

Prevalence of Obesity in Private Primary Schools in The City of Goma

Gisele Feza Muhemeri*, Halladain Mpung Mansoj, Richard BM

Department of Neurology Pédiatric, Fann Teaching hospital, Dakar-Senegal

*Corresponding author: Gisele Feza Muhemeri, Department of Neurology Pédiatric, Fann Teaching hospital, Dakar-Senegal, Tel: 00221778135777; Email: fezagisele@yahoo.fr

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Abstract

Obesity is an excess of fat mass; it corresponds to an imbalance between energy consumption and expenditure within the body. Obesity in children is one of the greatest public health challenges of the 21st century.

WHO estimates that in 2010 there were more than 42 million overweight children in the world, nearly 35 million of these children lived in developing countries and 18 million were between 3 and 9 years of age. (1.28)

Obesity is on the rise in most industrialized and so-called developing countries. It is a serious pathology in the sense that it can be the source of many diseases (cardiovascular, type 2 diabetes and early osteo-articular disorders [8]) capable of reducing life expectancy or seriously affecting its quality. Added to this are the psychological repercussions which result in a major economic and social cost taking on the dimension of a real public health problem. The problem of obesity is societal and requires a multisectoral, multidisciplinary and culturally relevant approach at the population level.

To this end, it seems that a healthy and balanced diet as well as a regular practice of physical activity constitute effective means to fight against this scourge.

As the schoolboy is our priority target and considering obesity as a time bomb that would risk hampering the good living conditions of children, we had undertaken a survey on obesity in schools.

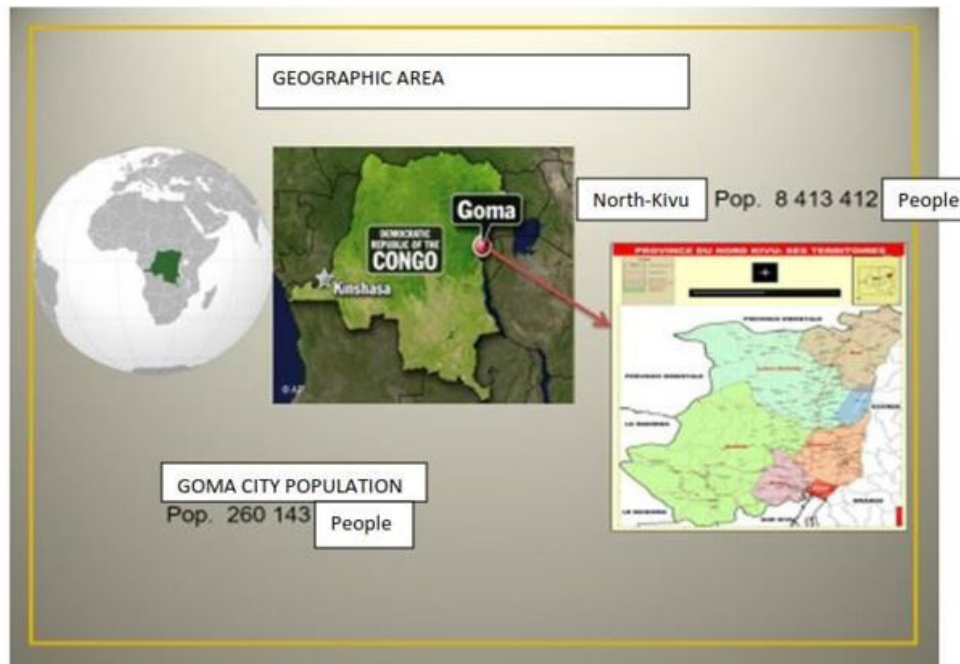
The objective of this study is to assess the prevalence of obesity in school settings specifically to determine the frequency of obesity and overweight in general in school settings on the one hand, then to know the distribution of obesity according to the age and gender.

Material and Methods

Study framework

The study was carried out in the Democratic Republic of Congo, in the Province of Nord - Kivu, in the town of Goma, in private primary schools.

