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Evaluation of the impact of certain socio-demographic and sociocultural factors on the weight of obese adults in the city of Brazzaville

Delvina NOHYA OKONDZA [1, 2, *], Djibrine Imar SOUDY [3] and Arsène LENGA [1]

[1] Laboratory of Biodiversity and Animal Ecology, Faculty of Science and Technology, Marien NGOUABI University of Brazzaville (Congo), BP 69, Brazzaville, Republic of the Congo.
[2] Faculty of Human Nutrition and Food BP 69, Faculty of Science and Technology, Marien NGOUABI University, Brazzaville, Republic of the Congo.
[3] Food Quality Control Center (CECOQDA), BP 4486 Ndjamena, Republic of Chad.

Abstract

Introduction: Obesity is excess of fat, often resulting from an imbalance between daily calorie intake and energy expenditure. It affects all parts of the globe, both genders and all age groups, and poses a threat to health. In the Republic of Congo, the prevalence of obesity increased from 7.7% to 9.6% between 2010 and 2016. Obesity is clearly a multifactorial disease resulting from interactions of several factors.

Objective: to study the influence of certain socio-demographic and socio-cultural factors on weight, but also the level of knowledge of obesity among obese adults.

Material and method: A descriptive cross-sectional survey was carried out using a questionnaire, associated with anthropometric measurements of obese (adult) people encountered in all districts of the city of Brazzaville.

Results: This study shows that there are more obese women (78%) than obese men (22%). The most common type of obesity is type I (50%). It appears that obesity is age-related and hereditary. The sector of activity has an influence on weight, unlike income. Obesity is promoted by sedentary lifestyle and poor eating habits. Finally, obesity is very poorly known by participants.

Conclusion: this study allowed us to show the influence of some socio-demographic and socio-cultural factors on weight.

Keywords: Obese; Adult; Socio-Demographic; Socio-cultural

1. Introduction

According to the WHO, obesity is defined as an abnormal or excessive accumulation of body fat that can be detrimental to health [1]. It can be conceptualized as the physical manifestation of chronic surplus energy [2]. Indeed, excess fat mass promotes the development of high blood pressure, hypercholesterolemia, type II diabetes, coronary artery disease, gallbladder disorders or sleep apnea and osteoarthritis. These pathologies pose a significant risk of mortality [3]. The phenomenon of obesity, which began in the United States, is now extends to all continents including Africa, in its northern part as well as in sub-Saharan regions. This is due to a radical change in social behaviour and the emergence of fast-food style, rich in fat and sugar [4]. Its evolution is very worrying as the number of obese adults continues to increase in developed countries, but it also increases alarmingly in developing countries. Congo-Brazzaville is no

exception, as several previous studies have warned of the significant increase in obesity cases caused by new eating habits [5].

Furthermore, there is very little data available on the prevalence of obesity in adults in Congo. The few existing data concern studies conducted by the WHO between 2010 and 2016. The prevalence of adults aged 18 years and over was 7.7 to 9.6% in the city of Brazzaville (WHO, 2018). To this end, it seems necessary toto carry out an updated assessment of adult obesity in the city of Brazzaville.

2. Materials and Methodology

2.1. Materials

2.1.1. Teaching Materials

The teaching materials consist of a survey form that we used to collect data from the obese adults we interviewed. This form is divided into four sections:

- Section 0: General Information;
- Section 1: Identity and Sociodemographic Characteristics;
- Section 2: Respondent's Diet and Physical Activity;
- Section 3: Knowledge and Treatment of Obesity.

2.1.2. Anthropometric Equipment

This equipment consisted of

- a scale for weight measurement;
- a tape measure (tailors) for measuring abdominal circumference;
- a tape measure (carpenters) for measuring the participants' height.

2.2. Methods

2.2.1. Sampling

We interviewed a total of 887 obese people in public settings across all districts of the city of Brazzaville.

The sample for this study was determined using Schwartz's sample size calculation formula, taking into account the prevalence of obesity from the Survey on the adult Obesity Control Survey, which was 9.6% [6]. To adjust the sample size, we used the design factor K = 6.

2.2.2. Schwartz's formula

$$n = \frac{z^2 \cdot p(1-p)}{e^2} \times K$$

2.2.3. Digital application

$$n = \frac{1,96^2 \times 0,096(1-0,096)}{0,05^2} \times 6 = 804 \text{ People}$$

with
$\Biggl\{$
K: Design factor; k=6

n: Minimum sample size retained

Z: Fixed confidence coefficient. For a 95% confidence level, z=1.96

p: Proportion of obese people. The prevalence of obesity in Brazzaville is 9.6%

2.2.4. Implementation of the survey

A team of seven investigators divided into pairs, including a single investigator, was trained in advance before being deployed to the districts.

