Texila International Journal | Open Access | Peer Reviewed

Journal: Texila International Journal of Medicine
https://doi.org/10.21522/TIJMD.2013.09.04.Art007

ISSN: 2520-3118
Volume 9 Issue 4, 2026

Child Food Poverty among Children Aged 6–23 Months in the Maradi Region, Niger: A Cross-Sectional Study of Magnitude, Associated Factors, and Urban–rural Disparities

Gaëlle Lesly Tchumbiep Ngouene[1*], Jacques Nshimirimana[1], Armand Mboutchouang Kountchou[2]

[1]*School of Public Health and Social Works, Texila American University, Guyana*

[2]*Faculty of Economics and Management, University of Dschang, Cameroon*

***Correspondence to be addressed:** E-mail - joslanie@yahoo.fr

Cite this article as: Gaëlle Lesly Tchumbiep Ngouene, Jacques Nshimirimana, Armand Mboutchouang Kountchou. Child Food Poverty among Children Aged 6–23 Months in the Maradi Region, Niger: A Cross-Sectional Study of Magnitude, Associated Factors, and Urban–Rural Disparities. Texila Int J Med. 2026;9(4). **https://doi.org/10.21522/TIJMD.2013.09.04.Art007**

Article Type: Original Research

Received: 16.09.2026

Accepted: 20.10.2026

Published: 29.10.2026

Abstract *Child food poverty, defined by the UNICEF framework according to the number of food groups consumed in the previous 24 hours, is an indicator of inadequate dietary diversity among young children. This study assessed the prevalence of child food poverty, its associated factors, and urban-rural disparities among children aged 6-23 months in the Maradi region of Niger. A cross-sectional survey conducted from September to October 2025 included 1,343 children with complete dietary information. Child food poverty was categorized as no food poverty (≥5 food groups), moderate food poverty (3-4 food groups), or severe food poverty (0-2 food groups). Associations were examined using chi-square tests and multinomial logistic regression, while urban-rural differences were assessed using a Blinder-Oaxaca decomposition. Overall, 95.0% of children experienced moderate or severe food poverty, including 51.4% with severe food poverty. Severe food poverty was most common among children aged 6-11 months (90.3%). Rural residence was strongly associated with both moderate (aRRR = 7.20; 95% CI: 3.50–14.82) and severe food poverty (aRRR = 14.69; 95% CI: 6.77–31.87). Children aged 18-23 months were less likely to experience severe food poverty than younger children. Although food poverty was substantially higher in rural areas than in urban areas, observed characteristics did not significantly explain this disparity. These findings underscore the urgent need for interventions targeting dietary diversity, particularly among younger children and rural populations.*

Keywords *Child Food Poverty, Dietary Diversity, Infant and Young Child Feeding, Maradi, Niger, Rural Population, Urban–Rural Disparities.*

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https://doi.org/10.21522/TIJMD.2013.09.04.Art007

Introduction

The period from 6 to 23 months is a critical window for child growth, development, and the establishment of dietary patterns [1-3]. During this period, children progressively transition from predominantly breast milk-based feeding to complementary foods, while their nutritional requirements increase substantially. The adequacy, quality, and diversity of complementary foods are therefore essential to meeting nutritional needs and supporting healthy growth and development. Inadequate dietary practices during this period may contribute to poor diet quality and increase children's vulnerability to malnutrition and micronutrient deficiencies.

Child malnutrition remains a major public health challenge in low- and middle-income countries, particularly in sub-Saharan Africa [3-6]. Nutritional vulnerability during early childhood is influenced by multiple and interconnected factors, including household socioeconomic conditions, food insecurity, maternal and child characteristics, feeding and caregiving practices, and environmental conditions.

Dietary diversity is an important dimension of this vulnerability because a monotonous diet may limit children's access to a broad range of essential nutrients [1, 2, 7, 8]. Consequently, assessing the quality and diversity of foods consumed by young children is an important component of understanding nutritional deprivation during the complementary-feeding period [4, 7-9].

Historically, the assessment of dietary diversity among children aged 6–23 months has relied extensively on the Minimum Dietary Diversity (MDD) indicator [1]. MDD provides an important measure of whether a child has consumed foods from at least five of the eight recommended food groups during the previous 24 hours, but its binary classification does not distinguish different levels of dietary deprivation. The UNICEF child food poverty framework complements this approach by providing a severity-based classification of dietary deprivation.

Under this framework, children consuming foods from 0–2 of the eight food groups are classified as experiencing severe child food poverty, those consuming 3–4 groups as experiencing moderate child food poverty, and those consuming at least five groups as experiencing no child food poverty [10].

This distinction is particularly relevant from a public health perspective because severe dietary deprivation may identify children experiencing a more profound lack of dietary diversity than can be captured by a binary indicator alone. UNICEF's 2024 global assessment estimated that approximately 181 million children under five years of age were experiencing severe child food poverty, with a particularly high burden in sub-Saharan Africa [5, 10, 11].

Recent studies applying this framework have examined child food poverty in relation to household socioeconomic conditions, maternal characteristics, place of residence, and other contextual factors [8, 9, 12-14]. However, evidence remains limited in many low-resource settings, particularly at subnational level.

Niger continues to face substantial nutritional vulnerability among young children [5, 6, 15]. National nutrition surveillance provides important information on child nutritional status, but such estimates may mask substantial geographic inequalities within regions. The Maradi region is of particular public health importance given the substantial nutritional challenges affecting young children in the region. The broader SMART survey in Maradi was designed to generate geographically disaggregated estimates across the eight departments and the urban municipality of Maradi City.

Previous analyses of the same survey population have reported low attainment of minimum dietary diversity and disparities in infant and young child feeding practices [16].

Nevertheless, the distribution of child food poverty according to its different severity levels, its associated characteristics, and the magnitude of urban–rural disparities remain insufficiently documented at the subregional level in Niger. This evidence gap is important because regional averages may conceal substantial differences between urban and rural populations and between local geographic areas.

A better characterization of child food poverty in this context may therefore contribute to a more precise understanding of dietary deprivation during early childhood and help identify populations requiring greater attention from nutrition programmes.

