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Alimentation et dépenses énergétiques des étudiants internes de l'UNILU à Lubumbashi

[Food consumption and energetical expenses of UNILU boarder students in Lubumbashi]

Mulungulungu N. Deogratias[1], Ntengu Mukeya[1], and Kalaka M. Clovis[2]

[1]Ecole de Santé publique Université de Lubumbashi, Lubumbashi, RD Congo

[2]Centre de Recherche agroalimentaire, CRAA, Lubumbashi, RD Congo

ABSTRACT: Authors of this article have carried out a study on food consumption, nutrition and energetical expensens of 426 students living in halls of residence of UNILU. Results from this study show that 53, 5% of students have a standard feeding with a bodily masss index varying between 18, 5% and 25, 9%. 20, 2% of boarders are under feed, but 26, 3% are obese, and only 26, 8% have a sport practice. Needs and food supplies evaluation in regards to activities shows that the diet is characterized with two meals which the main is taken at evening, whereas food toying is picked at along the day which supply energetical needs of 51, 6% boarder students. So 28, 6% of boarders have an excessive energetical balance whereas 19, 8% show a deficit. From the above results, authors of this study plead in favor of setting up restaurants and soup kitchens in the university hall of residence. The sport practice must as well be done.

KEYWORDS: Feeding, nutrition, energetic balance, boarder students, UNILU.

RESUME: L'alimentation, la nutrition et les dépenses énergétiques de 426 étudiants résidents sur les cités universitaires de l'Université de Lubumbashi à Lubumbashi ont été étudiées.
Les résultats obtenus indiquent un état nutritionnel normal pour 53,5% des étudiants avec un indice de masse corporel compris dans la fourchette entre 18,5-25,9. 20,2% des étudiants sont dénutris, 26,3 en surcharge pondérale ou obèse et seuls 26,8% pratiquent du sport. L'évaluation des besoins et des apports alimentaires en fonction des activités a montré que le régime alimentaire caractérisé par deux repas dont le principal le soir et des grignotages couvrait les besoins énergétiques de 51,6% des internes. 28,6% des internes ont un bilan énergétique excédentaire contre 19,8% qui en ont un déficitaire. Ces résultats plaident pour l'instauration des restaurants et des cantines ainsi que la pratique généralisée du sport par les étudiants aux cités universitaires.

MOTS-CLEFS: Alimentation, nutrition, bilan énergétique, étudiants, internes, UNILU.

1 INTRODUCTION

The human organism needs permanently energy and nutrients for its functioning [1]. Feeding supplies to the human system necessary energy [2] Food we have to consume must be determined according to our tolerance and food preference. Necessary nutrients arc brought up by an equilibrated and diversified feeding. In period of intensive intellectual activities and in sport practice, the concerned person must have a regular energical feeding to provide for his needs [3]. In addition, the practice of a regular physical activity as well as the sedentary activities limitation constitute both major factors of maintaining and acquiring good wealth state. [4, 7]

Let's mention that the brain work does not lead to excessively high energetical expenses. However, it is certain that the energetical substratum usued during an intellectual activity is likely the one noticed a weak intensity physical activity. The basis metabolism is thus increased. [5]

To have the best efficacy, it is required throughout the day a balanced, varying and well distributed diet. The brain needs about forty substances in order to work correctly : such as vitamins , minerals, oligo elements, amino acids, essential fat acids. But a single food is not able to contain all these elements [1]

Most of UNILU student's activities are not exclusively mental (intellectual), but they are di versified. In consequence, their diet should be adjusted. Students representatives, in terms of nutritional balance, that is 56% are mistaken, and bad diet habits cause injurious effect on their physical and psychical health. [6]

As there does not exist neither restaurant nor soup kitchens in the university hall of residence, student's boarders buy at random their foods tuffs on any market and try to cook them by themselves. The meal quality, quantity and frequency are prepared according to personal/ individual income. They are also subordinated to the available time of each other depending on duties and times of studying.

Feeding may be a factor that influence in general the health of students in the UNILU hall of residence in Lubumbashi. That is why authors of this study were interested in their feeding versus the energical expenses deriving from their activities.

2 BACKGROUND, MATERIAL AND METHODS

2.1 BACKGROUND

The study has been carried out from May the first up to the 30th, 2017 on the UNULU boarding house in Lubumbashi, province of Haut Katanga.

