Knowledge, Attitude, Feeding Practices and Nutritional Status of Infants and Young Children in Eseka District, Cameroon

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Abstract

There is limited data on the anthropometric indices and feeding practices of infants and young children in Eseka despite the high burden of malnutrition. This study was designed to evaluate the knowledge, attitude, feeding practices and nutritional status of children aged 0-24 months in Eseka District. A descriptive cross sectional study was conducted among 287 children aged 0-24 months of both sexes together with their mothers or caregivers. Data were collected using a modified questionnaire developed by the FAO/WHO. Information on sociodemographic status, feeding habits and anthropometric parameters were recorded. Anthropometric measurements taken included weight, length, arm circumference and head circumference. The Z-score classifications for malnutrition; weight for length, length for age and weight for age were compared according WHO standards. A subset of 29 children were selected for 24 recall and a 3-day weighed food intake study. There was a low prevalence (47.38%) of early initiation of breastfeeding within the first hour of birth. Only 2.44% practised exclusive breastfeeding, while 50% had introduced solids foods before five months and 22.54% after six months. Very few children (13.68% and 29.72%) consumed animal source foods and fruits respectively. The complementary foods consumed by the children were unbalanced, monotonous, poor in protein and some minerals such iron, and rich in fat. Furthermore, the study showed that 39.3%, 16.72% and 13.94% of children were stunted, wasted and underweight respectively. Stunting was highest in children under 6 months. The prevalence of stunting among children is severe public health problem in this age group. Some of the feeding practices are associated with poor nutritional status and can be improved with good nutrition education programs.

Keywords: anthropometry, nutritional status, infant, stunting, rural area

1. Introduction

The first two years of life are the critical window of opportunity (Satapathy et al., 2021). The age of 6-23 months is the longest period in the first 1,000 days of life. This period is called the window of opportunity and is the important stage to optimize child growth and development in order to prevent malnutrition, including wasting, underweight and stunting, as well as its negative consequences in adulthood (Ahmad et al., 2018; Hasibuan et al., 2019). Good nutrition protects infants, children and mothers, strengthens the immune system and reduces the risk of nutrition-related non-communicable diseases (Semahegn et al., 2014). Undernourished children have weakened immune systems, rendering them less able to fight diseases, whilst children who are sick are more likely to become undernourished (Nzefa et al., 2019). World Health Organization (WHO) and United Nations Children's Fund (UNICEF) have advocated for increased commitment to appropriate feeding practices for all infants and young children in order to achieve optimal growth, development and health of infants and young children who need special attention in order to attain their nutritional requirements, as young children within the period of complementary feeding are particularly vulnerable to nutritional deficiencies due to rapid growth

(Fekadu et al., 2015).

Globally, about 151 million children under 5 years of age suffer from chronic malnutrition and 67 million under five were wasted in 2017. Among these malnourished children, 55% are living in Asia and 39% in Africa, while 69% of all wasted children under 5 years of age resided in Asia and 27% in Africa. Moreover, UNICEF, WHO, and World Bank Group Joint Child Malnutrition estimate in 2018 showed that about 35.60% of children under-five years in East Africa were stunted (Woldeamanuel & Tesfaye, 2019). The consequences of undernutrition among children include delay in physical growth, lower intellectual quotient, greater behavioural challenges, and deficiency in social skills and susceptibility to contracting diseases. These negative outcomes are attributable to moderate rather than to severe undernutrition (Nzefa et al., 2019).

The prevalence of stunting, wasting and underweight remain high in developing countries. According to latest statistics (2018) from the Ministry of Public Health, Cameroon (EDS-MICS, 2018), the prevalence of protein-energy malnutrition among children age one to five years were 29%, 4% and 11% for stunting, wasting and underweight, respectively. Undernutrition is still major nutritional problem in Cameroon, especially in rural and periurban areas (Mananga et al., 2014). It is important to note that the prevalence is also disproportionate according to region and socio-economic status. The Eastern and Northern Regions of the country still have higher prevalence of childhood malnutrition in general. According to the 2014 nationwide survey, the Far North, North and Adamawa regions have a global acute malnutrition (GAM) prevalence of 9.0%, 6.7% and 5.2% respectively. The Far North region has a prevalence of severe acute malnutrition (SAM) at the emergency threshold of 2.0% (Kaptso et al., 2021).