Examining the urban–rural disparity may also provide complementary information on whether differences in observed child, maternal, household, environmental, and intervention-related characteristics account for the geographic gap in food poverty [9, 13, 14]. The present study therefore aimed to: (i) Estimate the prevalence of moderate and severe child food poverty among children aged 6–23 months in the Maradi region of Niger; (ii) Identify characteristics associated with moderate and severe child food poverty using multinomial logistic regression; and (iii) Examine the urban–rural disparity in child food poverty using a Blinder–Oaxaca decomposition [17, 18].

Methodology

Study Design and Setting

This quantitative cross-sectional descriptive and analytical study was conducted in the Maradi Region of south-central Niger using the SMART (Standardized Monitoring and Assessment of Relief and Transitions) methodology. The region comprises eight departments: Aguié, Bermo, Dakoro, Gazaoua, Guidan-Roumdji, Madarounfa, Mayahi, and Tessaoua; and the urban municipality of Maradi City. Each geographic unit was treated as a distinct survey stratum to permit geographically disaggregated estimates. Data collection was carried out from mid-September to mid-October 2025, corresponding to the end of the rainy season and the beginning of the post-harvest period.

Source Population, Target Population, and Unit of Analysis

The source population consisted of households within enumeration areas established during the 2012 General Population and Housing Census. The target population comprised children aged 6–23 months living in selected households. The unit of analysis for this article was the individual child aged 6–23 months with complete dietary information required to classify child food poverty.

Sampling Design and Sample Size

A stratified two-stage cluster random sampling design was used, with each department and the municipality of Maradi City constituting an independent stratum.

In the first stage, clusters were selected systematically with probability proportional to population size within each stratum. In the second stage, a complete household listing was conducted within each selected cluster, followed by systematic selection of 15 households per cluster. Villages containing more than 150 households underwent prior geographical segmentation, after which one segment was selected to maintain a feasible and standardized field workload. The operational target was 420 households per stratum, corresponding to 28 clusters of 15 households and 3,780 households across the nine strata.

Following data collection, 1,353 children aged 6–23 months had been surveyed for the anthropometric and Infant and Young Child Feeding (IYCF) modules; complete dietary information for classification of child food poverty was available for 1,343 children. Sample size for the parent SMART survey was calculated using ENA for SMART (January 2020 version), assuming an expected global

acute malnutrition prevalence of 13.6% based on the 2022 national SMART survey in Maradi [15], an absolute precision of 3.5%, a 95% confidence level, a design effect of 1.06, and an anticipated non-response rate of 5%. These assumptions yielded the operational target of 420 households per stratum. The present article uses the final observed analytical population rather than the planned household sample size: 1,353 children were assessed, and 1,343 (99.3%) had complete dietary information for the child food poverty outcome.

Inclusion and Exclusion Criteria

Children aged 6–23 completed months who had resided in a randomly selected household for more than six months and whose caregiver provided informed consent were eligible. Children without the dietary information required to classify child food poverty were excluded from the corresponding analytical denominator.

Data Collection

Data were collected by 15 field teams, each comprising four trained fieldworkers, using electronic questionnaires programmed on tablets with automatic consistency checks, including skip patterns, range checks, and mandatory fields. The IYCF module included a structured 24-hour dietary recall documenting all foods and beverages consumed by the child during the previous day, regardless of the quantity consumed. Information was also collected on sociodemographic characteristics, recent morbidity, household conditions, and selected nutrition interventions. Several days of standardized training and continuous field supervision were used to promote consistency in administration of the survey instruments. Potential sources of bias included recall error and day-to-day variation in dietary intake inherent to a single 24-hour recall. These issues were addressed operationally through standardized interviewer training, a structured recall instrument, electronic consistency checks, and field supervision.

Measurement of Child Food Poverty

Child food poverty was derived from the 24-hour dietary recall. Foods and beverages consumed by the child were classified into the eight UNICEF/WHO food groups: (i) Breastmilk; (ii) Grains, roots, tubers and plantains; (iii) Pulses, nuts and seeds; (iv) Dairy products; (v) Flesh foods; (vi) Eggs; (vii) Vitamin A-rich fruits and vegetables; and (viii) Other fruits and vegetables.

Children consuming foods from 0–2 groups were classified as experiencing severe food poverty, those consuming 3–4 groups as experiencing moderate food poverty, and those consuming foods from ≥5 groups as experiencing no food poverty [10]. The child food poverty classification was based on the number of food groups consumed during the previous day. The analytical denominator was 1,343 children with complete dietary information. The 10 children without complete dietary information were excluded from analyses requiring the child food poverty outcome.

Minimum Dietary Diversity (MDD) was treated as a related but distinct binary indicator: children consuming foods from at least five of the eight food groups met the MDD threshold, whereas those consuming fewer than five groups did not. Because MDD and child food poverty are constructed from the same 24-hour dietary recall and the same eight food groups, MDD was retained for descriptive and bivariate analyses but was not included as an independent covariate in the final multinomial model.

Explanatory Variables

Potential explanatory variables were selected a priori on the basis of their epidemiological and programmatic relevance and included child age, child sex, recent diarrhea, maternal age, maternal education,

maternal marital status, household size, access to an improved drinking-water source, access to an improved latrine, place of residence, vitamin A supplementation, and deworming. MDD was not entered into the final multivariable model because of its direct conceptual overlap with the outcome definition. Deworming was examined in bivariate analysis but was not retained in the final multinomial model.

Statistical Analysis

Bivariate associations between explanatory variables and the three-category child food poverty outcome were assessed using Pearson's chi-square test. Multivariable associations were estimated using multinomial logistic regression, with no food poverty as the reference outcome category. Adjusted relative risk ratio (aRRR) and 95% confidence intervals were reported for moderate versus no food poverty and severe versus no food poverty.

The final model included 1,343 children and was evaluated using the Wald test. The model included child age, sex, recent diarrhea, maternal age, maternal education, marital status, household size, improved drinking water, improved latrine, residence, and vitamin A supplementation. No sampling weights or survey-adjusted variance estimates were applied because their use was not documented in the verified thesis analysis. This limitation should be considered when interpreting the precision of the estimated associations.

A multinomial rather than ordinal logistic regression model was retained because the analytical objective was to estimate separate adjusted associations for moderate and severe food poverty relative to no food poverty; the three categories were therefore not assumed to satisfy the proportional-odds assumption of an ordinal model. Statistical significance was defined as $p < 0.05$.

