

**EVALUATION OF NUTRITIONAL STATUS OF CHILDREN IN NURSERY SCHOOLS
IN KISANGANI CITY, DR CONGO**

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ABSTRACT

Malnutrition is a public health problem in developing countries. In DR Congo no food is provide at nursery schools. So it is necessary to evaluate the nutritional status of children under five years old in pre-schools. In this study, the nutritional status of children attending nursery schools in the city of Kisangani, specifically those of the communes of Makiso, Mangobo, Tshopo and Kabondo is evaluated. It is a descriptive cross-sectional study of 400 target children in kindergartens. Anthropometric data was collected. They were weight-for-height, height-for-age, weight-for-age indices. These data have been processed and analyzed by WHO Anthro® software. The results showed that 4.0% of children were emaciated, 27.6% were stunted and 10.6% were underweight. In contrast, 2.4% of children were overweight (obesity). The distribution curves of the children compared to the reference curves are shifted slightly to the right for W/A, S/A, W/S slightly suggest a tendency to a state of under-nutrition and over-nutrition.

KEYWORDS: Nutritional status, emaciation, stunting, underweight, Kisangani, DR Congo.

INTRODUCTION

Children's nutritional status largely determines their growth and learning. The body, more precisely the child's brain, works as best as possible if it receives the food it needs.^[1] Healthy nutrition is a good combination of vitamins, minerals and vital nutrients that will allow the child to reach the optimal level of physical and mental health. It promotes basic physiological and neurological development.

Canada's Food Guide indicated that, the health of children between the ages of two and five depends largely on their diet. Children's foods should contain mainly the four groups including vegetables, fruits, cereal products, milks, substitutes, meat and alternatives. A balanced and varied diet allows the child to get all the nutrients he needs for proper growth.^[2,3]

According to UNICEF, 185 million children under five in the world are stunted, and over 129 million are underweight in developing countries.^[4,5]

In Africa, the prevalence of stunting is 40% and the prevalence of underweight 25%.^[6] In the Democratic Republic of Congo (DRC), 43.4% of children under five years of age are stunted, 22.2% of them in severe form.

The prevalence of underweight and emaciation is respectively 24.2% and 8.5%.^[3]

Indeed, in DRC, poverty, natural disasters, wars and lack of promotion of adequate agricultural policy contribute directly to the food shortage in the markets and poor households no longer have access to the food of their choice. This poverty is both the cause and the consequence of malnutrition. The latter causes half of all deaths in children under five and pregnant women.^[7]

The exclusive breastfeeding policy of the child up to six months can contribute to promoting the health and normal growth of the child. But this strategy is practiced only by 37.0% of breastfeeding women in DRC.^[2] In Kisangani City, our previous results show that only 51.4% of lactating mothers practice the strategy of exclusive breastfeeding until six months of age.^[2,3,7]

This study aims to evaluate the nutritional status of children under six years in Kisangani city (DRC). Children in nursery schools of Kisangani were chosen for this evaluation.

STUDY AREA AND METHOD

Study area

This investigation is done in eight nursery schools in Kisangani City respectively in the communes of Makiso, Mangobo, Tshopo and Kabondo (Fig.1). In this study, the probabilistic multistage sampling is used. This approach allowed us to easily build a sample, from an exhaustive list of nursery schools, and by combining different sampling techniques following the multistep process, namely:

- First degree: randomly select of four municipalities in the city of Kisangani (cluster survey);
- Second level: randomly select of four nursery schools per targeted municipality (cluster survey);
- The third degree: systematic choose of 25 children in each nursery school (systematic survey).

The survey was conducted from 01 to 30 November 2018.

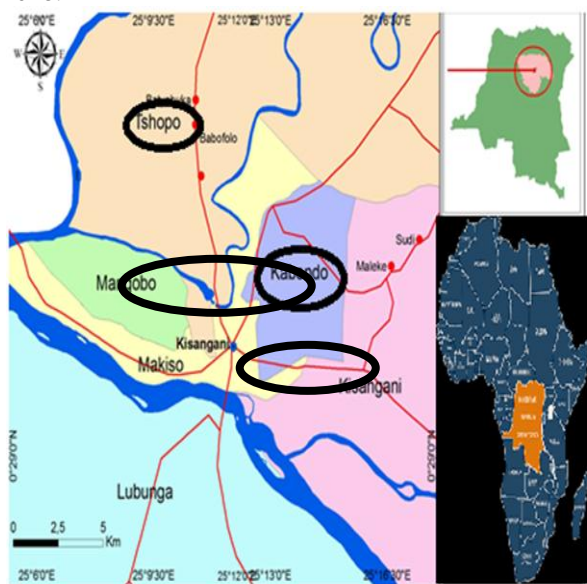


Figure 1: Sites of study and location of the city of Kisangani in the province of Tshopo in Democratic Republic of the Congo.

