

Food consumption and energy expenditure of the pupils of the primary schools Imara and Saint Joseph, in Lubumbashi

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Résumé :

L'alimentation des élèves en âge scolaire intéresse de plus en plus les pays en voie de développement. Dans le but de décrire les habitudes alimentaires en milieu scolaire et déterminer l'état nutritionnel des élèves en âge scolaire, nous avons mené une étude descriptive transversale auprès de 423 élèves respectivement des écoles primaires Imara et Saint Joseph et dont l'âge variait entre 5 à 12 ans. Les résultats de recherche révèlent que la plupart des élèves enquêtés avait un état nutritionnel normal pour les deux écoles dont, 86,2% pour saint joseph et 80,8% pour IMARA. La malnutrition (sévère et modérée) concerne 7,0 % des élèves de Saint Joseph et 6,4% des élèves d'IMARA. Le surpoids et l'obésité concernent 12,8% des élèves d'Imara contre 6% pour ceux de Saint Joseph. La position sociale des élèves, une alimentation non équilibrée et parfois excessive et la non pratique systématique d'exercice physique en sont les facteurs déterminants

Mots-clefs : Alimentation, nutrition, école, primaire, Imara , Saint Joseph.

Abstract:

The diet of school-aged students is of increasing interest to developing countries. In order to describe the eating habits in schools and determine the nutritional status of school-aged students, we conducted a cross-sectional descriptive study with 423 students of ages 5 to 12 years old respectively from Imara and Saint Joseph primary schools. The research results reveal that most of the students surveyed had a normal nutritional status for the two schools, 86.2% for Saint Joseph and 80.8% for IMARA. Malnutrition (severe and moderate) affects 7.0% of students in Saint Joseph and 6.4% of IMARA students. Overweight and obesity affects 12.8% of Imara students compared to 6% for those in Saint Joseph. The social position of the pupils, an unbalanced and sometimes excessive diet and the systematic non-practice of physical exercise are the determining factors.

Keywords: Food, nutrition, school, primary, Imara, Saint Joseph

1. INTRODUCTION

Today, the health and nutritional status of school-aged children are prominent in many developing countries and international and non-governmental organizations. Recent studies have looked at the effects of prevention on the evolution of eating behavior and the body mass index (BMI). These studies are however difficult to circumscribe because the children are in strong growth in pre-adolescent and adolescent period [1], [2].

It is currently established that children from 6 to 12 years old are not necessarily healthier than those under 5 years old. On the contrary, these children suffer from malnutrition, severe anemia and multiple parasitic infections [3].

According to estimates from the World Health Organization (WHO), undernutrition contributes a third to total child mortality [4].

School age is a phase of active growth in childhood, it represents a dynamic period of physical growth as well as mental development [5].

In addition, walking relatively long distances to school and intense physical activity during free or organized games entail caloric expenses which it is important to compensate for the risk of falling into undernourishment.

During periods of intense intellectual activity, students should regularly have an energy ration to cover their needs [6]. However, it is established that the use of energy substrates during an intellectual task resembles that observed during a low intensity physical activity. The basic metabolism is thus increased [7].

In the Democratic Republic of Congo, food consumption remains precarious in several households. There is a relationship between the quality of the food to be consumed and the level of malnutrition [8].

In Lubumbashi, in the absence of school canteens, many parents set up various food provisions or make money available for their purchases near schools. These various foods consisting essentially of starchy products, peanuts, sugary drinks are consumed during break times or at the end of classes. The quantity, quality and frequency of the catches depend on the environment where the educational establishments are located.

Nibbling on the one hand can constitute a non-negligible contribution in various nutrients and on the other hand the location of the school on the other hand which can influence the social position and the nature of the food consumption of the students, we interested in knowing their impact on the nutritional status of IMARA primary school students located in the city center of Lubumbashi and Saint Joseph located on the outskirts in the annex municipality by assessing the nature of food intake and collection of anthropometric data.

2. ENVIRONMENT, MATERIALS AND METHOD

2.1. ENVIRONMENT

This study was carried out from April 2 to 30, 2019 in IMARA and Saint Joseph primary schools.

The IMARA primary school is located in the commune of Lubumbashi. It is limited; to the north by avenue LUFIRA, to the south by avenue maman YEMO, to the east by avenue RUWE and to the west by avenue KAMBOVE

It has four thousand students (4000) within it, whose average per class in primary school is 70 students

Saint Joseph primary school is located in the commune annexed to the KAMASAKA district on avenue Saint Joseph at N ° 5. It has one thousand five hundred students (1,500) within it, with an average per class in primary school of 60 students.