The statistical software used for the analyses was Stata; the version was not documented in the verified thesis records and therefore is not specified here. To investigate the urban–rural disparity in the prevalence of child food poverty, a linear Blinder–Oaxaca decomposition was performed on a binary outcome defined as the presence of moderate or severe food poverty versus no food poverty. The decomposition partitions the observed urban–rural prevalence gap into endowment, coefficient, and interaction components [17, 18].

For the decomposition, the observed gap was expressed as urban prevalence minus rural prevalence. The endowment component represents the portion associated with differences in the distribution of measured covariates, whereas the coefficient and interaction components reflect differences in estimated coefficients and their joint contribution to the statistical partition of the gap. These components were interpreted as descriptive statistical quantities rather than causal effects.

Results

Sociodemographic Characteristics of the Study Population

The regional sample included 1,353 children aged 6–23 months, distributed across the nine survey strata. Madarounfa contributed the largest number of children (221; 16.3%), whereas Maradi City contributed 97 (7.2%). The sex distribution was balanced at the regional level, with 684 boys (50.6%) and 669 girls (49.4%). Children aged 18–23 months represented the largest age group (38.0%), followed by those aged 12–17 months (31.9%) and 6–11 months (30.2%).

https://doi.org/10.21522/TIJMD.2013.09.04.Art007

Table 1. Sociodemographic Characteristics of Children Aged 6–23 Months by Geographic Unit (n = 1,353)

Department	n	% of Region	Girls (%)	Boys (%)	6–11 Months (%)	12–17 Months (%)	18–23 Months (%)
Aguié	128	9.5	55.5	44.5	32.8	24.2	43.0
Bermo	111	8.2	48.7	51.4	22.5	38.7	38.7
Dakoro	134	9.9	49.3	50.8	26.9	36.6	36.6
Gazaoua	173	12.8	46.2	53.8	30.6	31.2	38.2
Guidan-Roumdji	159	11.8	52.2	47.8	31.5	34.6	34.0
Madarounfa	221	16.3	52.0	48.0	33.9	31.7	34.4
Mayahi	165	12.2	47.9	52.1	24.2	32.7	43.0
Tessaoua	165	12.2	47.9	52.1	29.7	29.1	41.2
Maradi City	97	7.2	43.3	56.7	39.2	27.8	33.0
Region total	1,353	100.0	49.4	50.6	30.2	31.9	38.0

Note: *It describes the full surveyed sample (n = 1,353). Subsequent child food poverty analyses use 1,343 children with complete dietary information; analytical denominators may therefore differ.*

Magnitude of Child Food Poverty

Among the 1,343 children with complete dietary information, only 67 (5.0%) were classified as experiencing no child food poverty. A total of 586 children (43.6%) experienced moderate food poverty and 690 (51.4%) experienced severe food poverty. Thus, 95.0% of children were affected by moderate or severe child food poverty. More than half of the children were living in severe food poverty, consuming foods from no more than two of the eight defined food groups during the day preceding the survey. Moderate food poverty affected a further 43.6% of children, while only 5.0% consumed foods from at least five food groups. These thresholds correspond to the UNICEF child food poverty framework. Overall, 95.0% of children in the region were affected by moderate or severe child food poverty. The burden was therefore dominated by severe dietary deprivation rather than by moderate deprivation alone.

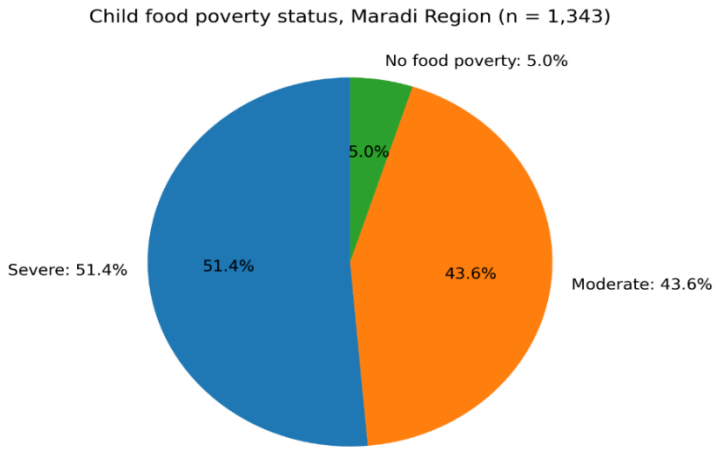


Figure 1. Distribution of Children Aged 6–23 Months According to Child Food Poverty Status, Maradi Region, Niger (n = 1,343)

Note: *Figure 1 displays the distribution of children across the three child food poverty categories. The predominance of severe food poverty indicates that the greatest share of children consumed foods from no more than two of the eight defined food groups during the preceding 24 hours.*

https://doi.org/10.21522/TIJMD.2013.09.04.Art007

Table 2. Distribution of Children Aged 6–23 Months According to Child Food Poverty Category (n = 1,343)

Food Poverty Category (UNICEF 2024)	n	%	Definition (No. of Food Groups/8)
No food poverty	67	5.0	≥5 groups
Moderate food poverty	586	43.6	3–4 groups
Severe food poverty	690	51.4	0–2 groups
Total	**1,343**	**100.0**	—

Note: Child food poverty was classified according to the number of the eight defined food groups consumed during the previous 24 hours: no food poverty (≥5 groups), moderate food poverty (3–4 groups), and severe food poverty (0–2 groups).

Factors Associated with Food Poverty: Bivariate Analysis

In bivariate analysis, child food poverty was significantly associated with child age ($\chi^2(4) = 32.13$; $p < 0.001$). Severe food poverty affected 90.3% of children aged 6–11 months, compared with 49.9% of those aged 12–17 months and 44.0% of those aged 18–23 months.