Study Methodology

According to the official register of nursery schools of the city of Kisangani; the Provincial Division of Primary and Secondary Education in the province of Tshopo has authorized us to organize this survey in all its nursery schools. About 400 children attending 12 target nursery schools in Kisangani City were selected.

The inclusion selection criterion was any child born and raised in Kisangani city and surroundings and, the criterion of non-inclusion was any child born or raised in another city. The confidentiality of the data has been guaranteed, the identity of the child has not been revealed, each child is represented by a number.

Sample size

The minimum sample size is given by the formula: $N \geq t^2 \times p(1-p) / d^2$

With:

N = minimum sample size

t = 95% confidence level (typical value of 1.96)

p = prevalence of stunting 36%

d = error margin at 5% (value of 0.05).

$N = (1.96)^2 \times 0.36(1-0.36) / (0.05)^2 = 354$

Type of study

The investigation is a descriptive cross-sectional study.

Study parameters

Following variable were exploited: Age (A), Weight (W), Size (S), W/A; W/S; S/A.

Data were analyzed using Epi Info 5.34 software and percentage were calculated using following formula:

$$\% = \frac{f_o}{N} 100$$

Where:

f_o = observed population, N = sum of staff or total number and 100 = conversion factor in percentage

The evaluation of our sample was made by comparing measures of children (weights, ages, and sizes) with those of other children of the same age in a reference population of new WHO growth standards.^[5-9]

RESULTS

Out of a total of 400 children attending selected nursery schools in Kisangani City, 372 children were selected to conduct this study according to selection criteria.

The distribution of children by school location and gender is given in table 1

Table 1: Distribution of children by school location and gender.

Commune	Numbers		Pourcentage (%)	
	Boys	Girls	Boys	Girls
Makiso	46	49	24.3	26.8
Mangobo	44	43	23.3	23.5
Tshopo	59	55	31.2	30.1
Kabondo	40	36	21.2	19.6
Total	189	183	100.0	100.0

Table 1 indicates that Tshopo has more boys (59 or 31.2%) and more girls (55 or 30.1%) and Kabondo has the lowest number of boys (40 or 21.2 %) and girls (36 or 19.6%). The total number of children is 189 boys that represent 51% and 183 of girls or 49%.

Figure 2 gives the proportion of total number of children per municipality.

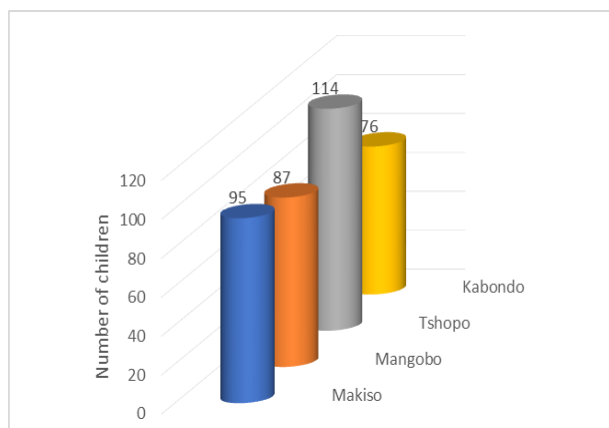


Figure 2: Distribution of total number of children per municipality.

The figure 2 shows that the municipality of Tshopo as the highest total number of children when Kabondo has the lowest.

The distribution of children by age is given in figure 3.

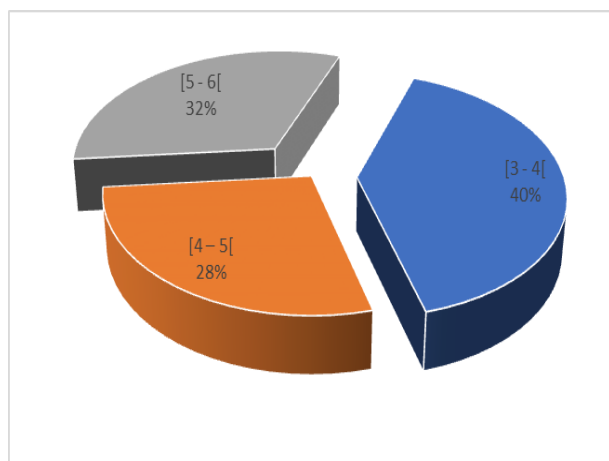


Figure 3: Distribution of children by age (years).