The Academic general secretary statistical tables records 4900 boarder students among 29.500 registered students in 2017. The University boarding has got ten buildings and ten homes. Many extra activities are performed in this area, such as agriculture, detail trade, sport (football, basketball, volley-boll, box, karate, judo, weight lifting and athleticism…) Let's mention that sportive equipment's are not sufficient in the UNILU Boarding house.

2.2 MATERIALS

Important materials used in the inquiry and treatment of data's were made of the follows:

- Boarder students
- Inquiry questionnaire
- SOEHNLE scale of 130 Kg maximal range for persons, and a BUEHLER scale 5 Kg max range.
- a metric
- a graded test – tube of 500ml.
- Epi Info software 2007 version, and Excel 2013.

2.3 METHOD

We have carried out a transversal descriptive study made on boarder students including men and women. We made a single random sampling though the formula $n=Z^2 \times pxq/ d^2$. With Z (1, 96) = study confidence threshold; p (50%) = population proportion consuming studded diet according to WHO recommendation (standards); d (5%) = precision degree of the study; q=1 – p is the population proportion who don't consume the diet; n = population sample. In order to cover non responding's, the result was multiplied by 1, 11 which is the equivalent value to the corrective factor c (c = 1/1- f; with f equivalent to 10% or 0, 1. Thus, the corrective factor c = 1/1- 0, 1 = 1, 11). So n = 384 x 1, 11 = 426 students including 386 men and 40 women. Let's point out the sample was 79% made of un married, 62% who are supplied by relatives (parents) with food, and 53 % who are financially helped by relatives and have a medium monthly income of 50 $ US.

- **Socio – demographic and diet investigations**

We collected informations of investigated persons, by the questionnaire, about the age, the gender, civil status, financial origin, supplying source, and sportive and daily physical activities. We also asked questions on diet habits, food quantity and kinds. strengthening drinks consumed. We weighted food from a scale, and the strengthening drinks quantities were evaluated through a graded test – tube. The conversion of food quantity in energy and nutrients has been obtained with the help of the food composition tables [8].

- **Anthropometric parameters determination [9]**

Weight: Persons were weighted by a digital scale. The person was standing, without any charge, with arms along the body. The weight was red on a screen.

Stature (height): We got the stature with the help of a metric. The person was standing, without shoes, along the wall. **The Bodily mass index (BMI):** It has been obtained by dividing the weight (in Kg) by the square of the stature (height) (in m). (B M I= W/s^2)

- **Daily energetic expenses**

It was calculated by using the « Harris and Benedict improved » formula. Linked to each type of activity and at the physical activity, the daily energetic expense is obtained by multiplying the basis metabolism (taking into account the gender, the eight, the weight, the age) with the own factor of the considered activity, and with the number of daily hours devoted to that activity using the appropriate multiplication factors. [10, 11].

3 RESULTS AND DISCUSSION

3.1 RESULTS

Table 1. Break down of the students by age and gender

Age scope	Gender		Total	Percentage
	Male	Female		
[17, 20[	5	1	6	1,4
[20, 23[	60	6	66	15,5
[23, 26[	213	23	236	55,3
[26, 29[	70	9	79	18,5
[29, 32[	21	1	22	5,1
[32 et plus[	17	0	17	3,9
Total	**386**	**40**	**426**	**100**
Percentage	**90,6**	**9,4**	**100**	

The age average is 25 years old. Table I shows that our ample is made of two sexes. The Masculine gender is predominant and represents 90, 6% masculine.

Table 2. Break down of students by the eight (stature) in cm

Stature (cm)	**Number**	**Percentage**
150 – 155	33	7,7
156 – 160	74	17,3
161 – 165	218	51,1
166 – 170	62	14,5
171 – 175	28	6,5
176 – 180	11	2,5
Total	**426**	**100**

Results of table II show that students whose stature is between 161 – 165 cm were the most selected, that is 51, 1%.

Table 3. Breakdown of students by the weight (kg)

Weight (kg)	**Number**	**Percentage**
[40-50[	9	2,1
[50-60[	84	19,7
[60-70[	175	41
[70-80[	113	26,5
[80-100[	34	7,9
[100-110[	11	2,5
Total	**426**	**100%**

According to the results of the above table, weight comprises between [60 - 70**[** has a high number, which is 41%, and the scopes of [100 - 110**[** and [40 - 50**[** have got less, respectively 2, 5 and 2, 1%.