The two schools are located in the city of Lubumbashi, Haut-Katanga province

2.2. MATERIALS

The materials which enabled us to carry out this study consist of:

- Students;
- Survey questionnaires;
- A scale weighing person of GEEPAS brand range 0-130 kilos for weight measurement;
- A measuring rod graduated in cm to measure the size;
- Epi-Info software version 2017 and Excel 2013.

2.3. METHOD

We conducted a cross-sectional descriptive study. The sampling was in a cluster. The sample size was calculated using the following formula:

$$n = \frac{z^2 \times P(1-P)}{E^2}$$

n = sample size

z = Reduced deviation which corresponds to 1.96 when alpha = 5%

P = proportion (prevalence) of the population estimated at 50% when unknown.

E = desired error or precision of risk = 0.05

$$n = \frac{1,96^2 \times 0,5(1-0,5)}{0,05^2} = \frac{3,8416 \times 0,5(0,5)}{0,0025} = \frac{3,8416 \times 0,25}{0,0025} = \frac{0,9604}{0,0025} = 384,16$$

Taking into account non-respondents, we added 10% to our sample size which gives 384.16 + 38.416 = 422.576 So our sample is brought back 423

The total sample is thus 846 pupils of which 423 for IMARA and 423 for Saint Joseph

•Socio-demographic and food surveys

For the data collection, we proceeded by direct interview using a questionnaire. The age of the respondents varied between 5 and 13 years. Using the questionnaire, respondents were asked about their eating habits; the number of meals taken per day as well as snacking and their composition, physical activities practiced,

•Determination of anthropometric data [9], [10].

Weight

To measure the weight, we used an electronic scale weighing scale brand GEEPAS range 0-130 Kilos d = 100g for weight measurement. The students wore their clothes but took off their shoes.

Cut

The size was measured using the height rod fixed to a wall; the stripped pupil was standing along the wall, head and heels touching the wall.

•Daily energy expenditure and conversion of nutrients into metabolizable energy [11], [12], [13], [14].

Daily energy expenditure

Calculated using the improved Harris and Benedict formula Linked to the level of physical activity, it is obtained by multiplying the basic metabolism (taking into account height, weight, age) by the factor specific to the occupation considered and by the number of daily hours spent in this occupation, using the appropriate multiplication factors. The average adopted is 1900 kcal / day

Conversion of nutrients into metabolizable energy:

It was done according to the following factors: 1g Proteins: 4kcal; 1g lipids: 9kcal; 1g carbohydrates: 4kcal.

3. RESULTS AND DISCUSSION

3.1 Results

Table 1: Distribution of respondents by age group

AGE GROUP	IMARA		SAINT JOSEPH	
	Frequency	Percent	Frequency	Percent
< 6	16	3,8	32	7,6
6 – 8	164	38,8	168	39,7
8 – 10	160	37,8	140	33,0
10 – 12	60	14,2	66	15,6
12 – 13	23	5,4	17	4,0
Total	423	100,0	423	100,0

Table 1 indicates that most of the respondents were in the 6 to 10 year age group.

Table 2: Distribution of respondents according to their means of transport to go to school

TRANSPORT	IMARA		SAINT JOSEPH	
	Frequency	Percent	Frequency	Percent
By moto	20	4,7	44	10,4
On foot	102	24,1	329	77,8
By Vehicle	301	71,2	50	11,8
Total	423	100,0	423	100,0

The table above reveals that among the IMARA students surveyed, most came by vehicle, ie 71.2%, and those from SAINT JOSEPH went on foot (77.8%).

Table 3: Distribution of respondents according to the round trip distance between home and school

DISTANCE(m)	IMARA		SAINT JOSEPH	
	Frequency	Percent	Frequency	Percent
< 1000	20	4,7	90	21,3
1000-2000	80	18,9	70	16,5
2001-3000	60	14,2	108	25,5
3001-4000	71	16,8	88	20,8
4001-5000	101	23,9	50	11,8
5001-6000	41	9,7	25	5,9
>6000	50	11,8	0	0
Total	423	100	423	100,0

This table shows that the average student travels between 2001 and 3000m to go to school and go home.

