East African Scholars Journal of Medical Sciences
Abbreviated Key Title: East African Scholars J Med Sci
ISSN: 2617-4421 (Print) & ISSN: 2617-7188 (Online)
Published By East African Scholars Publisher, Kenya

Volume-5 | Issue-11 | Nov-2022 | DOI: 10.36349/easms.2022.v05i11.001

OPEN ACCESS

Original Research Article

Current Food Behaviors and Nutritional Status of Children Aged 6 to 24 Months in Douala (Cameroon)

Fouejio Feuzet Aureole Sandra[1], Marlyne-Joséphine Mananga[1,2], Demasse Mawamba Adelaide[1], Nolla Nicolas Policarpe[1], Mimboé Foé Céline[1,4], Nyangono Biyegue Christine Fernande[3], Kana Sop Marie Modestine[1*]

[1]Department of Biochemistry, Laboratory of Biochemistry, University of Douala, Douala, Cameroon
[2]Department of Biochemistry, Laboratory for Food Science and Metabolism, University of Yaounde I, Yaounde, Cameroon
[3]Advanced Teacher Training College for Technical Education, University of Douala, Douala, Cameroon
[4]Center for Food and Nutrition Research (CRAN), Institute of Medical Research and Medicinal Plants Study (IMPM), Ministry of Scientific Research and Innovation, Yaounde, Cameroon

Article History
Received: 27.09.2022
Accepted: 03.11.2022
Published: 15.11.2022

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: Malnutrition and micronutrient deficiencies among infant and young children remain a public health problem in Cameroon. This study was designed to assess the current food behaviors and nutritional status of children aged 6 to 24 months in Douala (Cameroon). A descriptive cross sectional study was carried out for a period of 9 months at a Health Care Center and four district hospitals in Douala. The study was conducted among 333 children aged 6-24 months of both sexes together with their mothers or caregivers. Data were collected using a modified questionnaire developed by the FAO/WHO. Information on socio-demographic status, feeding habits and anthropometric parameters were recorded. Anthropometric measurements taken included weight, length, brachial perimeter and age. Subsequently, a blood sample was taken to measure the hemoglobin level in children whose mothers had given their consent, using the Hemocue Hb 301 method. Data were analysed using SPSS version 22.0. A P value ≤0.05 was considered as significant. Z-score classifications for malnutrition: weight for length, length for age and weight for age were compared with reference data from WHO standards. This study showed that: only 19.53%, 27.33% and 30.6% respectively of the children had a high dietary diversity score, a high meal frequency. Exclusive breastfeeding rate was 22.52% and 26.43% of children were breastfed within one hour after birth. Furthermore, the study showed that, 25.8%, 23.1%, 27% and 35.1% of children were underweight, wasted, stunted and anemic respectively. Among them, 28.8% and 6.3% were suffering of mild anemia and moderate anemia respectively. Moreover, no significant relationship was observed between nutritional status of children and socio-demographic characteristics of mothers (P>0.05). Some of the feeding practices were associated with poor nutritional status and could be improved with good nutrition education programs.

Keywords: Infants, young children, stunting, anemia, dietary diversity, Douala.

INTRODUCTION

Malnutrition among young children remains a critical public health problem in many parts of the world (Pan American Health Organization, 2013; Akhtar, 2016). Every year, 3.1 million children dead of undernutrition and malnutrition contributes to more than half of global child deaths. Nutritional deficiencies remain a disturbing multifaceted problems which affects infants, young children, adolescents, pregnant mothers. According to UNICEF, undernutrition represents a violation of children's right to survival and development and the highest attainable standard of health. Nations trapped in poverty are often crippled by the burden of hunger and undernutrition, although trends in undernutrition are improving (UNICEF, 2018). Malnutrition is defined by WHO as a medical condition resulting from the relative or absolute deficiency or excess of one or more essential nutrients (Pan American Health Organization, 2013). The consequences of malnutrition include increase in childhood death and future adult disability, diet related

***Corresponding Author:** Kana Sop Marie Modestine
Department of Biochemistry, Laboratory of Biochemistry, University of Douala, Douala, Cameroon

non communicable diseases (NCDs), as well as human capital costs. Undernutrition causes about 45% of deaths in children under 59 months of age, mainly in low and middle income countries (Black *et al.,* 2013). Undernutrition is still a major health problem in developing countries and particularly in sub-Saharan Africa. Stunting, wasting and underweight are the most common consequences of chronic and acute forms of malnutrition in children under 5 years (Chesire *et al.,* 2008 ; Odei *et al.,* 2021).

The first two years of life are the critical window of opportunity. Optimal nutrition is essential for good health and development during the early years of life. The age of 6-23 months is the longest period in the first 1,000 days of life. If children do not take right amounts of macronutrients and micronutrient, they may become ill, have delayed mental and motor development that can have enduring adverse effects beyond the childhood (Lutter *et al.,* 2003 ; Satapathy *et al.,* 2021). Inadequate diets are a common cause of malnutrition in all its forms and contribute to disease (Mananga *et al.,* 2014).

Globally, about 149 million, 49 million and 40 million of children under 5 years were stunting, wasting and overweight respectively in the world (UNICEF, 2019). The number of undernourished people in the world increased from 777 million in 2015 to 815 million in 2016. In Sub-Saharan Africa, 57.9 million, 4 million and 6.1 million of children under 5 yeras were stunted, wasted and overweight respectively (FAO, 2017). However, the prevalence of stunting, wasting and underweight remain high in developing countries. According to latest statistics (2018) from the Ministry of Public Health, Cameroon (EDSC-MICS, 2018), 29%, 4%, 11% and 57% of children under 5 years were stunted, wasted, underweight and anemic respectively. It is important to note that the prevalence is also disproportionate according to the region and socio-economic status. In the littoral region and more precisely in Douala, 4.7%, 20.9%, and 4.3% of children under 5 years are underweight, stunted and wasted (INS, 2015). Many studies indicated that the determinants of micronutrients deficiciencies and undernutrition among children under 5 years included the number of children in households with the same age group (Kana *et al.,* 2013; Poda *et al.,* 2017), birth order or residency, sources of improved drinking water, place of delivery, food insecurity and inapropriate feeding (Black *et al.,* 2013; Amare *et al.,* 2018; Nzefa *et al.,* 2019). The global nutrition targets was a reduction or elimination of malnutrition in all forms in the Sustainable Development Goals (SDGs). Improving nutrition can therefore act as a catalyst to achieve the overall Sustainable Development Goals, aiming to ensure a healthy life and promote well-being for all children (DI, 2017).

