Original Research Article

Knowledge, Attitudes and Food Practices of Students of the University of Dschang, West Cameroon

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Abstract

This is a cross-sectional, descriptive study carried out on a random sample of students, during Open Days in 2016. The knowledge, attitudes and practices of students on food were assessed using a structured questionnaire; the weight status evaluated using the body mass index classification of the World Health Organization (2006), the diet by the 24h recall method. Epi Infos 7.2.1.0 was used for data analysis, the confidence interval used 95%, P-value <5%. The study describes the weight status, knowledge, attitudes and eating habits of students at the University of Dschang in Cameroon. Out of 292 participants, the knowledge of the students, it emerges that eating is an essential act for: survival (58.86%) and health (26.88%); meanwhile 73.19% know that a diet must be varied. The first source of information on nutrition was school (30.04%) and 60.22% considered themselves to be well informed. According to 41.43%, cooking one's food enables healthy feeding and 51.25% rated themselves as eating balance. 65.41% practiced diversified diet against 34.59%. Regarding weight status, 64.73% normal; 28.77% overweight; 5.14% obesity and 0.34% morbid obesity. The study found limited access to information on diet and high proportions of overweight and obesity among students. We recommend the implementation of a healthy eating promotion program at the Dschang University Center.

Keywords: Cameroon, Knowledge-attitudes-practices, Nutrition, Obesity, Weight status.

INTRODUCTION

Several determinants influence consumption, eating habits and trends. These are mainly socio-psychological, economic and environmental factors as well as representations (food, taboo, etc.), information and nutritional education of the populations. Food practices differ according to cultural, religious and geographic

backgrounds (Ngo et al., 2014). The primary function of food is to keep the body healthy. It is therefore necessary to provide the quantity and quality of food that the body needs every day. No food can contain all the nutrients essential to our body, so it is up to us to balance our diet. The result of a cellular imbalance between the supply of food, energy and the demand for the body to ensure growth, maintenance, and specific functions of the body is malnutrition (Fimann, 2010). Malnutrition broadly refers to both undernourishment and overeating (Institut international de recherche sur les politiques alimentaires, 2014). Overeating is an unbalanced diet with excessive calorie intake compared to energy needs. Among the predominant factors that contribute to the installation of obesity, two inexorably stand out, namely, the excessive intake of food and insufficient energy expenditure (Goldblatt et al., 1973; Bary et al., 1992). Obesity then sets in when the mechanisms involved in maintaining the balance between energy intake and expenditure experience malfunctions. Indeed, when the energy gains are greater than the expenditure, the additional calories are stored for a prolonged period in the adipose tissue, which, by humoral mechanisms will proliferate (Basdevant et al., 1988). Industrialized countries have experienced an alarming increase in the prevalence of overweight and obesity in both children and adults in recent decades. However, this problem is not exclusively Western; statistics are also becoming worrying in many developing countries (Brus et al., 2010). Indeed, in sub-Saharan Africa, there is a double burden of malnutrition with prevalence of overweight sometimes higher than that of under nutrition (Mendez et al., 2005). In Cameroon, the overall prevalence of overweight in a student environment among young adults increased from 17% in 2009 to 20.5% in 2013 (Choukem et al., 2015).

The University of Dschang, located in the West Cameroon region, is a state institution of higher education. It welcomes students of various origins from Cameroon and neighboring countries. It constitutes several faculties and branches, including a faculty of medicine and pharmaceutical sciences (former biomedical sciences branch of the faculty of sciences in 2015). As part of the open days of this faculty, we found it relevant to conduct this study in parallel in order to describe the knowledge, attitudes and eating practices of students and explore the risk factors for malnutrition among its students.

MATERIALS AND METHODS

Study design

It was a cross-sectional, descriptive study conducted among students at the University of Dschang. Only students registered for the 2015-2016 academic year, at least 15 years of age and over 65 years of age were

included in the study. Students known to have a pathology responsible for any metabolic dysfunction (sickle cell, beta thalassemia, etc.) or having a pregnancy were excluded from the study.