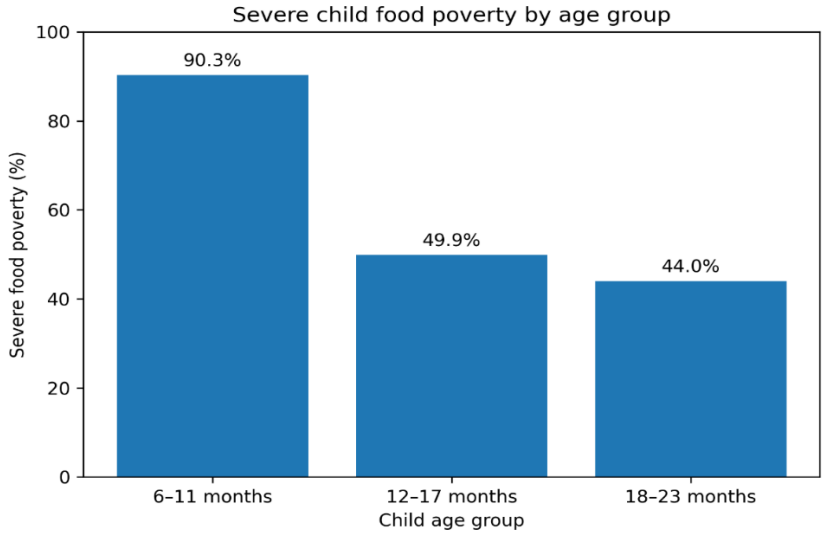


Figure 2. Prevalence of Severe Child Food Poverty by Age Group among Children Aged 6–23 Months, Maradi Region, Niger

Note: *Figure 2 illustrates the age gradient in severe child food poverty. The particularly high prevalence among children aged 6–11 months should be interpreted in the context of the transition to complementary feeding and the use of a single 24-hour dietary recall for classification.*

Significant associations were observed between child food poverty and recent diarrhea ($\chi^2(2) = 8.22$; $p = 0.016$), maternal education ($\chi^2(4) = 25.05$; $p < 0.001$), access to improved drinking water ($\chi^2(2) = 37.38$; $p < 0.001$), access to an improved latrine ($\chi^2(2) = 61.64$; $p < 0.001$), place of residence ($\chi^2(2) = 82.76$; $p < 0.001$), vitamin A supplementation ($\chi^2(2) = 12.47$; $p = 0.002$), and deworming ($\chi^2(2) = 17.40$; $p < 0.001$). The strongest bivariate geographic association was observed for place of residence, with substantially higher food poverty in rural than in urban areas. Access to improved water and sanitation was also strongly associated with food poverty status. The association between MDD and child food poverty was very strong ($\chi^2(2) = 512.38$; $p < 0.001$), as expected because both indicators are constructed from the same eight food groups and the same 24-hour dietary recall. MDD was therefore not interpreted as an independent determinant and was excluded

https://doi.org/10.21522/TIJMD.2013.09.04.Art007

from the final multinomial model. No statistically significant associations were found between child food poverty and child sex ($\chi^2(2) = 2.13$; $p = 0.344$), maternal age ($\chi^2(4) = 5.64$; $p = 0.228$), marital status ($\chi^2(2) = 1.62$; $p = 0.446$), or household size ($\chi^2(6) = 8.73$; $p = 0.189$).

Table 3. Bivariate Associations (Pearson's chi-square) between Selected Characteristics and Child Food Poverty (n = 1,343)

Variable	No Food Poverty (n)	Moderate Food Poverty (n)	Severe Food Poverty (n)	χ^2	p-value
Child Age					
6–11 months	13	14	252	32.13	<0.001
12–17 months	20	195	214		
18–23 months	34	251	224		
Sex					
Female	29	283	353	2.13	0.344
Male	38	303	337		
Recent Diarrhea					
No	35	318	420	8.22	0.016
Yes	32	268	260		
Maternal Education					
None	41	419	553	25.05	<0.001
Primary	11	94	84		
Secondary+	15	73	53		
Marital Status					
Not in union	2	35	33	1.62	0.446
In union	65	551	657		
Household Size					
<5	20	162	210	8.73	0.189
5–9	37	314	323		
10–14	9	82	122		
>14	1	28	35		
Improved Drinking Water					
No	7	101	210	37.38	<0.001
Yes	63	485	480		
Improved Latrine					
No	31	426	580	61.64	<0.001
Yes	36	160	110		
Residence					
Urban	23	43	30	82.76	<0.001
Rural	44	543	660		

Vitamin A					
No	11	73	116	12.47	0.002
Yes	51	452	404		
Deworming					
No	12	101	150	17.40	<0.001
Yes	42	345	279		
MDD					
No	0	402	690	512.38	<0.001
Yes	67	184	0		

Note: Values are observed frequencies (n) in each food poverty category. χ^2 and p-values refer to the overall Pearson chi-square test across the three outcome categories. MDD is shown for descriptive/bivariate purposes because it is constructed from the same eight food groups as the child food poverty classification.

Adjusted Factors Associated with Child Food Poverty

After adjustment for child, maternal, household, environmental, and intervention-related characteristics, rural residence remained the strongest adjusted factor associated with both moderate and severe child food poverty. Compared with children living in urban areas, children living in rural areas had an aRRR of 7.20 (95% CI: 3.50–14.82; $p < 0.001$) for moderate food poverty and 14.69 (95% CI: 6.77–31.87; $p < 0.001$) for severe food poverty. Children aged 18–23 months had a lower relative risk ratio for severe food poverty than children aged 6–11 months (aRRR = 0.46; 95% CI: 0.22–0.98; $p = 0.044$). The corresponding association for moderate food poverty was not statistically significant (aRRR = 0.61; 95% CI: 0.29–1.30; $p = 0.199$). The 12–17-month age group was not significantly associated with either moderate or severe food poverty. No statistically significant adjusted association was observed for household size, although estimates for households of more than 14 persons were imprecise. The association between an improved latrine and severe food poverty was inverse but did not reach statistical significance (aRRR = 0.54; 95% CI: 0.26–1.14; $p = 0.107$).

Sex, recent diarrhea, maternal age, maternal education, marital status, improved drinking water, and vitamin A supplementation were not independently associated with moderate or severe food poverty after adjustment. In particular, the bivariate association observed for maternal education did not persist in the final multivariable model. The final multinomial logistic regression model was statistically significant (Wald $\chi^2(32) = 380.70$; $p < 0.001$; $n = 1,343$). The adjusted associations are presented in Table 4.

