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### RESEARCH ARTICLE

#### NUTRITIONAL STATUS OF CHILDREN UNDER 5 YEARS RECEIVED IN CONSULTATION AT THE BASSILA ZONE HOSPITAL (NORTH-WEST BENIN)

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#### Abstract

The nutritional status of children under 5 years of age was an important indicator for monitoring their growth. This study aims to determine the nutritional status of children under five 5 years of age received in consultation and/or hospitalized pediatric ward of Bassila Area Hospital. This was a prospective, descriptive and analytical study that is unwound from March 7 to May 21, 2019. The study included children under 5 years whose parents agreed to do medical exams at the hospital. The size and weight of the children were collected. Anthropometric indices were calculated using WHO Anthro® software (Version 3.2.2). Results of the Blood count, Thick Drop / Parasite Density and C-Reactive Protein Counts were obtained from the children's records. Consenting parents have been subjected to series of questions developed for this purpose. Excel and SPSS software were used for data processing and analysis. The threshold of significance was 5%. In total, 300 children were the subject of this study. 26.9% of the children surveyed were emaciated, 23% were stunted, 28.3% were underweight and 8.6% were overweight. In addition, 90.67% of children were anemic with 48.9% severe cases. Etiological research has shown that 90.44% of children had microcytic anemia and 69.37% had normocytic anemia. All of us, children were exposed to both energy malnutrition in all its forms and a worrying nutritional anemia from so, a "double" burden of malnutrition in this study population.

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#### Introduction:-

Nutritional status is the physiological state of an individual defined by relationship between intake and need for nutrients and body's ability to digest, absorb and use these nutrients (INSAE/ICF, 2013). Knowledge of children's nutritional status is a priori, an asset in monitoring their growth. It is one of the key determinants for physical, mental and psycho-affective growth for both children and adults. Its evaluation is based on anthropometric and/or biological data. Thus, anthropometric evaluation uses weight, height and age to diagnose macronutrients deficiencies/excess (energy, protein) and biological evaluation takes biological analyses into account to diagnose

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deficiencies/excess micronutrients (iron, iodine, vitamins). Malnutrition, especially undernutrition, has been the most important nutritional problem in developing countries. Severe malnutrition, in most cases, is accompanied by anemia, which is an inherent part of the reductive adjustment process associated with weight loss, reduced lean mass and the presence of dropsy (Alan, 2007). Anemia is one of the most common public health problems in the world, especially in developing countries with the highest prevalences. In Benin, 32% of children fewer than 5 years are stunted and 72% of children aged 6-59 months have anaemia. In the Atlantic Department, there is prevalence of stunting and anaemia of 30.1% and 67.5% respectively compared to 27.2% and 75.8% in the Donga (INSAE/ICF, 2019). Recent studies have shown that these prevalences remain very high despite national control strategies. For example, some authors found prevalences of 56.48% respectively (Adébo et al, 2018) and 41.43% (Yessoufou et al, 2015) in the batch of children received in consultation/hospitalization in health facilities in the South (Abomey-calavi/So-Ava Zone Hospital) and the Centre du country (Zou/Collines Departmental Hospital Centre). So what about the prevalence of this pathology in a health structure in the northern part like Bassila?

## Materials and Methods:-

### Study type and population:

This study is prospective, descriptive and analytical by questionnaire and is unwound in period from March 07 to May 21, 2019 in paediatric department of bassila District Hospital (Figure 1). Study population consists of children under five years, who were consulted and/or hospitalized during the period and who performed biological analyses such as Formula Sanguine, Thick Drop/Parasitic Density, the C-reactive Protein and whose parents are consenting. The variables studied related to age, sex, nutritional status, dietary diversity of children and socio-demographic, economic characteristics of parents.

