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# Nutritional status of a cohort of children aged 6 to 59 months in the health district of Mvog beti in Yaounde, Cameroon

***Marianne Patricia Ntsama, Julie Judith T. Tsafack, Véronique Essa'a, and Gabriel Nama Medoua***

Centre for Food and Nutrition Research, IMPM, P O Box 6163 Yaoundé, Cameroon



**ABSTRACT:** *Background:* The nutritional status of children as well as the associated factors vary according to time, region, and the environment of residence (rural or urban). Limited information is available on the risk factors associated with preschool child undernutrition in Cameroon. Therefore, this study evaluate the nutritional status of children aged 6 to 59 months living in Mvog beti health district, Centre region of Cameroon.
*Methods:* This was a cross-sectional study that collected anthropometric and socio-demographic characteristics data in 102 children aged 6 - 59 months. Weight-for-Height z-score, weight-for-Age z-score and height-for-Age z-score were based on WHO's Child Growth Standards. The association between undernutrition and associated factors was determined using logistic regression analysis.
*Results:* Of the 106 children aged 6-59 months observed, 12.3%, 8.5% and 18.9% were respectively stunted, underweight and wasted. Low birth's weight was the main factor associated with underweight. None of the selected variables were significantly associated with stunting. Father's age and mother's employment were significantly associated with wasting.
*Conclusion:* Despite a relatively good food self-sufficiency situation, undernutrition is prevalent among pre-school age children in Mvog beti health district at prevalence above the national prevalence for wasting. Socio-demographic factors were associated with the different types of undernutrition.

**KEYWORDS:** Undernutrition, pre-school Children, risk factors, Centre Cameroon.

## INTRODUCTION

Malnutrition refers to when a person's diet does not provide enough nutrients or the right balance of nutrients for optimal health. Nutrient balance can be achieved when total energy intake is provided to the body in the following proportions: 15% protein, 30-35% fat and 50-55% carbohydrate [1]. Inadequate intake of food lead to undernutrition [1]. According to the World Health Organization (WHO) [2], undernutrition is is a type of malnutrition that occurs when the body does not get enough food and it can lead to delayed growth, low weight or wasting particularly in children and adults.

In most developing countries, the malnutrition prevalence among children younger than 5 years remains alarming. Some of the risks associated with undernutrion in children include; morbidity and mortality, delayed mental development, reduced muscle, impaired intellectual growth and development, and reduced economic activity [3], [4], [5], [6]. According to the National Center for Health Statistics (NHCS), moderately malnourished children are 5.4 times more likely to die from diarrhea than children who are not malnourished. For deaths from pneumonia, malaria and measles, the risks associated with moderate malnutrition are respectively 4, 4.5 and 3 times higher than in children that are not suffering from malnutrion [7].

The nutritional status of children as well as the associated factors vary according to time, region, and the environment of residence (rural or urban) [8], thus, there is need to often assess the nutritional status of children for an achieving optimal health and development of the growing population. Therefore, the general objective of this study was to evaluate the nutritional status of children aged 6 to 59 months in urban areas (Mvog Beti in Yaoundé) as well as identifying malnourished children and some risk factors associated with malnutrion in these children

**Corresponding Author:** Marianne Patricia Ntsama 

## MATERIALS AND METHODS

### POPULATION AND STUDY AREA

The study population consists of children aged 6 to 59 months admitted at the Mvog Beti health district. A cross-sectional nutrition survey was conducted between February and April 2012 on a representative sample of children under 5 years of age in the Mvog beti district.

### INFORMED CONSENT SIGNATURE

This study was authorized to take place by the Ethics Committee of the Ministry of Public Health. Thus, the mother or persons responsible for a child had to sign an informed consent after haven read and approved.

### DATA COLLECTION TOOL

Interviews were conducted on the basis of a questionnaire and informations related to the child and his or her parents was collected. Informations collected were as follows; the location of the child, socio-demographic data, and anthropometric data.

### ASSESSMENT OF DIFFERENT FORMS OF MALNUTRITION

### WEIGHT MEASUREMENT

The child's weight was measured using an electronic scale (Seca 416, Hamburg, Germany) with an accuracy of 5g. Each child was stripped naked and stripped off his or her shoes, and then put on the scale after the scale had been weighed out.