The children of a class will be obtained by a draw of the classes to be investigated followed by a third draw, that of the pupils who will participate in the study. The different prints will be made from a benchmark obtained randomly [2-5]



Type and period of study

This is a cross-sectional survey that was carried out in private primary schools in the City of Goma from January 15 to February 15, 2015.

Study population and sampling

Our study population consisted of all children aged 6 to 12 years enrolled in private primary schools in the city of Goma, the basis on which the sample size was calculated [1].

Sampling was done by systematic sampling at several degrees: We proceeded by retrieving the list of all private primary schools and the list of students of each school, this allowed us to identify schools, classes and then children in the study

Our sample was 2,512 students between the ages of 6 and 12. The number of children to be surveyed by school will correspond to the size of our sample calculated at 384 children according to information, by selected school, if the theoretical frequency is estimated at 50% and a confidence interval of 95% ($P = 5\%$, the acceptable margin of error)

Selection Criteria

Inclusion criteria

The participants in this study will be: students from 6 to 12 years of age from the selected schools, whose parents, school officials and the students themselves have accepted to participate in the research.

Non-inclusion criteria

Any child under the age of 6 or over the age of 12, Any child who opposes body measurements.

Any child who will be absent on the day of the investigation.

Variables Studied

- Weight
- Cut
- Age according to the date of birth in the teacher's register or bring the birth certificate
- Gender

Choice of indicators of overweight and obesity

Obesity is an excess of body fat that can be measured using precise methods of assessing body composition and is commonly predicted from anthropometric parameters. The most commonly used indicator is the body mass index (BMI) corresponding to the weight / height ratio² (expressed in kg / m²).

The size measurement (T) is made, barefoot. In normal standing, arms alongside the body, trunk and head straight, the student leans against the height chart fixed to the wall, feet together, heels glued to the wall. The result is expressed in m [6-8].

Weight (P) is measured in the same outfit, barefoot. The subject goes up on the scale. It adopts the same attitude when evaluating the size. The weight reading is indicated in kg.

The calculation of the body mass index (BMI) or Quetelet index, was performed after encoding the data (age, sex, height and weight) and with the BMI formula.

The standing height (expressed in meters) will be measured with an accuracy to the nearest millimeter, using a measuring rod. The weight (in kilograms) will be taken using a pre-tared electronic scale, the height of which on the floor has been checked using a measuring tape. Training of investigators in taking weight and height measurements was organized beforehand [9-11].

Data processing

We have classified our subjects into four corpulence zones, determined by these curves according to age and sex:

underweight area (PI), normal body area (CN), overweight area: (SP) obesity zone (OB).

To make this classification, we introduced into the computer two normality values a and b of BMI which depend on age and sex; a and b being respectively the lower and upper values of this normality at the level of each subject

Below a (BMI < a), he is underweight; equal to or greater than a, The value between a and b is considered a normal build; greater than b (BMI > b) also having 2 compartments: overweight and obese.

We first distributed all the pupils (boys and girls combined without distinction of sex) by body size, then by sex and finally by age.

After calculating the percentages corresponding to the numbers recorded in each distribution case, we proceeded to interpret the observed percentages and then compare the numbers by age, then by sex, then compare the age and sex. By definition, this comparison will be based on the Chi-square calculation with a predictive value (p) < 0.05 (the 95% confidence interval) [12,13].

Collection tools

Pre-established survey sheet; Student records; Computerization:

We will use a pack office 2013 computer;

Analysis will be done with the epi info 7.2.6.0 software; the qualitative variables will be presented in proportion and the quantitative variables in median (non-normal distribution), in average (normal distribution)

Ethical considerations

This study was carried out in accordance with the principles of confidentiality and anonymity. Both parents and school officials were informed in advance by letter of the completion of the study, its objectives and the terms of the survey. As such, they had the latitude to oppose the participation of their child.

In addition, the investigators took care to explain to the teachers and schoolchildren the

objectives of the study in order to obtain their informed consent.

Results

It appears from this table 1 that 8% of the students were obese and 24.1% overweight, 64.2% of normal build and 3.7% underweight. This difference is statistically significant (p < 0.05).