This figure shows that 40 % of children are in the age group of [3 - 4 [and 28% in the age group [4 - 5 [. Figure 4 gives the order of birth of the children in their biological family.

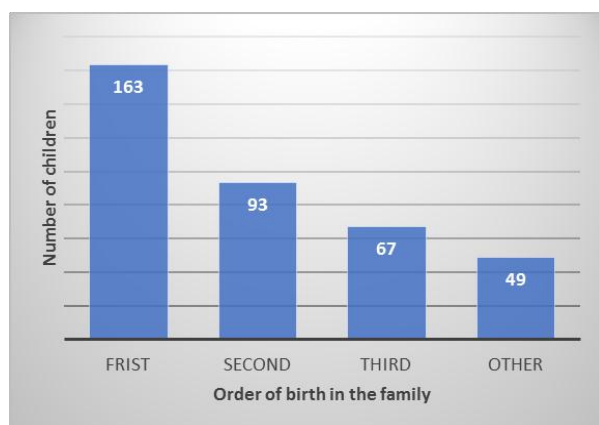


Figure 4: Distribution of children by order of birth in their family.

Figure 4 indicates that 163 children or 44 % are first born in their family and 49 (13%) are of order higher than third in their family.

Table 2 gives the anthropometric measurements in terms of: Emaciation or abnormal thinness caused by lack of nutrition, stunting growth, underweight and overweight

Table 2: Distribution of children according to their anthropometric data.

Anthropometric data	Children	
	Number	%
Emaciation	15	4.0
Stunting growth	103	27.6
underweight	39	10.5
overweight	9	2.4

This table shows that about 42 % of children have a malnutrition among which 4% have severe malnutrition. And 2.4% of children are overweighted.

DISCUSSION

The results shows that the number of boys and girls is almost the same in the nursery school (Tab.1) even if sex ratio generally indicate that there are more girls than boys, this can be due to the fact that many parents mainly send their boys than girls on school.^[10]

Tshopo, one of most popular municipality of Kisangani has the highest number of children in nursery schools (Fig.2) and Kabondo the poorest commune has fewer children at the nursery schools, may be because the kindergarten costs a little more and the parents who do not have enough means bring their children directly to the primary school after six years.

First births are the most numerous, perhaps because parents take more care of the studies of their first children, but also families who have only one or two children are more likely to pay for the nursery school than those who have more than three children, that could explain the low number of children who come after the third position in their family.

The obtained results indicate that about four out of ten children are malnourished that indicates a high rate of malnutrition. The rate of chronic malnutrition obtained is higher than that of the average rate in DRC (20.3%) while the rate of severe malnutrition or emaciation is less than that obtained by Gnimi et al for children from 0 to 59 months (10.8%).^[3] The prevalence of stunting and emaciation in this study is close to that obtained in the department of Ouémé in Benin by the Global Vulnerability and Food Security Analysis, which are 29.5% and 6.1% respectively.^[11]

In contrast, the prevalence of underweight was lower than that of the department Ouémé that was of 15.7%. The prevalence obtained for the various forms of malnutrition (emaciation, stunting and underweight) is

higher than those of the study conducted in Lomé in 2014 which are respectively 3.7%, 12.5% and 7.5%.^[12,13] This difference could be explained by the socio-economic level of the populations in each study and by strategies to combat malnutrition in each country. About the overweight children, the 2.4% of children overweight in Kisangani is very low compared to 45.9% of children in Porto-Novo who are overweight. This could be due to the difference on socio-economic status. Indeed, in Porto-Novo more than 2/3 of households are food secure.^[11] In addition, 68% of children's mothers were engaged in income-generating activities that enabled them to provide adequate food for their offspring. On the other hand, many families in Kisangani are poor and can not provide sufficient and good quality food for their children, which explains the high level of malnutrition and low numbers of overweight children.

This analysis shows that the study population is confronted with a single type of malnutrition (undernutrition). A statistically significant association was observed between emaciation, underweight and weaning practices. That can allows us to deduce that the cause of this malnutrition was the poor weaning techniques, as several authors have pointed out.^[12-15]

CONCLUSION

This study on the nutritional status of children in nursery school in Kisangani city showed that more than 40% of children are in malnutrition situation. The undernutrition is the main malnutrition. Only 2% of children are on over-nutrition indicating that poverty of households in Kisangani. This indicates that the overweight is not yet a public health problem in this city. The poor weaning would be one of the determinants associated with malnutrition among children under six in Kisangani City. Therefore, a regular growth monitoring must be done in order to avoid malnutrition that can damage the health of children.

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