Despite the fact that many studies have been done on the identification of factors that are associated with stunting, wasting, anemia or underweight among children under 59 months in many regions of Cameroon (Nolla *et al.,* 2014; Kana *et al.,* 2015; Azike *et al.,* 2019 ; Kaptso *et al.,* 2021), the prevalence are still high and more effort is needed to improve the barriers for further reduction. Moreover, with the recent corona virus pandemic that hit the world, people's food habits have been deeply affected. Therefore, the aim of this study was to evaluate the current food behaviors and nutritional status of children aged 6 to 24 months in Douala (Cameroon).

MATERIALS AND METHODS

Study Area

Douala is the economical capital of Cameroon with more than three million of inhabitants. The city is divided into seven health districts and it has more than 120 neighborhoods. Even though, a large percentage of its inhabitants live below the poverty line. Recent data showed that about 30% of population lives in poverty. Poverty is a growing problem for Douala, due to its steadily increasing populations. Unlike the rural populations of Cameroon that can grow their own foods to lessen their expenses, Douala locals are disadvantaged by living in the port city where there are not many opportunities for monetary gain (Marta and Amalia, 2013).

Sample Size

Based on the regional average (Littoral region), of 4.3%, 20.9%, and 4.7% respectively for the prevalence of global acute malnutrition, global chronic malnutrition and underweight in Douala (INS, 2015), the sample size (N) was determined using the Kuppers equation (Lawrence and Kerry, 1989): $N= Z^2PQ/D^2$, where N= sample size, D= 5% (absolute precession), Q= (1-P) expected non prevalence, Z= 1.96 (z value for 95% level of significance), P= % prevalence of global malnutrition which is (4.3 + 20.9 + 4.7)= 29.9% in Douala. The sample size adjusted for dropout was calculated to be 322. Finally, a total of 333 participants were enrolled for this study.

Inclusion and Non Inclusion Criteria of the Study

All children from 6 to 24 months attending one of the different district hospitals or Health Center were included in this study. The children included in this study were not sick or hospitalised. Children whose parents have agreed to their participation in the study by giving their signed consent were also included in this study. Children whose questionnaire were not completed were not included in the study.

Study Design

A descriptive cross-sectional study was carried out over a period of 9 months, from November 2018 to July 2019 at the following health centers: Deido District Hospital Douala 1, New-Bell District Hospital Douala

2, Logbaba District Hospital Douala 3, Bonassama District Hospital Douala 4 and the Health Centre (Care for All) in Makepè Missoke Douala 5.

Data Collection

We conducted a nutritional survey that enrolled mothers or caregivers with their young children aged 6 to 24 months. Participants were identified in the Douala district hospitals and the Health Centre (Care for All). Two categories of data were collected through the questionnaire: the anthropometric data with emphasis on nutritional status and the origin of nutritional diseases and the biochemical indicators of anemia. The questionnaire was designed to obtain information on the anthropometric parameters, feeding practices and socio demographic and economic status of mothers or caregivers. Infants and young children anthropometric measurements (weight and length/height) were recorded on the day of the interview. All the anthropometric measurements were taken twice by the same team member and the average computed. The data collectors were trained on data collection techniques for 1 week including practical work. Data collectors interviewed each mother individually.

Anthropometric Data

Anthropometric parameters recorded during the survey were: height, age, weight, brachial circumference (BP) and nutritional edema.

Body Mass Measurement

Weight measurements were taken using a SALTER brand baby scale with an accuracy of 100 grams, in a sitting or lying position depending on the child's ability. Shoes and heavy clothing were removed and the weight measurements read were recorded on the survey form. Weighing was done when the stomach was almost empty.

Size Measurement

Height measurements were taken using the height gauge. Children were asked to lie or to stand without shoes on the horizontal or vertical platform. With the feet parallel, the heels, buttocks, shoulders, and back of the head were to touch the vertical portion of the device. The head was held comfortably upright in the same horizontal or vertical plane as the external hearing meter. The height measurement was then read and recorded on the survey form.

Evaluation of Brachial Perimeter (BP)

Brachial perimeter (BP) was measured at the height between the shoulder and the elbow with the child's arm hanging and relaxed with a special wristband (0.1 cm of accuracy).

Evaluation of Nutritional Oedema

Oedema was assessed on the tops of both feet, back, and both hands. We applied gentle pressure, using the thumbs, to both feet, counting 121, 122, 123 seconds. Edema was present if there was a depression in the child's skin when the thumb was removed. We recorded an individual as having edema only if it was bilateral.

Evaluation of the Nutritional Status of Children

Data from anthropometric measurements were analysed using DHS and WHO standard references (WHO, 2012 ; DHS, 2012). Nutritional state indicators used were weight for age, height for age and weight for height z-scores. Malnourished children were reported when one of their anthropometric indices were abnormal (less than 2 z-scores below the average reference). Children were considered wasted if their weight for height index was below -2 z-scores compared to WHO standard reference. Those with severe wasting had their weight for height index below-3 z-scores of the average reference. Children were considered underweight if their weight for age indexes were below -2 z-scores of the average reference. Those with severe underweight had their weight for age indexes below -3 z-scores of the average reference. Children were considered stunted, if their height for age indexes were below -2 z-scores of the average reference. The arm had to be hanging and relaxed when the measurement was taken. The measurement was taken in centimetres. Brachial circumference served as a measure of the thickness of muscle tissue and subcutaneous fat. It was defined as follows:

- BP ≥ 12.5 cm the child was considered normal;
- PB < 11.5 cm, the child was considered to be severely malnourished;
- PB ≥ 11.5 cm and < 12.5 cm, the child was considered to be moderately malnourished (PRONANUT, 2016).

Clinical Examination

It was focused on the search for cutaneous pathological disorders, muscle wasting, the presence of edema. In case of edema, particular attention was paid to cardiac auscultation and palpation of the liver in search of causes that could explain the edema.

Biochemical Analysis

Hemoglobin test was done after taking a capillary sample of a drop of blood by pricking the finger and measuring the haemoglobin level with Hemocue (HemoCue®, Hb301). The haemoglobin value was expressed in g/dl. The haemoglobin level was divided into three suitability scale classes according to the WHO classification, in children aged 6-24 months:

- No anemia or normal (Hb level >11 g/dl);
- Mild anemia (Hb level between 10 g/dl and 10.9 g/dl);
- Moderate anemia (Hb level between 7 g/dl and 9.9 g/dl);
- Severe anemia (Hb level < 7g/dl) (WHO, 2008).

