Assessment of Nutritional Status and Associated Factors in Children Aged 6 to 59 Months in Ayos Locality, Cameroon

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Abstract

Childhood malnutrition is a serious public health problem around the world, particularly in Cameroon. This study was conducted to assess nutritional status and associated factors for children aged 6 to 59 months in the locality of Ayos. This is a cross-sectional and descriptive study that took place from August to October 2019 on a random sample of 309 children and his mothers. Anthropometric parameters of children were measured, socio-demographic data of mothers and children's eating habits were collected using a questionnaire, association between socio-demographic factors, dietary practices and malnutrition were identified. The results showed that 9.06% of children were wasted with 3.56% in the severe form, 26.54% were underweight with 10.03% in the severe form and 53.07% were stunted with 34.96% in the severe form. Overall, 86.1% of mothers have a poor understanding of the concept of dietary diversity. The first complementary food introduced is the poorly enriched local porridge used by 40.52% of the mothers, followed by the family meal, used by 38.52% of them. Marital status (p=0.009), level of education (p=0.001), occupation (p=0.046) were associated with chronic malnutrition. Type of breastfeeding (p=0.005), age of introduction of complementary foods (p=0.004), reason for introduction (p=0.002) had a significant association on the prevalence of stunting. There is a significant influence between the type of breastfeeding (p=0.017) and the first food introduced (p=0.022) on the prevalence of wasting. The prevalence of malnutrition in Ayos locality was accentuated in children who received inadequate breastfeeding and feeding. Nutrition education for mothers could improve this situation.

Keywords: Nutritional status; Children 6 to 59 months; Associated factors; Ayos; Cameroon

Introduction

Malnutrition is a significant global public health burden with greater concern among children under five years [1]. However, despite the observed improvements in nearly all low and middle-income regions around the world, sub-Saharan Africa and Central Asia, continue to have the highest prevalence of stunting [2]. Stunting is a condition of chronic malnutrition in children that causes the non optimal growth and triggers other disorders such as decreasing of immunity and intelligence [3]. A global review of stunting in low- and middle-income countries identified growth restriction in-utero and lack of access to sanitation as the main drivers of stunting [4]. Stunting affected an estimated 144 million children under five globally in 2019 and this prevalence increased from 32.4% in 2000 to 21.3% in 2019 [5]. Despite the global decline,
the number of stunted children is increasing in Africa and is still high by international standards. The number of stunted children in Africa increased from 49.7 million in 2000 to 57.5 million in 2019 [5]. The National Statistics Institute reported high rate and increasing prevalence of stunting (33%), underweight (15%) and wasting (6%) in children under 5 years. In Cameroon, despite a fairly large food production, malnutrition persists in children under 5 years old and prevalence of stunting is highest. According to the Demographic and Health Survey conducted by the National Statistics Institute in 2018, 29%, 11% and 4% of children under 5 years were suffering from stunting, underweight and wasting respectively [6]. The chronic malnutrition remained highest with 14% in the severe form and 15% in the moderate form. These proportions are much higher than those expected in a healthy and well-nourished population: 2.3% for chronic malnutrition (moderate or severe) and 0.1% for its severe form [6]. This national demographic and health survey data hide regional and cultural disparities. However, nutritional problems make it necessary to have regularly updated data in each region or even village of the country, in particular on food and health practices. The aim of this study was to determine the prevalence of nutritional status and associated risk factors among children aged 6 to 59 months in the locality of Ayos borders with the East Region of Cameroon which is one of the region most affected by chronic malnutrition (37%).

Material and Methods

Study site

This study was carried out in the locality of Ayos located in the Department of Nyong and Mfoumou, Central Region and bordering the Eastern Region, in Cameroon.

Study design

This is a cross-sectional and descriptive study that took place during the period from August to October 2019 in 19 neighborhoods in Ayos locality. About, 309 children of both sexes and their mothers were recruited.

Ethical approval

Before data collection, the study has been approved by the Institutional Research Ethics Committee for Human Health of Douala and ethical clearance was obtained (N° 2082 CEI-UDo/12/2019/M). After approval of this study by the Ethics Committee, the administrative health and community authorities have been met and informed of the objectives of our study in order to obtain their consent and assistance. Informed consent were then handed over and explained to parents.

Eligibility Criteria

Mothers and children aged 6 to 59 months who had resided in Ayos for at least 6 months at the time of the survey and who had voluntarily signed the informed consent form were included in the study. Any participant who was ill during the study was excluded.