Table 4. Adjusted Relative Risk Ratios (aRRRs) for Moderate and Severe Child Food Poverty, with No Food Poverty as the Reference Category (n = 1,343)

Variable	Moderate Food Poverty aRRR [95% CI]	p-value	Severe Food Poverty aRRR [95% CI]	p-value
Age				
6–11 months	1.00 (ref.)	—	1.00 (ref.)	—
12–17 months	0.84 [0.37–1.90]	0.678	0.77 [0.34–1.75]	0.539
18–23 months	0.61 [0.29–1.30]	0.199	0.46 [0.22–0.98]	0.044
Sex				

Female	1.00 (ref.)	—	1.00 (ref.)	—
Male	0.96 [0.58–1.60]	0.874	0.86 [0.51–1.44]	0.560
Recent Diarrhea				
No	1.00 (ref.)	—	1.00 (ref.)	—
Yes	1.05 [0.62–1.77]	0.856	0.82 [0.48–1.39]	0.455
Maternal Age				
<20 years	1.00 (ref.)	—	1.00 (ref.)	—
20–34 years	1.47 [0.65–3.32]	0.352	1.80 [0.79–4.10]	0.160
≥35 years	1.57 [0.60–4.10]	0.354	1.65 [0.62–4.38]	0.315
Maternal Education				
None	1.00 (ref.)	—	1.00 (ref.)	—
Primary	1.29 [0.60–2.73]	0.514	1.04 [0.48–2.25]	0.916
Secondary+	1.42 [0.66–3.06]	0.370	1.09 [0.49–2.41]	0.840
Marital Status				
Not in union	1.00 (ref.)	—	1.00 (ref.)	—
In union	0.95 [0.39–2.35]	0.913	1.64 [0.64–4.18]	0.298
Household Size				
<5 persons	1.00 (ref.)	—	1.00 (ref.)	—
5–9 persons	1.42 [0.77–2.61]	0.256	1.24 [0.67–2.29]	0.491
10–14 persons	1.47 [0.60–3.62]	0.404	1.95 [0.79–4.83]	0.147
>14 persons	4.40 [0.53–36.40]	0.169	4.91 [0.59–41.08]	0.142
Improved Drinking Water				
No	1.00 (ref.)	—	1.00 (ref.)	—
Yes	1.22 [0.59–2.53]	0.597	0.81 [0.39–1.68]	0.577
Improved Latrine				
No	1.00 (ref.)	—	1.00 (ref.)	—
Yes	0.72 [0.34–1.49]	0.372	0.54 [0.26–1.14]	0.107
Residence				
Urban	1.00 (ref.)	—	1.00 (ref.)	—
Rural	7.20 [3.50–14.82]	<0.001	14.69 [6.77–31.87]	<0.001
Vitamin A				
No	1.00 (ref.)	—	1.00 (ref.)	—
Yes	1.16 [0.58–2.33]	0.673	0.58 [0.29–1.16]	0.121

Note: aRRR = adjusted relative risk ratio; 95% CI = 95% confidence interval; ref. = reference category. aRRRs compare moderate or severe food poverty with no food poverty while holding the other variables in the model constant. Estimates for households with >14 persons should be interpreted cautiously because of their wide confidence intervals.

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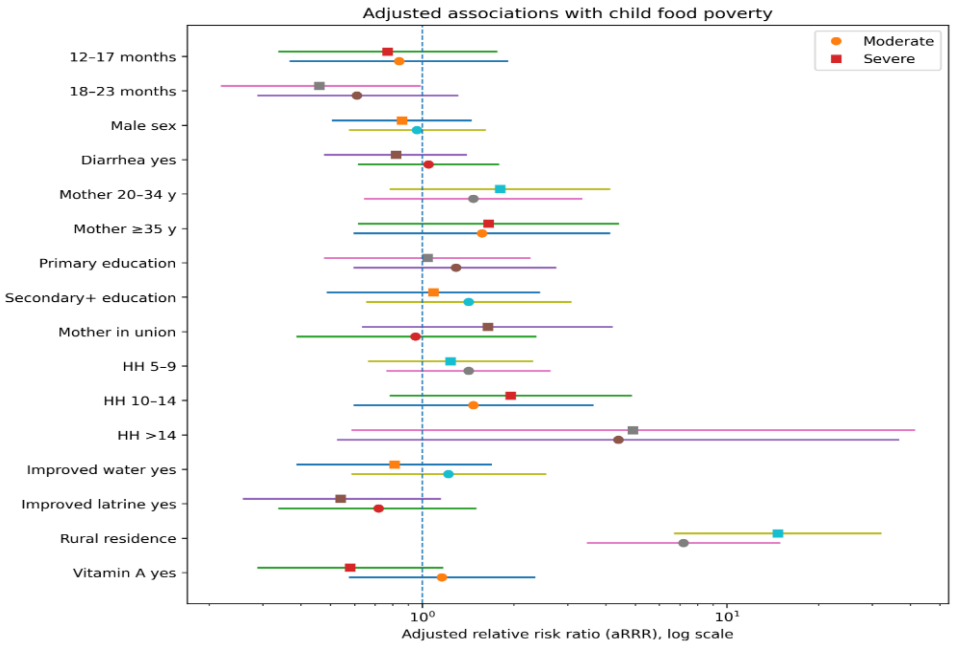


Figure 3. Adjusted Associations between Selected Characteristics and Moderate and Severe Child Food Poverty, Maradi Region, Niger (Multinomial Logistic Regression; aRRRs with 95% CI)

Note: *Points represent adjusted relative risk ratios (aRRRs) and horizontal lines represent 95% confidence intervals. Values >1 indicate higher relative risk relative to no food poverty, whereas values <1 indicate lower relative risk; the vertical reference line corresponds to aRRR = 1.*

Blinder–Oaxaca Decomposition of the Urban–Rural Gap

Child food poverty affected 75.6% of children in urban areas (72/96) and 95.3% of children in rural areas (1,189/1,247), corresponding to a crude urban–rural prevalence gap of −0.197 (19.7 percentage points; $p < 0.001$), expressed as urban minus rural prevalence. Thus, the prevalence was 19.7 percentage points higher in rural than in urban areas. The endowment component was 0.021 (SE = 0.020; $p = 0.284$) and was not statistically significant, indicating that the measured differences in observed characteristics did not, by themselves, account for a statistically significant portion of the urban–rural prevalence gap.