### SIZE MEASUREMENT

The child's height was measure using a measuring rod (Seca 416, Hamburg, Germany) or by standing for children over one metre tall. The measurement was made to the nearest 0.1cm. The different forms of malnutrition were assessed by taking anthropometric measurements. The use and interpretation of anthropometrics has been carried out taking into account the age and sex of the child [8]. So a child had: Emaciation: if his weight/height <-2Z-score

Growth retardation: if his height / age < -2Z-score and underweight: if his Weight/Age < -2Z-score. Children whose Z-score for any of the indicators was strictly below -3 were considered severely malnourished.

### ARM CIRCUMFERENCE MEASUREMENT

The arm circumference measurement consisted of measuring in centimeters the circumference (circumference, perimeter) of the left arm at its midpoint (mid-height of the arm). A specially designed bracelet was used for this measurement. The measurement was made to the nearest 0.1 cm.

### DATA ANALYSIS

The data were entered, checked and analysed using the Epi info software, version 3.4.8. The Chi-square test was used to determine the differences between qualitative variables and logistic regression was used to determine the risk factors associated with different forms of malnutrition

### CHARACTERISTICS OF THE SAMPLE

A total of 106 children between the ages of 6 and 59 months were surveyed. The average age was 20.5 months (SD 14.3), with the youngest children 6 months old and the oldest 59 months. The median age was 13 months. The first quartile was 10 months and the third quartile were 30 months. The mode being 13 months. Of the 106 children observed, 54 (50.9%) were girls and 52 (49.1%) were boys, giving a boy/girl sex ratio of 0.96. The sex ratio of the children was 0.96. The following table shows the distribution of children by age group and sex.

*Table 1. Distribution of children by age group and sex in the Mvog Beti health district (n= 106)*

| Age (Slices) | Sex | | n |
|---|---|---|---|
| | Male | Female | |
| **6-11** | 12 (23.1) | 21 (38.9) | 33 (31.1) |
| **12-23** | 19 (36.5) | 16 (29.6) | 35 (33.1) |
| **24-35** | 14 (26.9) | 5 (9.3) | 19 (17.9) |
| **36-47** | 3 (5.8) | 4 (7.4) | 7 (6.6) |
| **48-59** | 4 (7.7) | 8 (14.8) | 12 (11.3) |
| **Total** | **52 (100)** | **54 (100)** | **106 (100)** |

The above table shows that of the 106 children, the age groups 12 to 23 months (34.7%) and 6 to 12 months (32.6%) are in the majority. The mean weight observed was 10,719 Kg (standard deviation 2.99), the weight ranged from 5.520 Kg to 17.800 Kg, the modal value was 6.280 and the median was 9.96 Kg. Of the 106 children in our sample, the mean height was 82.1 (SD 12.76), ranging from 63.3 cm to 117 cm, with a median height of 77.5 cm. The mean MUAC was 14.6 (SD 1.78), the minimum observed was 10 cm and the maximum was 18 cm, with a median of 14.5. All 106 children (100%) were born in a health facility, no child was born at home in this health district. Regarding immunization, 97 (91.5%) children had all their vaccines up to date and 9 (8.5%) did not have their vaccines up to date.

#### PREVALENCE OF MALNUTRITION IN MVOG BETI

Of the 106 children aged 6-59 months observed, 13 (12.3%) were stunted, 20 (18.9%) were wasted and 9 (8.5%) were underweight. The following figure shows the distribution of malnutrition by gender.

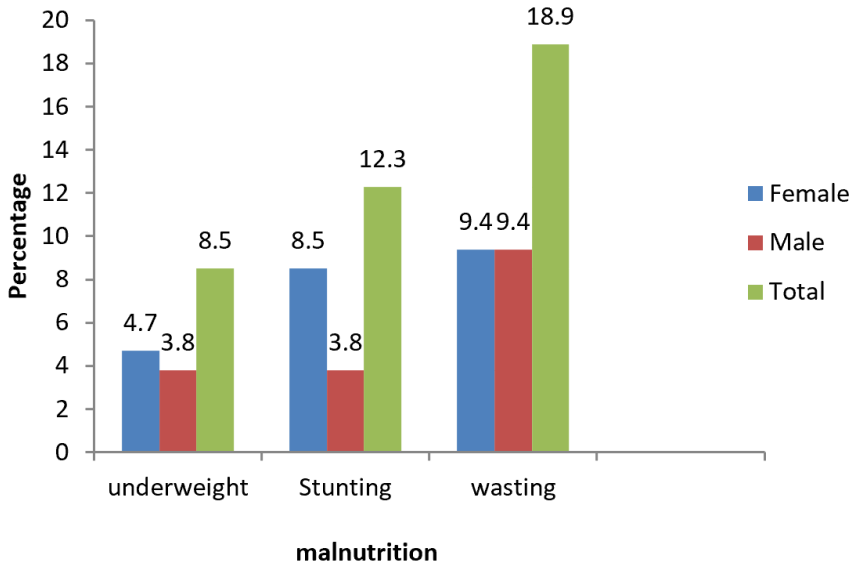


*Fig. 1. Distribution of malnutrition by sex among children aged 6-59 months in the Mvog Beti health district, 2012*

