated with childcare practices ($r = 0.184$, $p = 0.024$). Maternal occupation showed a significant association with childcare ($r = 0.167$, $p = 0.042$). Maternal education was significantly correlated with child nutritional status ($r = 0.187$, $p = 0.022$). Monthly income was significantly associated with childcare and child nutrition ($r = 0.173$, $p = 0.034$).

Discussion

This study evaluated the caring capacity of mothers and its association with the nutritional status of under-five children in Dass Local Government Area, Bauchi State, Nigeria. The findings confirm that maternal socioeconomic and care-related factors, particularly working time, education, income, and nutritional knowledge, are significantly associated with child nutritional outcomes, consistent with recent evidence from Nigeria and other SSA settings [15,13,1,14,12]. Over a third of mothers (35.2%) worked more than eight hours per day, and 40.8% breastfed their infants only twice daily, far below the recommended frequency of 8-12 times per day for infants

under six months [2,11]. The significant correlation between maternal working time and childcare practices (r = 0.182, p = 0.049) is consistent with a 2024 study from Ibadan, which found that mothers who worked more than six hours daily were 1.87 times more likely to have poor child-feeding knowledge [15,11]. Similarly, a study from rural Bangladesh demonstrated that the effect of care on child nutrition varies considerably with mothers' working hours, and that care becomes less effective as workload increases [1,17]. In a recent Ugandan study, maternal employment was described as a "solitary struggle," where income gains often came at the cost of reduced time for childcare, leading to poorer feeding practices and hygiene [18,19]. These findings underscore the need for workplace-based childcare support and flexible working arrangements for nursing mothers in rural Nigerian settings [23,10,16]. Recent research from Malawi and South Africa further confirms that maternal employment and decision-making autonomy are important dimensions of maternal capabilities that influence nurturing care behaviours [29].

The significant positive correlation between maternal education and child nutritional status (r = 0.187, p = 0.022) aligns with a large body of recent literature [1,12,2]. A 2026 study from Jos, Plateau State, found a strong graded protective effect of maternal education: children of mothers with no formal or only primary education had significantly higher odds of malnutrition ($p < 0.05$), whereas secondary education was associated with lower risk [13,11]. A systematic review and meta-analysis of 49 SSA studies reported that low maternal education was associated with a 55% higher risk of underweight (OR = 1.55; 95% CI 1.17-2.04) [1,2]. In our study, 37.8% of mothers had only primary education, 4.9% had no formal education, and only 13.5% had tertiary education. This low educational attainment likely limits mothers' ability to access, understand, and implement optimal infant and young child feeding practices, contributing to the observed levels of stunting (6% severe) and underweight (3.3% mild) [23,5,24].

The significant association between monthly income and child nutrition (r = 0.173, p = 0.034) is concerning given that 52.8% of mothers earned ≤N10,000 per month. This income level is far below the current Nigerian minimum wage and severely restricts household purchasing power for nutritious foods (eggs, meat, fish, fresh fruits and vegetables) [6,7,22]. Recent data from Bauchi State highlight the severity of the situation: 61.7% of children under five are stunted, and 68.6% of women of reproductive age suffer from anaemia [20,21,12]. The state government has responded by procuring Ready-to-Use Therapeutic Food and Small-Quantity Lipid-Based Nutrient Supplements for over 92,000 children [20,30], but such therapeutic interventions must be complemented by poverty-reduction strategies and income-generation programmes for mothers to achieve sustainable improvements [2,31,10].

The finding that two-thirds of mothers (66.7%) had no knowledge of protein-energy malnutrition, a fundamental concept in paediatric nutrition, is deeply concerning [23,12]. The significant correlation between nutritional knowledge and childcare practices (r = 0.184, p = 0.024) confirms that knowledge gaps translate directly into suboptimal practices [11,17]. A 2025 randomised controlled trial among teenage mothers in Nigeria found that a mobile-based intervention significantly improved knowledge of exclusive breastfeeding and complementary feeding, leading to better infant feeding practices [23,30]. In Jigawa State, despite almost universal breastfeeding (98% of children), only 15.6% of infants under six months were exclusively breastfed, and only 20% initiated breastfeeding within the first hour of birth [23,12]. These figures mirror the low prevalence of exclusive breastfeeding in our study (40.8%) and highlight the urgent need for community-based nutrition education programmes targeting not only mothers but also fathers and grandmothers, who often influence child-feeding decisions in northern Nigerian households [14,15,24].