The coefficient component was −0.558 (SE = 0.166; $p = 0.001$), and the interaction component was 0.340 (SE = 0.166; $p = 0.040$). These components should be interpreted as statistical partitions of the observed gap rather than causal effects. The three decomposition components sum to the observed crude gap: 0.021 − 0.558 + 0.340 = −0.197. The results therefore do not support the interpretation that approximately 21% of the disparity is explained by measured household characteristics, nor do they justify attributing the remaining disparity directly to unmeasured contextual factors. Because the decomposition is based on a cross-sectional prevalence comparison, the coefficient and interaction components reflect differences in estimated associations between urban and rural groups and should not be interpreted as causal mechanisms.

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Table 5. Blinder–Oaxaca Decomposition of the Urban–rural Prevalence Gap in Child Food Poverty, Expressed as Urban Minus Rural Prevalence (n = 1,343)

Component	Coefficient	Standard Error	p-value
Food poverty prevalence–urban (n = 96)	0.756	0.046	<0.001
Food poverty prevalence–rural (n = 1,247)	0.953	0.007	<0.001
Crude gap (urban–rural)	−0.197	0.047	<0.001
Endowment component	0.021	0.020	0.284
Coefficient component	−0.558	0.166	0.001
Interaction term	0.340	0.166	0.040

Note Table 5: *The crude urban–rural gap is expressed as urban prevalence minus rural prevalence. The endowment, coefficient, and interaction components are statistical partitions of the observed gap and should not be interpreted as causal effects. The three components sum to the observed gap (0.021 − 0.558 + 0.340 = −0.197).*

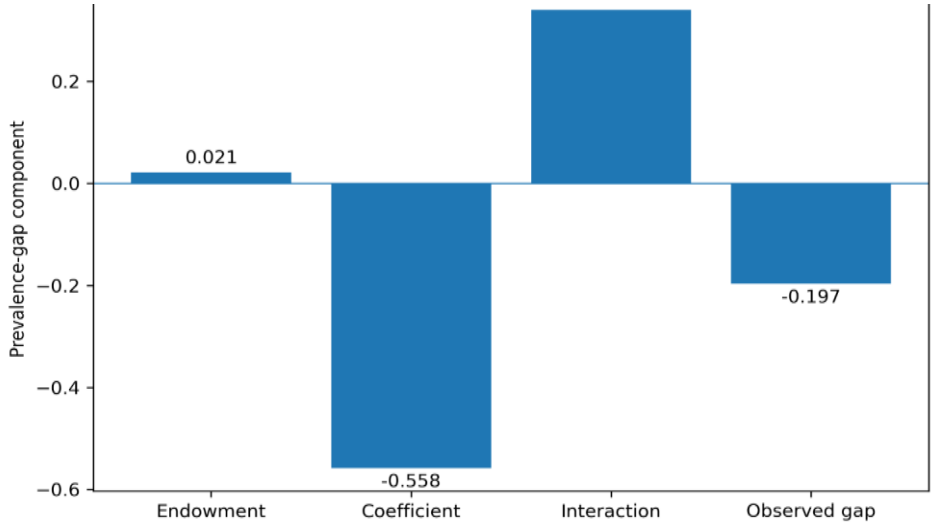


Figure 4. Blinder–Oaxaca decomposition of the urban–rural prevalence gap in child food poverty, Maradi Region, Niger

Note: *The three components sum to the observed urban–rural prevalence gap (0.021 − 0.558 + 0.340 = −0.197). Because the analysis is cross-sectional, the decomposition describes the statistical structure of the observed disparity and does not identify causal mechanisms.*

Discussion

Magnitude of Child Food Poverty

To our knowledge, this study is among the first to apply the UNICEF child food poverty framework to a subregional population in Niger and to examine the urban–rural disparity using a Blinder–Oaxaca decomposition. The findings show an exceptionally high burden of child food poverty, with severe food poverty predominating, and a strong adjusted association with rural residence.

The proportion of children experiencing no child food poverty in the Maradi region was only 5.0%, while 43.6% experienced moderate and 51.4% severe child food poverty. Thus, 95.0% experienced moderate or severe child food poverty. This represents a substantial level of dietary deprivation and indicates that severe food poverty is not a marginal subgroup but the predominant category in this population. More than half of the children consumed foods from no more than two of the eight food groups during the 24 hours preceding the survey.

Comparisons with other settings should nevertheless be made cautiously because published studies may differ in age range, survey design, timing, food-group definitions, and operationalization of child food poverty. A complementary analysis of the same study population found that 18.7% of children met the minimum dietary diversity threshold. The higher proportion meeting MDD than the proportion classified as experiencing no child food poverty is expected because MDD and child food poverty use the same eight food groups but apply different classifications. MDD is a binary indicator based on consuming foods from at least five of the eight food groups, whereas the child food poverty framework distinguishes moderate and severe dietary deprivation among children consuming fewer than five groups.

The magnitude observed in Maradi is also consistent with evidence from other Sahelian settings reporting substantial dietary deprivation among young children. [7-9, 20]. UNICEF's 2024 global assessment identified Niger among the countries carrying a particularly large burden of severe child food poverty [5, 10, 11].

The Age Gradient

Severe child food poverty was highest among children aged 6–11 months (90.3%) and declined to 49.9% among those aged 12–17 months and 44.0% among those aged 18–23 months. This age gradient is consistent with the transition toward complementary feeding after six months, but the cross-sectional design does not establish a causal effect of age or feeding practices.

The very high prevalence among children aged 6–11 months may reflect the early stage of complementary feeding and the limited diversification of diets during this transition, consistent with previous evidence from low- and middle-income countries [1, 2, 20]. However, the present data cannot distinguish developmental, behavioral, household, or seasonal explanations for the observed gradient. These findings support strengthening age-appropriate complementary-feeding counselling from six months onward, while avoiding the inference that the observed age gradient alone identifies a specific causal intervention target.

The Dominant Role of Place of Residence

One of the most important findings was the persistence of a strong association between rural residence and child food poverty after multivariable adjustment. Compared with children living in urban areas, children living in rural areas had an aRRR of 7.20 (95% CI: 3.50–14.82; $p < 0.001$) for moderate child food poverty and 14.69 (95% CI: 6.77–31.87; $p < 0.001$) for severe child food poverty. Rural residence was therefore the strongest adjusted factor associated with both moderate and severe child food poverty in the final multinomial model.

