



RELATIONSHIP BETWEEN DIETARY DIVERSITY AND NUTRITIONAL STATUS OF CHILDREN UNDER FIVE IN THE PENDJARI PLAIN IN NORTHWESTERN BENIN

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ABSTRACT

Background: Dietary diversity is at the individual level an approximate measure of the nutritional adequacy of the diet Purpose: This study aims to determine the dietary diversity of children under five and its impact on the various forms of malnutrition in the Pendjari Plain. **Methods:** This is a prospective, descriptive, and analytic study that took place in the second quarter of 2019. Anthropometric measurements were collected in children under five years of age and their mothers were surveyed this effect. The P / T, P / A, and T / A indices were calculated using the WHO Anthro software. The dietary diversity of children was estimated by the FANTA method. Statistical tests are considered significant for $P < 0.05$. **Results:** A total of 600 children were included in this study. Our results show that 54.8% were stunted, 20.9% were wasted, and 35% were underweight. By cons 25% were overweight. The distribution curves of the indices (Weight for Age and Height for Age) in z-score of the surveyed population compared to the curves of the WHO reference population were shifted to the left. On the other hand, that of the P / T index was shifted both to the right and to the left. About 20% of the children surveyed had a low dietary diversity score. Only the T / A index characterizing stunting was significantly related to the dietary diversity of children. **Conclusion:** In sum, dietary diversity has an impact on the nutritional status of children with a double burden of malnutrition: undernutrition and overnutrition.

KEYWORDS: Food diversity, double burden, stunting, wasting, underweight, Benin.

INTRODUCTION

Dietary diversity is a qualitative measure of food consumption, which accounts for the variety of foods that households have access to; it constitutes at the individual level an approximate measure of the nutritional adequacy of the diet (FAO, 2012). Dietary diversity is defined as the number of different food groups consumed by an individual or household over a given period of time (Bader et al., 2014). In infants, it intervenes when breast milk is no longer sufficient to cover its nutritional needs (Kennedy et al., 2013). Children with access to quality food that is appropriate in a healthy environment are less likely to suffer from repetitive illness (MICS, 2014). Globally, according to the latest estimates for 2016, 155 million children under five are stunted at the highest rates in developing countries (FAO, 2017). In Benin, at the national level, the prevalence of stunting is 32% and 63.4% at the Department of Atacora (EDSB, 2019). Stunting is a reflection of a situation that is usually the result of inadequate nutrition and / or illnesses that have occurred over a relatively long period of time. Furthermore, according to the Global Vulnerability and Food Security Analysis (AGVSA, 2017), 33.7% of households in the

Atacora Department have inadequate food consumption. The situation is still worrying in the Communes de Matéri, Cobly, and Tanguiéta of the Pendjari Plain, where more than one in ten households have poor food consumption. In these communes, 22.4% of households have a low dietary diversity and thus consume fewer than 4 food groups per day. As the number of food groups consumed increases, the nutritional status improves. It is then easy to see that a good dietary diversity of children could have a positive impact on the nutritional status of the consumer.

MATERIALS AND METHODS

The study took place from April 24 to June 2, 2019, in the plain of Pendjari, which covers the communes of Tanguiéta, Matéri and Cobly (Figure 1). It is a prospective, descriptive, and analytical study. The minimum sample size was determined from the Schwartz formula (1995) with a prevalence of 36.4% for stunting in the Atacora Department (EDBS, 2019). The selection of households was done randomly using the standard method in each district and by referring to the General Census of Population and Housing (RGPH 4, 2013). Thus, the number of children under five is estimated at

600. The mothers' questionnaires focus on the socio-economic characteristics of the parents, the eating habits

adopted by the mothers, and the children's state of health and their dietary diversity.