Statistical Analysis

Data from anthropometric measurement and biochemical were analyzed using Statistical Package for Social Sciences (SPSS) 20. The χ^2 test and Pearson correlation were used to compare the values of different parameters. The results were given as mean ± standard deviation and differences were considered significant from $P < 0.05$.

Ethical Aspects

Ethical approval and permission were obtained from the Institutional Research Ethics Committee for Human Health of the University of Douala (N°1663 CEI-Udo/09/2018/M). After administrative procedures, the aim of the study and different procedures were explained to the participants, informed consent to participate in the study was obtained from each mother or caregiver.

RESULTS

The results obtained in the study are summarised in table 1-7 and divided into the socio demographic characteristics of the subjects, breastfeeding practices, complementary feeding practices, nutritional status of children, prevalence of anemia, association between nutritional status of children and anemia and bivariate analysis of nutritional status and basic characteristics indicators. Majority of mothers had a secondary education (64.27%). A half of the mothers were employee (50.2%) while 36.3% were either housewife or unemployed. Mothers had more than one child (60.96%). More than 90% of children were reported to drink a mineral water. More than 77.18% of the children completed the age appropriate vaccination. More of the sociodemographic characteristics of the participants are shown in table 1.

Table 1: Sociodemographic characteristics of participants

Socio-demographic characteristics	N	(%)	Socio-demographic characteristics	N	(%)
Age (years)			Birth order		
< 18	1	0.3	1-2	203	60.96
18 – 24	70	21.02	3-4	103	30.93
25 – 30	132	39.64	≥ 5	27	8.11
>30	130	39.04	Age of children (months)		
Education level of the mother			6-8	111	33.33
No formal education	2	0.6	9-12	174	52.25
Primary	44	13.21	13-24	48	14.42
Secondary	214	64.27	Reason for consultation		
University	73	21.92	Immunization	257	77.18
Marital status			Fever	26	7.81
Married	232	69.7	Cough/Flu	16	4.80
Single	101	30.3	Diarrhea	5	1.50
Occupation of the mother			Vomiting	9	2.70
Students	145	13.5	Others	20	6.01
Housewife	121	36.3	Quality of drinking water		
Employee	167	50.2	Mineral water	307	92.2
Sex of children			Public tap water	12	3.6
Female	155	46.55	Borehole water	9	2.7
Male	178	53.45	Others	5	1.5
Birth weight			Birth order		
<2500 g	20	6	1-2	203	60.96
≥2500 g	313	94	3-4	103	30.93

Table 2 shows the breastfeeding practices of mothers. Majority of mothers (58.86%) had initiated breastfeeding within 1-23 hours after delivery. It appeared that 46.25% of children were fed on demand. Almost 77.48% of the mothers practiced nonexclusive breastfeeding and the main reasons were the occupation of the mother (11.67%), baby needs better diet (24.51%) or baby needs water (32.68%).

Table 2: Breastfeeding practices

Practices supporting exclusive breastfeeding	N	(%)	Practices supporting exclusive breastfeeding	N	(%)
Initiation of breastfeeding after delivery (N=333)			Breastfeeding practices (N= 333)		
Immediately after delivery	88	26.42	Breastfeeding	117	35.14
1 to 23 hours after	196	58.86	Artificial feeding	66	19.82
24 hours after	21	6.31	Mixed breastfeeding	142	42.64
2-10 days after	27	8.11	Doesn't drinks any milk	8	2.40
Never breastfeed	0	0	Age of stopping of breastfeeding (N= 333)		

Practices supporting exclusive breastfeeding	N	(%)	Practices supporting exclusive breastfeeding	N	(%)
Don't know anymore	1	0.3	1 to 5 months	9	10.98
Frequency of daily intake breast milk (N= 246)			6 months	20	24.39
On demand	154	62.60	7 to 9 months	21	25.61
When baby cries	31	12.60	10 to 11 months	8	9.75
According to schedule	61	24.80	12 months	18	21.95
Reasons for not practicing exclusive breastfeeding (N= 257)			Mothers knowledge on exclusive breastfeeding (N= 333)		
Occupation	30	11.67	Yes	277	83.19
Feeding the baby better	63	24.51	No	43	12.91
None	28	10.90	Don't know	13	3.90
Baby needs water	84	32.68	Practice of exclusive breastfeeding		
Not enough milk	26	10.12	Yes	76	22.82
Mother was sick	15	5.84	No	257	77.18
Baby refused	6	2.33	Type of breastfeeding (N= 333)		
Baby was sick	5	1.95	Exclusive breastfeeding	75	22.52
			Non exclusive breastfeeding	258	77.48

Results showed that only 52.55 % of the mothers started complementary foods at the age of 6 months while 34.84% of the mothers had begun complementary before 6 months. However, 59.46% of the mothers had given to their child the water from 3 months of age (table 3). More than 57% of children had a poor food diversity score, while more than half of children (69.4%) did not have access to a minimum diet (rich in cereals and starch poor in animal products).

Table 3: Complementary feeding indicators and related feeding practices of mothers

Variables	N	%	Variables	N	(%)
First feeding at birth (N= 333)			Food diversity (N =333)		
Breastfeeding	251	75. 38	Low score	190	57.06
Artificial feeding	34	10.21	Middle score	78	23.42
Water	23	6.91	High score	65	19.52
Glucose water	17	5.1	Frequency of meals (N= 333)		
Honey	7	2.1	Low	103	30.93
Others	1	0.3	Normal	139	41.74
Age of introduction of water (N= 333)			High	91	27.33
Birth to 3 months	198	59.46	Minimum food intake (N= 233)		
4 to 5 months	61	18.32	Positive	102	30.6
6 months	74	22.22	Negative	231	69.4
Age of introduction of complementary foods (N= 333)			Consumption of iron rich foods (N= 333)		
Birth to 5 months	116	34.84	Rich	85	25.53
6 months	175	52.55	Enriched	107	32.13
Up to 6 months	37	11.11	Rich and enriched	37	11.11
Don't know anymore	5	1.5	No consumption	104	31.23

Table 4 presents the nutritional status of the children. About 27%, 25.8%, 23.1%, 6.9% and 1.5% of children were stunted, underweight, wasted, overweight and obese respectively. According to the gender, the prevalence of stunting underweight, and wasting were higher among girls than boys, while nutritional status indicators were higher among children aged 9-12 months.