Procedures

Prior to the study, sensitization was carried out among the entire population in order to present the interest of our study. Subsequently, a pre-test was carried out to assess the comprehension of the questionnaire. The final questionnaire was therefore developed, adjusted and validated before the survey. During the survey, the socio-demographic characteristics of mothers, the practices and knowledge of child nutrition, the eating habits and nutritional status of children (anthropometric parameters) were evaluated.

Socio-demographic parameters of mothers

The socio-demographic parameters of mothers were: level of education, marital status, occupation, time spent at work, number of children.

Practices and knowledge of the mothers on the child nutrition

To determine whether or not the child's nutrition was under control, mothers were asked about the type of breastfeeding, the age at which complementary foods were introduced and the reasons for which they introduced these foods into the diet of their children.

Children's eating habits

The children's eating habits were assessed using a food consumption frequency questionnaire. The mothers had listed all the foods and drinks consumed by their children for seven days. The consumption of a food in a group regardless of the amount in a child's diet is rated "1" and the absence is rated "0". Each food group was assigned a weight, so the score obtained was the product of the weight.

Anthropometric parameters

Weight measurement

The weight measurement was performed using an electronic scale (TEFAL, Germany) of 150 kg with 0.1 g precision for infants and electronic digital baby scale (ALECTO) of 20 kg for young children. The children were made stand or lying on the scale without touching anything. Shoes and heavy clothing were removed.

Size measurement

The size of children was performed using a vertical locally manufactured measuring board with a ruler graduated in centimeter. With their feet parallel, their heels, buttocks, shoulders and back of head were made to touch the upright part of the meter.
Evaluation of nutritional status

Stunting is an indicator of linear growth retardation and cumulative growth deficits in children. The height-for-age Z-score (HAZ), as defined according to WHO growth reference, expresses a child’s height in terms of the number of standard deviations (SD) above or below the median height of healthy children in the same age group or in a reference group [7]. This study focused on children with a height-for-age Z-score below minus two standard deviations (-2 SD) as moderate stunted and height-for-age Z-score below minus three standard deviations (-3 SD) as severely stunted [7].

Statistical analyses

Data from anthropometric measurement were standardized using ENA software and analyzes were done using SPSS Version 16 software. Descriptive statistics were used to determine the means and percentages of the various parameters. Chi 2 test was 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.

Results

About 309 children 6 to 59 months aged in both sexes took part in the study almost equally in the surveyed population with a sex ratio of 1.02 in favor of girls. The average of age, weight and height were $24.61 \pm 1.13$ months, $10.49 \pm 0.25$ kg and $78.86 \pm 1.04$ cm respectively. Table 1 also shows that the least and the high represented age groups of children were 48-59 months (9.71%) and 12-24 months (28.16%) respectively.

Assessment of the nutritional status of children

In table 2, 9.06% of children suffer from wasting with 3.56% in the severe form and girls were more affected (5.18%) than boys (3.88%). The prevalence of underweight was 26.54% with 10.03% in the severe form and boys were the most affected (13.92%) compared to girls (12.62%). Stunting was the most common form of malnutrition among these children. Its prevalence was 53.07% with 34.96% in the severe form and predominance in boys (31.72%) against (21.36%) in girls.

Impact of socio-demographic factors of mothers on child malnutrition

Table 4 shows that underweight, wasting and stunted growth predominated in children from families of cohabiting mothers (17.52%; 6.94%; 27.74% respectively) and single mothers (7.3%; 2.18%; 20.07% respectively). The prevalence of malnourished children was highest among mothers in the

### Table 1: Distribution of children according to age group, sex, weight and height

| Age group (months) | Boys N (%) | Girls N (%) | Total N (%) |
|--------------------|------------|-------------|-------------|
| [6-9]              | 19 (6.15)  | 13 (4.21)   | 32 (10.36)  |
| [9-12]             | 22 (7.12)  | 21 (6.8)    | 43 (13.92)  |
| [12-24]            | 46 (14.89) | 41 (13.27)  | 87 (28.16)  |
| [24-36]            | 33 (10.68) | 39 (12.62)  | 72 (23.30)  |
| [36-48]            | 23 (7.44)  | 22 (7.12)   | 45 (14.56)  |
| [48-59]            | 11 (3.56)  | 19 (6.15)   | 30 (9.71)   |
| Total              | 154 (49.84)| 155 (50.16)| 309 (100)   |
| Weight (kg)        | 10.39 ± 0.25| 10.59 ± 0.25| 10.49 ± 0.25|
| Height (cm)        | 77.29 ± 1.07| 80.43 ± 1.03| 78.86 ± 1.04|

