



Research Article

Influence of Maternal Feeding Practices and Associated Factors on the Nutritional Status of Children Aged 6 to 59 Months in Koza (Far North, Cameroon)

Nicolas Policarpe Nolla^{1,*} , William Asongni Djeukeu² , Tiri Taguieke Hadja², Christine Fernande Biyegue Nyangono²

¹Department of Biochemistry, University of Douala, Douala, Cameroon

²Advanced Teacher Training College for Technical Education, University of Douala, Douala, Cameroon

Abstract

Malnutrition remains a major public health concern in Cameroon. The objective of this study was to assess the influence of maternal feeding practices and related factors on the nutritional status of children aged 6 to 59 months in Koza, Far North Cameroon, a region that has been affected for several years by the Boko Haram conflict. A cross-sectional descriptive study was conducted among 200 children aged 6 to 59 months and their mothers. Participants were randomly recruited after verification of their place of residence. Children's anthropometric measurements were taken, and height-for-age and weight-for-age indices were calculated based on WHO growth standards. Children's feeding practices, as well as mothers' dietary habits and sociodemographic characteristics, were assessed using a structured questionnaire. Mothers' body mass index was also calculated according to WHO criteria. The chi-square test was used to examine associations between the different variables. Among the 200 children included in the study, 39% were underweight (21% in the severe form) and 47.5% were stunted (19% in the severe form). A significant association was found between age group and underweight ($P = 0.03$), as well as stunting ($P = 0.04$). The type of breastfeeding was also significantly associated with the occurrence of underweight ($P = 0.02$) and stunting ($P = 0.03$) among the children. The age at which complementary foods were introduced was significantly associated with underweight ($P = 0.03$). Maternal characteristics including age group ($P = 0.005$), nutritional status ($P < 0.001$), marital status ($P = 0.02$), and employment status ($P < 0.001$) were significantly associated with child underweight. An association was also observed between stunting and maternal age ($P = 0.03$). The prevalence of chronic malnutrition among children in Koza was higher than the national average of 33% and the 40.2% reported in the North Region of Cameroon. Strengthening nutrition education and promoting appropriate complementary food formulations could help reduce this burden.

Keywords

Maternal Feeding Practices, Nutritional Status, Children, Koza

*Correspondence: Nicolas Policarpe Nolla (nolkov1@yahoo.fr)

Received: 19 February 2026; Accepted: 28 February 2026; Published: 10 March 2026



Copyright: © The Author(s), 2026. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

1. Introduction

Good nutrition is a fundamental requirement for children to thrive, grow, learn, play, and actively participate in daily life [1]. However, malnutrition remains a major public health problem worldwide, particularly in developing countries. It affects all segments of the population, but infants, young children, and pregnant women are the most vulnerable and most severely affected [2]. According to the World Health Organization (WHO), malnutrition is defined as a pathological condition resulting from the relative or absolute deficiency or excess of one or more essential nutrients. It adversely affects health and undermines socioeconomic development at the family, community, and national levels [2]. Malnutrition may arise from inappropriate dietary practices, poor diet quality, limited food availability and accessibility, improper food utilization, as well as an unhealthy environment, infections, poverty, and armed conflict [3, 4]. People living in poverty are more likely to be affected by various forms of malnutrition. In turn, malnutrition increases health care costs, reduces productivity, and slows economic growth, thereby perpetuating a cycle of poverty and poor health [5].

An estimated 45% of deaths among children under five years of age are attributable to undernutrition [4]. Globally, 148 million children under five were stunted and 45 million were wasted in 2022 [2]. The prevalence of stunting declined from 33% in 2000 to 22.3% in 2022, while wasting decreased from 8.7% in 2000 to 6.8% over the same period [6]. Despite this global decline, the situation in Africa remains concerning. The number of stunted children increased from 61.3 million (41.8%) in 2012 to 63.1 million (43%) in 2022 [6].

In Cameroon, despite relatively high levels of food production, the prevalence of malnutrition in all its forms has continued to rise. This burden varies across regions, with the northern regions being the most affected. Stunting has remained persistently high, increasing from 32.1% in 2012 to 33% in 2022 [6]. The SMART survey conducted in 2021 showed that the regions of Cameroon most affected by stunting among children under five were the North (40.2%), Far North (36.4%), Adamawa (34.6%), and East (32.8%) [7]. The Far North Region also recorded a moderate wasting prevalence of 5.8%, which is higher than the rates reported in the North (4.8%), East (4.5%), and Adamawa (3.8%) regions among children in the same age group [7].