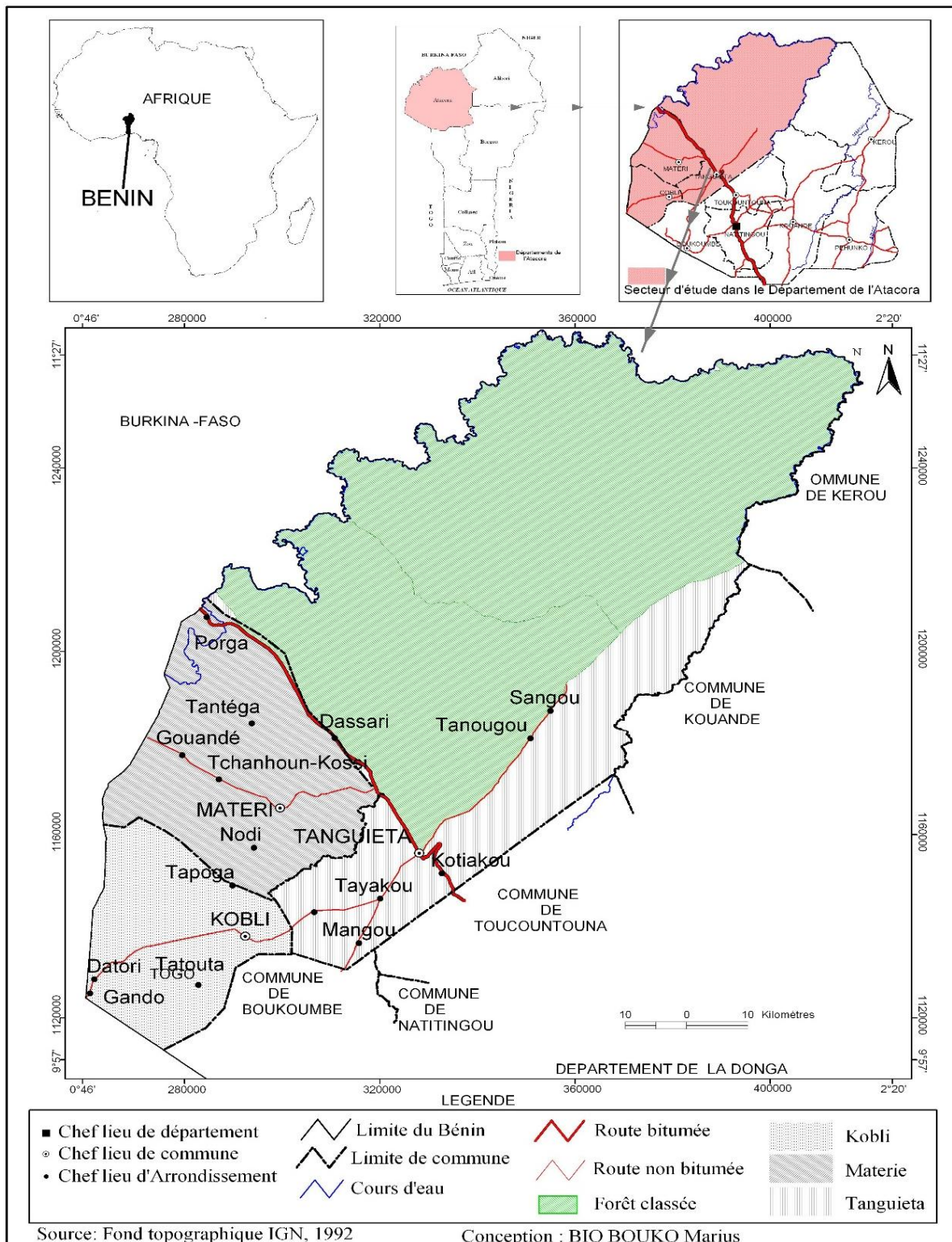


Figure 1: Geographic Location of the Commons of the Pendjari Plain (Source IGN Topographic Background, 1992.).

Anthropometric data

The weight and height of the children were collected respectively using a hanging scale (type SALTER,

Model 235 6S range 25 kg × 100 g) and a board (Shorr precision 0.1 cm). Their mothers or tutors were subjected to a questionnaire designed for this purpose.