| Age group (months) | Boys (n=154) | Girls (n=155) | Total (n=309) |
|--------------------|--------------|---------------|---------------|
| 6-9                | 56 (18.12)   | 89 (28.8)     | 145 (46.92)   |
| 9-12               | 30 (9.71)    | 26 (8.41)     | 56 (18.12)    |
| 12-24              | 68 (22.01)   | 40 (12.95)    | 108 (34.96)   |
| 24-36              | 111 (35.92)  | 116 (37.54)   | 227 (73.46)   |
| 36-48              | 26 (8.42)    | 25 (8.09)     | 51 (16.51)    |
| 48-59              | 17 (5.5)     | 14 (4.53)     | 31 (10.03)    |

| Wasting (n=309)    |              |               |               |
|--------------------|--------------|---------------|---------------|
| Normal (WAZ ≥ -2)  | 142 (45.96)  | 139 (44.98)   | 281 (90.94)   |
| Moderate (-3 ≤ WAZ < -2) | 7 (2.26) | 10 (3.24) | 17 (5.50) |
| Severe (WAZ < -3)  | 5 (1.62)     | 6 (1.94)      | 11 (3.56)     |
15-24 age group (54.74%), followed by the 25-34 age group (35.77%). The prevalence of malnourished children was higher among women farmers (19.71%) and the unemployed (58.76%). The higher number of malnourished children came from families where mothers had primary (38.32%) and secondary 1st cycle (33.94%) education level. From this study, it emerges a significant influence of the mother's level of education ($\chi^2 = 18.33; p=0.001$), marital status ($\chi^2 = 11.61; p=0.009$) and occupation ($\chi^2 = 11, 11; p=0.046$) on the prevalence of stunting in children.

Table 5 shows that 13.92% of infants received exclusive breastfeeding, 82.53% mixed breastfeeding and 3.55% artificial breastfeeding. The prevalence of underweight, stunting and wasting was higher among mixed breastfeeding mothers (22.98%, 47.57% and 7.12% respectively). These results also show that 86.1% of mothers practiced dietary diversification early (before 6 months) and only 4.53% of mothers gave exclusively breast milk during 6 months. Similarly, out of 86.1% of children who received the first food early, 24.28%, 48.87% and 8.09% were underweight,

### Table 3: Forms of malnutrition according to age groups

| Age groups (months) | Stunting N (%) | Underweight N (%) | Wasting N (%) | Malnourished children N (%) |
|---------------------|----------------|-------------------|--------------|----------------------------|
| [6-9]               | 22 (7.12)      | 5 (1.62)          | 1 (0.32)     | 28 (9.06)                  |
| [9-12]              | 27 (8.74)      | 14 (4.53)         | 3 (0.97)     | 44 (14.24)                 |
| [12-24]             | 60 (19.41)     | 33 (10.68)        | 13 (4.21)    | 106 (34.3)                 |
| [24-36]             | 27 (8.74)      | 15 (4.85)         | 5 (1.62)     | 47 (15.21)                 |
| [36-48]             | 15 (4.85)      | 10 (3.24)         | 3 (0.97)     | 28 (9.06)                  |
| [48-59]             | 13 (4.21)      | 5 (1.62)          | 3 (0.97)     | 21 (6.8)                   |
| Total               | 164 (53.07)    | 82 (26.54)        | 28 (9.06)    | 274 (88.67)                |