The Far North Region of Cameroon, where Koza is located and which borders Nigeria, has suffered for several years from the Boko Haram insurgency. Armed conflict is a major factor that exacerbates malnutrition and poverty, while also reducing productivity and hindering economic growth. However, in the aftermath of the Boko Haram crisis in the Far North Region of Cameroon, the determinants of malnutrition remain insufficiently documented in many localities. This study therefore provides an opportunity to generate updated data on the determinants of malnutrition in order to support more effective interventions aimed at reducing this burden.

2. Material and Methods

2.1. Study Site

This study was conducted in Koza, one of the districts of the Mayo-Tsanaga Division in the Far North Region of Cameroon. It is bordered to the west by Nigeria and to the east, north, and south by the districts of Mayo-Moskoto, Mokolo, and Souledé-Roua, respectively.

2.2. Study Population and Study Design

Children aged 6 to 59 months and their mothers participated in the study according to predefined inclusion and exclusion criteria. These participants, from different localities in Koza, were enrolled using a random sampling method after verification of their place of residence. This was a cross-sectional and descriptive study.

2.2.1. Inclusion Criteria

- 1) Children aged 6 to 59 months who had resided in the Koza area;
- 2) Mothers who provided written informed consent;
- 3) Children who appeared healthy at the time of the survey.

2.2.2. Exclusion Criteria

- 1) Any child reported to be ill during the study period;
- 2) Mothers who withdrew from the study for personal reasons.

2.3. Ethical and Administrative Considerations

Ethical clearance was obtained from the Douala Institutional Ethics Committee for Human Health Research (No. 2754/CEI-UDo/05/2021/M). Authorization to conduct the study in the locality of Koza was granted by the village chief. To facilitate data collection in the field, the head of the local Health Center provided a medical technician and the necessary equipment for the study. All information collected during the study was kept strictly confidential.

2.4. Sample Size

The minimum sample size was calculated using Cochran's formula, expressed as follows:

$$n = (Z^2 \times p \times (1 - p)) / e^2$$

where:

- 1) n = required sample size
- 2) $Z = 1.96$ for a 95% confidence level
- 3) p = estimated proportion of the characteristic in the study population
- 4) e = tolerated margin of error (0.05).

2.5. Survey Form

The questionnaire administered to the children's mothers included information on child identification, anthropometric measurements, and feeding practices, as well as the mothers' anthropometric characteristics, sociodemographic profile, and dietary habits.

2.5.1. Pre-test

Prior to the survey, a pre-test was conducted to assess participants' understanding of the questionnaire and to minimize potential bias related to improvised translation.

2.5.2. Survey Procedure

The survey was conducted in households across six neighborhoods in the locality of Koza. The fieldwork was organized into two main phases:

- 1) Awareness Phase: Preliminary visits were carried out to inform the population about the study and announce the date of data collection. This awareness campaign was conducted through public announcements in the different neighborhoods (Pawbaw, Guidchigu é Guidbala, Mbouzaou, Barrage, and Ketchk é m é).
- 2) Data Collection Phase: On the scheduled date, the questionnaire was administered and anthropometric measurements were taken by a trained team assigned by the head of the health center to ensure data quality and reliability.

2.6. Anthropometric Measurements

2.6.1. Weight Measurement

Weight was measured using a Salter hanging scale for infants and an Alecto electronic scale for older children. Both scales were regularly calibrated to ensure accuracy. Children aged 6 to 24 months were weighed without clothing using the Salter scale, which was suspended securely from a stable support. For mothers and children aged 25 to 59 months, weight was measured using the electronic scale. Participants, lightly clothed and barefoot, stood upright on the scale with their feet placed on the metal surface, and body weight (kg) was displayed directly on the screen.