Each team surveyed an average of 14 obese people per day for approximately 17 days.

2.3. Data collection

The data collection concerned obese adults (18 years and older) encountered in public settings (markets, bus stations, etc.) in all districts of the city of Brazzaville.

The survey was conducted using an administered questionnaire combining the taking of anthropometric measurements.

Anthropometric measurements were taken before the interview to ensure that the person who agreed to participate in the study was actually obese.

Indeed, the anthropometric parameters were determined according to the WHO (2020) guidelines. Height, in the absence of a height gauge, was measured using a tape measure (POWER TAPE 3m tape measure) such that, with the participant in a standing position, without shoes, the iron tip of the tape measure is under his heel, and at the top the value read is that corresponding to the lower limit of a notebook placed on the participant's head.

Weight was measured using a scale (Body balance 180 kg scale). From the weight and height measurements, the Body Mass Index (BMI) was determined by dividing the person's weight by the square of their height (kg/m2). To define obesity, the WHO (2017) standards were used such as:

- If BMI < 18.5: Protein-Energy Malnutrition (PEM);
- If BMI between 18.5 and 20: risk of chronic energy deficit or EPM;
- If BMI between 20 and 25: the nutritional status is normal (no PEM);
- If BMI between 25 and 30: overweight (risk of obesity);
- If BMI > 30: there is nutritional imbalance to type of overweight (Obesity);
- If BMI is between 30 and 35: moderate or common obesity;
- If BMI between 35 and 40: obesity is severe;
- If BMI is greater than or equal to 40: obesity is referred to as massive or morbid.

$$IMC = \frac{P}{T^2}$$

P = Weight in kg

T = Size in meter

In addition, the waist circumference must be less than 80 cm in a normal women. The latter is considered obese if her waist circumference is greater than or equal to 88 cm. In a normal man this value should be such that TT < 94 cm. He is considered obese when TT ≥ 102 cm.

Regarding socio-demographic parameters, we took into account age, marital status, education level and income. Five age groups were retained (18-20 years; 21-30 years; 31-40 years; 41-50 years; 50 years and over), with five categories of education level (no level: for those who have never studied; primary: who only have CEPE; secondary I: those who have the BEPC; secondary II: those who have the BAC and superior: those who have gone to university) were defined. Four categories were defined for marital status (widows, divorced, married and single) and the profession of respondents (no profession, civil servant, private sector, liberal profession).

The assessment of physical activity practice was established using a questionnaire approach to determine the frequency, number of days, location of practice; as well as impact of heredity and the various consequences of obesity on their health.

Finally, eating habits were assessed through a questionnaire using the weekly technique, applying the principles set up by the dietician Guillaume Benjamin [8]. To this end, we studied potential factors of obesity such as: the frequency of meals during the day (breakfast, lunch, snack, nibbling) for one week, information related to the frequency of consumption of certain foods and beverages, the excess would promote obesity.

According to Guillaume Benjamin, a few dietary hygiene tips such as taking three (3) meals a day (breakfast, lunch and dinner) + 1 snack in the afternoon which is optional allows you to have a regular and sufficient energy intake throughout the day. And this to avoid the cravings that lead to snacking, harmful for weight loss. According to Guillaume Benjamin, depending on the food groups, certain foods should be avoided in cases of obesity or limited consumption in order to prevent weight gain:

- VPO: Sheep, Breaded meat and poultry, pork, Cold cuts (sausages, merguez, pâté...), breaded fish,
- Sweets: pieces of sugar, powdered sugar, honey, candies, treats, pastries, Viennese pastries, etc, because they are very rich in energy and poor in vitamins and minerals
- Beverages: sugary drinks (soda, fruit juice), alcohol that provides a lot of energy and is also very poorly used by the body;
- Oleaginous fruits (peanuts, almonds ...), because it is with these fruits that vegetable oils are made, they are therefore very rich in lipids and energy.

2.4. Data analysis

Data were entered using CSPro 7.7 software. Data were refined using CSPro 7.7, SPSS 24 and Excel. The SPSS 24 software and the R 4.2.2 software were used to estimate the statistical parameters.