Table 4. Breakdown of students by the bodily mass index (B M I)

B M I kg/m²	WHO Standard	Numbers	Percentage %
< 18,5	Under feed	86	20,2
18,5-20,9	Normal	35	8,2
21,0-23,3	Normal	102	23,9
23,4-25,9	Normal	91	21,4
26-26,6	Stoutness	25	5,9
26,7-28,2	Stoutness	63	14,8
28,3-29,9	Stoutness	10	2,3
> 30	Obesity	14	3,3
Total		426	**100%**

Results from table IV show that students (53, 5%) having a normal B M I are situated between 18,5 – 25,9 are most represented.

Table 5. Breakdown of boarders by practiced activities and related energetic expenses

Activities	Hours number	Number	%	Energetic expenses (Kcal) hour for an individual of 60 kg [14, 15].
Walking	1	50	11,7	236
Football	2	34	8	413
Karate	1	10	2,3	590
Weight lifting	1	12	2,8	354
Judo	1	6	1,4	590
Basketball	2	28	6,6	354
Volleyball	2	16	3,8	177
Boxing	1	8	1,9	531
Lesson attendancy	8	120	28,2	67
Studying in group	3	20	4,7	67
Concentrated and intensive study	3	35	8,2	180
Kitchining (cooking)	2	63	14,8	148
Washing up	2	20	4,7	148
Forming	2	4	0,9	325
Total		**426**	**100**	

By this result, we notice that lesson attendancy is the main activity of students.

Table 6. Breakdown of boarders by the number of daily meals and the eating time (moment)

Number of meals	Number	%	Eating time	Number	%
1 meal	61	14,3	Morning	10	2,3
			At noon	12	2,8
			Evening	39	9,2
2 meals	242	56,8	Morning and at noon	30	7,0
			Morning and evening	162	38,0
			At noon and evening	50	11,8
3 meals	123	28,9	Evening	123	28,9
Total	**426**	**100**	Total	**426**	**100**

Table VI shows that most of students (56, 8%) take two meals a day mainly in the evening.

Table 7. Breakdown of basic foods consumed by the investigated persons

Basic food	Quantity (g)	Additive meal	Number	%	Energy (kcal)
Maize paste (Bukari)	300	1-2 fishes + 1bean and /or vegetables	284	64,5	865,5
	500	1-2 cut of meal + 1vegetables	65	15,2	1127,5
Rice	100	1 Bean	25	5,8	350
Sweet potatoes	250	150g of peanuts	52	12,1	220
Total			**426**	**100**	

Table VII shows that most of students (64,5%) have maize paste as the basic food (3 pieces of 300 g) with 1 – 2 fishes added with bean and /or vegetables,. They get from this 8665, 5 Kcal.

Table 8. Breakdown of boarders by type of food toying and energetic drinking

	Food toying				Sweet drinkings					Beer					Milk.			
	Quantity (g)	Number	%	Energy (Kcal)	Volume (cl)	Quantity (bottles)	Number	%	Energy (Kcal)	Volume (cl)	Quantity (bottles)	Number	%	Energy (Kcal)	Quantity (glass)	Number	%	Energy (Kcal)
Cassava	100	122	28,6	153		1-2	176	41,3	132-264		1-3	11	2,5	108,9-326,7	1	261	61,2	141,6
Groundnut	30	94	22,1	180,3	30	3-4	45	10,5	396-528	33	4-6	62	14,5	435,6-653,4	2	87	20,4	283,2
Biscuit	25	49	11,5	106,7		4 and more	18	4,2	>480		7 and more	95	22,3	762,2	3 and more	69	16,1	566,4
Chips	15	41	9,6	81,7		1-2	120	28,1	220-440		1-2	30	7	247,5-495				
Others		9	2,1		50	3 and more	10	2,3	>640	75	3-4	82	19,2	742,5-990				
Total		315	73,9								4 and more	136	31,9	>990				

From the table VIII, we notice that 73,9% of investigated students snack food, of whish 50,7% eat cassava with peanut (groundnuts), 41,3% drink 1- 2 bottles of sweet drinks of 30 cl a day; 31,9% of students drink daily 4 bottles of beer or more; 61,2% drink a glass of milk and ears 141,6 Kcal.

Table 9. Breakdown of students by energetic expenses in terms of intensive study hours per day (Exams preparation)

Number of hours	Number	Percentage	Energetic expenses in Kcal
[0, 2[	102	23,9	180
[2, 4[	181	42,5	540
[4, 6[	86	20,2	900
[6 and more[	57	13,4	>900
Total	**426**	**100**	

It results from this table that 42, 5% among students devote 2-3 hours for studying. Thus, they spend 540 Kcal.