Previous studies have linked childhood malnutrition with taboo, maternal education, lack of knowledge of mothers, source of treated water, toilet facility, social network and family support (Kana et al., 2013; Mananga et al., 2014; Nzefa et al., 2019). The high number of malnourished children aged 6-23 months is strongly related to improper feeding practices since from age 6 months breast milk is no longer adequate to meet the energy and nutrient requirements, hence the need for complementary feeding (CF) to fill the nutrition gap (Woldeamanuel & Tesfaye, 2019). Improper feeding practices remain a common problem in developing countries. WHO found that only less than one-fourth of children aged 6-23 months met the minimum acceptable diet (MAD), dietary diversity and meal frequency standards in these countries (UNICEF, 2018). Feeding practices might affect the nutritional status of the children (Semahegn et al., 2014).

Childhood malnutrition is most often measured by anthropometry and evaluated in terms of stunting, wasting and underweight. These conditions are based on WHO classification using child growth standards medians in terms of standard deviations (SD) (Nzefa et al., 2019). Three indicators used for classification by comparison with a reference population (NCHS/ WHO International growth reference) are weight for height; weight for age and height for age. Wasting refers to a low weight for height z-score (WHZ) that is below -2SD of the median value of the NCHS/WHO International weight for height reference. A prevalence of wasting or acute malnutrition between 5-8% indicates a worrying nutritional situation and prevalence greater than 10% presents a serious nutritional situation. Underweight is defined as low weight for age z-score (WAZ) below -2SD of the median value of the NCHS/WHO International reference. Stunting is defined as low height for age z-score (HAZ) below-2SD of the median value of the NCHS/WHO International growth reference (Okoroigwe & Okeke, 2009).

Despite the fact that a number of studies have been done on feeding practices and nutritional status of children under 59 months, in Cameroon, there is limited data available on the prevalence of infant malnutrition in the Center Region of Cameroon in general and specifically in Eseka District. Therefore, the aim of this study was to assess the mother's knowledge, attitude, feeding practices and nutritional status of infants and young children in Eseka district.

2. Methodology

2.1 Study Setting

This community based cross-sectional study was conducted in Eseka municipality. Eseka is the divisional headquarters of Nyong and Kelle Division of the Center Region of Cameroon. It is located between latitude 3°39'North and longitude 10°46' East with an estimated population of about 23,200 inhabitants (NGO, 2015). Most residents are dependent on animal products (their own or from the market) and farming products for consumption. Likewise, they mostly depend on animal production for their income either by selling animal products or depending on them as a means of income generation like fetching water. A few members of the community are merchants at the border of the district.

2.2 Study Design

This was a descriptive and analytical cross-sectional study carried out over a period of 2 months, from November to December 2020 at the Eseka District Hospital. We conducted a nutritional survey that enrolled mothers or caregivers with their infant or child aged 0 to 24 months. Modified questionnaire on nutrition knowledge, attitude and practices developed by FAO was used in data collection. Data was collected on the demographic, social and household characteristics, infant and young children feeding, and sanitation and hygiene practices. Two categories of food data were collected: the food intakes (food frequency questionnaire and 24 hours recall, and seasonal food dairy (7 days)) and anthropometric measurements. The training of researchers was performed in different universities, medical institutions and laboratory.

2.3 Sample Size

Using the regional average (Center region) of the prevalence of malnutrition (24%) from statistics of the Cameroon Demographic Health Survey ((EDS-MICS, 2018). The sample size (N) was determined using the following formula; 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 malnutrition (24%). The sample size adjusted for dropout was calculated to be 280. Finally, a total of 287 participants were selected for this study.

2.4 Data Collection Procedures

The questionnaire was validated in a preliminary pilot survey. It contained questions related to demographic data (the mother's age, the infant's age and gender, source of income, the mother's educational level), anthropometric data, breastfeeding and complementary feeding practices. The survey was conducted using the local language (Bassa), french and pidgin (traditional English language) to increase understanding and accuracy of responses. Infants and young children's anthropometric measurements (weight and length/height) were recorded on the day of 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.

