

Research Article

Factors Associated with Dietary Diversity Among Children Aged 6 to 23 Months in Two Localities with the Highest Prevalence of Chronic Malnutrition in Côte d'Ivoire

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Abstract

Introduction: Poor dietary diversity is a major determinant of malnutrition among children aged 6 to 23 months. In Côte d'Ivoire, it was estimated at 28.4% according to the 2020 Demographic and Health Survey. The objective of this study was to identify the factors explaining this poor dietary diversity in areas severely affected by malnutrition. **Methods:** This was a descriptive and analytical cross-sectional study conducted in the administrative districts of Woroba and Zanzan. The study population consisted of mother-child pairs. The 24-hour recall method was used to obtain data on the children's feeding practices. A multivariate analysis was performed using a significance threshold of 5%. **Results:** A total of 293 mother-child pairs were surveyed. The average age of the infants was 13.54 ± 4.82 months and that of the mothers was 26 ± 7 years. The majority of mothers lived with a partner (81.9%) and had not attended school (63.5%). Advice on child feeding came from people other than health workers (24.9%). Dietary diversity was good in only 24.9% of infants. Factors significantly associated with good diversity were a minimum level of primary education [$p = 0.042$, OR = 2.15 (1.03–4.48)], children older than 12 months [$p = 0.000$; OR = 3.72 (1.86–7.43)], and single marital status [$p = 0.002$; OR = 2.93 (1.5–5.73)]. **Conclusion:** The factors associated with dietary diversity among children in areas severely affected by malnutrition are socio-demographic in nature. It is essential to take these factors into account when developing strategies to improve dietary diversity among these children.

Keywords

Associated Factors, Dietary Diversity, Children, Malnutrition, Ivory Coast

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Received: 6 September 2025; **Accepted:** 18 September 2025; **Published:** 10 October 2025



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1. Introduction

Proper feeding practices for infants and young children are essential for reducing infant morbidity and mortality [1]. World Health Organization recommends early breastfeeding, exclusive breastfeeding until 6 months of age, dietary diversification from 6 to 24 months with continued breastfeeding until 24 months or longer [1]. This period of dietary diversification should take into account dietary diversity, which means that children should receive at least four distinct food groups in their daily diet in order to maintain adequate growth and development [2]. Poor dietary diversity is one of the major determinants of malnutrition in children aged 6 to 23 months. In addition to clinically apparent forms of malnutrition, dietary diversity plays a key role in the occurrence of micronutrient deficiencies, also known as “hidden hunger.” According to estimates, hidden hunger affects up to 2 billion people worldwide [3]. Vitamin and mineral deficiencies account for 7.3% of the global burden of disease, with iron and vitamin A deficiencies among the 15 leading causes [3]. It is an essential indicator for achieving the Sustainable Development Goals [4]. However, a study conducted by Ortenzy et al. in 50 countries showed that the percentage of children consuming a poorly diversified diet remained stable, from 21% in 2010 to 24% in 2020 [5]. In West and Central Africa, only one in four children (25%) has a sufficiently diverse diet. The proportion of children aged 6–23 months with a minimum dietary diversity is 34% in Nigeria, 28% in Mauritania, 26% in Benin, 24% in Ghana, 20% in Senegal, and 11% in Mali [6]. In Côte d'Ivoire, despite an increase from 26% in 2016 [7] to 28% in 2020 [8], minimum dietary diversity remains low among children aged 6 to 23 months. This is despite the activities to promote good infant and young child feeding practices implemented by the National Nutrition Program as part of the fight against malnutrition, particularly chronic malnutrition. In light of this situation, a study based on secondary data was conducted by the executive secretariat of the National Council for Nutrition, Food, and Early Childhood Development to identify the factors explaining this low dietary diversity in Côte d'Ivoire [9]. The study found that low levels of maternal education and poor access to drinking water were the causes of this weakness. However, the study was unable to highlight the specific characteristics of each area, especially those areas severely affected by malnutrition. The objective of this study, based on primary data, was to examine the factors associated with dietary diversity among children aged 6 to 23 months in the localities with the highest prevalence of chronic malnutrition in Côte d'Ivoire.