Sampling Technique

Simple random sampling technique was used. All students who met the inclusion criteria and agreed to respond to our survey questionnaire were enrolled in the study. The sampling was therefore exhaustive.

Data Collection process

In order to assess the knowledge, attitude and practices of the students on their diet, students in the biomedical sciences sector trained for this purpose administered a structured and pre-tested questionnaire. Obesity and overweight were assessed and classified using the body mass index according to the recommendations of the World Health Organization (WHO) 2006. Weight in kg was measured using a bathroom scale with 150Kg capacity and o0.1Kg accuracy. Individuals were then weighed barefoot and bore nothing other than their clothing on. The patient's height was measured with a height rod two meters high, barefoot when standing.

Statistical analysis

The data were entered in an Excel 2007 mask, then cleaned and analyzed with the Epi-Infos 7.2.1.0 software, a 95% confidence interval was used and a P-value less than or equal to 5% was considered significant in the Chi2 statistical test.

Body Mass Index Calculation

The body mass index (BMI) was the measure used to assess the student's weight status. The formula for calculating BMI was equal to Weight in Kg over Height in meters^2 ($BMI = Weight / Height^2$). We used the 2006 World Health Organization (WHO) classification to assess the weight status of students (Table 1).

Diet

In order to reflect better a quality diet, we calculated the number of different food groups consumed in the 24 hours preceding the survey, rather than the number of different foods consumed. Knowing that households consume, for example, on average four different food groups meant that their diets were diverse, both from the

Table 1. Classification of weight status according to the body mass index.

BMI	Weight status
BMI <18.5	Underweight
BMI = 18.5 - 24.9	Normal weight
BMI = 25.0 - 29.9	Excess weight / Overweight
BMI = 30.0 - 39.9	Obesity
BMI = ≥40	Morbid obesity

Table 2. Distribution by sex, age and weight of participants.

Sex	Nber	μ Age (year)	SD Age (year)	μ Weight (Kg)	SD Weight (Kg)	μ Height (m)	SD Height (m)
M	116	21,26	2,47	65,51	9,68	1,62	0,07
F	176	22,95	3,31	71,32	8,44	1,73	0,08
Total	**292**	**22,28**	**3,11**	**69,01**	**9,38**	**1,69**	**0,09**

Nber: Number; μ: Mean; SD: standards deviation

Table 3. Distribution of participants by level of education.

Level of education	L1	L2	L3	Master Degree	Total
M	59,00	27,00	19,00	11,00	116,00
F	64,00	39,00	28,00	39,00	170,00
Total	123,00	66,00	47,00	50,00	286,00

macronutrient and micronutrient viewpoints. This indicator was more significant than that of knowing that the household consumes four different foods, which could all belong to the same group groups. A set of 12 food groups was used to calculate the Household Food Diversity Score (HFDS) (Food and Agriculture Organization, 1970). The different food groups were: (1) Cereals; (2) Fish and seafood; (3) Roots and tubers; (4) Pod vegetables / legumes / nuts; (5) Vegetables; (6) Milk and dairy products; (7) Fruit; (8) Oil / fat; (9) Meat, poultry, organ meats; (10) Sugar / honey; (11) Eggs; (12) Spices, condiments and drinks.

RESULTS

Demographic description of the sample

Two hundred and ninety-two subjects were retained in this study because they presented usable data. One hundred and sixteen (39.73%) male and 176 (60.27%) female. The age varied between 17 and 39, with an average of 22 (Table 2) and a mode of 21. Concerning the level of education (Table 3), the majority of students were in the first year of university, 123 (43.00%); followed by those of the second year 66 (23.07%); of the Master's

level 50 (17.48%) and finally those of the third year 47 (16.43%).