2.4.1 Food Survey

The dietary survey was conducted among the mothers, the caregivers and their children. The information was obtained as mentioned earlier by food frequency questionnaire to assess food availability, 24 hour recalls help to record recipes and feeding habits and finally, sub-sample of 30 families was randomly selected for the weekly food diary. This was to determine dietary habits, the type of food and the usual frequency of consumption of food and the main differences between the families with well-nourished and malnourished children.

2.4.2 Anthropometric Measurements

Anthropometric measurements taken during the survey were the length/height, the weight of young children and their mother.

- ***Weight measurement***

Weight measurements were performed using an electronic infant scale for the children (SECA745) that was accurate to 0.01kg (maximum weight 20 kg and 0.05 precision). Participants were made to stand (mothers) or to lie (children) on the platform without touching anything. Shoes and heavy clothing were removed and weight measurements was read and recorded on the survey form. Weighing was done when the stomach was virtually empty.

- ***Lenght measurement***

Length measurements were performed using the length board. Children were made to lie without shoes on the horizontal or vertical platform. With their feet parallel, their heels, buttocks, shoulders and back of head were made to touch the upright part of the board. The head was held comfortably erect in the same horizontal or vertical plane as the external auditory meter. Length measurement was then read and recorded in the survey form. The ages were recorded from the children's health care cards or immunization card. The record was added in the questionnaire.

- ***Assessment of the nutritional status of children***

Data from anthropometric measurements were analysed using DHS, and WHO (DHS, 2012; WHO, 2012) standard references. 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 index was below -2 z-scores of the average reference. Those with severe underweight had their weight for age index below -3 z-scores of the average reference. Children were considered stunted, if their height for age index was below -2 z-scores of the average reference.

2.5 Data Analysis

Anthropometric data were standardized for age using ENA version 2015. The data analysis was performed using SPSS version 20. Descriptive statistics (mean and standard deviation) were calculated for continuous variables. The nutritional status indicators, weight for length (WLZ), length for age (LAZ) and weight for age (WAZ) were compared with reference data from World Health Organization (WHO) standards.

2.6 Ethical Approval and Consent

Ethical approval and permission were obtained from Center Regional Ethics committee for Human Health Research, Cameroon (N°CE1581/CRERSHC/2020). 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.

3. Results

The results obtained in the study are summarised in table 1-7 and divided into demographic and socioeconomic characteristics, anthropometric indices, feeding practices, complementary feeding practices, food consumption, dietary habits and nutritional status. This study enrolled 287 infant-mother pairs. Table 1 presents the demographic and socioeconomic characteristics and health outcomes of children.

Table 1. Demographic and socioeconomic characteristics and health outcomes of children

Socio demographic characteristics (N= 287)	Frequency	Percentage (%)
Age of the child (in months)		
0-6	165	57.49
7-24	122	42.5
Sex of children		
Male	140	48.78
Female	147	51.21
Number of children by mother		
1	83	28.92
2	50	17.42
≥ 3	154	53.66
Caregivers		
Mothers	202	70.38
Grandmothers	46	16.02
Others	39	13.59
Age of the Mothers (Years)		
15-25	126	43.90
26-34	122	42.51
≥ 35	39	13.59
Level of education		
No formal education	15	5.23
Primary	79	27.53
Secondary	169	58.88
University	24	8.36
Marital status of mothers		
Married	217	75.61
Unmarried	70	24.39
Employment status of the mothers		
Housewives	108	37.63
Students	60	20.91
Working	119	41.46
Family size (person)		
3-4	9	3.14
5-6	89	31.01
7 and above	189	65.85
Completion of appropriate vaccination		
Complete	173	60.28
Incomplete	94	32.75
Not all	20	6.97
Water source for drinking		
Springs	181	63.06
Wells	80	27.87
Public tap	17	5.92
Mineral water	9	3.14