2.6.2. Height Measurement

Height was measured using a locally constructed vertical measuring board fitted with a ruler graduated to the nearest centimeter for mothers and for children aged 25 to 59 months. Participants removed their shoes and stood upright while the measurement was taken. For infants aged 6 to 24 months, length was measured in the recumbent position using a graduated measuring board placed on a low table. The child was

laid flat, and the measurement was then recorded.

2.7. Assessment of Nutritional Status

Children's nutritional status was assessed using Z-scores according to WHO growth standards. Chronic malnutrition (stunting) was classified as moderate when the height-for-age Z-score was between -2 and -3 , and severe when it was below -3 compared with the reference population. Underweight was classified as moderate when the weight-for-age Z-score was between -2 and -3 , and severe when it was below -3 [8, 5]. Mothers' Body Mass Index (BMI), expressed in kg/m^2 , was calculated using the formula: weight in kilograms divided by the square of height in meters.

2.8. Feeding Practices

Mothers' feeding practices were assessed using a structured questionnaire. The variables examined included the type of breastfeeding, the age at introduction of new or complementary foods, the reasons for their introduction, and the first food introduced into the child's diet. These variables made it possible to collect information on mothers' practices, skills, and knowledge regarding infant nutrition.

2.9. Statistical Analyses

Statistical analyses were performed using SPSS (Statistical Package for the Social Sciences), version 22.0. The chi-square test was applied to assess associations between the different variables. Statistical significance was set at $P < 0.05$.

3. Results

This study included 200 children aged 6 to 59 months and 200 mothers aged 16 to 44 years. Among the children recruited, 53.5% were girls and 46.5% were boys, corresponding to a sex ratio of 1:1.5.

3.1. Nutritional Status of Children by Age and Sex

Table 1 shows that among the 200 children recruited, 39% were underweight and 47.5% were stunted, with 21% and 19%, respectively, affected in the severe form. Table 1 also indicates that 25.5% of underweight children were female, compared to 18.5% who were male. Stunting was observed in both sexes, with prevalences of 25% among females and 22.5% among males. However, no significant association was found between nutritional status and gender.

Table 1. Distribution of children by nutritional status and gender.

Gender	Nutritional status					Total
	Underweight n (%)		Normal n (%)	Stunting n (%)		
	Moderate (-3 ≤ WAZ < -2)	Severe (WAZ < -3)		Moderate (-3 ≤ HAZ < -2)	Severe (HAZ < -3)	
Feminine	17 (8.5)	24 (12)	16 (8)	32 (16)	18 (9)	107 (53.5)
Masculine	19 (9.5)	18 (9)	11 (5.5)	25 (12.5)	20 (10)	93 (46.5)
Total	36 (18)	42 (21)	27 (13.5)	57 (28.5)	38 (19)	200 (100)
	78(39)			95 (47.5)		
Khi-2	0.36			0.37		
P-value	0.55			0.54		

n= Number; %= Percentage; WAZ= Weight for Age Z-score; HAZ= Height for Age Z-score

Table 2 indicates that children aged 6–23 months and 24–35 months were the most affected by underweight (15% and 4.5%, respectively) and by stunting (13% and 22%, respectively). Age group had a significant influence on both stunting ($\chi^2= 8.31$; $P= 0.04$) and underweight ($\chi^2= 8.59$; $P= 0.03$).

Table 2. Distribution of children according to the nutritional status and age group.

Age group (months)	Nutritional status			Total n (%)
	Underweight n (%)	Normal n (%)	Stunting n (%)	
6-23	30 (15)	5 (2.5)	26 (13)	61 (30.5)
24-35	9 (4.5)	7 (3.5)	44 (22)	60 (30)
36-47	13 (6.5)	9 (4.5)	16 (8)	38 (19)
48-59	26 (13)	6 (3)	9 (4.5)	41 (20.5)
Total	78 (39)	27 (13.5)	95 (47.5)	200 (100)
Khi-2	8.59		8.31	
P-value	0.03		0.04	

n= Number; %= Percentage; WAZ= Weight for Age Z-score; HAZ= Height for Age Z-score

3.2. Impact of Mothers' Feeding Practices on Nutritional Status of the Children

Table 3 indicates that three types of feeding practices were observed: breastfeeding, formula feeding, and mixed feeding. According to the table, 34% of underweight children and 43% of stunted children were breastfed. Among the 59.5% of children who were introduced to complementary foods before the

age of six months, 18.5% were stunted and 18% were underweight. Porridge was the first food introduced into the diet of 43% of stunted children and 34% of underweight children. The primary reason given for the early introduction of complementary foods was the perceived lack of satiety in children. The type of breastfeeding was significantly associated with the occurrence of underweight ($\chi^2= 7.39$; $P= 0.02$) and stunting ($\chi^2= 6.91$; $P= 0.03$). In addition, the age at which complementary foods were introduced was significantly associated with underweight ($\chi^2= 6.73$; $P= 0.03$).