2.4.1. The data were statistically analyzed according to

- Univariate analysis: for the statistical description of the sample ((Mean ± Standard Deviation, percentage and confidence interval);
- Bivariate analysis: to identify variables that may explain obesity in PAOs obesity in Brazzaville using parametric tests (Chi-square test, Student's t-test) and non-parametric tests (Fisher's Exact Test, Wilcoxon Test or Kruskal-Wallis Test). Test assumptions are validated at the 5% threshold.
- Multivariate analysis: binary logistic regression was necessary to identify factors associated with obesity (Odds-Ratio, Confidence Interval).

3. Results

3.1. Univariate analysis

These results show that there were more obese women (78%) than men (22%) out of a total of 887 participants (including 689 women and 198 men).

The average age of our study is 40 ± 11 years. Comparing the different age groups, we find that the most represented age group is between 31 and 40 years old, or 33%. The least represented respondents are those whose age varies from 18 to 20 years, or 3% of the population studied. There is a significant difference at the 5% threshold.

The results of the study show a predominance of participants with secondary level II (high school, holder of a BAC) or 45%, compared to those with secondary level I (26%). Participants with a higher level of education represent 17% of this population, compared to 9.20% who have a primary level and 2.8% who have not studied. There is significance at the 5% threshold.

The distribution of participants by sector of activity shows that the most represented are in a liberal profession, 69%, compared to 4.0% of civil servants, who are least represented. The difference is significant at the 5% threshold.

Depending on their marital status, there is a higher proportion of single people, 47%, compared to married people (43%); and even higher than that of widows, which represent 6.50% of the population. The least represented are those who are divorced, or 3.3% of the population studied. However, we do not see any significant difference at the 5% threshold.

The average BMI of our study is $36.21 \pm 7.20 \text{ kg/m}^2$. For comparison, we note that the majority of participants, i.e. 50%, are categorized as type I obesity (moderate obesity, from 30 to 34.9 kg/m²); however, those with type II obesity (severe obesity, from 35 to 39.9kg/m²) are represented by a percentage of 32%, and finally, the least represented are those with type III obesity (morbid obesity, 40 kg/m² and above), i.e. 18%.

Table 1 Socio-demographic characteristics of respondents

Variables	Category	Percentages
Gender	Men	22%
	Women	78%
Ages	18-20	3%
	21-30	20%
	31-40	33%
	41-50	15%
	51 et plus	29%
Educational level	No level	2,80%
	Primary	9,20%
	Secondary I	26%
	Secondary II	45%
	Superior	17%
Sector of activity	No occupation	14%
	Employee	4%
	Working in the private sector	13%
	Liberal profession	69%
Marital status	Single	47%
	Married	43%
	Divorced	3,50%
	widower	6,50%
Physical activity	Yes	22%
	No	78%
BMI	Type I obesity	50%
	Type II obesity	32%
	Type III obesity	18%

Regarding physical activity, these results show that the majority of participants, 78%, do not engage in physical activity, compared to 22% who do. This difference is significant at the 5% threshold. Physical activity practiced by the population in our study is, for the majority, jogging for 15 to 30min, at least three times a week. These results show a higher proportion of single people, 47%, emerges compared to married people (43%); and even greater than that of widows, which represents 6.50% of the population. The least represented are those who are divorced, or 3.3% of the population studied.

Table 2 Knowledge of obesity

Variables	Catégory	Percentages
Knowledge of obesity	Yes	49.85%
	No	50.15%

Based on their knowledge of obesity, these results show that overall, 49.85% of participants are aware of obesity, and are represented by "Yes" versus 50.15% who do not know what obesity is, which are represented by "No".

Comparing these results by gender, we find that, among men, 49.50% know about obesity, compared to 50.50% who do not know about obesity. However, in the overall female population of this study, 50.20% are aware of obesity compared to 49.80% who are not.

3.2. Bivariate analysis

Table 3 Relationship between BMI and gender.

Gender	N	BMI (kg/m²)	
		Mean ± SD	P-value*
Man	198	34.5 ± 5.2	<0.001
Woman	689	36.7 ± 7.6	
*Wilcoxon test			

Based on the statistical test carried out, there is a positive correlation between sex and BMI. The difference is significant at 5% threshold, with a P-value < 0.001.

Table 4 Relationship between BMI and education

Educational level	N	BMI (kg/m²)	
		Mean ± SD	P-value*
No level	25	36.9 ± 4.7	0.072
Primary	78	36.4 ± 4.5	
Secondary I	231	36.6 ± 7.8	
Secondary II	398	36.2 ± 7.4	
Superior	155	35.4 ± 7.3	
Mean (SD)			
*Kruskal-Wallis test			

Although the different BMI values of the obese adults differ according to the different levels of education, the statistical test carried out shows no significance at the 5% threshold between these values.