The mean (±SD) age of infants and young children who participated was 5.13 (±0.6) months. Majority of the children were between the ages of 0-6 months (57.49%). From the total of infants and young children, 51.21 % were females and 48.78% males. It appeared from the survey that 43.90% of mothers were aged 15 to 25 years, 42.51% aged 26 to 34 years and 13.59 % older than 34 years. Most of the mothers were married (75.61%) and the husbands were the head of the household. In addition, nearly 58.88% of the mothers had secondary school level education while only 27.5% had only primary school level education. It is noteworthy that only 5.1% of mothers were not educated (table 1). Some 37.63% of the mothers were housewives, 20.91% were students and 41.46 % were working (public sector, farmers teachers, sellers, tailors, hairdressers). The majority of the mothers reported having more than three (03) children (53.66%). In this study, 29.61% of caregivers were grandmothers

(16.02%) and others members of the family (13.59%). Sixty percent (60%) of children had completed the age appropriate vaccination. Spring water was the major source (63.06%) of water for cooking and drinking among the mothers.

Table 2 presents the anthropometric indices of children by sex and age. It was observed that the mean of all anthropometric indices (weight, lenght, arm circumference, head circumference) of infants sampled increased significantly with age. Anthropometric indices of male were significantly higher than those of female.

Table 2. Anthropometric indices of children by sex and age

Growth indicators	Sex		Age (months)	
	Female (N= 147)	Male (N= 140)	≤ 6 (N= 165)	> 6 months (N= 122)
Age (months)	5.05 ± 0.1^a	$5,20 \pm 0.21^{ab}$	3.72 ± 1.36^a	10.11 ± 1.63^a
Weight (Kg)	6.85 ± 0.16^a	6.93 ± 0.23^{ab}	6.24 ± 0.32^a	9.20 ± 0.39^b
Lenght (cm)	59.7 ± 0.87^a	60.55 ± 0.6^{ab}	57.19 ± 0.76^a	70.43 ± 0.9^b
Arm circumference	12.58 ± 1.83^a	12.62 ± 1.72^a	12.29 ± 1.77^a	39.03 ± 2.93^b
Head circumference	40 ± 3.23^a	40.01 ± 3.55^a	13.68 ± 1.29^a	43.43 ± 2.56^b
AC/HC	0.31 ± 0.04^a	0.32 ± 0.04^a	0.31 ± 0.04^a	0.32 ± 0.03^a
L/A	1.65 ± 0.63^a	1.91 ± 0.5^b	2.22 ± 1.33^b	-0.78 ± 1.20^a
W/L	2.08 ± 1.13^{ab}	1.84 ± 1.07^b	1.08 ± 0.43^a	1.84 ± 0.74^b
W/A	-0.51 ± 1.1^{ab}	-0.16 ± 0.7^b	-0.30 ± 0.57^a	0.32 ± 0.42^b

AC = Arm circumference, HC = Head circumference, L/A= Lenght for age z-score, W/L= Weight for lenght z score, W/A= Weight for age z-score. Values are means ± SD. Means within the same line with different superscripts significantly different at p <0.05.

Table 3 shows the feeding practices adopted by the mothers. According to these results, 47.38% of the mothers revealed to introducing their babies to breast milk immediately after delivery. Whereas, 52.5% of mothers admitted they did not breastfed theirs babies immediately after birth. This could be because 12.54% of the mothers complained of not having enough breastmilk, 10% had breast pain after breastfeeding, whiles 13% reported that the reason are the taboo or ancestral beliefs and 47% were aware of the importance of colostrum. Based on the results obtained from this study, only 2.44% of the infants assessed were exclusively breastfed. The prevalence of breastfeeding was 78.75%. Majority of the mothers breastfed their child on demand.