Table 10. Breakdown of students by energetic expenses related to the activity and to basal metabolism

Expensed energy related to the activity (kcal)	Basal Metabolism (Kcal)	Total expensed energy (Kcal)	Number	Percentage
600-650	1400-1450	2000-2100	13	3,1
651-700	1451-1500	2102-2200	6	1,4
701-750	1501-1550	2202-2300	49	11,5
751-800	1551-1600	2302-2400	42	9,8
801-850	1601-1650	2402-2500	99	23,1
851-900	1651-1700	2502-2600	72	16,8
901-950	1701-1750	2602-2700	31	7,3
951-1000	1751-1800	2702-2800	21	4,8
1001-1050	1801-1850	2802-2900	15	3,4
1051-1100	1851-1900	2902-3000	20	4,6
1101-1050	1901-1950	3002-3100	15	3,5
1051-1100	1951-2000	3102-3200	16	3,8
1101-1150	2001-2050	3202-3300	19	4,5
1151-1200	2051-2100	3302-3400	8	1,9
Total			**426**	**100**

Results of table X reveal that students whose energetic expense is between 2402 – 2600 Kcal and the energetic expenses between 801 – 900 Kcal are numerous and represent 39,9,4% .

Table 11. Breakdown of students by the energetic expenses and gain

Expensed energy related to the activity (kcal)	Energrtic Gain	Number	Percentage (%)	Nutritional status
550-600	950-1000	43	10,1	Stoutness
601-650	950-1000	42	9,9	Stoutness
651-700	700-750	30	7,0	Normal
701-750	750-800	18	4,2	Normal
751-800	700-750	12	2,8	Normal
801-850	800-850	13	3,1	Normal
851-900	800-850	20	4,7	Normal
851-900	501-550	39	9,2	Under feed
901-950	950-100	10	2,3	Normal
951-1000	900-950	14	3,3	Normal
951-1000	601-650	45	10,6	Under feed
1001-1050	900-100	5	1,2	Normal
1051-1100	1700-1750	10	2,3	0bese
1101-1050	1600-1650	9	2,1	Obese
1051-1100	1400-1450	18	4,2	Stoutness
1051-1100	1400-1450	40	9,4	Normal
1101-1150	1100-1150	30	7,0	Normal
1151-1200	1200-1250	28	6,6	Normal
Total		**426**	**100**	

Results of table XI show that students with normal nutritional status are of majority (51, 6%) and having scattered energetic expenses and gains.

4 DISCUSSION

At the end of the data analysis, results of this study show the following tendencies:

The table I shows that the sample is made of two sexes. The masculine sex is predominant and represents 90, 6% versus 9, and 4% for feminine sex. This means that women are less numerous and are living only in two buildings out of 20.

From table II, it is noticed that students whose stature is between 161-165cm are more selected, i.e. 51, 1%, whereas those whose stature are between 176-180 cm are less represented, i.e. 2, 3%. The average stature (height) of most of students is due to genetic parameters. [12]

Results of table III indicates that boarders having the weight between 60 – 70 Kg are numerous, i.e. 41%. Then come those whose weight is between 70 -80 Kg, i.e. 26, 5%. Students having weight between 40 – 50 Kg, i.e. 2, 1% are less represented. This tendency can be understood by the fact that the stature and the weight are depending on genetic and environment factors. The weight is proportional to the stature. The two follow a distribution which obey to theoretical pattern of the Gauss law [13].

The table IV indicates that boarders having normal B M I which is comprised between 18,5 – 25,9 are more represented, i.e. 53,5%. The fact of having two meals daily, especially in the morning and in the evening with some picking up food between the two meals may justify their mass maintaining.

From table V we learn that boarders who are practicing different sportive games, in occurrence football, karate, weight lifting, judo, basketball, volleyball and boxing represent 26,8% of investigated. Those who do not practice sports but attending lessons, reading, preparing exams and quizzes, working at home (cooking, washing up) are representing 60,6%. This tendency means that the lack of sportive practicing leads to non-organization of competition in the boarding school. In addition, most of tutors or parents want their sons or daughters to devote more time to studying than to any other activity.