Table 3. Influence of mothers' feeding practices on children's underweight and stunting.

Variables	Dietary practices	Underweight N=78 n (%)	Normal N=27 n (%)	Stunting N=95 n (%)	Total N=200 n (%)
Type of breastfeeding	Breastfeeding	68 (34)	26 (13)	86 (43)	180 (90)
	Artificial	2 (1)	0 (0)	2 (1)	4 (2)
	Mixed	8 (4)	1(0.5)	7 (3.5)	16 (8)
Khi-2		7.39		6.91	
P-value		0.02		0.03	
Age of introduction of complementary feed	Before 6 months	36 (18)	12 (6)	37 (18.5)	119 (59.5)
	During 6 months	12 (6)	8 (4)	24 (12)	44 (22)
	After 6 months	13 (6.5)	7 (3.5)	17 (8.5)	37 (18.5)
Khi-2		6.73			0.59
P-value		0.03			0.74
Reason for introducing foods early	Health Personnel Council	8 (4)	3 (1.5)	6 (3)	17 (8.5)
	Lack of satiety in children	47 (23.5)	18 (9)	33 (16.5)	98 (49)
	In-laws Council	26 (13)	6 (3)	18 (9)	50 (25)
	Parents' Council	2 (1)	0 (0)	2 (1)	4 (2)
	Advice from a friend	5 (2.5)	0 (0)	6 (3)	11 (5.5)
	Mother's illness	12 (6)	0 (0)	8 (4)	20 (10)
Khi-2		6.47		7.08	
P-value		0.17		0.13	
First food introduced	Local porridge	86 (43)	26 (13)	68 (34)	180 (90)
	Family meal	11 (5.5)	1(0.5)	8 (4)	20 (10)
Khi-2		1.41		1.16	
P-value		0.23		0.28	

n= Number; %= Percentage; N=Total number

3.3. Impact of Mothers' Sociodemographic Factors on Children's Nutritional Status

Table 4 indicates that mothers aged 25–34 years had the highest proportion of malnourished children, with 25% affected by stunting and 18% by underweight. Malnutrition was particularly prevalent among children of undernourished mothers: among the 84.5% of mothers who were thin, 37.5% of their children were stunted and 34% were underweight. Mothers in polygamous unions had the highest proportion of

children affected by malnutrition, with 24% stunted and 16% underweight. Stunting and underweight were also more prevalent among children whose mothers had no formal education and among those whose mothers were unemployed. Table 4 further indicates that maternal age group ($\chi^2=10.55$; $P=0.005$), nutritional status ($\chi^2=12.11$; $P<0.001$), marital status ($\chi^2=11.72$; $P=0.02$), and employment status ($\chi^2=23.13$; $P<0.001$) were significantly associated with child underweight. A significant association was also observed between stunting and maternal characteristics, including age ($\chi^2=7.10$; $P=0.03$), nutritional status ($\chi^2=5.95$; $P=0.01$), and employment status ($\chi^2=30.80$; $P<0.001$).

Table 4. Impact of mothers' socio-demographic factors on children's nutritional status.