Table 4: Nutritional status of children according to age in months

Nutritional status indicators (N= 333)	Gender		Age (months)		
	Female	Male	6-8	9-12	13-24
Stunted	16.82	10.21	9.31	14.41	3.30
Underweight	16.82	9.01	9.60	13.51	2.70
Wasted	12.01	11.11	9.00	11.11	3.00
Overweight	2.7	4.2	2.70	3.90	0.30
Brachial perimeter	2.7	1.8	2.40	2.10	0
Obesity	0.9	0.6	0.30	0	1.20

Regarding hemoglobin level, more than a third of the children (35%) had a hemoglobin level < 11g/dl. Among these children, 6.3% were suffering of moderate anemia (table 5). The prevalence of anemia was higher among children aged 9-12 months (16.3%) than 6-8 months (15.1%) and 13-24 months (3.8%).

Table 5: Prevalence of anemia

Indicators	Normal		Mild anemia		Moderate anemia		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
6-8 mois	17	21.3	11	13.8	1	1.3	29	36.25
9-12 mois	30	37.5	10	12.5	3	3.8	43	53.75
13-24 mois	5	6.3	2	2.5	1	1.3	8	0.1
Total	52	65.1	23	28.8	5	6.3	80	100

The results of analysis results (table 6) showed that weight for age (P= 0.728), height for age (P= 0.178) and weight for height (P= 0.899) were not associated with anemia. Association between nutritional status and socio demographic indicators of the subject are presented in table 7. There was a significant association (P<0.05) between age of mothers and wasting. The occupation of the mother, education level and marital status were not associated (P>0.05) with the stunting, wasting, underweight and brachial perimeter in this study.

Table 6: Association between nutritional status and anemia

Variables	Correlation coefficient (r)	P-value
Anemia and weight for age	0.039	0.728
Anemia and height for age	- 0.152	0.178
Anemia and weight for height	- 0.014	0.899

Table 7 presents bivariate analysis of nutritional status of children. Age of the mother (P = 0.028) is highly correlate with the nutritional status of children.

Table 7: Bivariate analysis of nutritional status and basic socio demographic indicators

Sociodemographic indicators	Wasting N (%)	P	Underweight N (%)	P	Stunting N (%)	P	Brachial perimeter N (%)	P
Occupation								
Housewife	36 (10.81)		27 (8.11)		31 (9.31)		6 (1.8)	
Student	14 (4.20)	0.8	11 (3.30)	0.406	11(3.30)	0.806	1 (0.3)	0.356
Employee	55 (16.52)		48 (14.41)		48 (14.41)		8 (2.4)	
Education level								
No formal education	1 (0.30)		1 (0.30)		0 (0)		0 (0)	
Primary	17 (5.10)	0.892	12 (3.60)	0.571	13 (3.9)	0.117	4 (1.20)	0.476
Secondary	63 (18.92)		53 (15.92)		60 (18.02)		9 (2.71)	
University	24 (7.21)		20 (6.00)		17 (5.1)		2 (0.6)	
Age of mother								
< 18	0 (0)		0 (0)		0 (0)		0 (0)	
18- 24	17 (5.11)		15 (4.50)		25 (7.51)		4 (1.2)	
25- 30	40 (12.01)	0.028	37 (11.11)	0.776	34 (10.21)	0.458	5 (1.5)	0.794
> 30	48 (14.41)		34 (10.21)		31 (9.31)		6 (1.8)	
Marital status								
Married	74 (22.22)	0.387	60 (18.02)	0.928	61 (18.32)	0.170	10 (3)	0.362
Single	31 (9.31)		26 (7.81)		29 (8.71)		5 (1.50)	

P-value = Significance level (p<0.05).

DISCUSSION

Appropriate breastfeeding and complementary feeding practices are fundamental to children's survival, growth and development (Fekadu *et al.*, 2015). The present study has highlighted inadequate feeding practices, negative minimum food intake, low food diversity score and high prevalence of acute and chronic malnutrition and anemia among children aged 6-24 months in Douala. Only 22% of children had been exclusively breastfed during the first 6 months. This observation of low rate of exclusive breastfeeding agrees with the finding of a national survey in cameroon where only 20 % of the mothers practiced exclusive breastfeeding (EDS-MICS, 2018). Results from the study demonstrated that there is inappropriate child feeding practices mostly due to the occupation of the mothers. More than half of the mothers were employees. The fact that the mothers of children had a job is a risk for factor the occurrence of child malnutrition in their children, as it reduces the time available for childcare and monitoring, although it

promotes financial empowerment. The consequence is that the child is cared by others who are less experienced and do not have the knowledge of appropriate feeding practices and hygiene conditions. Other studies from India (Saito *et al.,* 1997) have reported higher correlation (P=0.01) between occupation and malnutrition in children. According to many authors, the occupation of the mother has a significant impact on the nutritional status of the child because the availability of the mothers is an important indicator for a good follow up of the breastfeeding and the complementary feeding of the child (Trèche, 2008). Breast milk remains an important source of nutrients for the young infant and child, despite the introduction of complementary foods. It provides between one third to half of the caloric need of the child during the second year of life and it continues to supply high quality nutrients and protective factors (Grummer-Strawn *et al.,* 2008).

Not all the indicators of complementary feeding practices in this study were in adequation with the indicators of complementary feeding practices set by IYCF (Infant and Young Children Feeding) for children aged 6-23 months recommended by WHO (WHO, 2012). Regarding early introduction of complementary foods (before age of 6 months) many infants were introduced to liquids and foods earlier than the recommended age of 6 months. Early introduction of complementary foods is a common practice in Cameroon (Mananga *et al.,* 2014 Kaptso *et al.,* 2021). In this study, majority of the mothers (52.55%) interviewed have initiated complementary feeding timely (6 months) with about 34.84% of the mothers who introduced complementary foods early (3-5 months) and 11.11% of the mothers who introduced complementary foods too late. According to Grummer-Strawn *et al.,* (2008) the early introduction to solid foods is a risk factor for infection and early cessation of breastfeeding. This is similar with findings from Woldie *et al.,* (2015) in Ethiopia where 64% and 20.5%, introduced complementary foods early and timely the expected 6 months age. Our study respondents are contrasting with findings from other locations in South Africa (Mushaphi *et al.,* 2008) and Nepal (Subedi *et al.,* 2012) where 77% and 90% respectively introduced complementary foods at the time. Poor practices of early introduction of complementary foods may be due to the fact that the mothers have a wrong knowledge about feeding breast milk alone as recommended for a duration of six months. Indeed, in this study, majority of the mothers indicated that their babies were not satisfied with breast milk only. One third of mothers said that baby needs water and 10% said they had begun early complementary feeding without any reason because the milk is not enough. After 6 months of age, breast milk is not enough to provide a growing infant with adequate nutrients for normal growth and development, hence, there is a need for appropriate and adequate complementary foods to ensure adequate physical growth and development (Okeahialam, 2007).