### Table 4: Distribution of malnourished children according to socio-demographic factors of mothers

| Variables                  | Number of malnourished children (N=274) | Total n (%) |
|----------------------------|----------------------------------------|-------------|
|                            | Stunting n (%) | Underweight n (%) | Wasting n (%) | n (%)       |
| Age group of mothers (years) |                                        |             |
| 15-24                      | 83 (30.29) | 49 (17.88) | 18 (6.57) | 150 (54.74) |
| 25-34                      | 64 (23.36) | 26 (9.49)  | 8 (2.92)  | 98 (35.77)  |
| 35-44                      | 17 (6.2)   | 7 (2.56)   | 2 (0.73)  | 26 (9.49)   |
| 45-54                      | 0 (0)      | 0 (0)      | 0 (0)     | 0 (0)       |
| Total                      | 164 (59.85)| 82 (29.93) | 28 (10.22)| 274 (100)  |
| Marital status             |                                        |             |
| Monogamous                 | 33 (12.04) | 13 (4.75)  | 3 (1.09)  | 49 (17.88)  |
| Polygamous                 | 0 (0)      | 1 (0.36)   | 0 (0)     | 1 (0.36)    |
| Cohabitation               | 76 (27.74) | 48 (17.52) | 19 (6.94) | 143 (52.2)  |
| Single                     | 55 (20.07) | 20 (7.3)   | 6 (2.18)  | 81 (29.56)  |
| Total                      | 164 (59.85)| 82 (29.93) | 28 (10.22)| 274 (100)  |
| Level of education         |                                        |             |
| No Formal education        | 26 (9.49)  | 16 (5.84)  | 3 (1.09)  | 45 (16.42)  |
| Primary                    | 65 (23.72) | 29 (10.58) | 11 (4.02) | 105 (38.32) |
| Secondary 1st cycle        | 52 (18.98) | 30 (10.95) | 11 (4.02) | 93 (33.94)  |
| Secondary 2nd cycle        | 12 (4.38)  | 5 (1.82)   | 3 (1.09)  | 20 (7.3)    |
| Higher                     | 9 (3.28)   | 2 (0.74)   | 0 (0)     | 11 (4.02)   |
| Total                      | 164 (59.85)| 82 (29.93) | 28 (10.22)| 274 (100)  |
| Employment status          |                                        |             |
| Work at home               | 8 (2.92)   | 5 (1.82)   | 5 (1.82)  | 18 (6.56)   |
| Farmer                     | 32 (11.68) | 17 (6.21)  | 5 (1.82)  | 54 (19.71)  |
| Employee                   | 9 (3.28)   | 2 (0.74)   | 0 (0)     | 11 (4.02)   |
| Trader                     | 11 (4.02)  | 9 (3.28)   | 1 (0.37)  | 21 (7.67)   |
| Unemployed                 | 99 (36.13) | 46 (16.79) | 16 (5.84) | 161 (58.76) |
| Others                     | 5 (1.82)   | 3 (1.09)   | 1 (0.37)  | 9 (3.28)    |
| Total                      | 164 (59.85)| 82 (29.93) | 28 (10.22)| 274 (100)  |

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stunted and wasting respectively. The first complementary food introduced was the poorly enriched local porridge used by 41.12% of the mothers, followed by the family meal (38.52%).

Type of breastfeeding ($\chi^2 = 10.616; p=0.005$), age of introduction of complementary foods ($\chi^2 = 11.110; p=0.004$), reason for introduction ($\chi^2 = 27.442; p=0.002$), have a significant impact on the prevalence of stunting. There is a significant influence between the type of breastfeeding ($\chi^2 = 8.168; p=0.017$) and the first food introduced ($\chi^2 = 16.367; p=0.022$) on the prevalence of wasting. Likewise, it emerges that the mother's level of education ($\chi^2 = 14.696; p=0.005$) has a significant relationship on the prevalence of underweight. The low consumption of dairy products and other fruits and vegetables are associated with underweight and stunting respectively.

Discussion
The present study investigated the nutritional status and associated factors in children 6 to 59 months of age in the locality of Ayos. Almost 309 children were included in the study, ie 155 (50.16%) girls and 154 (49.84%) boys (Table 1). The female gender predominated with a ratio of 1:0.2. The results obtained indicate that the prevalence of underweight, stunting and wasting was 26.54%, 53.07% and 9.06% respectively. These prevalences were similar to those obtained in the rural community of Bangang, Cameroon for children aged 0-24 months [8]. The high prevalence rate of stunting could be explained by inadequate dietary practices and health care, culture and/or relatively chronic or recurrent infectious diseases. Also most households live in precarious conditions, characterized by a limited or undiversified quantity of available food. This could lead to a prolonged micronutrient deficiency, thus weakening the nutritional status of children [9]. The mothers gave the family meal and porridge to the children at the age of one month, this according to their culture which say we should always give eat to the child when we eat. Our survey showed that the prevalence of underweight and stunting is higher in boys than girls (Table 2). This predominance in male children could perhaps be explained by the biological difference between the sexes from the start of pregnancy, the length of the rump to the crown is greater in male fetuses than in female fetuses in early pregnancy. The male gender is significantly associated with stunting ($p=0.026$) as reported by the study in Indonesia [10]. Boys are more susceptible to malnutrition than girls. This result is also similar to that of the work of Alur et al. 2019 [11]. This association between male sex and nutritional status could be
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Conflict of interest

The authors declare they have no financial interests.

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