Tables VI, VII and VIII report' some informations related to the number of meals which are taken per day by boarder students, the nature and quantities of food taken. There is neither restaurants not canteens for boarder students in UNILU. So, the frequency of meal eating is not uniformized. Every student has got own frequency of meal eating depending on the schedule of daily activities, the availability of food or his financial means. However, most of students, i.e. 56, 8% have two meals a day, mainly in the morning and in the evening. It is in the evening that a student has more time to devote to the activity of cooking meal. The meal composition does not fit to nutritional requirements related to the student extra academic and academic activities. But it depends on the availability of food and diet habits. The break time at noon is devoted to chatting with friends or teachers. But, it also that moment which is devoted to picking at food. This food is made of cassava, peanuts, sweet potatoes, chips, maize, biscuits and sweet drinks. This food toying is contributing to provide sufficient energy to use for the afternoon lessons.

The table IX shows that 42, 5% of boarder students produce unintermitting intellectual efforts when preparing exams. This needs a supplement calorific supply of 540 Kcal [5]. Results of table X and XI give informations on energetical expenses due to the activity and to the basal metabolism of the investigated persons, and on the energetical gains issued from their feeding. It has been established that if the energy absorption exceeds the energy expense, thus we have a positive energetical balance. This situation leads to the weight gain in long term. The energy excess may be due to the fact that one person can eat more than what is necessary, or do few physical exercises. If the energy expense exceeds the energy absorption, we have a negative energetical balance. This situation leads to the weight loss. The negative energetical balance derives from the fact that the consumption of food is inferior to the energy expense and/or the physical activity. So, the energetical expense is increasing. When comparing the table IV relating to breakdown of students by the bodily mass index (B M I) and tables X and XI relating to energetical expenses and energetical gains, we come to the following synthesis table XII:

Table 12. Nutritional status of boarder students (in %)

Nutritional status	BM I	Energetical balance	Average
Obese	3,3	4,4	3,9
Stoutness	23	24,2	23,6
Normal	53,5	51,6	52,6
Under feed	20,2	19,8	20,0

Results of the above table, taking into account measures of the bodily mass index (BMI) and the calculation of the energetical expenses due to the effort, and calculation of energetical gains deriving from food intake show the same tendency.

The light differences of numerals mays due to the metabolism trouble or to the investigated person illness which have not been taken into account. The sport practice may as well have an effect on the nutritional status. When a person is sick, especially the case of infectious disease going with fever, the bodily temperature will increase, and so energetical expenses will increase. [14]

The table XI shows that when we take into account consumptions, we notice that the percentage of obeses and stoutness individuals increases than the one deriving from the anthropometric statements. We can assess that the difference may due to sport practice leading to calories supplementary expenses which make change the concerned persons the nutritional status

category. Most of investigated persons have a normal nutritional status due to the equilibrium between the caloric expenses and gains.

The non-negligible proportion of obese investigated persons (3,8%) with ponderal overloading (23,5%) may due to the diet including the number of meals per day, food toying, the energetic beer or sweet drinking and no practice of sports. Under feed boarder students (20,0%) consume more calories than they gain in food.

5 CONCLUSION

The present work has been carried out on the UNILU boarding house in Lubumbashi, where a transversal descriptive study and measurement of 426 boarder students has been done, from the 1st up to the 30 th of may in 2017. Our objective lies on the evaluation of the nutritional statute of the above students, by analyzing the energetical expenses modes in regards to some diet habits. So, we come to the following results: We noticed that there is no restaurant or soup kitchen in the university halls of residence. Boarder students have to cook their meals in the bedroom. Most of boarder students, i.e 56, 8% consume two meals a day. They usually cook their meal in the evening after they come from school. The meal is mainly made of maize paste (Bukari) with fishes, bean and / or vegetables. The caloric gain per meal is estimated at 865, 5 Kcal.

During the break time, about 12 hours, 73, 9% of students are picking at food made of cassava with peanuts. They also get calories from energic drinkings, mainly sweet drinking or beer, and milk. 26,8% of boarders, in spite of studying, practice some sports, especially football, karate, weight lifting, judo, basketball, volley-boll and boxing versus 60,6% who do not practice sport. But they devote most of time to studying, reading, preparing exams and quizes, or making light farming, cooking or washing up clothes. Only 52, 5% of boarders have a good nutritional status due to their BMI which is normal. 47, 5% of boarders have a bad nutritional status characterized by abnormally high or low B M I, energetic gains or expenses. This situation seems worrying. It is better for students living in the university halls of residence to have a rich diet and have a habit of sport practicing within their daily schedule.

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