Table 5 Relationship between BMI and LOB

Sector of activity	N	BMI (kg/m^2)	
		Mean ± SD	P-value*
Unemployed	120	39.6 ±12.2	
Employee	38	35.7 ± 3.9	
Private sector workers	113	34.1 ± 3.0	< 0.001
Liberal profession	616	36.6 ± 6.8	
*Kruskal-Wallis test			

The statistical test shows a significant difference at the 5% threshold, with a P-value < 0.001 between the different BMI values depending on the sector of activity.

Table 6 Relationship between BMI and whether or not physical activity is practiced

Physical activity practice	N	BMI (kg/m^2)	
		Mean ± SD	P-value*
Yes	191	34.4±5.7	<0.001
No	696	36.7±7.5	
*Wilcoxon test			

According to statistical tests, the difference is significant at 5% threshold with a P-value < 0.001. Physical activity therefore has an influence on the weight of participants.

3.3. Multivariate analysis

In this study, multivariate analysis is used to determine the factors that explain whether or not obesity occurs at different stages in the study population.

- From univariate to multivariate analysis, it is noted that men are twice more likely to be affected by type I obesity than women. This is significant at the 5% threshold;
- In terms of sector of activity; participants who work in the private sector are more likely to be affected by type I obesity than those who do not have professions. This is explained by the results of the multivariate analysis such as, (OR=1.46[CI (95%): 0.24-0.89]);
- Regarding age, according to multivariate analysis, obese adults aged between 31 and 40 have 1.33[CI (95%): 0.11-1.02] times more chance of being affected by type II obesity than those aged 18-20 years;
- The multivariate analysis shows that it is more likely to find participants, civil servants suffering from type II obesity i.e., 2.53[CI (95%): 0.99-6.30], than those who do not have a profession.
- In addition, according to the multivariate analysis, obese adults affected by type II obesity are more likely to be found in the private sector (3.22 [CI (95%) 1.64-6.45]) and liberal sector (2.21[CI (95%) 1.31-3.87]) than those without an occupation.

4. Discussion

The results show that there are more women than men who are obese, 78% of women compared to 22% of men. The most represented type of obesity is type I obesity (moderate obesity), which represents half of the population studied, with a percentage of 50%. However, the least common type is type III obesity (morbid obesity), which accounts for 18%.

In a bivariate analysis, this study showed that the average BMI of women is higher than that of men, at 36.7 kg/m^2 (type II obesity), compared to 34.5 kg/m^2 (type I obesity) for men.

These results were confirmed by multivariate analysis which showed that men are two (2) times more likely to be affected by type I obesity than women (OR=2.21[IC (95%): (1.60-3.08)]); they are also less likely to suffer from type III obesity compared to women (OR=0.34[IC (95%): (0.19-0.56)].

These findings support those of a larger global study conducted by the WHO in 2016, revealing a percentage of obese men of 11% compared to 15% of obese women.

The results of this study showed that obese adults were more represented in the age group between 31 and 40 years, or 33% of the population under study. The least represented are those aged between 18 and 20, representing 3% of the population under study. We observed a positive correlation between BMI and age in women. These results are similar to those obtained by Houriya et al. (2018) [9], which showed an increase in BMI from the age of 38 to 60 compared to the lower age group among obese adult Moroccan women in the city of Casablanca.

For the sector of activity, we observed a positive correlation between BMI variation and the sector of activity of obese adults in the population under study. In fact, those who do not have a profession or who have a liberal profession are those with the higher BMI than those who work in the private sector or civil servants.

Regarding physical activity, In this study, we observed a link between BMI and the practice or not of physical activity. Indeed, it has been shown that obese adults who practiced regular physical activity have a lower average BMI than those who do not. These results are in line with those of Rennie et al. in 2005[10], which showed that low levels of physical activity would be associated with a higher risk of weight gain and obesity.

These results are lower than those obtained by Kambasu et al., (2019) [11] for the knowledge of obesity.

5. Conclusion

Our survey results show that the number of obese adults in the city of Brazzaville is increasing, and that women are the most affected by this phenomenon.

Obesity seems to be well linked to age and heredity, and is promoted by sedentary lifestyle and poor eating habits. The type of work also seems to influence weight gain.

Furthermore, limitations in knowledge about obesity could also be considered as one of the causes of obesity.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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