The health district of Mvog Beti does not seem to be spared the phenomenon of child malnutrition. The prevalence of stunting, underweight and wasting was 12.3%, 8.5% and 18.9% respectively. The result of this study revealed that the prevalence of stunting observed was the same as that of the MICS DHS [9] in the cities of Yaounde and Douala where prevalences of 12.9% and 12.8% were observed. These roughly equal prevalences could be explained by the stabilization of local conditions, especially since the two studies took place in close years. However, this prevalence remains low compared to the WHO severity threshold. The prevalence of underweight observed in this study (8.5%) was lower than that observed in the 2011 Demographic and Health Survey (15%) [9], according to WHO severity thresholds, underweight in the study area is

considered low among children aged 0-59 months. It can therefore be said that there is no nutritional emergency among children under 5 years of age in the Mvog Beti health district with regard to underweight.

The prevalence of wasting observed in this study (18.9%) was three times higher than that observed in the 2011 Demographic and Health Survey (6%) [9], according to WHO severity thresholds, wasting in the study area is considered very high among children aged 6-59 months (prevalence > 15%). It can therefore be said that there is a nutritional emergency among children under 5 years of age in the Mvog Beti health district with regard to wasting. The prevalence found in this health district can be explained by inappropriate behaviours in terms of dietary diversification, supplementary foods are given early, maize-based porridges are little or not enriched, sometimes prepared in conditions that may favour bacterial contamination, weaning is not always carried out in ideal conditions. Underweight and stunting were more prevalent among girls than boys. On the other hand, there was parity between girls and boys in terms of wasting.

#### AGE DISTRIBUTION OF MALNUTRITION

The following figure shows the prevalence of malnutrition by age group.

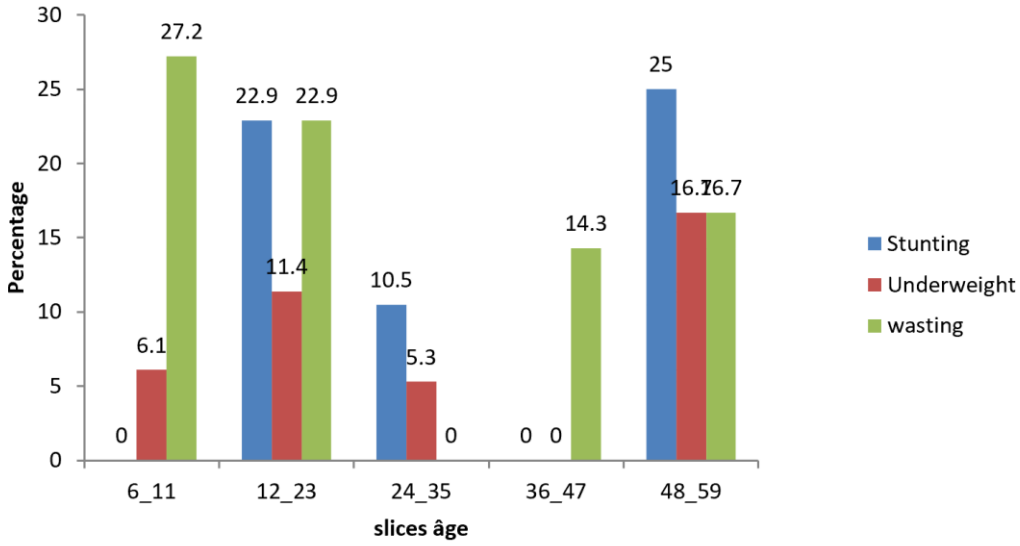


*Fig. 2. Prevalence of malnutrition by age group among children aged 6-59 months in Mvog Beti health district, 2012*

% Of children aged 48-59 months were underweight, 11.4% of children aged 12-23 months were wasted. No cases were recorded in the 36-47 months age group. The highest rate of stunting was observed in the 48-59 months age group (25%) followed by the 12-23 months age group (22.9%). No cases were recorded in the 0-6 months and 36-47 months age groups. A high proportion of children aged 12 to 23 months had stunted growth compared to children aged 6 to 11 months where no cases were observed, stunting was very rare between 6 and 11 months and very common just after that. This can be explained by the fact that before 6 months and a little after, children have all the nutrients they need for their healthy development thanks to breast milk. But after this age, milk becomes increasingly insufficient, the weaning diet is often not very varied and the children's ration loses quality but also quantity in relation to their age and weight.