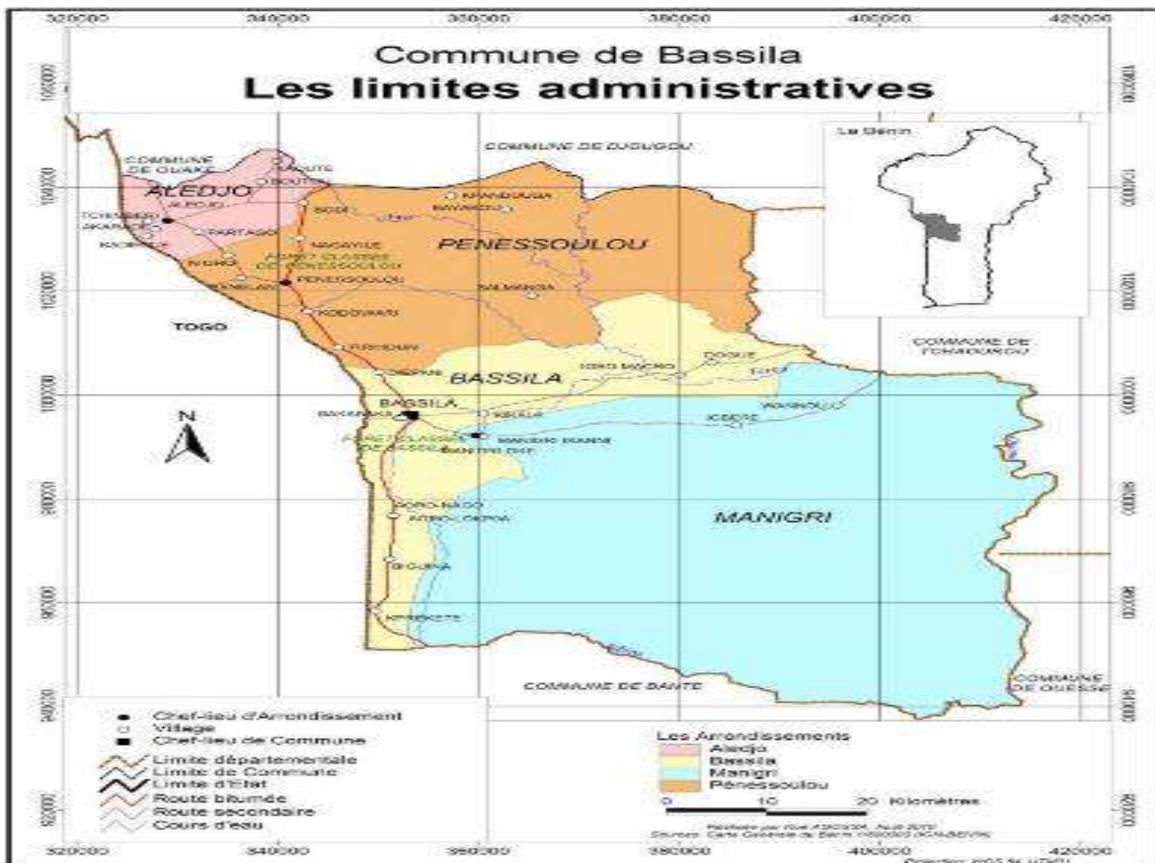


Figure1:- Cartography of the municipality of Bassila.

### Collection materials:

After obtaining parental consent, we took anthropometric measurements (weight and height) of the children. These are taken according to WHO standards. We used SECA brand baby scale for weight gain in children under two

years and LITTLE BALANCE person weighs for children over two. The size measurement was taken using an infantometer and stadiometer, all of precision 1mm. The age of the children was taken from either their birth certificate, their health record or from the information provided by their parents.

#### **Laboratory analysis:**

##### **Blood Formula Count:**

Principle of variation of impedance has been used where a suspension of blood in a conductive dilutant causes a decrease in electrical conductivity, the voltage drop is proportional to the size of the cell and these pulses are counted. Which made possible to have the figured elements of blood (red bloodcells, leukocytes and thrombocytes), the rate of hemoglobin as well as the calculation of hematocrit, and the establishment of the leukocytic formula.

##### **Goute Thick/Parasitic Density:**

For the search for a possible malaria infection, we performed the technique of the Thick Drop/Parasitic Density. This is done in two stages: the deposition of two drops of blood, one for the confession of the blood smear and the other used for thick gout according to the basic technique for the microscopic diagnosis of malaria (WHO, 2014).

##### **C-Reactive Protein:**

CRP-latex reagent is an agglutination test based on the quantitative and semi-quantitative detection of C-Reactive protein in serum at around 6mg/L . The latex particles covered with human anti-CRP IgG are clumped together when mixed with samples containing CRP (biolabo)

##### **Data analysis:**

The classification of children according to anthropometric indices (WHO, 2006):

According to the Weight-for-Age Index we have percentage of underweight children ( $P/A < 2$  ET) and children who are severely underweight ( $P/A < -3$  ET).