Classification of children

The calculation of the P / T, T / A, P / A indices was done using the new standards of growth and development of the child (De Onis *et al.*, 2006). The children surveyed were distributed as follows: for example, there is respectively emaciation, stunting or underweight when P / T is below -2ET; T / A is below -2ET; P / A is below -2ET of the reference median. The cases of severity are noted with z score lower than -3ET for the three different forms of malnutrition. Moreover, when the P / T index is greater than +1 ET we are talking about overweight. The dietary diversity of children was estimated by the FANTA III method, according to which the score is constructed by summing the number of food groups consumed during a given 24-hour period. These food groups range from 1 to 7 at most (Coates *et al.*, 2007). Thus children were classified into low dietary diversity (dietary diversity score 1- 2 food groups), average (3-4) and high (5-6 and above).

Data processing

Data processing was done with Excel, WHO Anthro, and SPSS software. The tests are considered significant for $p < 0.05$.

Ethical considerations

The investigation was authorized by the political and administrative authorities under the number 64-3 / 294 / MCM-SG-SPDL-SA of May 07, 2019. All the mothers of children surveyed had deliberately and orally

consented to participate in the survey interview. The confidentiality of the data was guaranteed.

RESULTS

A total of 600 predominantly female children (sex ratio 0, 85) were included in this study. The average age was 26.80 ± 2.19 months. Our results show that 54.8% were stunted, 20.9% were wasted, and 35% were underweight. On the other hand, 25% were overweight. The distribution curves of the indices (Weight for Age and Height for Age) in z-score of the surveyed population compared to the WHO reference population curves were shifted to the left (Figure 2 and 3). That of distribution of index P / T in z-score was both shifted left and right (Figure 4). About 20% of the children surveyed have a low dietary diversity score. The results of the analysis of statistical tests revealed a number of factors related to one or other of the different forms of malnutrition (Table 1). Only the T / A index characterizing stunting is significantly related to the dietary diversity of children.

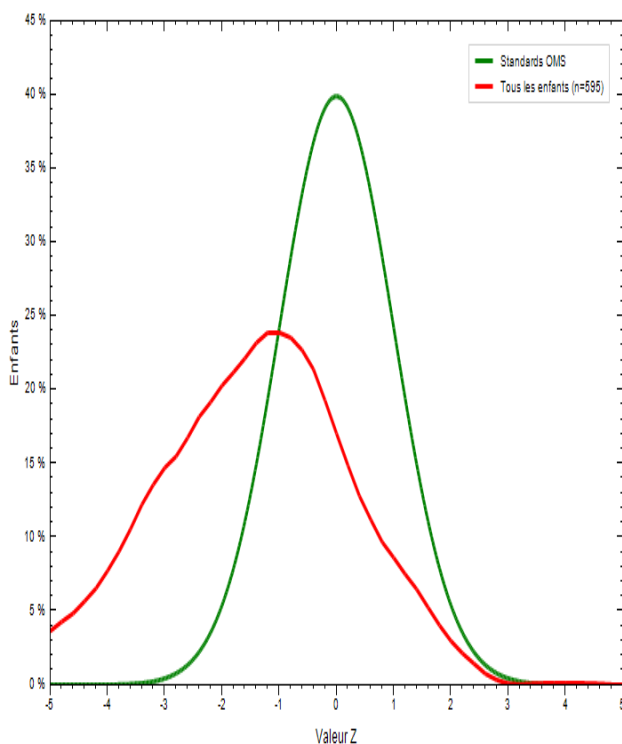


Figure 2: Distribution of the Weight / Age (P / A) index in z-score relative to the WHO reference