Category	Percentage
Underweight	3.70%
Normal	64.20%
Over Weight	24.10%
Obesity	8.00%
Total	100.00%

Table 1: Breakdown of the Study Population by BMI

Category	Sex	
	Female	Male
Thin	64.5%	35.5%
Normal weight	50.6%	49.4%
Obesity		
58.90%		
41.10%	58.9%	41.1%
Overweight	49.6%	50.4%
Total	51.5%	48.5%

Table 2: Gender-based mass index Chi square = 0.007 p <0.05

It appears from this table 2 that among the obese cases, 58.9% are female and 41.1% male whereas for the overweight 49.6% are female and 50.4% male. Chi-square? Depending on gender, the prevalence of obesity is increased in girls more than in boys (Ta-

ble 2), it is 3.3% in boys and 4.7% in girls.

It appears from this table 3 that there are more cases of obesity at 6 years and at 11 years.

Age	Type of BMI				Total
	Thin	Obesity	Normalweight	Overweight	
5 years		0	191	0	214
6 years	0	37	134	73	244
7 years	14	14	271	58	357
8 years	33	25	487	92	637
9 years	5	30	97	96	228
10 years	15	0	262	51	328
11 years	0	78	55	168	301
12 years	3	0	89	2	94
13 years	0	15	26	64	105
14 years	0	1	0	1	2
15 years	0	2	0	0	2
Total	93	202	1612	605	2512

Table 3: Body Mass Index by Age Chi square = 0.000 p <0.05

Discussion

The study on the prevalence of overweight and obesity assessed among students of private schools in Goma, used a sample of 2,512 subjects. It is representative of private schools because chosen according to standards. The distribution of our subjects by sex is balanced, 1291 female subjects against 1218 male subjects. We claim to have achieved our objective which was to estimate the prevalence of obesity among children in private schools in the city of Goma because the diagnosis of obesity was made by means of an indirect measure which is the 'BMI, as recommended by the WHO, BMI seems to be a reliable measure of adiposity in children, since it takes account of the child during growth. At the epidemiological level, the biases would come from different anthropometric measures used by the investigators because some preferred the height rods and the others the tape measures, this does not call into question our results because the team consisted of health professionals. To assess weight status, the prevalence is difficult to compare to those mentioned in the literature because the methods of measuring obesity vary according to the study. Similarly, the criteria used to define it are more stringent in some studies than in others. Furthermore, this comparison should be considered in a limited way, because our sample is not representative of all Congolese children, even if the results are not always strictly comparable (separate reference population, criterion for defining the different obesity).

The prevalence we found (8%) is similar to that found by Kruger et al. [22], in South Africa (7.8%) in 2006. In Senegal, the prevalence of obesity in urban areas (13.77%) is six and a half times higher than that in rural areas (2, 06%) [14] and P. Ndiaye in 2016 found a prevalence of 9.34%.

On the other hand, our results are superior to the results reported by Frelut [15] in France, more precisely in Lorraine (2.5%) in 1980 and by Singh et al., In Indian adolescents from 12 to 17 years old schooled in Mexico City (4, (36%). It is also higher than that reported in Finland (2.1%) between 9 and 18 years old in 1980 and by Faye et al. in 1986 in Dakar (6.13%) [18-20].

This prevalence of overweight in private schools is lower than that found by Wannan (17.85%) in the study of overweight and obesity in children aged 5 to 14 in China in 2014 [25], and in middle school students. Haute-Savoie (15.7%) in Normandy in 2003 (25), to that observed in children aged 11-12 years living in Hérault (15.6%), Doubs (19.8%) and in Val-de-Marne (20.9%) [14].

It is also lower than those reported in Northern (10–20%) and Southern Europe (20–35%) [14], in France (10–12% in 1996 and 16% in 2000) [1].