Diet assessed of the children in this study were of low food diversity score and negative minimum food intake. This could be justifie by the diet which mostly consits of mainly staple foods, legumes and poor in meat and milk products, fruits and vegetables. According to the results of this study, only 27.33% of children have adequate dietary diversity score, 31.23% of children didn't consume iron rich or enriched foods. Only 41.74% of the children have normal freqency of meal. Finding of the present study are similar to those of Woldie *et al.,* (2015) in Ethiopia, Folake *et al.,* (2020) in Nigeria and Udoh *et al.,* (2016) in Nigeria where 85%, 85% and 70% of the children aged 6-23 months had a poor dietary diversity score. In contrast a previous study reported adequate dieary diversity in Tanzania (95%) and adequate minimum meal frequency in Indonesia (74%) (Kulwa *et al.,* 2015 ; Ahmad *et al.,* 2018). Dietary diversity is an important element for diet adequacy. The poor diet diversity among children could be due to the poor knowledge, attitude and infant and young child feeding practices of the caregivers (Sulaiman *et al.,* 2020). This result was in line with those reported by WHO where less than one fourth of the children aged 6-23 months in developing countries had good consumption quality (WHO, 2018).

Interestingly, the study showed that more than 90% of children drank mineral water. The most important way to reduce the spread of infection among children is clean water, basic toilets and good hygiene practices. Improper water storage facilities and practices are the main cause of waterborne illnesses in the children. The quality of drinking water given to the children is a determining factor in their nutritional status because untreated sources of drinking water are strongly associated with higher risk of stunting (Amare *et al.,* 2018). Poor water quality is the main cause of diarrhoeal infections in children. In fact, good hydration practices for children significantly reduce infections. In this study, only 1.50% of chidren have had diarrhea. This is in agreement with the reports of Kaptso *et al.,* (2021) in Buea (Cameroon) were 91% of caregivers gave mineral water to their children.

The prevalence of stunting, wasting, underweight, overweight, obesity and malnutrition according to brachial perimeter in the region was 27%, 23.1%, 25.8%, 6.9%, 1.5% and 4.5% respectively. According to the last Cameroon EDS survey, among children under 59 months of age, the proportion of stunting was 29%, underweight level 11%, overweight 11% and wasting, 4% at the national level (EDS-MICS, 2018). The results of the stunting and overweight in the present study were lower than to those of the national survey in 2018 (29% and 11% respectively). However, the levels of underweight and wasting in this study were higher than 11% and 4% respectively obtained in the

same national survey (EDS-MICS, 2018). The prevalence of stunting obtained in this study was lower compared to those observed in Bangang, Douala and Pitoa (Cameroon) where 42.22%, 30.47% and 75.1%, respectively for children under 24 months (Kana *et al.,* 2013; Mananga *et al.,* 2014; Azike *et al.,* 2019). A similar studies conducted in Sokoto (Nigeria), Tigray region (Ethiopia) and in Somali reported a higher prevalence of stunting (24.5%, 22.9%, 27.6%), wasting (18.1%, 4.10%, 17.5%) and underweight (26.5%, 19.5%, 14.2%) respectively (Fekadu *et al.,* 2015; Woldeamanuel *et al.,* 2019; Yusuf & Jibrin, 2020). Whereas a study in Bandja (Cameroon) and in the Orphanages in Douala (Cameroon), reported lower prevalence of stunting (16.4%, 18.2%), wasting (3.2%, 5.6%) and underweight (5.2%, 4.2%) respectively (Nzefa *et al.,* 2019; Okalla *et al.,* 2019). Another study in Sri Lanka reported lower prevalence of stunting (17%), wasting (17%) but higher in underweight (21.3%) (Ubeysekara *et al.,* 2015). This difference in the prevalence of malnutrition indicators from one country to another or from one city to another could be due mainly to differences in food habits, sociodemographics and politic indicators or environment. Stunting and growth faltering observed may be due to the early introduction of complementary foods that children assimilated poorly. While the etiology of stunting is complex, inadequate nutrition and infection are among factors thought to play major roles in reducing a child's height for age. As a manifestation of chronic under nutrition, stunting has been linked to multiple adverse health outcomes that extend beyond childhood into adult life (Kana *et al.,* 2013). According to the findings of Chekol *et al.,* (2022), the high rate of wasting in this study could be explained by the fact that a dietary intake below the minimum requirement leads to nutritional inadequacy and reduces the immune response. It exacerbates the chance of childhood illness and, ultimately, acute malnutrition. Wasting is a form of acute under-nutrition characterized by a loss of body weight in relation to height, which increases a child's risk of infection and death decreasing their ability to learn (Abdiwali *et al.,* 2022). The rate of overweight and obesity were also low. This result suggests that malnutrition by deficiency remains a real problem among the children living in Douala. Underweight which reflects chronic or acute malnutrition among the infants was also at a critical level. Many reports have shown that children are generally rarely exclusively breastfed in Cameroon, despite of WHO recommendations. Even though breast milk offers the best source of nutrients. Consequently, inadequate breastfeeding practice could explain the higher prevalence of underweight in this study. Furthermore, the clinical evaluation of oedema revealed that no children suffering from bilateral oedema

Moreover, female children are highly stunted (16.82%) underweight (16.82%) and wasted (12.01%) than males. The findings of Kaptso *et al.,* (2021) shown that females (53.3%) were severely stunted than the males (42.9%). However, another studies done in Cameroon (Henry *et al.,* 2007) and Vietnam (Nguyen *et al.,* 2008) revealed that the males had poor nutritional status than females. Differences in socio economic background between the different areas could be the reason for that.