Variables	Mother's parameters N=200		Children's nutritional status N=200		
	Socio-demographic factors	Total n (%)	Underweight N=78 n (%)	Normal N=27 n (%)	Stunting N=95 n (%)
Age group (years)	16-24	48 (24)	20 (10)	7 (3.5)	26 (13)
	25-34	109 (54.5)	36 (18)	20 (10)	50 (25)
	35-44	43 (21.5)	22 (11)	0 (0)	19 (9.5)
Khi-2			10.55		7.10
P-value			0.005		0.03
Nutritional status	Thinness (BMI<18.5 Kg/m ²)	169 (84.5)	68 (34)	15 (7.5)	75 (37.5)
	Normal (BMI:18.5-24.9 Kg/m ²)	31 (15.5)	10 (5)	12 (6)	20 (10)
Khi-2			12.11		5.94
P-value			<0.001		0.01
Marital status	Monogamous	25 (12.5)	16 (8)	2 (1)	20 (10)
	Polygamous	141 (70.5)	32 (16)	21(10.5)	48 (24)
	Widow	17 (8.5)	14 (7)	3 (1.5)	14 (7)
	Single	9 (4.5)	8 (4)	1 (0.5)	6 (3)
	Divorcee	8 (4)	8 (4)	0 (0)	7 (3.5)
Khi-2			11.72		7.37
P-value			0.02		0.12
Level of education	No Formal education	93 (46.5)	40 (20)	9 (4.5)	48 (24)
	Primary	74 (37)	28 (14)	12 (6)	31 (15.5)
	Secondary	33 (16.5)	10 (5)	6 (3)	16 (8)
Khi-2			2.93		2.25
P-value			0.23		0.29
Employment status	Work at home	27 (13.5)	10 (5)	7 (3.5)	8 (4)
	Farmer	47 (23.5)	18 (9)	3 (1.5)	24 (12)
	Employee	6 (3)	0 (0)	6 (3)	0 (0)
	Trader	20 (10)	14 (7)	2 (1)	17 (8.5)
	Unemployed	100 (50)	36 (18)	9 (4.5)	46 (23)
Khi-2			23.13		30.80
P-value			<0.001		<0.001

n= Number; %= Percentage; N= Total number; BMI= Body Mass Index

4. Discussion

The study conducted in Koza in the Far North Region of Cameroon revealed that the prevalence of underweight among the children aged 6 to 59 months was 39% (Table 1). This prevalence is higher than 3.6% reported by [9] in India and 12.8% reported by [10] in a rural area of the West Region of Cameroon. Regarding stunting, its prevalence was 47.5%, which is higher than the 43% reported by UNICEF, WHO, World Bank, (2023) in Africa among children in the same age group. This prevalence was also higher than the 36.4% reported by the World Food Programme [7]. Furthermore, the study found that 32% of the children were severely stunted, a proportion higher than the 27.9% reported by [9] in India. The high prevalence of these forms of malnutrition may be attributed to several factors, including the geographical location of Koza. Table 1 also indicates that both underweight and stunting were observed in both sexes, with a predominance among female children. However, the difference between males and females was not statistically significant for stunting or for underweight. This shows that malnutrition can affect all segments of the population, regardless of sex or age [2].

The locality of Koza is located in one of the regions of Cameroon most affected by malnutrition [7] and has experienced the Boko Haram conflict. According to the [11], insecurity in this region continues to have a severe impact on food security and the nutritional status of the population. The differences in prevalence observed may also be explained by feeding practices, dietary patterns, food availability and accessibility, food utilization, as well as the sanitary environment, infections, and poverty [3, 4].

Table 2 shows that children aged 6-23 months and 24-35 months were the most affected by underweight (15% and 4.5%, respectively) and by stunting (13% and 22%, respectively). This observation is consistent with the findings of [12]. It may be explained by children's feeding patterns, as this age period is characterized by the introduction of new foods or complementary foods, which, when nutritionally inadequate or unbalanced, can contribute to poor nutritional status. This situation may also be related to inappropriate feeding practices and a lack of maternal knowledge regarding proper infant and young child feeding practices [13].

Table 3 shows that 34% of underweight children and 43% of stunted children were breastfed. Among the 59.5% of children who were introduced to complementary foods before the age of six months, 18.5% were stunted and 18% were underweight. These findings may be explained by the fact that the type of breastfeeding and the early introduction of foods other than breast milk in children under six months of age may interfere with proper physiological development, thereby contributing to poor nutritional status [14]. This study also revealed that children who were introduced to complementary foods before the age of six months had a higher prevalence of underweight and stunting. These findings are consistent with those of [15], conducted among children in the same age group

in the locality of Ayos, located in the Centre Region of Cameroon.