This finding is consistent with evidence from sub-Saharan Africa showing geographic and socioeconomic inequalities in young children's dietary diversity. Previous studies have demonstrated that rural residence, household poverty, limited maternal access to information, and reduced market access are associated with poorer dietary diversity among young children [7, 9, 13, 14, 21]. However, the present cross-sectional analysis cannot determine which specific rural mechanisms, such as household resources, food availability, market access, sanitation, or social norms, produce the observed disparity.

The Blinder–Oaxaca decomposition adds an important qualification to this finding. Child food poverty affected 75.6% of children in urban areas and 95.3% of children in rural areas, corresponding to a crude urban–rural prevalence gap of −0.197 (19.7 percentage points), expressed as urban minus rural prevalence. Thus, the prevalence of child food poverty was 19.7 percentage points higher in rural than in urban areas. The endowment

component was 0.021 (SE = 0.020; p = 0.284) and was not statistically significant. This indicates that differences in the distribution of the measured characteristics included in the decomposition did not, by themselves, account for a statistically significant portion of the observed urban–rural prevalence gap.

The coefficient component was −0.558 (SE = 0.166; p = 0.001), while the interaction component was 0.340 (SE = 0.166; p = 0.040). The three components sum to the observed crude gap (0.021 − 0.558 + 0.340 = −0.197). These decomposition components should be understood as statistical partitions of the observed prevalence difference rather than causal effects. In particular, the results do not support describing approximately 21% of the disparity as being "explained" by measured household characteristics, nor do they justify attributing the remaining disparity directly to unmeasured contextual factors.

Because the decomposition is based on a cross-sectional prevalence comparison, the coefficient and interaction components reflect differences in estimated associations between urban and rural groups and their joint contribution to the statistical partition of the observed gap. They should therefore not be interpreted as causal mechanisms or as direct measures of unobserved contextual factors.

Although maternal education was not independently associated with child food poverty in the present study, previous studies have reported positive associations between maternal education and improved infant and young child feeding practices [13, 14, 20]. This distinction is important because the data do not support a claim of an independent protective effect of maternal education in the final model. Accordingly, interventions should not be justified solely on the basis of maternal education as an independent factor in this dataset. Education may still be relevant to nutrition programming, but its role requires interpretation within the broader socioeconomic and structural context.

Limitations and Implications

This study has several limitations. First, its cross-sectional design does not permit causal inference regarding the relationships between the characteristics studied and child food poverty. The observed associations should therefore be interpreted as correlational rather than causal.

Second, child food poverty relies on a single 24-hour dietary recall and may therefore be affected by recall or reporting errors and by day-to-day and seasonal variation in food consumption. The use of a single recall also limits the ability to distinguish usual dietary intake from short-term variation. This limitation is particularly relevant when interpreting the strong relationship between child food poverty and MDD because both indicators are derived from the same dietary information. Their conceptual and measurement overlap explains the strong bivariate association and supports the decision not to include MDD in the final multivariable model.

Third, several potentially relevant factors, including detailed household wealth, household food security, food prices, market access, and broader characteristics of the local food environment, were not available for the final analysis. Their absence limits the ability to fully characterize the socioeconomic and structural pathways underlying child food poverty.

Fourth, although the study used a stratified cluster sampling design, the verified thesis analysis did not document the application of sampling weights or survey-adjusted variance estimation. Consequently, the reported confidence intervals and p-values should be interpreted with this analytical limitation in mind.

Finally, the Blinder–Oaxaca decomposition provides a statistical partition of the observed urban–rural disparity and does not establish causal mechanisms. In particular, a statistically significant coefficient or interaction component

does not identify a specific unmeasured determinant or causal pathway.

Despite these limitations, the study provides regionally disaggregated evidence on child food poverty using a recent international framework and identifies rural residence and early age as key correlates that merit attention in nutrition policy and programming. Given the particularly high prevalence of severe food poverty among children aged 6–11 months, complementary-feeding counselling and support should be strengthened from six months of age, alongside broader measures that improve access to diverse and nutritious foods, consistent with WHO, UNICEF, and nutrition-sensitive programming recommendations [1, 19, 22]. Nutrition programming should also consider the broader rural socioeconomic and food-system context rather than focusing on individual-level characteristics alone, including food affordability, agricultural diversification, market accessibility, and social protection interventions [6, 11, 19, 23].

Future studies should incorporate longitudinal designs and more detailed measures of household economic resources, food security, food environments, market access, food prices, and seasonal variation to clarify the pathways underlying child food poverty and geographic disparities. Further research is also needed to determine whether the observed urban–rural disparity persists across seasons and to better characterize the contextual factors contributing to the particularly high burden of severe child food poverty in rural areas.

Conclusion

Using the UNICEF child food poverty framework, this study found a very high burden of child food poverty among children aged 6–23 months in the Maradi region, with 95.0% experiencing moderate or severe child food poverty and 51.4% experiencing severe child food poverty. Severe food poverty was particularly pronounced among children aged 6–11 months, among whom 90.3% were classified as experiencing severe child food poverty. Rural residence was the strongest adjusted factor associated with both moderate and severe child food poverty, with adjusted relative risk ratios of 7.20 and 14.69, respectively.

These findings highlight the need to strengthen complementary-feeding counselling and support from six months of age, particularly in rural areas, while promoting sustained access to diverse and nutritious foods in accordance with global recommendations on child nutrition and complementary feeding [1, 19, 22].

However, the cross-sectional design does not permit causal inference, and the Blinder–Oaxaca decomposition should be interpreted as a statistical partition of the observed urban–rural disparity rather than as evidence of causal mechanisms.

Programmatic responses should therefore extend beyond individual feeding practices and consider the broader socioeconomic and food-system context, including household economic conditions, food availability and affordability, market access, food security, and other contextual determinants, as highlighted in recent global nutrition and food security reports [6, 11, 23, 24]. Further research, particularly longitudinal studies incorporating detailed measures of household wealth, food security, food prices, market access, food environments, and seasonality, is needed to clarify the pathways underlying child food poverty and the urban–rural disparity observed in the Maradi region.

Conflict of Interest

The authors declare that they have no conflict of interest related to this study. All authors reviewed and approved the final manuscript.