Next T/A, we will determine the percentage of children with stunted growth ( $T/A < -2$  ET) and those who have significant growth retardation ( $T/A < -3$  ET).

Finally, P/T indices will allow us to determine percentage of emaciated children ( $P/T < -2$  ET), severely emaciated ( $P/T < -3$  ET) and those who are overweight.

( $P/T > 1$  ET), reflecting the possible risk of being overweight, ( $P/T > 2$  ET) overweight and ( $P/T > 3$  ET) obesity.

##### **Classification of red line parameters:**

Anemia was defined by a hemoglobin level strictly less than 11g/dl in children (WHO, 2011). Depending on the degree of severity, we distinguished:

$10.0 \leq Hb \leq 10, 9$ g/dl ( mild anemia)

$9.9 \leq Hb \leq 7.0$  g/dl (moderate anemia)

$Hb < 7$ g/dl (severe anemia)

Furthermore, on the basis of other erythrocytic constants to determine etiology of anemia we have distinguished according to French Society of Hematology (SFH, 2010):

Normocytic anemia for normal VGM between 82fl-98fl

Microcytic anemia for VGM of less than 80fl

Macrocytic anemia for VGM greater than 98fl

Hypochromy was defined by CCMH of less than 32 g/dl and normochromy by CCMH between 32 and 36 g/dl.

##### **Statistical analysis:**

The various data were collected and analyzed by Microsoft Office Word, Excel, SPSS and WHO Anthro software ® version 3.2.2. Quantitative data were submitted to Excel to identify descriptive statistics. SPSS software Khi<sup>2</sup> test

was used to verify the association hypothesis between assumed risk factors and pathological condition. The significance threshold has been set at 5% for all analyses.

#### Ethical considerations:

The investigation was conducted after the approval of the bassila District Hospital under memo 111/2019/MS/DDS-D/ZSB/HZ-Bla/SAAE on 6 March 2019. The validation of the research protocol and the survey questionnaire by the competent authorities of the structures concerned has been carried out. The data was analysed with discretion .

#### Results:-

A total of 300 children under the age of 5 received in consultation and/or hospitalized were recruited for this study. The average age is 21.74 15 months. Males predominated with a sex ratio of 1.4 and more than half were less than 24 months old. The most represented age group is 12 to 23 months with 26.33%. Socio-demographic characteristics of the study population are recorded in Table 1. The results show that 26.9% of the children surveyed are emaciated, 23% are stunted, 28.3% are underweight and 8.6% are overweight. In addition, 90.67% of children are anaemic, 48.9% of whom are severe. Etiological research has shown that 90.44% of children suffer from microcytic anemia and 30.63% from hypochrome anemia. In addition, 38% had normochrome normocytic anemia, 39.58% microcytic/normocytic hypochrome anemia and 2.94% macrocytic anemia. Statistical analyses revealed a statistically significant relationship between the occurrence of anaemia and malaria infection ( $p < 0.000$ ) on the one hand and other infections ( $p < 0.048$ ) on the other (Table 2).

**Table 1:-** Socio-demographic characteristics of the study population.

Sociodemographic characteristics	Fréquency %
Sex	
Male	58,33
Female	41,67
Age (months)	
00-05	10
06-11	22
12-23	26,33
24-35	17
36-47	09,67
48-59	15
Education level	
None	59,49
Primary	33,85
Secondary	06,15
Others	00,51
Mother's profession	
None	41,54
Farmers	26,15
Craftwomen	14,87
Officials	12,31
Tradeswomen	03,59
Others	01,54

**Table 2:-** Distribution of children according to Associated factors in anemia.

Variables	Frequency (anemia) % n=272	Frequency (No anemia) % n=28	P value
Household waste management			0,123
-Subscription	14,83	23,08	
-Incineration	10,44	38,46	
-In nature	74,72	38,46	
Water supply			0,640
-Pomp	41,76	30,77	

-Shaft	56,04	69,23	
-Others sources	02,19	00	
GE/DP			
-Positif	48,9	14,28	0,00*
-Negatif	51,1	85,71	
CRP			
-Positif	46,69	28,57	0,048*
-Negatif	53,31	71,4	
Use of latrines			
-Yes	54,39	61,57	0,832
-No	45,60	38,46	
Use of mosquito nets			
-MILD	65,12	69,23	
-Ordinary	03,49	23,07	0,293
-None	31,39	07,68	

\*P <0,05

### Discussion:-

In Benin, few studies have looked at the prevalence of malnutrition, either at the departmental or communal level. The latest Health Demographic Survey 2017-2018 in Benin shows that the prevalence of stunting is 27.2% and that of anaemia is 75.8% among children in the Donga department against a rate of 32% and 72% respectively at the national level. (INSAE/ICF, 2019).