Table 4 indicates that mothers aged 25–34 years had the highest proportion of malnourished children, with 25% affected by stunting and 18% by underweight. Malnutrition was particularly prevalent among children of undernourished mothers: among the 84.5% of mothers who were thin, 37.5% of their children were stunted and 34% were underweight. These findings may be explained by young mothers' limited experience and inadequate infant feeding practices. They may also be attributed to insufficient nutritional education, which can lead to a lack of knowledge regarding appropriate feeding practices and the nutritional needs of the child [16]. Maternal malnutrition, particularly when resulting from undernutrition, can pose serious health risks [17]. Our study found a significant association between maternal nutritional status and child underweight ($\chi^2=2.11$; $P<0.001$). This suggests that maternal undernutrition may contribute to adverse outcomes such as low birth weight [17], which in turn increases the risk of underweight in children. This association may also be explained by inadequate maternal nutrition, particularly during pregnancy and breastfeeding, which can have harmful and irreversible effects on child survival, birth weight, and growth [18]. In addition, food taboos affecting pregnant women in the locality of Koza, as well as their economic constraints, may contribute to poor maternal nutritional status, which in turn can negatively affect the nutritional status of their children. Table 4 also shows that 50% of the mothers were unemployed, and a significant association was found between maternal employment status and child underweight ($\chi^2=23.13$; $P<0.001$). This may be explained by poverty, limited food accessibility and by limited maternal knowledge regarding nutrition and children's dietary needs [3, 4]. A limitation of this study's statistical analysis is that statistical significance does not necessarily imply practical relevance, as the magnitude of the effect and the broader contextual factors must also be considered.

5. Conclusion

At the end of this study, the prevalence of chronic malnutrition among children in Koza was higher than the national average of 33% and the 40.2% reported in the North Region of Cameroon. The prevalence of both stunting and underweight was influenced by the children's age. The age at which complementary foods were introduced was associated with underweight. Maternal age, nutritional status, marital status and employment status were also associated with underweight. The nutritional education and food formulations based on local products could reduce malnutrition among these children.

Abbreviations

BMI	Body Mass Index
SPSS	Statistical Package for the Social Sciences

HAZ Height for Age Z-score
WAZ Weight for Age Z-score

Acknowledgments

The authors are grateful to the children and their mothers who participated in this study. They also express their sincere thanks to the administrative and health authorities for their co-operation and support.

Author Contributions

Nicolas Policarpe Nolla: Conceptualization, Data curation, Methodology, Formal Analysis, Writing – original draft, Writing – review & editing

William Asongni Djeukeu: Conceptualization, Data curation, Methodology, Writing – review & editing

Tiri Taguieke Hadja: Methodology, Data curation, Writing – review & editing

Christine Fernande Biyegue Nyangono: Conceptualization, Data curation, Methodology, Supervision, Writing – review & editing

Conflicts of Interest

The authors declared no conflict of interest.