GINIOUX C. et al., In France [16], during the 2003-2004 school year, carried out a survey on the prevalence of obesity in children in the large section of kindergarten and third grade, associated with awareness Individual care for the students screened, show a prevalence of obesity of 13.9% at 6 years and 14.3% at 15 years [17], then that found by Faye et al. in Dakar (9.34%) in 2010 (15%), to that observed, in Great Britain (8–16.5%) between 5-11

Table 2 shows that among the obese cases, 58.9% are female and 41.1% male while for overweight 49.6% are female and 50.4% male. Compared to our prevalence of 8%; 4.7% are female and 3.3% are male. The prevalence of obesity is 4.74% among girls and 3.3% among boys. Referring to the data provided by Frelut [15], the higher prevalence among girls was observed in Finland (3.6% in 1980 and 4.36% in 1986 between 9 and 18 years old) and in Japan (9.8 % in 1988). FAYE J. et al. [15], in Dakar in 2010, found a prevalence of obesity is 9.34%, of which 2.88% are boys and 6.46% are girls. KRAMOH et al. in 2010 in Abidjan, in a prospective descriptive survey of pupils from primary and secondary schools in the Abidjan district observed a prevalence of obesity, 5%, more common in girls (6.8%) than in girls boys (1.8%) [21], MADHI KAMOUN et al. [28] in Tunisia in 2011, showed that the frequency of obesity was 2.4% and that of overweight was 6.3% that obesity was significantly associated with parental obesity, a high socioeconomic level, taking more than two snacks per day and sedentary activity. OUCHFOUN A. et al. in Tebessa, Algeria in 2011 [30-31], it was found that the prevalence of overweight and obesity increased from 17.39% in 1995-1998 to 8.49% in 2005- 2007. Overweight goes from 12.55% to 6.38% ($p = 0.0001$) and obesity from 4.48% to 1.80% ($p = 0.0001$) over the same period as older children 10 to 13 year olds are the only ones who show an evolution during this period after that girls are more affected by obesity than boys (3.2% against 2.82% [33].

From Table 3 it appears that there are more cases of obesity at 6 years and at 11 years. FAYE et al. found that at 11 years the prevalence of obesity is higher, than from one year to another, its decrease (from 12 to 17 years) is not significant ($p > 0.05$). The decline in prevalence from 12 years is linked to the fact that with age, we become more and more sensitive to the mockery and teasing suffered in the event of obesity, and that we tend to impose ourselves dietary restrictions and / or physical activity (ies). In Tunisia, the team of the research laboratory "Epidemiology

and Prevention of Cardiovascular Diseases" carried out in 2005 a survey on obesity among 3199 school-aged children in the Ariana region and showed that the obesity prevalence was 7.4%, with 8.6% among boys and 6.1% among girls [28].

Grousset et al., In 2002 in Morocco, in a study carried out on 274 mothers, 37.1% of infants aged 0 to 2 years were overweight or obese [17]. In 1993, in a recent school study in Saudi Arabia, boys between the ages of 6 and 18 showed a prevalence of obesity of 15.8%. Great Britain in 1994 and Northern Europe have a prevalence of overweight is 10-20%. In Southern Europe and the United States, the prevalence of obesity exceeds 30%. In the United States, the prevalence of obesity in children was estimated in 1998 to be 21.5% among African Americans, 21.8% among Hispanics and 12.3% among non-Hispanic whites. Among the American Indian community, the prevalence varies between 25% and 46% [27]. The Eastern Mediterranean Health Review, out of 654 registered in Portugal 32% are obese in 7-9 year olds, in Spain (31% in 2-9 year olds) and in Italy (27% in 6-11 year olds).

El Bayed and Teniat El Had in 2005, showed a prevalence of overweight including obesity of 12% and a prevalence of obesity of 2%. At the same time, in the east of the country in the city of Jijel, the prevalence of overweight including obesity is estimated at 14.5% and the prevalence of obesity is 1.2% [28]. A study of children and adolescents aged 6 to 16 in the Khroub region in 2001-2002 indicates a prevalence of overweight and obesity of 12.8% and 6.4% respectively. In Constantine, the prevalence of overweight, obesity included, among 5101 6-year-old students was 10.2% [28]. Also in Constantine, in 2004 [28], the prevalence of overweight in 810 children aged 7 to 13 years was 10.5%, that of obesity was 7.4%. In 2004, in another study carried out in Constantine in children aged 5 to 18, the prevalence of overweight including obesity increased from 8.27% in 1996-1998 to 10.12%; the prevalence of obesity increased from 1.26% to 1.88% [28]. The same author showed in children and adolescents schooled in Constantine in 2006 a prevalence of overweight, obesity included, of 9.92% [34-37].