Table 4: Distribution of respondents according to the nature of physical activities and energy expenditure

Activities	Duration (hours)	Energy expenditure (kcal)	Frequency(IMARA)	Frequency (Saint Joseph)
Walking	2	313,5	235(55,6%)	317(74,9%)
Football	$\frac{1}{2}$	313,6	256(60,5%)	365(86,3%)
Stroke	$\frac{1}{4}$	112	212(50,1%)	282(66,7%)
Learning Metabolism basic 24	8	1410,9	182(43,0%)	84(19,8%)

Table 4 above shows that most of the respondents did 2 hours of walking and 30 minutes of football as the main intentional activities responsible for energy expenditure.

Table 5: Distribution of respondents according to the number of meals taken per day

MEAL	IMARA		SAINT JOSEPH	
	Frequency	Percent	Frequency	Percent
1	12	2,8	17	4,0
2	101	23,9	266	62,8
3	310	73,2	140	33,1
Total	423	100,0	423	100,0

The table indicates that most of the students surveyed eat 3 meals a day for IMARA while those of Saint JOSEPH most eat 2 meals a day.

Table 6. Distribution of respondents according to the quantities and nutritional value of ingested dinner

Basic food and quantity (g)	Energy (kcal)	Prot (g)	Lip (g)	HC (g)	Frequency IMARA	Frequency S.J
Bukari (corn dough): 400 Various fish: 50 Vegetable: 100	540,3	22,6	5,5	100,1	171(40,4%)	239(56,5%)
Bukari (corn dough): 400 Meat: 50 Vegetable: 100	542,1	21,6	5,7	101,1	208(49,2)	140(33,1)
Bean: 200 Rice: 300 Sugar: 25 Oil: 10	845,5	30,5	12,9	140,1	22(5,2%)	25(5,9%)
Sweet potatoes: 300	276	2,5	0,7	66	8(1,9%)	16(3,8%)
Fried potatoes: 100	227,7	1,1	5,7	43	14(3,3%)	3(0,7%)
Total					423(100%)	423(100%)

This table illustrates that the largest proportion of students consume Bukari accompanied by vegetables with fish or meat

Table 7: Distribution of respondents according to breakfast consumption

CONSUMPTION OF BREAKFAST	IMARA		SAINT JOSEPH	
	Fréquence	Pourcentage	Frequency	Percent
No	43	10,2	59	13,9
Yes	380	89,8	364	86,1
Total	423	100	423	100

The majority of our respondents consume breakfast and represents 89.8% for IMARA and 86.1% for Saint JOSEPH.

Table 8: Distribution of respondents according to the quantities and nutritional value of ingested breakfast

Breakfast	Energy (kcal)	Proteins (g)	Fat (g)	Carbohydrates(g)	Frequency IMARA	Frequency Saint Joseph
Milk : 250ml Bread : 150g Margarine : 5g Omelet : 100g	330,7	8,2	5,5	62,1	199(52,4%)	126(34,6%)
Tea with milk : 250ml Bread: 100g Margarine : 5g	253,3	5,6	3,3	50,3	26,6(49,2)	103(28,3)
Tea:330ml Doughnuts: 150g	310,5	6,5	4,9	60,1	73(19,2%)	32,7(5,9%)
Spud : 100 Tea : 330	255,5	1,3	0,7	61	7(1,8%)	16(3,8%)
Total					380(100%)	364(100%)

The table shows us that the majority of students surveyed consume milk and bread at breakfast, 52.4% for IMARA and 34.6% for Saint JOSEPH.

Table 9: Distribution of respondents according to snacking between meals

SNACKING	IMARA		SAINT JOSEPH	
	Frequency	Percent	Frequency	Percent
NO	48	11,3	250	59
YES	375	88,7	173	41
Total	423	100,0	423	100

Table 9 above reveals that the majority of students nibbles between meals and represents 375 or 88.7% at IMARA and 41% of students for Saint JOSEPH.