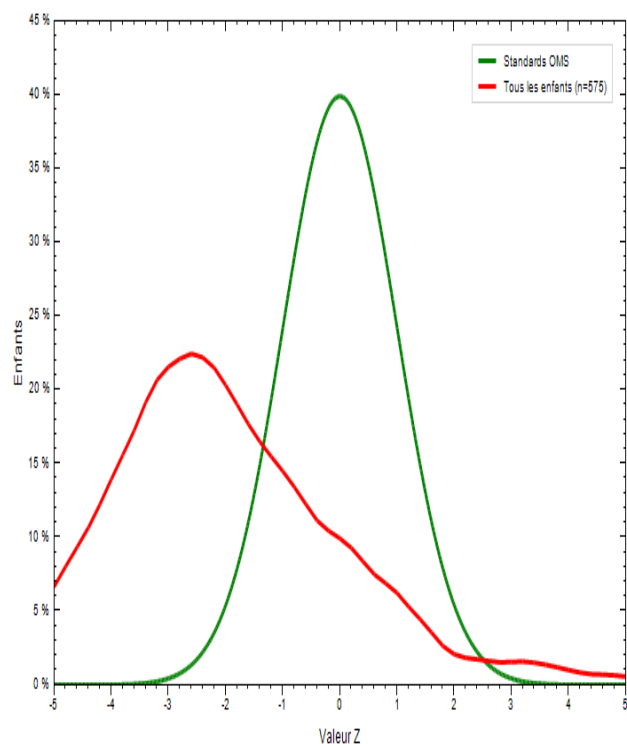


Figure 3: Distribution of the Size / Age (T / A) index in z-score compared to the WHO reference

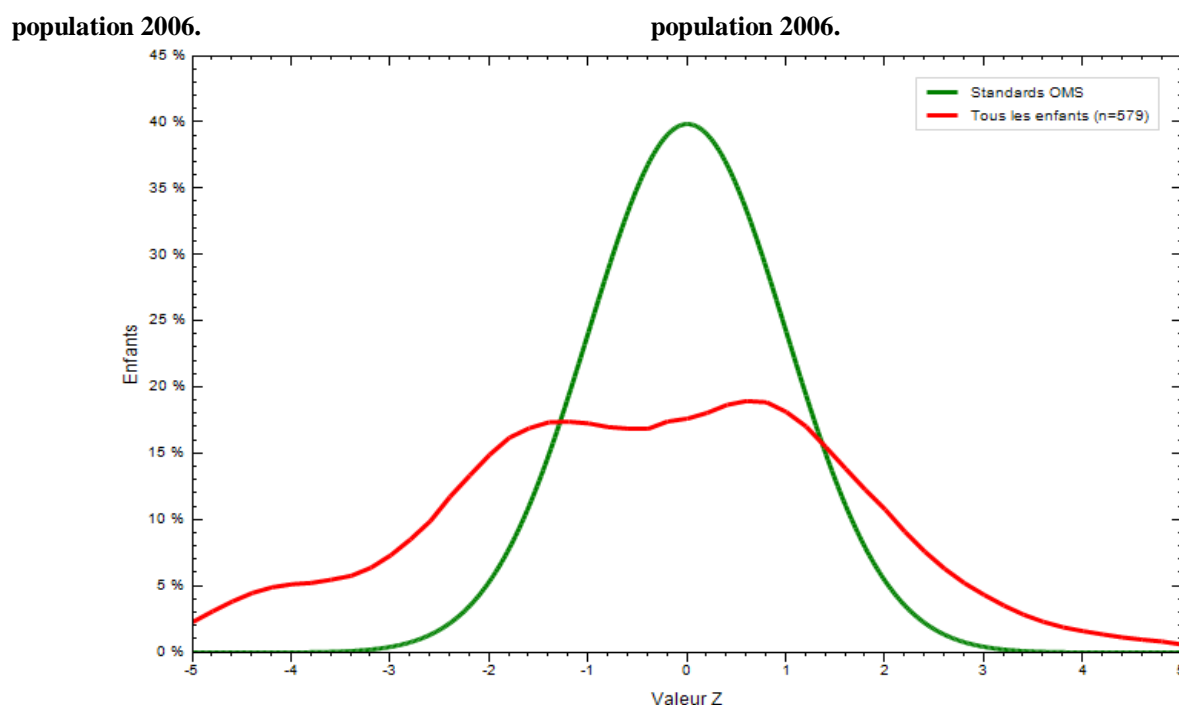


Figure 4: Distribution of the Weight / Size (P / T) index in z-score compared to the WHO reference population 2006.

Table 1: Significance test between determinants and different forms of malnutrition.