With regard to the global malnutrition, the 9-12 months age group was the most affected. This age indicated nutrition transition and probably inappropriate breastfeeding and complementary feeding practices. Children stunted before the age of two years have been shown to have poorer emotional and behavior outcomes later in adolescence, including increased symptoms of anxiety and depression (Walker *et al.,* 2007). Sociodemographic indicators (age of mother, occupation, marital status, education level of the mother) were not statistically associated with young children malnutrition indicators. Similar findings were observed in Chepang communities (Nepal), Tigray (Ethiopia), Sri Lanka, Nigeria, and Tanzania where the sociodemographic characteristics were not significantly related to the nutritional status of the children respectively (Ogunlesi, 2010; Subedi *et al.,* 2012; Kulwa *et al.,* 2015; Ubeysekara *et al.,* 2015; Woldeamanuel *et al.,* 2019). On the other hand, this result is not in line with the study of Ahmad *et al.,* (2018), who found a significant association between the age of the mother, completion of appropriate vaccination age and fish consumption with the odds of wasting. In addition, the study done in Uganda, and Nigeria showed that there was a positive association between levels of maternal education and nutritional indices (Lawal & Samuel, 2010; Bukusuba *et al.,* 2009). Another study conducted in Bandja found that having a farmer mother predisposed children to both stunting and underweight (Nzefa *et al.,* 2019). Differences of associated factors of nutritional status between countries or areas or regions could be due to the disparities in socio economic status, geography and the cultural conditions.

The results of this study revealed that 35% of children were anemic. The result is lower than that of 2018 Cameroon EDS-MICS report, 57% (EDS-MICS, 2018), 66% in rural Cameroon (Kana *et al.,* 2015), 65.5% in Wolaita zone in Ethiopia (Alemayehu *et al.,* 2019) and 66.6% in Wag Himra zone in Ethiopia (Woldie *et al.,* 2015). The finding is higher than the study report in Huaihua (China), 29.73% (Huang *et al.,* 2018). This could be justify by the fact that in Douala complementary foods for children are mostly fortified manufactured porridge made of iron fortified cereals. Effectively in this study majority of mothers practiced mixed (42.64%) and artificial feeding (19.82%). In addition, the consumption of milk powder or infant formula was associated with a decreased risk of anemia, likely because these are fortified and have higher levels of minerals than breast milk. The production of

powdered formulas was base on ordinary powdered, as iron has been added to powdered formulas to prevent anemia in recent decades (Huang *et al.,* 2018). On the other hands, this rate remains higher and constitutes a public health problem due to inappropriate complementary feeding practices. UNICEF and WHO recommend adequate breastfeeding, iron supplementation and fortification, and nutrition education for mothers in order to curve health loss (high morbidity and mortality) due to iron deficiency anemia in children (Nzefa *et al.,* 2019). Children in the age group of 6-8 months were most likely to be anemic than children in the age group of 9-12 months and 13 to 24 months. Indeed, the concentration of iron in human milk is relatively low and so iron is supplied mainly from iron stores from birth until 6 months of age. However, iron stores are depleted after 6 months of age, the time at which iron demand increases because of rapid growth and development (WHO, 2006). Therefore, the risk of anemia increases after 6 months of age in breastfed children. Anemia in children of 6 months of age is reduced by the intake of iron rich foods and their risk of anemia increases with age In addition, pregnant mothers are more likely to give birth to child with poor iron stores (WHO, 2010). In the current study, malnutrition indicators were not associated with anemia. Similar findings have been reported by Kana *et al.,* (2015) and Woldie *et al.,* (2015). However, the studies conducted in Brazil (Osorio *et al.,* 2001) and Bangladesh (Uddin *et al.,* 2010) reported that stunted children were 2.7 times more likely to be anemic because the coexistance of other micronutrient defiencies and stunting may increase the development of anemia by a synergic association.

Although our study included only children under 24 months of age, the findings of this study can be considered to reflect the anthropometric status for the population in Douala. Our study can be use as reference for planning nutritional education programs for these targets population, to improve the complementary feeding practices and nutritional status of children.

CONCLUSION

This study showed high prevalence of stunting, underweight, wasting and anemia. Nutritional problems observed were due mainly to inappropriate breastfeeding practices (low rate of exclusive breastfeeding), early or too late introduction of complementary foods, inadequate and unsafe complementary foods in very poor environment. Majority of the mothers had a good knowledge concerning feeding practices of the children. However, many occupation of the mothers appeared to be main obstacle to children optimal feeding by reducing the time available for childcare and growth monitoring. The high proportion of stunting, underweight, wasting and anemia suggest the great need for prevention and control of the malnutrition, especially among young children aged 6-24 months in Douala. The present study could used as a reference for planning the development of nutritional education programs aimed at improving breastfeeding practices and timely initiation of complementary feeding and develop sanitation and hygiene guidelines.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.

ACKNOWLEDGEMENT

The authors thank all the mothers who agreed to participate in this study and the administration of differents heath centers.

REFERENCES

- Abdiwali, A., Gebremichael, B., Gebretsadik, S., & Roba K. (2022). Prevalence of wasting and associated factors among children aged 6-23 months in Garowe, Puntland, Somalia. *International Journal of women's Health Care*, 7(2), 96-103.
- Ahmad, A., Madanijah, S., Dwiriani, CM., & Kolopaking, R. (2018). Complementary feeding practices and nutritional status of children 6-23 months old: formative study in Aceh, Indonesia. *Nutrition Research and Practices*, 12(6),512-520.
- Akhtar, S. (2016) Malnutrition in South Asia. A critical reappraisal. *Critical Review in Food Science and Nutrition*, 56, 2320-2330.
- Alemayehu, M., Meskele, M., Alemayehu, B., & Yakob, B. (2019). Prevalence and correlates of anemia among children aged 6-23 months in Wolaita Zone, Southern Ethiopia. *Plos One*, 14(3), e0206268.
- Amare, M., Benson, T., Fadare, O., & Oyeyemi, M. (2018). Study of the determinants of chronic malnutrition in Northern Nigeria: quantitative evidence from the Nigeria demographic and health surveys international food policy research institute (IFPRI) working paper 45 (September 2017). Food and Nutrition Bulletin, 39 (2), 296–314.
- Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., De Onis, M., ... & Maternal and Child Nutrition Study Group. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet*, *382*(9890), 427-451.
- Bukusuba, J., Kikafunda, J. K., & Whitehead, R. G. (2009). Nutritional status of children (6-59 months) among HIV-positive mothers/caregivers living in an urban setting of Uganda. *African Journal of Food, Agriculture and Development*, 9(6), 1345-64.
- Chekol, T. Y., Arefaynie, M., Kassa, A. A., Alene, T. D., & Ngusie, H. S. (2022). Determinants of wasting among children aged 6–59 months in

NorthEast Ethiopia: a community-based case control study. *BMJ Open*, 2, e057887.