The weight of the participants varied between 47 - 101Kg, the average weight was 69.01Kg. The size of the participants varied between 1.21 - 1.96 Meter (m), with an average height of 1.66 m.

Importance of food for humans

Regarding the importance of food, 280 respondents, 59.86% (167) replied that eating was above all an essential thing for the survival of an individual, for 26.88% (75) it was an important act to maintain health. On the other hand, 3.58% (10) thought that it was a pleasure in taste, 3.58% (10) saw it as a constraint, and 2.51% (7) a moment of distraction (Table 4).

Definition of a balanced diet

The students' knowledge of the concept of a balanced diet is diverse (Table 4), most of it was a question of having a varied diet (73.19%); for others to eat a reasonable amount (15.58%). A minority of respondents said that a good diet requires promoting the consumption

Table 4. Food knowledge and information source.

Importance of food	No.	%
Indispensable for living	167	59.86
A taste pleasure	10	3.58
Means of maintaining health	75	26.88
A distraction	7	2.51
Nothing in particular	10	3.58
A constraint	10	3.58
Definition of a balanced diet		
Vary your diet	202	73.19
Favor certain foods	11	3.99
Avoid certain foods	11	3.99
Eat a reasonable amount	43	15.58
Cook your own meals regularly	5	1.81
Do not snack between meals	4	1.45
Food Information Sources		
At school	82	30.04
Brochure & leaflets	17	6.23
Food packaging	20	7.33
Home	54	19.78
Friends	14	5.13
Health center	15	5.49
Personal intuition	20	7.33
Media	36	13.19
Personal experience	15	5.49
Information level self-assessment		
Very knowledgeable	25	9.12
Rather well informed	165	60.22
Rather uninformed	74	27.01
Rather very badly informed	10	3.65

of certain foods (3.99%) and not snacking without meals (1.45%). A small proportion (1.81%) also thought that preparing their own meals would lead to a balanced diet.

Main food information channels

The main source of information for students on food was school (30.04%); advice at the household level (19.78%) and the media (13.19%). Only, 9.12% of the students declared that they were very well informed on good eating practices, and against 27.01%. A significant minority (3.65%) considered themselves to be very ill-informed on the subject (Table 4).

Students' attitude towards food

The majority of students (41.64%) thought that cooking was "a way of eating healthy", 19.64% cooked for self-pleasure, 15.71% to save money, 9.29% by obligation and 2.86% thought that this activity was reserved for women.

A high proportion of students felt that they gave insufficient time for sporting activity (57.14%). Almost 19.3% of the students declared that they did not participate in sports and only 23.57% of the students declared that they devoted enough time to sport. (Table 5). Out of 279 respondents, 51.25% of the students declared that they had a fairly balanced diet, 7.89% a very balanced diet, 23.66% an insufficiently balanced diet and 17.20% an unbalanced diet.

Diet based on the Food Diversity Score, 24h reminder

A large proportion (65.41%) of students had an acceptable dietary diversity score (DDS) (DDS≥4), compared to 47 (34.59%) having a score below the acceptable threshold (DDS<4). Majority (17.81%) of the

Table 5. Students' attitudes towards eating practices.