Acknowledgements

The authors would like to thank the senior management of Texila American University, the Ministry of Health, and the Nutrition Directorate for their assistance in carrying out this study. The authors also thank all field workers for their contribution to data collection and all mothers and children who participated in the study.

Ethical Approval

Ethical approval for this study was obtained from the National Health Research Ethics Committee of Niger. Administrative authorization was also secured from relevant regional and local health authorities. Written informed consent was obtained from caregivers before participation. All collected data were anonymized prior to analysis, and confidentiality was maintained throughout the study.

Authors' Contributions

All authors contributed to the conception and design of the study, data analysis and interpretation, and drafting or critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript.

Data Availability

The dataset analyzed during the current study is not publicly available due to data governance and confidentiality requirements. However, anonymized data may be made available by the corresponding author upon reasonable request and subject to the necessary approvals.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors. The study was self-supported with institutional guidance from Texila American University.

References

[1]. World Health Organization (WHO), United Nations Children's Fund (UNICEF). *Indicators for Assessing Infant and Young Child Feeding Practices: Definitions and Measurement Methods*. Geneva: WHO; 2021.

[2]. Krasevec J, An X, Kumapley R, Bégin F, Frongillo EA. Diet quality and feeding practices of infants and young children aged 6–23 months in low- and middle-income countries. *Maternal and Child Nutrition*. 2017;13(Suppl 2):e12408.

[3]. Victora CG, Christian P, Vidaletti LP, Gatica-Domínguez G, Menon P, Black RE. Revisiting maternal and child undernutrition in low-income and middle-income countries: variable progress towards an unfinished agenda. *Lancet*. 2021;397(10282):1388-1399.

[4]. Akombi BJ, Agho KE, Merom D, Renzaho AM, Hall JJ. Child malnutrition in Sub-Saharan Africa: a meta-analysis of demographic and health surveys (2006-2016). *PLoS One*. 2017;12(5):e0177338.

[5]. UNICEF, World Health Organization, World Bank Group. *Levels and Trends in Child Malnutrition: UNICEF/WHO/World Bank Joint Child Malnutrition Estimates. 2024 Edition*. New York: UNICEF; 2024.

[6]. Development Initiatives. *2024 Global Nutrition Report*. Bristol, United Kingdom: Development Initiatives; 2024.

[7]. Belay DG, Aragaw FM, Teklu RE, Fetene SM, Negash WD, Asmamaw DB, et al. Determinants of inadequate minimum dietary diversity intake among children aged 6–23 months in Sub-Saharan Africa: pooled prevalence and multilevel analysis of Demographic and Health Survey data from 33 countries. *Frontiers in Nutrition*. 2022;9:894552.

[8]. Ba DM, Ssentongo P, Gao X, Chinchilli VM, Richie JP Jr, Maiga M, Muscat JE. Prevalence and determinants of meeting minimum dietary diversity among children aged 6–23 months in three Sub-Saharan African countries: Demographic and Health Surveys, 2019–2020. *Frontiers in Public Health*. 2022;10:846049.

[9]. Endawkie A, Tsega Y, Asmamaw DB, Kebede N, Arefaynie M, Mawugatie TW. Multidimensional disparity in inadequate minimum dietary diversity between poor and non-poor children aged 6–23 months in Sub-Saharan Africa: a multivariate decomposition analysis. *Frontiers in Public Health*. 2025;13:1516129.

[10]. UNICEF. *Child Food Poverty: Nutrition Deprivation in Early Childhood*. Child Nutrition Report, 2024. New York: UNICEF; 2024.

[11]. Food and Agriculture Organization of the United Nations (FAO), International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Programme (WFP), and World Health Organization (WHO). *The State of Food Security and Nutrition in the World 2024*. Rome: FAO; 2024.

[12]. Carneiro LBV, Lacerda EMA, Oliveira N, Schincaglia RM, Alves-Santos NH, Berti TL, et al. Food poverty among children aged 6–59 months in Brazil: results from the Brazilian National Survey on Child Nutrition (ENANI-2019). *Public Health Nutrition*. 2024;27(1):e196.

[13]. Ahmed KY, Page A, Arora A, Ogbo FA. Trends and determinants of minimum dietary diversity among children aged 6–23 months in Sub-Saharan Africa. *Nutrients*. 2020;12(11):3501.

[14]. Amugsi DA, Dimbuene ZT, Mberu B. Household, community and socioeconomic determinants of dietary diversity among children in Sub-Saharan Africa. *BMC Public Health*. 2017;17:248.

[15]. National Institute of Statistics (INS), Nutrition Directorate, Ministry of Public Health, Population and Social Affairs of Niger. *Niger Nutritional and Retrospective Mortality Survey Using SMART Methodology, 2022*. Niamey: INS; 2023.

[16]. Tchumbiep Ngouene LG, et al. *Nutritional Profile and Infant and Young Child Feeding Practices among Children Aged 6–23 Months in Maradi Region, Niger: SMART 2025 Data*. Manuscript in preparation.

[17]. Blinder AS. Wage discrimination: reduced form and structural estimates. *Journal of Human Resources*. 1973;8(4):436-455.

[18]. Oaxaca RL. Male-female wage differentials in urban labor markets. *International Economic Review*. 1973;14(3):693-709.

[19]. Ruel MT, Alderman H; Maternal and Child Nutrition Study Group. Nutrition-sensitive interventions and programmes: how can they help accelerate progress in improving maternal and child nutrition? *Lancet*. 2013;382(9891):536-551.

[20]. Ickes SB, Wu M, Mandel MP, Roberts AC. Associations between social support, maternal knowledge and complementary feeding practices among caregivers of young children. *Public Health Nutrition*. 2018;21(9):1573-1581.

[21]. Hirvonen K, Hoddinott J, Minten B, Stifel D. Children's diets, nutrition knowledge, and access to markets. *Food Policy*. 2017;73:105-110.

[22]. United Nations Children's Fund (UNICEF). *Fed to Fail? The Crisis of Children's Diets in Early Life*. New York: UNICEF; 2021.

[23]. World Bank. *Poverty, Prosperity and Planet Report 2024: Pathways Out of the Polycrisis*. Washington, DC: World Bank; 2024.

[24]. United Nations Children's Fund (UNICEF). *The State of the World's Children 2024*. New York: UNICEF; 2024.