The highest rate of wasting was observed in the 6-11 months age group (27.2%) followed by the 12-23 month age group (22.9%). No cases were observed in the 24-35 months age group.

#### FACTORS ASSOCIATED WITH MALNUTRITION IN CHILDREN

#### FACTORS ASSOCIATED WITH BEING UNDERWEIGHT

In univariate analysis, only the child's birth weight was significantly associated with low birth weight (p = 0.037), children with a birth weight of less than 3000 g were 3 times more likely to be underweight compared to those born with more than 3000 g (RR = 3.04 CI95% (1.1 - 16.84) see Table.

*Table 2. Univariate analyses showing the effect of selected independent variables on underweight among children aged 6-59 months in Mvog Beti health district (n=106)*

| Variables | n | Underweight | RR (CI 95%) | p-value |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | 52 | 5 (9.6) | 1 | |
| Female | 54 | 4 (7.4) | 0.77 (0.19-3.03) | 0.481 |
| **Age (months)** | | | | |
| 6-11 | 33 | 2 (6.1) | 1 | |
| 12-23 | 35 | 4 (11.4) | 1.86 (0.68-2.83) | |
| 24-35 | 19 | 1 (5.3) | 0.87 (0.33-1.97) | 0.054 |
| 36-47 | 7 | 0 (0) | 0.03 (0.01-1.78) | 0.242 0.151 |
| 48-59 | 12 | 2 (16.7) | 2.73 (0.37-3.28) | 0.067 |
| **Bith weight** | | | | |
| <3000 g | 31 | 5 (16.1) | 3.04 (1.1-16.84) | 0.037 |
| ≥3000 g | 75 | 4 (5.3) | 1 | |
| **Father's age** | | | | |
| <31 years | 47 | 6 (12.8) | 2.51 (0.68-12.43) | 0.138 |
| ≥31 years | 59 | 3 (5.1) | 1 | |
| **Mother's age** | | | | |
| <26 years | 49 | 6 (12.2) | 2.30 (0.59-10.76) | 0.129 |
| ≥ 26 years | 57 | 3 (5.3) | 1 | |
| **Children in the household** | | | | |
| <5 | 81 | 6 (7.4) | 0.62 (0.1-2.02) | 0.294 |
| ≥5 | 25 | 3 (12.0) | 1 | |
| **Mother's children** | | | | |
| 1-2 | 72 | 7 (9.7) | 1 | 0.417 |
| >2 | 34 | 2 (5.9) | 0.61 (0.13-3.39) | |
| **Father's job** | | | | |
| Yes | 96 | 8 (8.3) | 1 | 0.248 |
| No | 10 | 1 (10.0) | 1.20 (0.32-7.24) | |
| **Mother's job** | | | | |
| Yes | 38 | 1 (2.6) | 1 | 0.113 |
| No | 68 | 8 (11.8) | 4.54 (0.54-7.75) | |
| **Father's education** | | | | |
| Primary | 21 | 0 (0.0) | 0.04 (0.01-2.25) | 0.136 |
| Secondary | 66 | 8 (12.1) | 2.28 (0.76-6.86) | 0.096 |
| University | 19 | 1 (5.3) | 1 | |
| **Mother's education** | | | | |
| Primary | 24 | 1 (4.2) | 1 | 0.124 |
| Secondary | 70 | 8 (11.4) | 2.71 (0.78-4.49) | 0.238 |
| University | 12 | 0 (0) | 0.03 (0.01-2.59) | |

Child birth weight was the only variable significantly associated with under weight in univariate analysis. With respect to the relationship between birth weight and low birth weight, the modality involved was low birth weight. This result can be explained by the fact that low birth weight is most often the result of maternal malnutrition, suggesting that the conditions in which the child will now live are precarious from the point of view of food security but also of feeding and environmental hygiene practices [10]. It is therefore not surprising that a child already malnourished before birth and living in these conditions sees his or her malnutrition persist or worsen.