Table 10. Distribution of respondents according to the type of snacking

Type of snack and quantity	Energy (kcal)	Protein (g)	Fat (g)	Carbohydrates (g)	Frequency (IMARA)	Frequency (S.JOSEPH)
Doghnuts: 100g Sweet: 330ml	347,9	4,1	3,5	75,1	16(4,3%)	30(17,3%)
Biscuit: 100g	241,3	5,1	4,1	46	22(5,8%)	13(7,5%)
Biscuit : 50g Doghnut: 50g	214,6	4,6	3,8	47,5	13(3,5%)	18(10,4%)
Biscuit: 50g YO-GO sweet drink: 230ml	255,2	4,5	3,6	51,2	7(1,9%)	15(8,7%)
Candy: 20g Biscuit: 50g	211,3	2,5	2,5	45	24(6,4%)	12(6,9%)
Crunchy: 30g Popcorn: 50g Juice: JUCE-IT: 330ml	307,8	4	5	61,7	33(8,8%)	25(14,5%)
Fries: 100g, Sandwich: 150g YESS sweet drink; 330ml	458,6	5,1	11,4	83,9	71(18,9%)	1(0,6%)
Popcorn: 50g	181,6	4,2	4,8	30,4	12(3,2%)	20(11,6%)
Potato chips: 30g, Biscuit: 50g	236,3	4,1	5,1	43,5	65(17,3%)	18(10,4%)
Popcorn: 50g, Biscuits: 50g MILKIT milk drink: 250ml	315,4	6,9	5,8	58,9	112(29,9%)	21(12,1%)
Total					375 (100,0)	173 (100%)

This table informs us that at IMARA the majority of students nibbles between meals popcorns and Loly juices for a percentage of 29.9% while those of Saint JOSEPH consume doghnuts (17.3%).

Table 11. Distribution of respondents according to the quantities and nutritional value of ingested suppers

Basic food and quantity (g)	Energy (kcal)	Prot (g)	fat (g)	HC (g)	Frequency IMARA	Frequency S.J
Rice: 200 Vegetable (Sombe)	221,3	4,6	2,5	45,1	34(11,0%)	35(25%)
Bukari (corn dough): 200g Meat: 50 Vegetable: 50	209,9	8,6	2,7	37,8	51(16,5%)	11(7,9%)
Bean: 100 Rice: 200 Sugar: 5	315,5	9,5	1,9	65,1	75(24,2%)	25(17,9%)
Bread: 100 Milk tea: 250 Margarine: 5	207,3	4,5	5,7	34,5	61(19,7%)	40(28,6%)
Bread: 100 Milk: 250 Margarine: 5	230,8	4,6	6,8	37,8	89(28,7%)	29(20,7%)
Total					310(100%)	140(100%)

Table 12: Distribution of students according to their nutritional status

% P/T	IMARA		SAINT JOSEPH		NUTRITIONAL STATE
	Frequency	Percent	Frequency	Percent	
<70	7	1,7	9	2,1	Severe malnutrition
>70 - 80	16	3,8	21	4,9	Moderate malnutrition
>80 - 85	113	26,7	93	21,9	85% Normal
>85 - 100	229	54,1	272	64,3	100% Normal
>100 -110	19	4,5	14	3,0	overweight
>110 -175	39	9,2	14	3,0	Obesity
Total	423	100,0	423	100,0	

It emerges from this table that most of the students surveyed had a normal nutritional state, in total 229 or 54.1% for IMARA and for Saint JOSEPH, 272, or 64.3%.

3.2. DISCUSSION

From the transversal descriptive study carried out by means of questionnaires and anthropometric measurements targeted on children of school age in Primary Schools IMARA College and SAINT JOSEPH school complex, the following interpretations emerge:

Table 1 gives us the data according to the age of the pupils, after analyzing the data we found that the majority of pupils in the two schools were 6 to 8 and 8 to 10 years old, representing respectively. 38.8% and 37.8% for IMARA students, then 39.7% and 33.0% for SAINT JOSEPH students. . These results are close to those of SANKO in its nutritional survey of children enrolled in community schools in Bamako, which found that the age group of 6-10 year olds was in the majority with 54% [15].

Children under the age of 6 are in the minority in both schools due to the fact that in the DRC 6 years is the start age of primary school.

Table 2 indicates that most IMARA students used the vehicle (public or private) as a means of transport (71.2% of respondents). 77.8% of SAINT JOSEPH came to school on foot. This difference is due to the fact that IMARA, a prestigious school, its students live in different municipalities of the city, the tutors have private means of transport or financial means to pay for public transport. Saint Joseph is a school in the outskirts and its students live nearby. This trend corroborates the results of Table 3, indicating that 23.9% of IMARA students travel distances between 4001-5000m to go to school and return home while those of Saint Joseph (25.5%) only perform 2001-3000m.