In the municipality of Tebessa, in a study on children and adolescents aged 4 to 18 years, the prevalence of overweight, obesity included, was estimated at 10.54%; the prevalence of obesity alone is 3.36% [38]. In Switzerland, overweight children increased from 4% in 1960 to 18% in 2003. In the United Kingdom (England), these figures increased by 8 to 20% between 1974 and 2003. In several regions of Spain, the prevalence of overweight more than

doubled from 1985 to 2002. The only decline in prevalence was observed in the Russian Federation during the economic crisis which followed the dissolution of the Union of Soviet Socialist Republics (USSR). The prevalence of obesity in children aged 5-12 years increased fourfold in France between the 1960s and 2000s, while between 1971-1974 and 1999, it tripled in the United States among children aged 6-6. 11 years old [24]. In Canada, the prevalence of childhood obesity tripled between 1981 and 1996 [40,41].

Also in Canada in 2004, the combined rate of overweight and obesity was about 70% higher than it was in 1978-1979 for both boys and girls, while the rate for obesity was 2.5 times higher. In American children aged 2 to 19, there is no significant difference between 1999-2000 / 2007-2008, and in 2009-2012 the prevalence is again stable compared to previous years: prevalence = 16.9%. Another study done in Massachusetts found a stable prevalence from 1999 to 2003, and a decrease in the prevalence of obesity in children under 72 months from 2004 to 2008. There is a risk obesity in boys from 1999 to 2003 by (10.6% -10.5%) and from 2004 to 2008 by (10.5% - 8.9%), and respectively among girls of (8.2% -7.7%) and (9% - 6.4%). A study carried out in New York and Los Angeles (L.A.) from 2003 to 2011 in children aged 3 and 4 years, shows a decrease in the prevalence in New York from 18.9% to 15.1% in children 3 years and in those of 4 years a decrease from 19.9% to 17.2%. In Los Angeles, there was an increase in the prevalence from 2003 to 2009 respectively from 16.3% to 21% and from 17.2% to 22.4%, then a decrease from 2009 to 2011 from 21% to 20.5% and from 22.4% to 20.3%. A study carried out in Germany on children newly enrolled in school from 2007 to 2010 shows that the prevalence rate was down, from 11.2% to 8.5% for overweight and from 4.8% to 3.3% for obesity according to a German reference (Kromeyer-Hauschild et al. For this country, there is a trend towards stabilization of the prevalence of overweight and obesity, or even in other countries a very recent but still very fragile decrease, hence the need to continue to maintain the efforts made so far and the reinforce [23], but for the private schools of the city of Goma, it would be necessary to provide a great overall effort to manage to reduce the rate of obesity which still remains alarming in private schools.

According to several surveys carried out by the Nutrition, Prevention and Health Program for Children and Adolescents (PNPS) in Aquitaine*, in 2004-2005, among third-graders the prevalence of overweight obesity included was 15%, in 2007-2008, in children of large kindergarten section 9.4% of children are overweight (obesity included) including 2.2% obesity 14%

overweight including 3.6% obesity. In 2004-2005, 15% of children in CE2 (from 7 to 9 years old) were overweight (obesity included) and 3% were obese. In 2008-2009, the children of CE2 were again surveyed. It appeared that 15.6% were overweight (obesity included), of which 2.9% were obese. From 2004-2005 to 2008-2009, the statistical analysis did not find any significant difference between the prevalence of the two years of surveys, thus leading to the conclusion that the prevalence of overweight from 2004-2005 to 2008-2009 [60-63] and also confirms a clearer tendency to obesity in girls than in boys [23].