Table 3. Feeding practices adopted by the mothers

Variables (N= 287)	Frequency	Percentage (%)
Timely initiation of breastfeeding		
- **Immediately after delivery**	136	47.38
- **A few hours/day after delivery**	151	52.61
Reasons to timely initiation of breastfeeding		
- **Not enough milk**	36	12.54
- **Pain after breastfeeding**	29	10.10
- **Taboo or ancestral beliefs**	87	30.31
- **Aware of the importance of colustrum**	135	47.04
Type of feeding (0-6months)		
- **Breast milk**	7	2.44
- **Formula**	0	0
- **Mixed feeding**	140	48.78
Type of feeding (7-24months)		
- **Breast milk**	0	0
- **Formula**	0	0
- **Mixed feeding**	79	27.53
Frequency of daily intake breast milk (< 6 months)		
- **On demand**	125	43.55
- **Less than 3 times**	9	3.14
- **3 times**	14	4.88
Frequency of daily intake breast milk (> 6 months)		
- **On demand**	68	23.69
- **Less than 3 times**	6	2.09
- **3 times**	6	2.09

Table 4 shows that majority of the mothers (50%) started introducing complementary foods to their children before 6 months of age. Only 27.46% of the mothers began complementary feeding at the age of 6 months, while 22.54% were not started on complementary feeding after 6 months of age. More than half of mothers reported that they did not have knowledge about appropriate complementary feeding practices.

Table 4. Complementary feeding practices

Variables	Frequency	Percentage (%)
Age of introduction of complementary foods (N= 244)		
- < 6 months	122	50
- 6 months	67	27.46
- > 6 months	55	22.54
Reasons for not practicing good complementary feeding (N= 207)		
- Not enough milk	29	14.01
- Taboo/ ancestral beliefs	138	66.66
- Milk is spoiled	40	19.32
Knowledge about appropriate infant and young children complementary feeding practices (N= 207)		
- Have knowledge	74	35.75
- Don't have knowledge	133	64.25

The frequency of intake of complementary food are illustrated in table 5. According to these results, 31.63%, 18.37%, 34.69% and 20.41% of children consumed respectively milk products, eggs, meat, and fish occasionally. The consumption of foods rich in starch (cassava, yam, potatoes) was very high (up to three (03) times per week) compared to the vegetables.

Table 5. Consumption of food by children (N= 196)

Complementary food	Daily n (%)	< 3xwk n (%)	> 3x/wk n (%)	Occasionnaly n (%)	Never n (%)
Plantain	8 (4.08)	52 (26.53)	35 (17.86)	98 (50)	03 (1.53)
Cassava/yam/potatoes	38 (19.39)	42 (21.43)	87 (44.39)	29 (14.79)	0 (0)
Sorghum	27 (13.77)	41 (20.92)	100 (51.02)	26 (13.26)	2 (1.02)
Rice	7 (3.57)	17 (8.67)	112 (57.14)	60 (30.61)	0 (0)
Vegetables	19 (9.69)	6 (3.06)	37 (18.88)	134 (68.37)	0 (0)
Beans	0 (0)	55 (28.06)	22 (11.22)	107 (54.59)	12 (6.12)
Peanut	12 (6.12)	74 (37.76)	36 (18.37)	74 (37.75)	0 (0)
Leafy green vegetables	11 (5.61)	22 (11.22)	126 (64.29)	37 (18.88)	0 (0)
Fruits	31 (15.82)	23 (11.73)	147 (75.00)	23 (11.73)	18 (9.18)
Fish	18 (9.18)	50 (25.51)	81 (41.33)	40 (20.41)	07 (3.57)
Meat (beef, pork)	4 (2.04)	83 (42.35)	8 (4.08)	68 (34.69)	33 (16.84)
Egg	1 (0.51)	103 (52.55)	20 (10.20)	36 (18.37)	36 (18.37)
Milk products	9 (4.59)	70 (35.71)	17 (8.67)	62 (31.63)	38 (19.39)

n= number; % = percentage.

Table 6 presents the dietary habit of children. It appeared that the children were mainly fed with diet containing palm oil, tubers, and cereals. The consumption of animal products (meat, fish, eggs, and milk products), vegetables and fruits was very low.