**FACTORS ASSOCIATED WITH GROWTH RETARDATION**

In the univariate analysis, none of the selected variables were significantly related to stunting.In the Mvog Beti district no selected variables were significantly associated with stunting. Unlike the study in Ethiopia [11], child sex, household size and maternal education were not significantly associated with stunting.

**FACTORS ASSOCIATED WITH EMACIATION**

In univariate analysis, child birth weight (p=0.015), father's age (p=0.025) and mother's employment (p=0.001) were significantly associated with wasting. No statistically significant associations were found with sex, age of child, age of mother, number of children in the household, number of children in the mother's household, mother's education and father's employment. In fact, not all mothers of emaciated children were employed, about 1/3 (32.3% versus 13.3% with a birth weight over 3,000 g) of emaciated children had a birth weight under 3,000 g.

***Table 3. Univariate analyses showing the effect of selected independent variables on wasting among children aged 6-59 months in the Mvog Beti health district (n=106)***

| Variables | n | Wasting | RR (CI 95%) | p-value |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | 52 | 10 (19.2) | 1 | |
| Female | 54 | 10 (18.5) | 0.96 (0.362.86) | 0.368 |
| **Age (months)** | | | | |
| 6-11 | 33 | 9 (27.3) | 1 | |
| 12-23 | 35 | 8 (22.9) | 0.84 (0.22-2.64) | 0.093 |
| 24-35 | 19 | 0 (0.0) | 0.03 (0.01-3.42) | 0.189 |
| 36-47 | 7 | 1 (14.3) | 0.52 (0.11-1.83) | 0.334 |
| 48-59 | 12 | 2 (16.7) | 0.61 (0.32-1.98) | 0.516 |
| **Birth weight** | | | | |
| <3000 g | 31 | 10 (32.3) | 1 | 0.015 |
| ≥3000 g | 75 | 10 (13.3) | 0.41 (0.09-0.77) | |
| **Father's age** | | | | |
| <31 years | 47 | 13 (27.7) | 1 | |
| ≥ 31 years | 59 | 7 (11.9) | 0.43 (0.10-0.89) | 0.025 |
| **Mother's age** | | | | |
| <26 years | 49 | 13 (26.5) | 1 | |
| ≥26 years | 57 | 7 (12.3) | 0.46 (0.12-1.04) | 0.054 |
| **Chidren in the household** | | | | |
| <5 | 81 | 16 (19.7) | 1 | |
| ≥5 | 25 | 4 (16.0) | 0.81 (0.19-2.96) | 0.691 |
| **Mother's children** | | | | |
| 1-2 | 72 | 16 (22.2) | 1.88 (0.64-9.07) | |
| >2 | 34 | 4 (11.8) | 1 | 0.182 |
| **Father's job** | | | | |
| Yes | 96 | 18 (18.7) | 0.93 (0.07-7.03) | |
| No | 10 | 2 (20.0) | 1 | 0.574 |
| **Father's education** | | | | |
| Primary | 21 | 2 (9.5) | 1 | |
| Secondary | 66 | 12 (18.2) | 1.91 (0.9-3.89) | 0.053 |
| university | 19 | 6 (31.6) | 3.33 (0.7-5.27) | 0.123 |
| **Mother's education** | | | | |
| Primary | 24 | 2 (8.3) | 1 | |
| Secondary | 70 | 16 (22.9) | 2.76 (0.91-4.39) | 0.191 |
| University | 12 | 2 (16.7) | 2.01 (0.76-3.69) | 0.137 |

Child birth weight, father's age and mother's employment were significantly associated with wasting. Concerning the mother's employment, all the children with wasting were born to unemployed mothers. This can be explained by the fact that unemployed mothers have much more difficulty in finding sufficient resources to feed their children and often they are still dependent on their parents because they are unmarried and live in difficult conditions, they spend more time looking for work and therefore do not have enough time to look after their children.

## CONCLUSION

The prevalence of stunting, underweight and wasting was 12.3%, 8.5% and 18.9% respectively in the Mvog Beti health district. The prevalence of wasting in this health district was three times higher than that obtained in the 2011 Demographic and Health Survey which showed that 6% of children under 5 years old were emaciated. A total of 20 children were suffering from moderate acute malnutrition in this health district.In univariate analyses only the child's birth weight was associated with low birth weight. Child birth weight, father's age and mother's employment were significantly associated with wasting. No selected variables were associated with stunting. Nutritional surveillance should be initiated in this area with regard to wasting. The prevalence of wasting remains very high in the Mvog Beti health district.

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