Recommendations

Give their children less calorie-rich foods, encourage children to exercise and organize medical care for their children.

Distributing effective prevention programs requires time, money and specialized skills on the part of health professionals; as many elements as these do not always seem to have. Obesity is a complex pathology that requires a multidimensional approach. The prevention dispensed to fight against this affection does not systematically take this last characteristic into account since the epidemiological data of childhood obesity in our country are

poorly known until now, for better care and a prevention policy. To claim one day to suppress this problem, a systemic approach must be offered during primary and secondary prevention programs. The family plays an important role in this process, so it should not be put aside [29]. It is important to promote physical and sports activities in and out of school.

Establish active screening of underweight children and adolescents and continue the epidemiological work undertaken. • Continue tracking and individual management of excess weight during all medical or nursing checkups during schooling. Encourage the development of partnerships in the management of obesity and health education; Organize the screening network networks and the implementation of educational actions, involvement of the services of the General Council (PMI, Social Services) and the Primary Health Insurance Fund.

Reflect on eating practices at school with teaching teams, local authorities and families, in particular on snacks and school meals.

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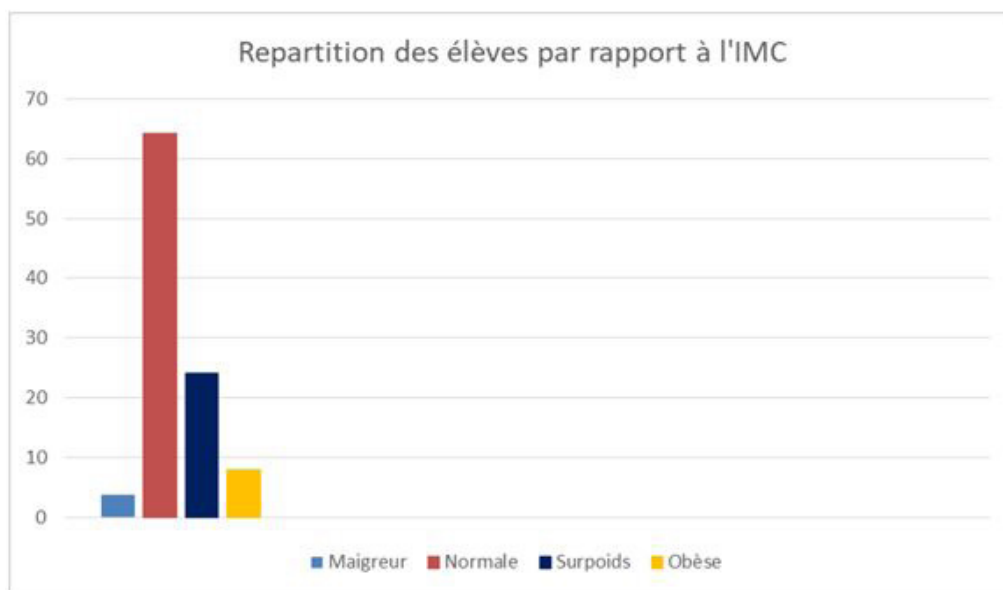
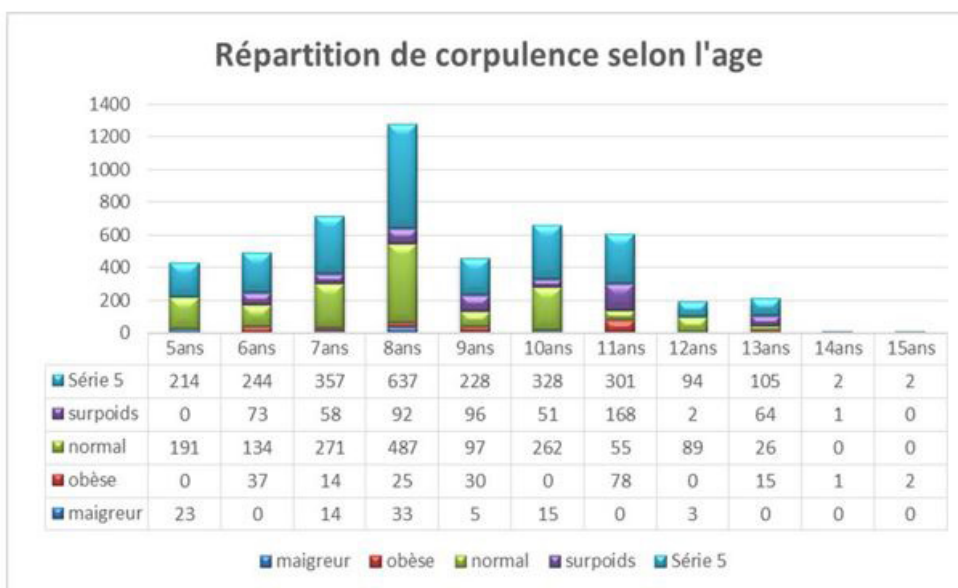
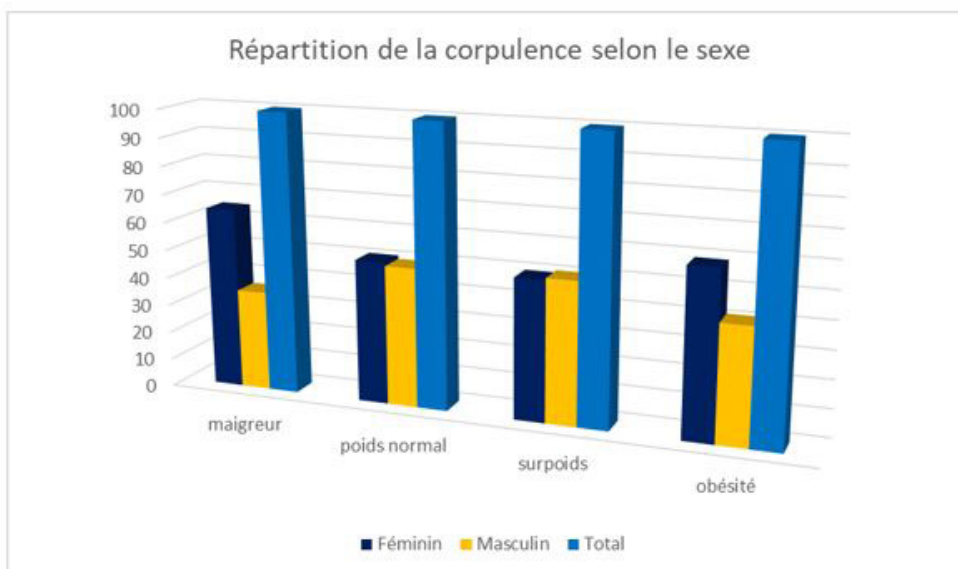
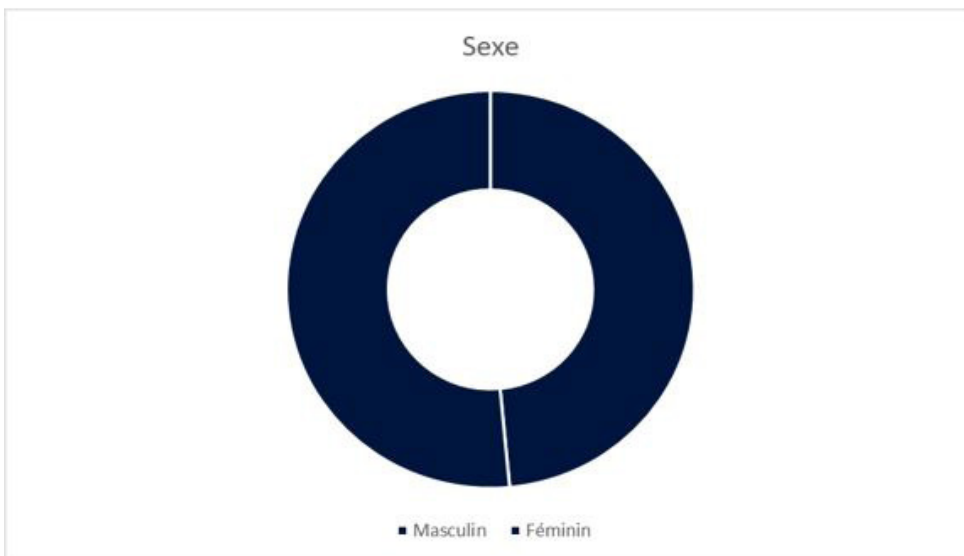
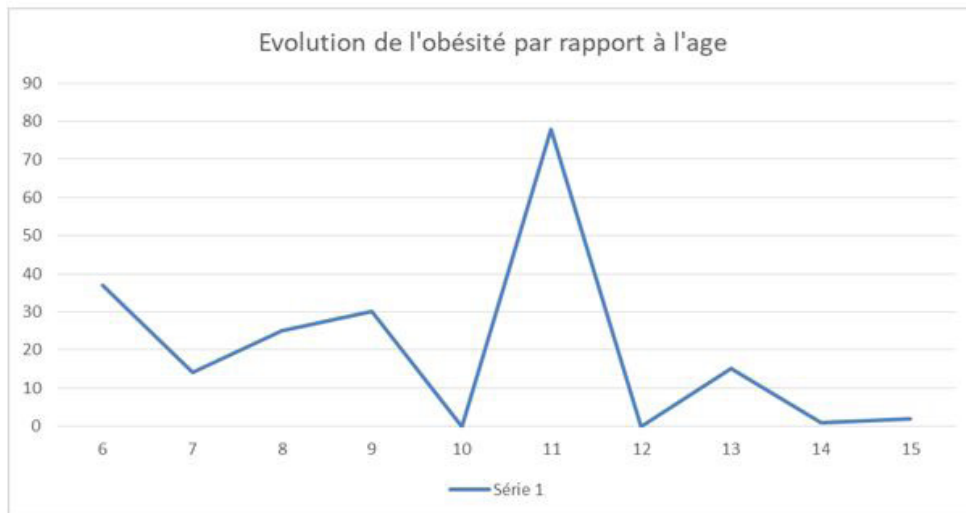
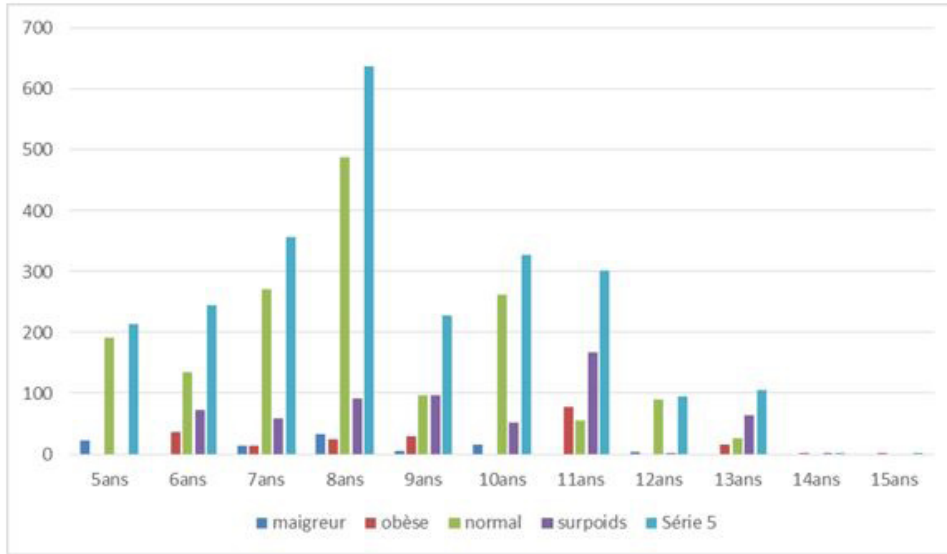


Figure 2: The prevalence of overweight and obesity in schools is 24.1% overweight and 8% respectively for obesity in schools is 24.1% overweight and 8% respectively for obesity.





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