| Attitude to cook	No.	%
A way of eating healthy	116	41.43
It's friendly	24	8.57
Pleasure	55	19.64
More economical	44	15.71
An obligation	26	9.29
A chore	7	2.50
It's only for women	8	2.86
Self-estimated time spent in sport		
Sufficient	66	23.57
Insufficient	160	57.14
Don't do sports	54	19.29
Self-assessment of feeding quality		
Very balanced	22	7.89
Rather balanced	143	51.25
Not balanced enough	66	23.66
Not at all balanced	48	17.20
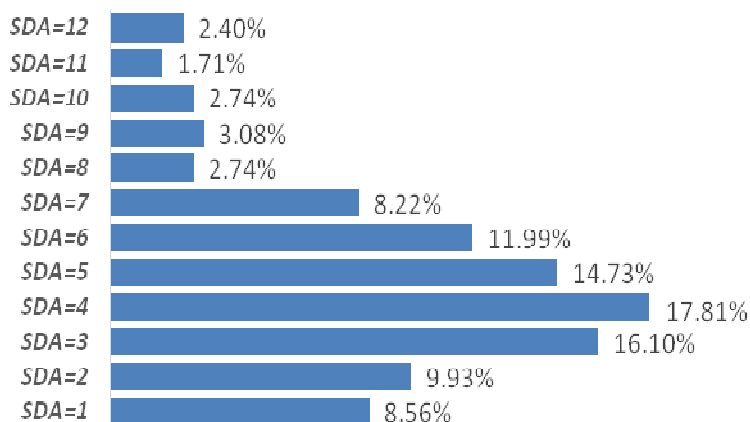
Figure 1. Distribution of students according to the 24hour dietary diversity score (SDA).

students had a score of four, and 8.56% had a score of 1, well below the acceptable threshold (Figure 1). According to gender, 57.59% of female students had a diversified diet against 42.41% of those of men. Similarly, 65.35% of female subjects had an undiversified diet, compared to 34.65% male (OR = 0.72; CI = 0.43-1.18). Of the 292 respondents, 191 (65.41%) had a diversified diet in the 24 hours preceding the survey (score greater than 4), compared to 101 (34.59%) undiversified. Among the students who consider having a diet: very balanced (n = 22), rather balanced (n = 143), 18.18% and 35.66% respectively had an undiversified diet (n = 48). Among the students who estimated having a rather unbalanced diet (n = 66) and not at all balanced, 68.18% and 54.17% respectively had a diversified diet.

Weight status of students

The BMI calculation among student volunteers showed that 103 (35.27%) had a BMI excluded from the normal threshold range (18.5 - 24.9 kg / m2) and therefore malnourished. Fifty-two (50.49%) of the malnourished were female. In the group of subjects with normal weight, 124 (65.61%) were female (OR = 1.87; CI = 1.14 - 3.05). Overall, 28.77% (84) were overweight; 5.14% (15) obesity; 0.34% (01) morbidly obese and 1.03% (3) were underweight.

Weight status and dietary diversity score

According to the household food diversity score, 24.27%

(25) malnourished had an undiversified diet, compared to 78 (75.73%) with a diversified diet. Among those not malnourished 113 (59.79%) and 76 (40.21%) had a diversified and undiversified diet, respectively.

Weight status and knowledge, attitude, eating practices

The evaluation and analysis of students' knowledge, attitudes and practices on diet compared to weight status shows that: 112 people (67.0%) of normal weight status against fifty-five (32.9%) malnourished stated that eating is essential. Similarly, 134 (66.3%) people of normal weight status against 68 (33.6%) malnourished declared that a balanced diet is a varied diet. One hundred and sixteen against forty-nine said they were well informed about food and nutrition for people with normal nutritional status and those who were malnourished, respectively.

DISCUSSION

Several indicators show today that overweight and obesity are on the rise in the majority of countries. This alarming increase affects developed countries as well as developing countries, such as Cameroon where children and adults are concerned. Eating habits are determining weight status, which is itself conditioned by multiple factors, such as, culture, environment, knowledge, attitudes etc. Eating, cooking, composing menus are more or less associated, depending on age, with different dimensions, combining taste pleasure, conviviality, health, constraint (Escalon and Beck F, 2010).

The study showed proportions of 26.88% to 59.86% of students with satisfactory knowledge on the importance of diet for survival and health respectively. These proportions are largely above those found by Shaziman et al. (2017), i.e. 16.5% and 20.3% found respectively in adolescents living in orphanage institutions (Syimir et al., 2017), and in older French people 18-54 years old (Escalon and Beck F, 2010). A small minority declared that eating was a pleasure in eating (2.51%), a result far below 26.2% found by Escalon H et al. (2010). This testifies to the disparities between the level of individuals' knowledge of food according to social background and level of study, etc.