- Chesire, E. J., Orago, A. S., Oteba, L. P., & Echoka, E. (2008). Determinants of under nutrition among school age children in a Nairobi peri-urban slum. *East African Medical Journal*, 85(10), 471-9.
- Chukuwchindun, B. A., Goura, A. P., Beyala, L. B. A., Chebe, A. N., Bita, A. I. G., Nguefack, J. A., & Ateudjieu, J. (2019). Pratiques alimentaires des mères et malnutrition infantile dans le district de santé de Pitoa: Etude cas-témoin. *Budapest International Research in Exact Sciences (BirEx) Journal*, *1*(4), 144-155.
- Development Initiatives (DI) (2017). Rapport sur la nutrition mondiale 2017: La nutrition au service des ODD. Bristol, Royaume-Uni : Development Initiatives. 121p.
- DHS (Demographic Health Surveys) (2012) Measure DHS Statcompiler.
- EDSC-MICS (Enquête de Démographie et de Santé à Indicateurs multiples) (2018). Rapport préliminaire. Institut national de la statistique : pp 739 Cameroun.
- FAO (2017). Vue d'ensemble régionale de la sécurité alimentaire et la nutrition. Le lien entre les conflits et la sécurité alimentaire et la nutrition : renforcer la résilience pour la sécurité alimentaire, la nutrition et la paix. 96p.
- Fekadu, Y., Mesfin, A., Haile, D., & Stoecker, B. J. (2015). Factors associated with nutritional status of infants and young children in Somali Region, Ethiopia: a cross- sectional study. *BMC Public Health*, 1-9.
- Folake, O. S., & Ebunoluwa, G. I. (2020). Complementary feeding practices and associated factors among nursing mothers in southwestern nigeria. *International of Maternal and Child Health AIDS*, 9(2), 223-231.
- Grummer-Strawn, L. M., Scanlon, K. S., & Fein, S. B. (2008). Infant feeding and feeding transitions during the first year of life. *Pediatrics*, 122, S36-S42.
- Huang, Z., Jiang, F. X., Li, J., Jiang, D., Xiao, T. G., & Zeng, J. H. (2018). Prevalence and risk factors of anemia among children aged 6–23 months in Huaihua, Hunan Province. *BMC Public Health*, *18*(1), 1-11.
- Institut National de la Statistique (INS) (2015). Enquête par grappes à indicateurs multiples (MICS5), 2014, Rapport Final. Yaoundé, Cameroun, Institut National de la Statistique.
- Kana, S. M. M., Gouado, I., Mananga, M. J., Ekoule, L. D., Amvam, Z. P. H., & Tetanye, E. (2013). Evaluation of nutritional status of young children aged 0–2 years in the Douala city (Cameroon), survey of some practices during diversification of complementary foods. *Afr J Food Sci Technol*, *4*(2), 29-34.
- Kana, S. M. M., Mananga, M. J., Tetanye, E., & Gouado, I. (2015). Risk factors of anemia among young children in rural Cameroon. *International Journal of current Microbiology and Applied Science*, 4(2), 925-935.
- Kaptso, K. G., Tchabo, W., Nkongho, J. E., Asoba, N. G., & Amungwa, A. F. (2021). Assessment of feeding habits and nutritional status of infants admitted in Kumba hospitals (South-West Region, Cameroon). *European Journal of Nutrition and Food Safety*, 13(3), 1-19.
- Kulwa, K. B. M., Mamiro, P. S., Kimanya, M. E., Mziray, R., & Kolsteren, P. W. (2015). Feeding practices and nutrient content of complementary meals in rural central Tanzania: implications for dietary adequacy and nutritional status. *BMC Pediatrics*, 15(171), 1-11.
- Lawal, B. O., & Lawal, F. O. (2010). Determinants of nutritional status of children in farming households in Oyo State, Nigeria. *African Journal of Food Agriculture, Nutrition and Development*, 10(10):4235-53.
- Lawrence, L. K., & Kerry, B. H. (1989). How appropriate are popular sample size formulas? *American Statistical Association Bulletin*, 43(2), 101-105.
- Lutter, C. K., & Rivera, J. A. (2003). Nutritional status of infants and young children and characteristics of their diets. *Journal of Nutrition*, 133, 2941s-2949s.
- Mananga, M., Kana, S., Nolla, P., Tetanye, E., & Gouado, I. (2014). Feeding practices, food and nutrition insecurity of infants and their mothers in Bangang rural community, Cameroon. *Journal of Nutrition and Food Science*, 4(2), 1-6.
- Marta, P., & Amalia, S. (2013). What do we know about Douala? Access to information in and about the largest Cameroonian city. *7th International Development Informatics Association Conference*, held in Bangkok pp 152-169.
- Mushaphi, L. F., Mbhenyane, X. G., Khoza, L. B., & Aka, A. (2008). Infant-feeding practices of mothers and the nutritional status of young children in the Vhembe District of Limpopo Province. *South African Journal of Clinical Nutrition*, 21, 36 -41.
- Nguyen, N. H., & Kam, S. (2008). Nutritional status and the characteristics related to malnutrition in children under-five years of age in Nghean, Vietnam. *Journal of Preventive Medicine and Public Health*, 41(4), 232-240.
- Nolla, N. P., Kana, S. M. M., Mananga, M. J., Tetanye, E., & Gouado, I. (2014). Assessment of nutritional status of preschool children in the Bangang rural community, Cameroon. *International Journal of Biotechnology and Food Science*, 2(2), 44-52.
- Nzefa, L. D., Monebenimp, F., & Äng, C. (2019). Undernutrition among children under five in the

Bandja village of Cameroon, Africa. *South African Journal of Clinical Nutrition*, 32(2), 46-50.