The finding that 6.0% of children were severely stunted, while only 1.3% were severely wasted, is consistent with the pattern observed across Nigeria and SSA, where chronic undernutrition (stunting) is more prevalent than acute undernutrition (wasting) [5,1,4]. Nationally, 40% of Nigerian children under five are stunted, up from 37% in 2018, and in Bauchi State the situation

is even worse, with stunting rates exceeding 61% in some areas [7,6,22]. Stunting reflects prolonged inadequate nutrition and repeated infections, and it is associated with irreversible cognitive impairment, reduced school performance, and lower adult productivity [2,8,12]. The fact that 74.5% of children in this study had suffered from diarrhoea, a known risk factor for stunting, is consistent with the meta-analysis finding that diarrhoea is associated with a 77% increased risk of overall undernutrition (OR = 1.77) [1,17,11].

Strengths and limitations

This study provides locally relevant data on maternal caring capacity and child nutrition in an understudied area of Bauchi State. However, several limitations must be acknowledged. The cross-sectional design precludes causal inference; the observed associations may be bidirectional. The sample size (267 dyads) limits generalizability to other wards or LGAs in Bauchi State. Social desirability bias may have affected responses to questions on breastfeeding and feeding practices. Additionally, the use of self-reported income and working hours may introduce recall bias. Future longitudinal studies with larger, more representative samples are needed to establish causality and to evaluate the effectiveness of targeted interventions.

Conclusions

This study demonstrates that the caring capacity of mothers in Dass Local Government Area, Bauchi State, Nigeria, is significantly associated with the nutritional status of their under-five children. Specifically, mothers' working time, income level, educational attainment, and nutritional knowledge each show statistically significant associations with child-care practices and child nutritional outcomes. The persistence of severe stunting (6.0%) in this population, despite the majority of children having normal weight-for-age, indicates that chronic undernutrition remains a hidden crisis with long-term consequences for human capital development. The very low levels of maternal nutrition knowledge (only 33.3% knew what protein-energy malnutrition is) and the high prevalence of child morbidity (diarrhoea in 74.5%) further underscore the urgency of action. Addressing child undernutrition in Dass Local Government Area requires a multi-sectoral approach that goes beyond therapeutic feeding programmes to tackle the underlying social and economic determinants: maternal education, household income, and women's time constraints. Without such integrated strategies, Nigeria will not meet its global nutrition targets, and generations of children will continue to suffer the irreversible consequences of early-life undernutrition.

Recommendations

Based on these findings, the following actions are recommended:

(1) Implement community-based, culturally appropriate nutrition education programmes that cover exclusive breastfeeding, timely complementary feeding, dietary diversity, and recognition of malnutrition signs, while also targeting fathers and grandmothers who influence household food decisions.

(2) Establish crèches at workplaces and markets, provide flexible working hours for nursing mothers, and extend paid maternity leave to enable longer exclusive breastfeeding.

(3) Link social protection programmes such as cash transfers and food vouchers to nutrition counselling, targeting low-income households with young children.

(4) Train community health workers to regularly screen children for malnutrition using mid-upper arm circumference (MUAC) and growth monitoring, with functional referral pathways to therapeutic feeding programmes.

(5) Improve access to clean water, latrines, and handwashing facilities to break the infection-malnutrition cycle, given the high prevalence of diarrhoea.

(6) Ensure uninterrupted supply of Ready-to-Use Therapeutic Food and micronutrient supplements through continued collaboration with UNICEF, while investing in prevention through family-level nutrition practices.

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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