2. Method

2.1. Study Setting

This study was conducted in Woroba and Zanzan adminis-

trative districts. Woroba district, located in the northwest of Côte d'Ivoire, is the fifth largest in the country. It covers an area of 31,088 km² and has an estimated population of 1,184,813 in 2021, with an average of 3,000 assisted births per year in the district and 14 health facilities. Zanzan district, located in the east of Côte d'Ivoire, has an area of 38,251 km² and an estimated population of 1,235,886 inhabitants in 2021. It has 10 health facilities and records an average of 2,700 assisted deliveries per year. These districts are among the 14 districts of Côte d'Ivoire and have the highest prevalence of chronic malnutrition (30.4% and 30.5%) [8].

2.2. Type and Period of Study

This was a cross-sectional analytical study conducted in 12-day period from March 19 to 30, 2023.

2.3. Study Population

The study population consisted of mother-child pairs.

2.3.1. Inclusion Criteria

The study included, mother-child pairs who had lived in the study areas for six months or more and who were present during the survey period were included.

2.3.2. Exclusion Criteria

Those who were ill at the time of the survey and who did not consent to participate in the study were excluded.

2.4. Sample Size and Sampling

2.4.1. Sample Size

The sample size calculation, which took into account the prevalence of dietary diversity in the Zanzan district (18.2%) [8] resulted in a sample size of 229 mother-child pairs.

2.4.2. Sampling

Mother-child pairs were selected from households as follows: within each administrative district, one locality was selected at random. The locality of Bondoukou was selected for the Zanzan district and that of Touba for the Zanzan district. Within each locality, seven clusters of 20 households were selected. The distribution of clusters according to environment was based on population density. Thus, three clusters were chosen in urban areas and four clusters in rural areas. Within each cluster, the investigators sought the center and randomly selected the direction in which to begin the survey. The first household in that direction was chosen, and a step of two households was applied for the following households. In each household, a mother-child pair was selected, and if there

were several targets, the target was selected at random. This distribution resulted in a total of 280 mother-child pairs.

2.5. Data Collection

Data collection was carried out during a face-to-face interview with the mothers using a questionnaire that gathered information on the sociodemographic characteristics of the children and the household. To obtain data on children's feeding practices, the 24-hour recall method was used.

2.6. Data Analysis

Data were analyzed using SPSS 26 software. The dependent variable was dietary diversity. It was recoded as 0 for low dietary diversity and 1 for good dietary diversity. Good dietary diversity was defined as the child having consumed at least 5 of the 8 recommended food groups (i.e., a score ≥ 5 out of 8) [10]. The eight food groups are: breast milk; cereals, roots, and tubers; legumes and nuts; dairy products; meat products (meat/fish/poultry); eggs; vitamin A-rich fruits and vegetables; and other fruits and vegetables. The independent variables were derived from the mother's sociodemographic factors and the characteristics of the household and the child. Analysis consisted of performing the usual descriptive statistics with, depending on the nature of the variables, frequencies, proportions, and means with their standard deviations. Bivariate analysis used, Chi2 test and identified associations between the variables studied. Independent variables for which the associations had a p-value of less than 0.20 were used in the multivariate analysis through logistic regression. Significance was confirmed for a p-value <0.05 .

2.7. Ethical Considerations

Approval was obtained from the National Committee for Ethics in Life Sciences and Health. The informed consent of each mother was sought after she had been informed of the voluntary, free, and unpaid nature of the study. The survey only began once written consent had been obtained.

3. Result

3.1. Socio-demographic Characteristics of Mothers and Children

A total of 293 mother-child pairs were surveyed. More than half (53.2%) of mothers were aged between 20 and 29, with extremes of 15 and 50 and an average age of 26.3 ± 6.6 years. Most mothers (63.5%) had no schooling, were engaged in income-generating activities (74.1%), and lived with a partner (81.9%). The average age of the children was 13.54 ± 5.1 months, and more than half (65.2%) were between 12 and 24 months old. More than half of the children were female (53.2%) and lived in rural areas (54.6%). The majority of children lived in households with no other children aged 0 to 24 months (88.7%) (Table 1).