	P Value			
	Stunting (T/A)	Underweight (P/A)	Wasting (P/T)	Overweight
Birth Weight	0,000*	0,004*	0,57	0,43
Food diversity	0,024*	0,454	0,85	0,99
Family dish	0,006*	0,06	0,195	0,861
Vaccination	0,005*	0,019*	0,96	0,75
Exclusive Maternal Breastfeeding	0,022*	0,46	0,032*	0,16
Malaria	0,536	0,618	0,375	0,589
Diarrhea	0,037*	0,06	0,146	0,018*
Cough	0,044*	0,39	0,05	0,09
Acute Respiratory Infection	0,927	0,011*	0,011*	0,856
Fever	0,934	0,324	0,811	0,16
Enriched porridge	0,949	0,003*	0,254	0,000*
Number of people per household	0,563	0,012*	0,009*	0,069

* Significant Values of p ($p < 0, 05$)

DISCUSSION

The stunting in the Pendjari plain reaches a rate of 54.8%. This rate is similar to that obtained in the communes of Natitingou, Boukoumbé and Toucountouna (NBT zone) (Bio Bouko *et al.*, 2018). On the other hand, this prevalence is below that obtained for the Communes of Kouandé, Kérou and Péhunco (Zone 2KP) (Bio Bouko *et al.*, 2019). This frequency is much higher than that of the Demographic Health Survey in the Department of Atacora, 36.4% (EDSB, 2019). In addition, 29.9% of the children surveyed were emaciated and 35% were underweight. These prevalences are largely above those obtained at the departmental level (EDSB, 2019). These results are far superior to those obtained by Bio Bouko *et al.* (2018) in the 2KP area. These differences could be explained by the period of the survey, the socio-

demographic and economic characteristics of the study area. Indeed, according to the calendar of the agricultural production three periods are to be considered: the period of seed, pre-harvest and post-harvest. During the first two periods (lean season), food availability and accessibility to food become increasingly limited for very low-income households; which increases the risk of undernutrition among children under five years of said households. On the other hand, during the post-harvest period, indices of food security components are improved, so that children are better fed and the risk of undernutrition is reduced. Moreover, since the socio-economic characteristics are not the same, poverty is unevenly distributed in each zone of Atacora. According to Global Analysis of Vulnerability and Food Security, in the Pendjari Plain and in the NBT area, more than 40%

of households are poorer, ie do not have the capacity to access a food beyond their own production and monetary income. However, this rate does not exceed 20% in the 2KP zone (AGVSA, 2017).

The low dietary diversity of children was 20.67%. This rate is lower than those obtained in the other Communes of Atacora (Bio Bouko *et al.*, 2018, Bio Bouko *et al.*, 2019). This difference could be explained by the period of investigation: the lean season for the Communes of the plain of Pendjari and abundance for the Communes 2KP and NBT. Significance tests between dietary diversity and children's nutritional status have been positive. This result is comparable to those obtained by several authors. Thus, outside Benin, we can mention China (Taren *et al.*, 1993), Kenya (Onyango *et al.*, 1998), and Philippines (Kennedy *et al.*, 2007). At the national level and in the Department of Atacora, the Communes of the plain of Pendjari (Yessoufou *et al.*, 2014), and those of 2KP (Bio Bouko *et al.*, 2018). The distribution curves of the indices (Weight for Age and Height for Age) in z-score of the surveyed population compared to the WHO reference population curves were shifted to the left as found by several authors (Bio Bouko *et al.*, 2018, Diara, 2010). This reflects a poorer nutritional status than that of the reference population. The distribution curve P / T has a peculiarity of the fact that it is shifted to the left and right. This finding reflect both undernutrition and over-nutrition among the surveyed population. The delicate nutritional status of the children of the Pendjari Plain is maintained by dietary diversity ($p = 0.024$). This result is comparable to that obtained by Bio Bouko *et al.* (2018) in the 2KP zone and in 2019, in the communes of the NBT zone of the same Department.

CONCLUSION

The evaluation of the nutritional status of children under five years of the Pendjari plain has shown that they are victims of both undernutrition and overnutrition due to inadequate dietary diversity.

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