Our study found that 23% of children were stunted. This result is comparable to that obtained at the Abomey-calavi/Sô-Ava Zone Hospital (24%) in the Atlantic Department in southern Benin by (Adébo et al, 2018). Moreover, this prevalence is below that obtained at the departmental level (Donga following the fifth Demographic Health Survey in Benin 2017-2018 (INSAE/ICF, 2019). This difference can be explained by characteristics of the population surveyed (children received in consultation for our study and children surveyed at the household level for the national survey). Moreover, our study shows that 91% of children are anemic, 49% of who are severe. This result is much higher than that obtained by (Adébo et al 2018) in the Municipality of Abomey-Calavi one of the departments of southern Benin. Etiological research has shown that hypochrome microcytic anemia is one of the most observed forms in our sample at 40%. According to the literature, this form of anemia is related to iron deficiency and inflammatory anemia. Iron deficiency anemia may be due to either insufficient intake of bioavailable iron-rich foods or, poor absorption of iron at the intestinal level or loss of iron in the body caused by parasitosis (malaria, intestinal worms). Iron is found in many types of food, both animal and plant. Only the most easily absorbed form is hemic iron found in animal foods. Depending on the dietary diversity of the children surveyed, most of them do not regularly consume foods rich in protein and bioavailable iron (meat, fish, egg, etc.). As a result, their diet can cause anaemia, as several authors have pointed out (Wolmaraus et al, 2003); (Baig-Ansari et al, 2008). In addition, other micronutrients such as Vitamin C in fruits and vegetables can increase the rate of iron absorption in the body. Besides, most children consume vegetables, but since these are consumed after cooking, they already lose their vitamin C, a thermolabile vitamin.

Also, consumption of fruits and vegetables after meals increases the risk of the deterioration of vitamin C in the stomach by gastric acidity and decreases the absorption of iron at the level of the duodenum especially non-hemic iron. On the one hand, it is easy to see that the diet of children is highly dependent on cereals, which can also contribute to iron deficiency due to the inhibitory effect of high levels of phytic acid on the absorption of trace elements, as bo Lonnerdal (2000) and (Qianyi et al 2011) have pointed out in their studies. On the other hand, presence of iron absorption inhibitors such as phytates or phenols, which are very present in plant-based foods, contribute to the development of anemia (Wolmaraus et al, 2003). Also, 38% of the children had normochrome normocytic anemia, which translates into either by the inability of the bone marrow to meet erythrocyte production needs (non-regenerative normocytic anemia) and/or extracorporeal anemia due to destruction of red cells by infectious agents such as malaria or corpuscular hemolytic anemia (sickle cell disease) as pointed out by several authors (Badham et al., 2007); (Barro et al., 2013), (Sellam et al., 2014) in their respective studies. The few cases of macrocytic anemia observed in this population are believed to be due to vitamin deficiency in B12 or folic acid (Scott, 2007). Statistical analyses revealed a statistically significant relationship between the occurrence of anaemia

and malaria infection ( $p < 0.000$ ) on the one hand and other infections ( $p < 0.048$ ) on the other. Almost half of anaemic children are infected with malaria (positive GE/DP) and other bacterial or viral infections (positive CRP). Added to this is an unhealthy environment (garbage mismanagement, insufficient latrine, consumption of unsuitable water, etc.) in which children's households live.

### Conclusion:-

Assessing the nutritional status of children visited at Bassila District Hospital reveals that children are exposed to energy undernutrition in all its forms and the majority suffered from anaemia, almost half of which were severe cases. In short, children are exposed to both chronic malnutrition and worrying nutritional anaemia, which places a "double" burden of malnutrition in this study population.

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