References

- [1] Govender, I., Rangiah, S., Kaswa, R., Nzaumvila, D. (2021). Malnutrition in children under the age of 5 years in a primary health care setting. *South African Family Practice*. 63(1): 5337. <https://doi.org/10.4102/safp.v63il.5337>
- [2] WHO (2024a). World health statistics 2024: monitoring health for the SDGs, Sustainable Development Goals. Geneva: World Health Organization; 2024. Licence: CC BY-NC-SA 3.0 IGO.
- [3] Drammeh, W., Hamid, N. A., Rojana, A. J. (2019). Determinants of household food insecurity and its association with child Malnutrition in Sub-Saharan Africa: A review of the literature. *Current Research in Nutrition and Food Science*. 7: 3. <https://doi.org/10.12944/CRNFSJ.7.3.02>
- [4] Clark, H., Coll-Seck, A. M., Banerjee, A., Peterson, S., DalGLISH, S., Ameratunga, S. (2020). A future for the world's children? A WHO-UNICEF-Lancet commission. *The Lancet*. 395: 605-658. [https://doi.org/10.1016/S0140-6736\(19\)32540-1](https://doi.org/10.1016/S0140-6736(19)32540-1)
- [5] WHO (2024b). Malnutrition: Key facts. <https://www.who.int/news-room/fact-sheets/detail/malnutrition> Accessed on 16 March 2025.
- [6] UNICEF, WHO, WB. (2023). Levels and trends in child malnutrition: UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates: Key findings of the 2023 Ed. New York: UNICEF and WHO; 2023. CC BY-NC-SA 3.0 IGO.
- [7] WFP (2022). Malnutrition prevention and treatment, Cameroon. WFP Cameroon; 2022, Avenue Valery Giscard d'Estaing, Yaoundé, Cameroon.
- [8] Nolla, N. P., Kana Sop, M. M., Mananga, M. J., Gouado, I. (2021). Nutrition education of mothers and zinc supplementation among children in the rural community, Cameroon. *European Journal of Nutrition & Food Safety*. 13(1): 59-69. <https://doi.org/10.9734/EJNFS/2021/v13i130348>
- [9] Dahal, D., Amita, K. C., Chand, S., Pant, R. D., Dikkatwar, M. S., Pant, B. V. (2023). Determinants of nutritional status among mothers and their children of age 6–59 months. *Global Journal of Medical, Pharmaceutical, and Biomedical Update*. 18: 7. https://doi.org/10.25259/GJMPBU_139_2022
- [10] Tchunte, B. R. T., Nguedjo, M. W., Ngoumen, D. J. N., De Wandji, G. C. F., Tene Mouafo, H., Tambe, B. A., et al. (2024) Prevalence and associated factors of coexisting forms of malnutrition in children under 5 years age in a rural area of Cameroon. *PLoS ONE*. 19(6): e0303611. <https://doi.org/10.1371/journal.pone.0303611>
- [11] WFP (2024). Cameroon's country strategic plan (2022-2026). WFP; 2024. Via Cesare Giulio Viola, Rome, Italia.
- [12] Demyo, F. S. G., Mananga, M. J., Nolla N. P., Demasse, A. M., Kana Sop, M. M. (2022). Anthropometric and Biochemical Indicators for Protein Energy Malnutrition in Children Aged 0-36 Months in Douala, Cameroon. *World Journal of Nutrition and Health*. 10(1): 25-34. <https://doi.org/10.12691/jnh-10-1-4>
- [13] Purba, I. E., Purbaa, A., Sembiring, R. (2020). Factors associated with nutritional status of children under the age of 5 years in the working area of Sadabuan Public Health Center. *Enfermeria Clinica*. 30(S5): 140-143. <https://doi.org/10.1016/j.enfcli.2019.11.040>
- [14] Ndah, T., Tazoho, G. M., Youssa, C. N., Ngoufack, F. Z., Kuate, J. R. (2024). Risk factors associated with Severe Acute Malnutrition (SAM) in children aged 6-59 months in the Mokolo Health District, Far North region of Cameroon. *The North African Journal of Food and Nutrition Research*. 8(17): 76 – 85. <https://doi.org/10.51745/najfnr.8.17.76-85>
- [15] Tchapda A. E., Dzeukou S. B., Nyangono C. B., Nolla N. P., Gouado I., Tetanye E. Assessment of Nutritional Status and Associated Factors in Children Aged 6 to 59 Months in Ayos Locality, Cameroon. *Journal of Food Science and Nutrition Research*. 5(2022): 651-657. <https://doi.org/10.26502/jfsnr.2642-110000110>
- [16] Prasetyo, Y. B., Permatasari, P., Susanti, H. D. (2023). The effect of mothers' nutritional education and knowledge on children's nutritional status: a systematic review. *International Journal of Child Care and Education Policy*. 17: 11. <https://doi.org/10.1186/s40723-023-00114-7>
- [17] Rajput, A., Siddiqui, F., Ojha, K. (2024). Impact of Maternal Nutrition and Mental Health on Fetal Development and Pregnancy Outcomes: An Integrative Approach. *International Journal of Novel Research and Development*. 9(5): 130-136. https://www.researchgate.net/publication/380537595_Impact_of_Maternal_Nutrition_and_Mental_Health_on_Fetal_Development_and_Pregnancy_Outcomes_An_Integrative_Approach

- [18] Serbesa, M. L., Iffa, M. T., Geleto, M. (2019). Factors associated with malnutrition among pregnant women and lactating mothers in Miesso Health Center, Ethiopia. *European journal of Midfery*. 3: 13. <https://doi.org/10.18332/ejm/110131>