Table 6. Dietary habit

Foods	Frequency (N= 212)	Percentage
Tubers and plantain (plantain, cassava, yam, potatoes, cocoyam)	212	100
Cereals	187	88.21
Legumes and nuts	94	44.34
Milk and milk products	7	3.30
Egg	13	6.13
Animal origin foods (Fish and Meat)	29	13.68
Fruits	63	29.72
Vegetables	60	28.30
Palm oil	212	100

The nutritional status of the infants and young children was determined by calculating the weight-for-age, length-for-age and weight-for-length indices. Table 7 represents the malnutrition parameters according to the age of children. About 39.37%, 16.72% 13.93% and 3.48% of the infants and young children were stunted, wasted, underweight and overweight respectively. The prevalence of wasting was higher among children 7-24 months, while stunting, underweight and overweight was higher among children at the age of 0-6 months. Concerning the sex, the prevalence of wasting, underweight were higher among male while stunting and overweight was higher among female.

Table 7. Prevalence of malnutrition among children in Eseka by sex and age

Nutritional status indicator (N= 287)	Sex		Age (months)		Total (%)
	Female	Male	≤ 6 (%)	> 6 (%)	
Lenght for age z-score					
Severely stunted	6.97	4.88	8.71	3.48	39.37
Moderately stunted	13.94	13.59	17.07	10.10	
Weight for lenght z-score					
Severely wasted	2.79	1.74	2.44	2.09	16.72
Moderately wasted	4.53	7.66	6.27	6.27	
Overweight/obese	2.09	1.39	3.14	0	3.48
Weight for age z-score					
Severely underweight	1.04	2.44	3.48	0	13.93
Moderately underweight	4.88	5.57	5.92	4.53	

4. Discussion

This was a descriptive and exploratory study carried out to provide baseline data on the existing situation and the magnitude of child malnutrition and feeding practices adopted by the mothers. This work will assist in the planning of nutritional interventions with the aim of improving the nutritional status of children in this locality. Many scientific studies have reported that children from poor families are usually malnourished, have poor academic performances and reduced intellectual achievement due to lack of access to food, poor feeding practices and health care (Danjin *et al.,* 2011). Main objectives of this work was to assess the knowledge, attitude, feeding practices and nutritional status of children aged 0 to 24 months of age in Eseka district, Cameroon.

According to the results of this study, 37.63% of mothers did not have remunerated jobs. This high number of unemployed mothers could be explained by the fact that it is periurban area, so agriculture is the main activity. In effect many of the mothers were farmers. This suggests that they have easy access to food such as plantain, bananas, cassava, and yams. On the other hand, about 21% of the mothers were the students. This leads to rapid weaning of children or the lack of exclusive breastfeeding. Indeed, for most student mothers, their children are often looked after either by the grandmother or by the oldest available person in the family. As a result, the child's feeding behaviour is greatly modified. This situation strongly influences the eating habits of the child. Our findings were lower than those of Mvogo et al. (2020), who reported that children of 90% of mothers, who have a remunerated job consume cereal, based industrial supplements in the city of Yaounde. According to many authors, the occupation of the mother has a significant impact on the nutritional status of the child because the unavailability of the mothers is an important indicator for a good follow up of the breastfeeding and the feeding of the child (Trèche, 2008).

Regarding the education level of the mothers, nearly 95% of the mothers were educated and most (67%) had reached the secondary level. The result are not correlate those of studies carried out effect of mother's education on child's nutritional status in the slums of Nairobi which reported that 76% of mothers who have primary education shown 43% of stunted children (Abuya *et al.,* 2012). Indeed, according to OMS (2006), the high level of education is one of the factors that predispose the mothers to practice breastfeeding and to adopt good weaning practices.

Concerning the number of children of each mother, about 54% of mothers had up to three (03) children. This could be attributed to the fact that in this community (Eseka), the respect and the honor of a woman depended on the number of children that she has birthed. Therefore, many women tend to have many children and this from young age. A mother of several children is assumed to have a better experience with child feeding practices compared to the primipare mothers (INS, 2020). In agreement with this assertion, the birth order of the children showed a higher risk wasting for those born as a first or second child compared with those born as the third or later, probably because the mothers have had more experience and practice in how to feed and take care of their children with time (Nzefa *et al.,* 2019). Several studies have documented that children are more prone to suffer from malnutrition if they live in households with more than five residents (Kana et al., 2015).