- Odei Obeng-Amoako, G. A., Karamagi, C. A. S., Nangendo, J., Okiring, J., Kiirya, Y., Aryeetey, R., ... & Wamani, H. (2021). Factors associated with concurrent wasting and stunting among children 6–59 months in Karamoja, Uganda. *Maternal & Child Nutrition*, *17*(1), e13074.
- Ogunlesi, T. A. (2010). Maternal socio-demographic factors influencing the initiation and exclusivity of breastfeeding in a Nigerian semi-urban setting. *Maternal Child Health Journal*, 14(3), 459-65.
- Okalla, C. E., Koum, D. K., Penda, C. I., Mefo'o, J. P. N., Wanye, F., Eloumou, S. A., & Temfack, E. (2019). Assessment of the nutritional status of children living in orphanages in the city of Douala, Cameroon. *International Journal of Child Health and Nutrition*, *8*(1), 1-9.
- Okeahialam, T. (2007). Complementary feeding: The foundation of child Nutrition. *Journal of child and Health*, 1(1), 1-22.
- Osorio, M. M., Lira, P. I. C., Batista-Filho, M., & Ashworth, A. (2001). Prevalence of anemia in children 6-59 months old in the state of Pernambuco, Brazil. *Revista Panamericana de Salud Publica*, 10(2), 101-107.
- Pan American Health Organization, (World Health Organization) (2013). UNICEF. ProPAN: Process for the Promotion of Child Feeding. 2nd ed. Washington, D.C.: Pan American Health Organization.
- Poda, G. G., Hsu, C-Y., & Chao, J. C. J. (2017). Factors associated with malnutrition among children. *International Journal of Quality and Health Care*, 29(7), 901-908.
- PRONANUT (Programme National De Nutrition) (2016). Fiches Techniques sur l'Approche NACS. République Démocratique du Congo : 54p.
- Saito, K., Korzenik, J. R., James, F., & Bhattacharji, S. J. (1997). A case control study of maternal knowledge malnutrition and health care seeking attitudes in rural South India. *Yale Journal of Biology and Medicine*, 149-16.
- Satapathy, D. M., Karmee, N., Sahoo, S. K., Patro, S. K., & Pandit, D. (2021). Effect of feeding practices on nutritional status of infant and young children residing in urban slums of berhampur: A decision tree approach. *Indian Journal of Public health*, 65, 147-51.
- Subedi, N., Paudel, S., Rana, T., & Poudyal, A. K. (2012) Infant and young child feeding practices in Chepang communities. *Journal of Nepal Health Research Council*, 10, 141-146.
- Sulaiman, S., Gadanya, A. M., Muhammad, A. S., Abubakar, H., & Abubakar, S. M. (2020). Assessment of nutritional status, knowledge, attitude and practices of infant and young child feeding in Kumbotso local government area, Kano State, Nigeria. *Pakistan Journal of Nutrition*, 19, 444-450.
- Trèche, S. (2008). Rôle et importance des microorganismes pour le développement de voies alimentaires d'amélioration des situations nutritionnelles dans les pays du Sud. In 1er congrès de l'entreprenariat agroalimentaire, du 09 au 11 décembre à port prince, Haïti, 1-16.
- Ubeysekara, N. H., Jayathissa, R., & Wijesinghe, C. J. (2015). Nutritional status and associated feeding practices among children aged 6-24 months in a selected community in Sri Lanka: A cross sectional study. *European Journal of Preventive Medicine*, 3(2-1), 15-23.
- Uddin, M. K., Sardar, M. H., Hossain, M. Z., Alam, M. M., Bhuya, M. F., Uddin, M. M., & Rahman, M. J. (2010). Prevalence of anaemia in children of 6 months to 59 months in Narayanganj, Bangladesh. *Journal of Dhaka Medical College*, *19*(2), 126-130.
- Udoh, E. E., & Amodu, O. K. (2016). Complementary feeding practices among mothers and nutritional status of infants in Akpabuyo Area, Cross River State Nigeria. *Springer Plus*, 5(2073), 1-19.
- UNICEF (2018). Malnutrition rates remain alarming: stunting is declining too slowly while wasting still impacts the lives of far too many young children, UNICEF, New York, USA.
- UNICEF/ OMS/ WORLD BANK (2019). Levels and trends in child malnutrition: key findings of the 2019 edition of the Joint Child Malnutrition Estimates-UNICEF Regions. 20p
- Walker, S. P., Chang, S. M., Power, C. A., Simonoff, E., & McGregor, S. M. G. (2007). Early childhood stunting is associated with poor psychological functioning in late adolescence and effects are reduced by psychosocial stimulation. *Journal of Nutrition*, 137, 2464-2469.
- Wamani, H., Nordrehaug, A. A., Peterson, S., Tumwine, J. K., & Tylleskar, T., (2007). Boys are more stunted than girls in Sub-Saharan Africa: A meta analysis of 16 demographic and Health Surveys. *BMC Pediatrics*, 7, 17.
- WHO (World Health Organisation) (2012). Global database on child growth and malnutrition. World Health Organization, Geneva.
- WHO (World Health Organization) (2006). World Health Organization Child Growth Standards: Methods and Development, World Health Organization, Geneva, Switzerland.
- WHO (World Health Organization) (2008). Worldwide prevalence of anaemia 1993-2005: WHO global database on anaemia. Geneva.
- WHO (World Health Organization) (2010). Indicators for assessing infant and young child feeding practices, WHO press, Geneva, switzerland.

- WHO (World Health Organization) (2012). Sixty-fifth World Health Assembly. Geneva, 21-26 May 2012. Resolutions and decisions, annexes. WHA65.6. Comprehensive implementation plan on maternal, infant and young child nutrition [Internet]. Geneva.
- WHO (World Health Organization) (2018). Infant and young child feeding [Internet], Geneva.
- Woldeamanuel, B. T., & Tesfaye, T. T. (2019). Risk factors associated with under-five stunting, wasting, and underweight based on Ethiopian Demographic Health Survey datasets in Tigray Region, Ethiopia. *Journal of Nutrition and Metabolism*, 1-11.
- Woldie, H., Kebede, Y., & Tariku, A. (2015). Factors associated with anemia among children aged 6–23 months attending growth monitoring at Tsitsika Health Center, Wag-Himra Zone, Northeast Ethiopia. *Journal of Nutrition and Metabolism*, 1-9.
- Yusuf, T., & Jibrin, B. (2020). Complementary feeding practices and nutritional status of young children in a community in Sokoto. *Niger Journal of Paediatrics*, 47(4), 324 329.

Cite This Article: Fouejio Feuzet Aureole Sandra, Marlyne-Joséphine Mananga, Demasse Mawamba Adelaide, Nolla Nicolas Policarpe, Mimboé Foé Céline, Nyangono Biyegue Christine Fernande, Kana Sop Marie Modestine (2022). Current Food Behaviors and Nutritional Status of Children Aged 6 to 24 Months in Douala (Cameroon). *East African Scholars J Med Sci*, *5*(11), 282-293.