3.2. Advice on Child Nutrition and Dietary Diversity

With regard to advice on child nutrition, 22.2% of mothers received it from health workers and 24.9% from their social circle. Three out of four children (75.1%) had poor dietary diversity (Table 2). The most commonly consumed foods were cereals, roots, and tubers (87.4%), fruits and vegetables (74.7%), and animal proteins (59.4%). Less than 3 out of 10 children consumed dairy products (23.9%), legumes and nuts (13.7%), eggs (10.6%), and other fruits and vegetables (2.4%).

3.3. Factors Associated with Dietary Diversity

In bivariate analysis (Table 3), minimal dietary diversity was significantly associated with place of residence ($p = 0.015$), mother's educational level ($p = 0.042$), marital status ($p = 0.001$), and child's age ($p = 0.000$). In multivariate analyses (Table 4), the factors significantly associated with dietary diversity were single marital status among mothers [$p = 0.002$; OR = 2.93 (1.5–5.73)] and minimum primary education level [$p = 0.042$; OR = 2.15 (1.03–4.48)]. Among children, age 12–24 months was significantly associated with dietary diversity [$p=0.000$; OR= 3.72 (1.86–7.43)].

Table 1. Socio-demographic characteristics of Bondoukou and Touba mothers and children, 2023.

		Number	Percentage
Characteristics of mothers	Age	< 20 years	49
		20 – 29 years	156
		≥ 30 years	88
	Level of education	No schooling	186
		Primary	49
		Secondary and higher	58

			Number	Percentage
Characteristics of childs	Income-generating activity	Yes	217	74,1
		No	76	25,9
	Marital status	In relationship	240	81,9
		Single	53	18,1
	Age	6 – 11 months	102	34,8
		12 – 24 months	191	65,2
	Gender	Male	137	46,8
		Female	156	53,2
	Place of residence	Urban	133	45,4
		Rural	160	54,6
Household characteristics	Number of children aged 0 to 24 months in the household	1	260	88,7
		2	33	11,3

Table 2. Child nutrition advice, food groups consumed and dietary diversity of children from Bondoukou and Touba in 2023.

		Number	Percentage
Source of advice on children's nutrition	Health workers	65	22,2
	Knowledge	73	24,9
	Cereals, roots and tubers	256	87,4
Food consumed	Vitamin A-rich fruits and vegetables	218	74,4
	Animal proteins	174	59,4
	Dairy products	70	23,9
	Legumes and nuts	40	13,7
	Eggs	31	10,6
	Other fruit and vegetables	7	2,4
	Bad	220	75,1
Dietary diversity	Good	73	24,9

Table 3. Bivariate analysis of Touba and Bondoukou children dietary diversity, 2023.

		Dietary diversity		p
		Bad	Good	
Place of residence	Urban	92 69,2%	41 30,8%	0,033
	Rural	128 80,0%	32 20,0%	
Number of children in the household	1	196	64	0,740

		Dietary diversity		
		Bad	Good	p
Mothers age	≥ 2	75,4%	24,6%	0,482
		24	9	
		72,7%	27,3%	
	< 20 years	40	9	
		81,6%	18,4%	
		114	42	
	20-29 years	73,1%	26,9%	
		66	22	
	30 years	75,0%	25,0%	
		145	41	
Educational level	Unschooler	78,0%	22,0%	0,187
		32	17	
	Primary	65,3%	34,7%	
		43	15	
	Secondary and higher	74,1%	25,9%	
		164	53	
Income-generating activity	Yes	75,6%	24,4%	0,759
		56	20	
	Non	73,7%	26,3%	
		189	51	
	Marital status	In a relationship	78,8%	
31			22	
Alone		58,5%	41,5%	
		103	34	
Child sex	Masculine	75,2%	24,8%	0,971
		117	39	
	Feminine	75,0%	25,0%	
		89	13	
Child Age	6 – 11 months	87,3%	12,7%	0,000
		131	60	
	12 – 24 months	68,6%	31,4%	
		42	12	
Breastfed child	Non	77,8%	22,2%	0,613
		178	61	
	Yes	74,5%	25,5%	
Advice on nutrition received from health workers	Non	173	55	0,557
		75,9%	24,1%	