From Table 4, it emerges that of the physical activities carried out by the pupils, football comes in first position (86.3% for Saint Joseph and 60.6% for Imara). This trend is justified by the fact that the respondents are boys whose favorite activity is football.

The higher percentage for Saint Joseph in terms of football and running could be explained by the fact that in peri-urban areas young people gather more easily than in the city center where young people are under strict parental control. In addition, as indicated in table 3, the pupils of Saint Joseph have more opportunity to walk on foot than those of Imara because going more to school on foot (77.8% against 24.1 for IMARA.). They would therefore spend more energy.

Table 5, distributes the respondents according to the number of meals taken per day. 73.2% of IMARA students eat three meals a day and 62.8% of Saint Joseph students eat two meals a day. We believe that parents of Imara students have a better understanding of the challenges and importance of nutrition for older children in elementary school. In addition, these results have the same trend as those found by SANKO, reporting that 59.6% of the subjects studied ate at least two meals a day [15]”.

Analysis of Table 6, indicates that the main dish of the majority of Saint Joseph students (40.4%) consists of corn dough (Bukari), various fish and Vegetables, while the main dish of the majority of Saint Joseph students 'IMARA (49.2%) is made from corn (Bukari), meat and Vegetables. It is important to note that the food ration will depend on the habits and finances

of the housewife. Aside from snacking, the school-aged child does not have a special diet. The systematic association of fried vegetables is not in the same sense as Achouri in his study on the nutritional status and food consumption of school children in Kenitra (North-West Morocco) following eating habits [16].

From Table 7, Breaking down the respondents according to the consumption of breakfast, it appears that more than 85% take it. Parents are well aware that breakfast contributes a great deal to meeting children's daily nutritional and energy needs.

Table 8, reports that the nutritionally balanced ration also consists of milk, bread, margarine and omelet respectively 52.4% for IMARA and 34.6% for Saint Joseph. The difference in proportions would be due to the parents' income.

Tables 9 and 10 show the survey results relating to the proportion of pupils in love with snacking, the nature and composition of the latter. 88.7% of Imara's students are fond of it, against 41% of those of Saint Joseph. The intake of snacks is conditioned by the provision of financial means and the good will of parents and guardians to satisfy or bow to the whims of children.

However, Saint Joseph's statistics are not very close to those of BECHIRI LOUBNA who in 2011 in his study on the feeding of children aged 6 to 12 in Algeria "who found that 33.63% of students were snacking. [17].

Tables V and 11 tell us that 73.2% of the pupils of Imara and 33.1% of the pupils of Saint Joseph eat their supper. The latter consists of bread, milk, margarine (28.7%) and Beans, Rice, Sugar (24.2%) for IMARA and of Bread, Tea with milk, margarine (28.6%) and more rice 25%) for Saint Joseph. Although the notion of a light meal in the evening is internalized, the substantial meal taken after returning from school still reappears for a significant part.

Table 12 indicates that:

- the majority of the pupils surveyed had a normal nutritional state for the two schools with a total of 353 or 86.2% for Saint Joseph and 314 or 80.8% for IMARA.
- malnutrition (severe and moderate) concerns 7.0% of Saint Joseph students and 5.5% of IMARA students - overweight and obesity concern 13.7% of Imara students compared to 6% for those of Saint Joseph. The malnutrition, overweight and obesity observed could be justified by an unbalanced and sometimes excessive diet and the systematic non-participation in sport, observations similar to those of Tee, E.S et al and Oninla, S.O. and all in their studies. [18], [19]. Indeed:
- Table 2 indicates that 77.8% of Saint Joseph students go to school on foot thus spending more energy while 71.2% of Imara students come to school in a vehicle that does not spend so energy. -Tables V and X indicate that 68.2% of the pupils of Saint Joseph take two meals a day against 72.3% of Imara who take three. In addition, 88.7% of Imara's students snack, while 59% of those in Saint Joseph do not snack, accusing them of a nutrient deficit.

CONCLUSION

From the evaluation of food and its implication on the nutritional state of the pupils of the two schools studied, it emerges most of the pupils surveyed had a normal nutritional state however malnutrition by deficiency is noted in Saint Joseph, a school of the periphery while excess malnutrition affects more Imara, a school in the city center and should be a health concern.

Information and awareness programs on food and nutrition, the practice of sport and the opening of school canteens are therefore urgently needed for children of school age.

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