Results from the study demonstrated that 63% of the children drank spring water. This is contrary to the reports of Kaptso et al. (2021) in Buea (Cameroon) were 91 of caregivers gave mineral water to their children. However, Woldeamanuel & Tesfaye (2019) reported similar finding. The quality of drinking water given to the children is a determining factor in their nutritional status because untreated sources of drinking water is strongly associated with higher risk of stunting (Amare et al., 2018).

Appropriate breastfeeding and complementary feeding practices are fundamental to children's survival, growth and development (Fekadu et al., 2015). In this study, nearly 52.62% of the infants were not breastfed within the first hour after delivery. Honey, water with or without sugar and or traditional liquids were given to children. The reasons given by the mothers for not breastfeeding after delivery in this study were cultural influences (30%), not enough breast milk (12.5%), and breast pain (10%). Due to the early introduction of the complementary food, the prevalence of mixed feeding was relatively high and very low for the exclusive breastfeeding. These results were quite similar to those found by Kana et al. (2013) in which the prevalence of exclusive breastfeeding was 18.67%. The findings of the study indicated that 76.31% of the mothers were still breastfeeding at the time of survey. The results are contrary to those obtained in South Africa (Limpopo) and in Cameroon (Douala) where more than 90% (Mushaphi et al., 2008) and less than 50% (Kana et al., 2013) of the mothers breastfed their babies. A similar result was found in a recent study conducted in Cameroon (Bagang) (Mananga et al., 2014). Reasons given by the mothers for not breastfeeding in this study were resuming school or work, tiredness, the cultural influences, not enough breast milk or health reasons. These reasons are similar with study reports in Indonesia (Budiati & Setyowati 2019). Interestingly, the study showed that none of the mothers was using

formula milk. This is due to the high cost of formula milk for families living in this periurban area. These results are however not similar to those reported by Azike et al. (2019) where 24.6% of the mothers practiced mixed breastfeeding with artificial formula. Appropriate breastfeeding practices are fundamental to children's survival, growth and development. Continued, frequent breastfeeding also protects child health and wellbeing by reducing the child's risk of morbidity and mortality in disadvantaged populations (Adeyemi et al., 2022). This could be due to the immunological, hygienic and nutritional advantages of breastfeeding. These additional advantages of breastfeeding have a role in the prevention of malnutrition (Fekadu et al., 2015).

In terms of the timeliness to introduction of complementary food, this study found that nearly 27.46 % of children received complementary foods timely, while 50% introduced earlier (before 6 months) and 22.54% introduced late (after 6 months). The main reasons of the early or late CF were not enough milk (14.01%), cultural influences (66.66%) and spoiled milk (19.32%). This is contrary to the reports of Azike et al. (2019) where 38.4% of children received complementary foods before 6 months. However, our findings are very low compared to that of Udoh et al. (2016) in which the prevalence of timely introduction of complementary feeding among infants aged 6-8 months was 85.4%. A study in Nigeria mentioned that 37.7% and 8.1% of children were initiated on complementary feed early (before 6 months of life), late (after 8 months) respectively (Yusuf, & Jibrin, 2020). UNICEF/WHO recommends exclusive breastfeeding during the first six months of life. But, these guidelines are not being followed. Untimely introduction to complementary food remains a real problem particularly in Cameroon where about 15% of the children received complementary food at the age of 4-5 months (EDS-MICS, 2018). Among the complementary foods early introduced to children under 6 months were water, sorghum, maize and traditional beverages. The frequency of intake of complementary foods consumed revealed that the commonest food given weekly (up to three times per week) was cassava/potatoes, yams (44%), cereals (51%) and vegetables (19%). The dietary habit showed that tubers (100%) and cereals (88%) followed by legumes and nuts (44%) were mostly consumed by the children. Complementary feeding practices were inadequate compared to the recommended standards. Complementary feeding education using various media especially health facilities is very important for mothers of infants.