		Dietary diversity		p
		Bad	Good	
Advice on food received from knowledge	Yes	47	18	0,234
		72,3%	27,7%	
	Non	169	51	
		76,8%	23,2%	
	Yes	51	22	
		69,9%	30,1%	

Table 4. Multivariate analysis of the good dietary diversity of children from Touba and Bondoukou, 2023.

	p	OR	CI for OR 95%	
			Lower	Superior
Place of residence				
Rural		1		
Urban	,065	1,734	,967	3,107
Marital status				
In a relationship		1		
Single	,002	2,930	1,498	5,731
Level of education	0,099			
Unschooling		1		
Primary	,042	2,145	1,027	4,479
Secondary	,861	,934	,437	1,997
Age of the child				
6 – 11 months		1		
12 – 24 months	,000	3,718	1,860	7,430

4. Discussion

Poor quality diets are one of the major barriers to survival, growth, development and learning for children [6]. Throughout the world, young children do not benefit from appropriate diets, the diet they receive is neither age-appropriate nor satisfactory in terms of frequency and diversity [11]. It appears from our study that the foods most consumed by children were cereals, roots, and tubers. This observation is the same in all regions of Côte d'Ivoire, regardless of age [9] and in those of several studies carried out [12-15]. Moreover, our study noted a low consumption of dairy products, legumes, and eggs. The low consumption of

legumes and eggs was noted in Annane study [13] and in 2019 report of UNICEF on children situation in the world [16]. This low consumption of legumes is justified by the lack of knowledge about the use of legumes in children's diets. Emphasis must be placed on these foods in nutritional education provided as part of children under 2 years old nutrition. The low consumption of eggs would find its explanation in taboos which stipulate that its consumption by children would promote the practice of theft among them [17]. Regarding food diversity, its prevalence in the two localities with a high prevalence of malnutrition in Côte d'Ivoire (Touba and Bondoukou) was 24.9%. This result is slightly below those found by the national multisectoral platform for nutrition in Côte d'Ivoire in 2016, which noted a food diversity of 26% [9]

et and by Agboaye et al (25.5%) in 2021 [18]. Khamis et al in Tanzania (26%) [19] and Opoku et al in Ghana (35.3%) [14] noted higher prevalence of dietary diversity in their studies. This low diversity could be explained by mothers' lack of knowledge about the use of certain foods in children's meals, by the existence of taboos, and by difficulties in accessing certain foods. This observation raises the need to strengthen all the strategies that have been implemented by the executive secretariat of the national council for nutrition, food, and early childhood development and by the multisectoral national nutrition plan, to improve the diet of the population and especially children living in areas with low dietary diversity [9]. Regarding the factors associated with dietary diversity, our study found a significant association with an children age of 12 months and older, the level of education, and the marital status of the mother. No significant association was found between place of residence and dietary diversity, even if place of residence explained urban and rural differences in educational attainment. Indeed, mothers in urban areas were significantly more educated than those in rural areas. This association between place of residence and level of education could make place of residence as a confounding variable. However, logistic regression considering place of residence along with other variables made it possible to objectively assess the influence of each variable on children's dietary diversity. Concerning age, our study noted that being older than 12 months was positively related to dietary diversity. In fact, children aged 12 to 23 months were 4.5 times more likely to have good diversity compared to those aged 6 to 11 months. Our results are consistent with those of Opoku et al. in Ghana [14]. These findings may be due to mothers perceiving young children as having a low intestinal capacity to digest certain foods. Consequently, the complementary foods offered to young children lack variety and are often based solely on cereals and legumes. Furthermore, the older the child becomes, the more this perception of mothers diminishes, and the child is integrated into the family meal, which is more diversified. This explains the greater diversity among children aged 9 to even 12 months. Moreover, the good diversity among older children could also be attributed to their preparation to accept foods in various forms and their greater familiarity with certain foods compared to younger infants [14]. Regarding education level, our study showed that mothers with at least a primary education were 2.8 times more likely to have good dietary diversity. This finding was also made by Frempong in Ghana [20]. Several studies have shown a strong association between maternal education and positive nutritional outcomes in children [21-23]. Indeed, education enables women to provide appropriate care for their children [24]. Furthermore, it is linked to higher incomes and better nutritional knowledge, both of which are associated with child diets and nutrition [21]. This suggests the importance of intensifying strategies to increase women's education and strengthen nutrition education at the school level to fight poor dietary diversity. Our study noted that, children of single