Students' knowledge on the concept of a balanced diet is diverse, to a majority it was about having a varied diet (73.19%), a proportion well above the results found in adolescents in school (Sitti et al., 2016). Indeed, the work of Patimah et al. (2016), showed that 59% had good knowledge regarding balanced eating. The age and the level of education in the subjects could explain this difference.

The low proportions of students informed about food via advice at the household level (19.78%) and the media (13.19%), would be due to a low promotion of food and nutrition education in student environment and on national and regional television channels. The superiority of students who consider themselves poorly / least informed (30.66%) testifies to the insufficient access to nutritional education among students.

Several students considered cooking as "a way of eating healthy" (41.64%), having fun (19.64%) and an obligation (9.29%). These proportions were below those found by Escalon H. et al., (2010), with 90.9% respectively; 83% and 49.0% (Escalon and Beck F, 2010). These differences are likely due to the level of income of individuals, social background and cultures.

The results showed that 23.57% of the students declared that they devoted enough time to sport compared to 19.3% who did not practice it at all. The work of Belbachir (2017), had shown higher proportions with 38% and 43% respectively (Belbachir, 2017). Nearly 82.8% of the students declared that they had a balanced diet, this proportion was higher than those found by Escalon H. et al., (2010) and Belbachir (2017) respectively 74.1% and 29%.

Nearly 65.41% of the students had a dietary diversity score ≥4 compared to 34.59%, these proportions were above those found by Karoune R and Al, (2017) with 9.2% and 19.6 respectively % (Karoune and Mekhancha, 2014). This high dietary diversity observed among respondents could be due to the socio-economic environment in which the students live, who are mostly dependent on the sums of money sent by parents, offering them better access to the foods of choice. The city of Dschang is part of the West region of Cameroon, which is very rich local food diversity as it is an area of intense agricultural and livestock activity. Specific studies have shown that dietary diversity is positively linked to income from animal husbandry, the sale of agricultural products and cash transfers (Pauze, 2015. In addition, culturally speaking, women have more relevant nutritional education than men do because they are given the nutritional responsibilities of the family at a younger age.

The calculation of the Body Mass Index in student volunteers showed that, 103 (35.27%) had a BMI excluded from the normal threshold range (18.5 - 24.9 kg / m2), 28, 77% (84) overweight; 5.14% (15) obesity; 0.34% (01) morbidly obese and 1.03% (3) underweight. This would be due to a weak promotion of nutritional education specifically the promotion of a healthy and balanced diet within the University. These proportions are below those found by Moussa D, (2015) in young Jamesians, with respectively 39%, 25%, 1.05% (Moussa, 2017).

Almost 24.27% malnourished had an undiversified diet, compared to 75.73% with a diversified diet. These proportions do not corroborate with those found by Pauzé E, (2015) with 89.4% and 10.6% respectively (Sanou et al., 2018). Among the undernourished, 59.79% and 40.21% had a diversified and undiversified diet,

respectively. This would be due to a lack of financial resources to eat adequately at the frequencies recommended for certain students of the University of Dschang.

One hundred and thirty-four (66.3%) people of normal weight status against 68 (33.6%) malnourished declared that a balanced diet is a varied diet. Similarly, 116 against 49 said they were well informed about food and nutrition for people with normal nutritional status and those who were malnourished, respectively. This confirms the place that knowledge could play on diet and the effect of weight status among students.

CONCLUSION

The double burden of malnutrition is growing in developing countries like Cameroon, concomitantly with non-communicable diseases. The study found limited access to information on diet, high proportions of overweight and obesity among students. We recommend the implementation of a program to promote a healthy and balanced diet at the University of Dschang.

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Conflicts of interest

The authors declare no conflict of interest

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