Nutritional status was interpreted as stunting, wasting and underweight (height for age, weight for height and weight for age were <-2SD) in this study. The data regarding anthropometric parameters of children indicated an increase in growth with age of children. According to Kaptso et al. (2021), growth is faster in the first two years of life and increases with age. During the first decades of life, there is an increase height, weight and head that continue to develop after birth and during infancy growth is faster than any other time after birth. Similar observations in Nepal, Cameroon and South Africa have been documented earlier (Mushaphi et al., 2008; Osei et al., 2010; Mananga et al., 2014).

According to the results of this study prevalence of wasting, underweight and stunting were 16.72%, 13.94%, and 39.37% respectively. According to the last Cameroon EDS survey (2018), among children under 59 months of age, the proportion of stunting was 29%, underweight was 11% and the wasting was 4% at the national level (EDSC-MICS, 2008). The results in the present study were higher than those of the national survey in 2018. The difference observed could be due to the differences in area and or communities (the studies are carried out mainly in urban areas). In addition, we observed that the national prevalence was for the whole country. The prevalence of stunting was higher compared to those observed in Pitoa (Cameroon) where 75.1% of children under five were stunted (Azike et al., 2019).

However, the percentage of stunting in Eseka remain higher than that of Nigeria, which has reported to be 16% (Sulaiman et al., 2020). 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 (Mananga et al., 2014). Furthermore, it is known that in children under 6 months who receive foods other than breastmilk, there is competition between nutrients from breastmilk and those from complementary foods, resulting in poor absorption of milk minerals (Beck et al., 2010). According to our findings, the majority of the infants aged of 0-6 months (29.94%) were stunted compared to that of children aged 7-24 months. This high rate of stunting among children aged 0-6 months can be associated to the early introduction of complementary foods and the lack of knowledge of the mothers.

The prevalence of malnutrition (underweight) was 13.94% which means that one in seven children in Eseka was underweight due to no non-regular feeding caused by the occupation of mothers (farms or studies). In the present study, the prevalence of underweight was higher than those found in Douala (Cameroon), Sri Lanka and Indonesia where the prevalence were 5.7%, 21.3% and 26% respectively (Ubeysekara et al., 2015; Ahmad et al.,

2018; Okalla et al., 2019). However, the findings were lower than those of 35.3% obtained in Berhampur in India (Satapathy et al., 2021).

Wasting which represents the acute Protein Energy Malnutrition (PEM) indicates recent weight loss which could be related to recent state of morbidity associated with poor hygienic practices or poor feeding habits (Fekadu et al., 2015). In the current study, the prevalence of wasting was 16.72%. Male children were mostly affected by wasting than female. Wasting could be linked to inappropriate feeding practices such as early introduction of complementary food or poor hygiene and health care practices. A similar study conducted in India reported a higher prevalence of wasting (36.4%) (Satapathy et al., 2021). While the studies in Cameroon (Mayo-Danay), Nigeria (Okrika Town) and Ethiopia (Tigray Region) reported a lower prevalence of wasting 4.4%, 8.80% and 16.7% respectively (Woldeamanuel & Tesfaye 2019; Okari et al., 2019; Sobze et al., 2020). These differences of prevalence of wasting or another malnutrition indicator (stunting or underweight) could be due to the differences of associated factors of nutritional status between countries could be due to the disparities in socio economic status, literacy level of females and the cultural conditions (Okari et al., 2019).

Although our study included only children aged 0-24 months, the results can be considered to reflect the anthropometric status for the population in Eseka district. This work is a good gauge for population-based malnutrition. We suggest that our results could be applied to other settings with similar characteristics in Cameroon.

5. Conclusion

At the end of this study, the findings revealed the high prevalence of all malnutrition indicators among infants and young children in Eseka District. There is inappropriate age of complementary feeding initiation compared to the recommended standard mainly due to cultural beliefs of the mothers. The present study can be used as a reference for planning the development of nutritional education programs aimed at improving breastfeeding practices and timely initiation of complementary feeding, practical education for both parents on the implementation of adequate infant feeding practices, education level of caregivers/guardians and developed sanitation and hygiene.

Conflicts of interest

The authors declare that they have no conflict of interest.

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