mothers were nearly three times more likely to have good dietary diversity. This could be explained by the fact that these mothers receive more support from their extended families and have more time to care for their children, unlike mothers living with a partner, who are more concerned with running their households and face different economic realities than single mothers. Our result are in contradiction with studies conducted by Dhami and Ng [25, 26] who noted that children with single mothers were more likely to have poor dietary diversity due to the fact that single mothers lack support from their families or communities, which leads to poor infant feeding practices. In order, to improve dietary diversity among children, it would be appropriate to strengthen the training and supervision of health workers on feeding indicators for infants and young child especially among uneducated mothers and mothers living with a partner, as well as children under 1 year of age. The message on dietary diversity for children should be tailored to uneducated mothers. Families and friends of mothers should be encouraged to support them, and community cooking demonstrations on preparation of complementary foods should be organized.

This work has limits. On the one hand, its transversal nature prevents establishing the causal link, the temporal sequence between explanatory variables and good dietary diversity. On the other hand, dietary diversity as measured in this study refers to whether or not food is consumed on the eve of the survey. However, not having consumed a food or group of foods on the eve of the interview with the investigators does not imply that this food or group is not part of the infant's eating habits. However, it should be noted that these limitations do not alter the informative nature of this study. It has the merit of highlighting the factors that explain dietary diversity among children aged 6 to 23 months in our study area.

5. Conclusion

Good dietary diversity among children aged 6 to 23 months in the study areas was relatively low. It was associated with the child's age, mother's marital status and education. Interventions aimed at improving maternal education and diversified food consumption among children aged 6 to 59 months should be strengthened to break the intergenerational cycle of malnutrition.

Abbreviations

UNICEF	United Nations Children's Fund
OR	Odds Ratio
CI	Confidence Interval

Author Contributions

Sable Parfait Stephane: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Meth-

odology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

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Conflict of Interest

The authors declare no conflicts of interest.

References

- [1] WHO. Global Strategy for Infant and Young Child Feeding. Geneva, 2003. 37 p.
- [2] WHO. Indicators for Assessing Infant and Young Child Feeding Practices: Part 1: Definitions. Geneva, 2007. 27 p.
- [3] CU L. Evaluation of Dietary Approaches to Preventing Micronutrient Deficiencies Using Isotopic Techniques. IAEA Bulletin. 2014; 55(1): 2.
- [4] WHO. Regional Nutrition Strategy: Addressing Malnutrition and Micronutrient Deficiencies (2011-2015) 2012. 48 p.
- [5] Ortenzi F, Beal T. Priority Micronutrient Density of Foods for Complementary Feeding of Young Children (6-23 Months) in South and Southeast Asia. Front Nutr. 2021; 8: 785227. <https://doi.org/10.3389/fnut.2021.785227>
- [6] Keeley B de Oliveira JD, Aguayo V. M, Branca F, Demaio S, Fanzo J, Haddad L, Menon P, Piwoz E, Quinn V, Rivera J, Shekar M. The State of the World's Children 2019. Children, Food and Nutrition: Growing Up Well in a Changing World. New York: United Nations International Children's Emergency Fund; 2019.
- [7] National Statistics Institute. Multiple Indicator Cluster Survey, 2016, Key Results Report. In: Abidjan Cdi, editor. 2017.
- [8] National Statistics Institute. Côte d'Ivoire Demographic and Health Survey. 2021.
- [9] Nutrition PNMD. Analysis of the determinants of dietary diversity in children aged 6 to 23 months in Côte d'Ivoire. 2021. 73 p.
- [10] WHO. In: Definitions P, editor. Indicators for Assessing Infant and Young Child Feeding Practices. Geneva: WHO; 2008.
- [11] UNICEF. Fed to fail: the feeding crisis for young children. New York, NY 10017, USA: UNICEF, Gdp Nutrition Section; 2021 September 2021.
- [12] Dafursa K, Gebremedhin S. Dietary Diversity among Children Aged 6-23 Months in Aleta Wondo District, Southern Ethiopia. J Nutr Metab. 2019; 2869424. <https://doi.org/10.1155/2019/2869424>
- [13] Anane I, Nie F, Huang J. Socioeconomic and Geographic Pattern of Food Consumption and Dietary Diversity among Children Aged 6–23 Months Old in Ghana. Nutrients. 2021; 13(2): 603. <https://doi.org/10.3390/nu13020603>
- [14] Opoku Agyemang G, Attu SS, Annan RA, Okonogi S, Sakura T, Asamoah-Boakye O. Factors associated with food consumption and dietary diversity among infants aged 6-18 months in Ashanti Region, Ghana. PLoS One. 2023; 18(11): e0294864. <https://doi.org/10.1371/journal.pone.0294864>
- [15] Sisay BG, Afework T, Jima BR, Gebru NW, Zebene A, Hassen HY. Dietary diversity and its determinants among children aged 6–23 months in Ethiopia: evidence from the 2016 Demographic and Health Survey. Journal of Nutritional Science. 2022; 11: e88. <https://doi.org/10.1017/jns.2022.87>
- [16] UNICEF. The State of the World's Children 2019: Children, food and nutrition, growing up well in a changing world. UNICEF; 2019 October 2019.
- [17] Koné M. Household strategies and child malnutrition in the Madarounfa region. Contemporary Africa. 2008(1): 161-97. <https://doi.org/10.3917/afco.225.0161>
- [18] Aboagye RG, Seidu AA, Ahinkorah BO, Arthur-Holmes F, Cadri A, Dadzie LK, et al. Dietary Diversity and Undernutrition in Children Aged 6-23 Months in Sub-Saharan Africa. Nutrients. 2021; 13(10). <https://doi.org/10.3390/nu13103431>
- [19] Khamis AG, Mwanri AW, Ntwenya JE, Kreppel K. The influence of dietary diversity on the nutritional status of children between 6 and 23 months of age in Tanzania. BMC Pediatr. 2019; 19(1): 518. <https://doi.org/10.1186/s12887-019-1897-5>
- [20] Frempong RB, Annim SK. Dietary diversity and child malnutrition in Ghana. Heliyon. 2017; 3(5): e00298. <https://doi.org/10.1016/j.heliyon.2017.e00298>
- [21] Utami RA, Setiawan A, Fitriyani P. Identifying causal risk factors for stunting in children under five years of age in South Jakarta, Indonesia. Enfermeria clinica. 2019; 29: 606-11. <https://doi.org/10.1016/j.enfcli.2019.04.093>
- [22] Gautam KP, Adhikari M, Khatri RB, Devkota MD. Determinants of infant and young child feeding practices in Rupandehi, Nepal. BMC research notes. 2016; 9: 1-7. <https://doi.org/10.1186/s13104-016-1956-z>

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- [23] Tegegne M, Sileshi S, Benti T, Teshome M, Woldie H. Factors associated with minimal meal frequency and dietary diversity practices among infants and young children in the predominantly agrarian society of Bale zone, Southeast Ethiopia: a community based cross sectional study. *Archives of Public Health*. 2017; 75: 1-11.
<https://doi.org/10.1186/s13690-017-0216-6>
- [24] Prickett KC, Augustine JM. Maternal education and investments in children's health. *Journal of Marriage and Family*. 2016; 78(1): 7-25. <https://doi.org/10.1111/jomf.12253>
- [25] Ng CS, Dibley MJ, Agho KE. Complementary feeding indicators and determinants of poor eating practices in Indonesia: a secondary analysis of 2007 Demographic and Health Survey data. *Public health nutrition*. 2012; 15(5): 827-39.
<https://doi.org/10.1017/S1368980011002485>
- [26] Dhami MV, Ogbo FA, Osuagwu UL, Agho KE. Prevalence and factors associated with complementary feeding practices among children aged 6–23 months in India: a regional analysis. *BMC public health*. 2019; 19: 1-16.
<https://doi.org/10.1186/s12889-019-7360-6>