

Nutritional status, sociodemographic status and academic performance of students in two selected secondary schools in Yopougon, Abidjan (Côte d'Ivoire).

BaudouinAngoua KOKORE¹, Howele OUATTARA², SoualioKAMAGATE³
and Paul AngouéYAPO⁴.

¹(Training and Research Unit of Biological Sciences/ PeleforoGonCoulibaly University of Korhogo, Côte d'Ivoire)

²(Training and Research Unit of Biological Sciences / PeleforoGonCoulibaly University of Korhogo, Côte d'Ivoire)

³(Training and Research Unit of Biological Sciences / PeleforoGonCoulibaly University of Korhogo, Côte d'Ivoire)

⁴(Training and Research Unit of Natural Sciences/ Nangui Abrogoua University, Côte d'Ivoire)

Corresponding Author: Baudouinangoua Kokorel

Abstract: *This study investigated the nutritional status and its effect on the academic performance of students in some selected secondary schools in Yopougon, a district of Abidjan (Cote d'Ivoire). The study population was drawn from secondary school students attending private secondary establishments. A determination of anthropometric indices using a computer program "Epi Info" has yielded. However, questionnaires were used to elicit information from the students. The selected schools were: Institut LKM Yopougon (LKM) and CollègeCielPlurielYopougon (CCP). A total of two hundred and fifty one (251) secondary school students comprising 108 males (70%) and 143 females (30%) participated in the study. The result revealed a high prevalence of malnutrition of 29.4% among the selected secondary school students, using BMI as index. Prevalence of malnutrition was higher in LKM (23.6%) than CCP (17.3%). Undernutrition and overweight are respectively correlated to household size and education level of the mother. Concerning academic performance, only 2% of children in the study have a low level. Academic performance is related to the size of the household and to the level of education of the mother.*

The impact of socio-demographic and nutritional factors on school performance is difficult to demonstrate. Even if statistical analysis has shown that some characteristics, notament the size of the household and the level of instruction of the mother, are significantly related to school performance.

Key words: *Nutritional status, Academic performance, Secondary schools, Yopougon, Côte d'Ivoire.*

Date of Subissions: 21-08-2018

Date of acceptante: 04-09-2018

I. Introduction

Nutrition is an endogenous factor that affects the overall capacity and specific learning before and after school¹. Balanced nutritional intake is required for adequate biological functioning, and any deficit or excess could lead to alterations that, in turn, affect such complex brain functions as the cognitive processes related to the learning of reading and writing². Despite this, we realize that nutrition as a determinant of academic progress receives little attention from the actors of education especially in secondary school in Côte d'Ivoire. Programs of the school canteens are developed only in the primary schools. In addition to the nutrition, the school performance is also influenced by a certain number of factors, such as the socio-economic statute and the level of education of the parents³. Indeed, socio-demographic and family economic variables influence the well-being of children in school activities as demonstrated by some research⁴. Thus, disadvantaged backgrounds, the low level of education of parents and the number of children raised in the family hinder communication and appropriate interaction with their children, but also their comprehension of the functioning of the education system⁵.

It has been shown that living conditions in a disadvantaged socio-economic environment strongly increase the risk of the appearance of child malnutrition, but the link between nutritional status and school performance through the reinforcement of cognitive capacities are clearly established in Morocco⁶. In Côte d'Ivoire, research work exists and report the share of nutrition and family antecedents on school performance among primary schoolchildren⁷. However, few work exist showing the situation prevailing among their senior high school students. Through a study conducted in the commune of Yopougon, we tried to assess

the contours of this situation. The aims of this study was to analyze the relationship between nutritional status, socio-economic status and academic performance of secondary school children in private secondary schools in Yopougon, city of Abidjan district (Côte d'Ivoire).

II. Material And Methods

Our work was a descriptive and analytical cross-sectional study conducted among students from two secondary schools in Yopougon. The selected schools were: Institute LKM Yopougon (LKM) and CollègeCielPlurielYopougon (CCP). Study were carried out during the period from January 2016 to March 2016. Permission to carry out the study was obtained from the Ministry of Education. All the school children present the day of the study were included in the study. A total number of 251 students, comprising of 199 students from Institute LKM Yopougon (LKM) and 52 from CollègeCielPlurielYopougon (CCP) were used for the study. Sociodemographic data were collected from a questionnaire survey completed by parents. The socioeconomic status was defined by the following parameters: the mother's and father's level of education, the mother's and father's occupation, parents' marital status, and household size, marital status of parent and sibling position. Data concerning academic results were collected from the school administration. These children were informed of the experimental protocol and their parents signed a consent form free. Our investigation was conducted under the supervision of school officials and school health.

Assessment of nutritional status (Anthropometry) and school performance

The main anthropometric indices which helped to assess the nutritional status of school children were calculated based on the values of the age, size and weight. Anthropometric measurements was based on the standardized method of WHO and UNICEF^{8,9}. The body mass index (BMI) was chosen for the assessment of nutritional status. It was defined with Cole et al.^{10,11} classification modified for children aged 0 to 18 years.

The academic performance of the school children was determined thorough assessment of their performance based on the annual general average. The performance scores of school children were graded as follows: Very good for averages greater than 14, Good for averages between [13.99-12], Fair for averages between [11.99-10] and poor for averages less than 10.

Data analysis

For statistical analysis, the data were analysed with the computer program Statistical Statsoft Windows version 7.1 (Statsoft, 2005). All values were compared with reference values using the non-parametric Mann Whitney U test and ANOVA Kruskal-Wallis H test. Comparisons of different proportions observed were performed by G test of reasonableness or log Likelihood ratio test with the statistical software R.2.0.1 Windows (Ihaka and Gentleman, 1996). The relationship between nutritional variables and the other parameters were studied using Pearson's correlation coefficient test. Statistical significance was set at $p < 0.05$.

III. Results

All general characteristics of the study population are summarized in Table 1. A total of two hundred and fifty-one (251) secondary school students comprising 108 males (43%) and 143 females (57%) with a sex ratio of 0.76 participated in the study. The age of the students ranged from 10 to 15 years with a majority (72.1%) having more than 12 years. 73.3% of this population of study lived in a household whose size is higher than 5. Only 12.4% of our subjects had a sibling position greater than 4. The illiteracy rate and unemployment rate were higher among mothers (respectively 7.6 and 21.1% against 3.6 and 5.6%) that in the fathers with a very significant difference concerning the occupation ($p=0.01$). The rate of school children living in a home with separated parents was 25.1%.

Table no 1: General characteristics of the study population

General characteristics	Frequency	Percent (%)
Sex		
Male	108	43
Female	143	57
Total	251	
Age group		
10-11	70	27.9
12-15	181	72.1
Household size		
≤5	67	26.7
>5	184	73.3
Sibling position		
≤4	220	87.6
>4	31	12.4

Level of father's instruction		
Illiterate	9	3.6
Educated	242	96.4
Level of mother's instruction		
Illiterate	18	7.6
Educated	233	92.4
Occupational status of father		
Unemployed	13	5.6
Employed	238	94.4
Occupational status of mother		
Unemployed	53	21.1
Employed	198	79.9
Marital status of parents		
Married	188	74.9
Separate	63	25.1

Nutritional status

Fig no 1 shows the nutritional status of the selected secondary school students. A total of 22.2% of the students were underweight in the two sex (22.2%). Also, there were more girls in overweight (8.4%) compared to the boys without significant difference. Furthermore, obesity was higher in boys (0.9%) comparatively to girls (0.6%), with no significant difference.

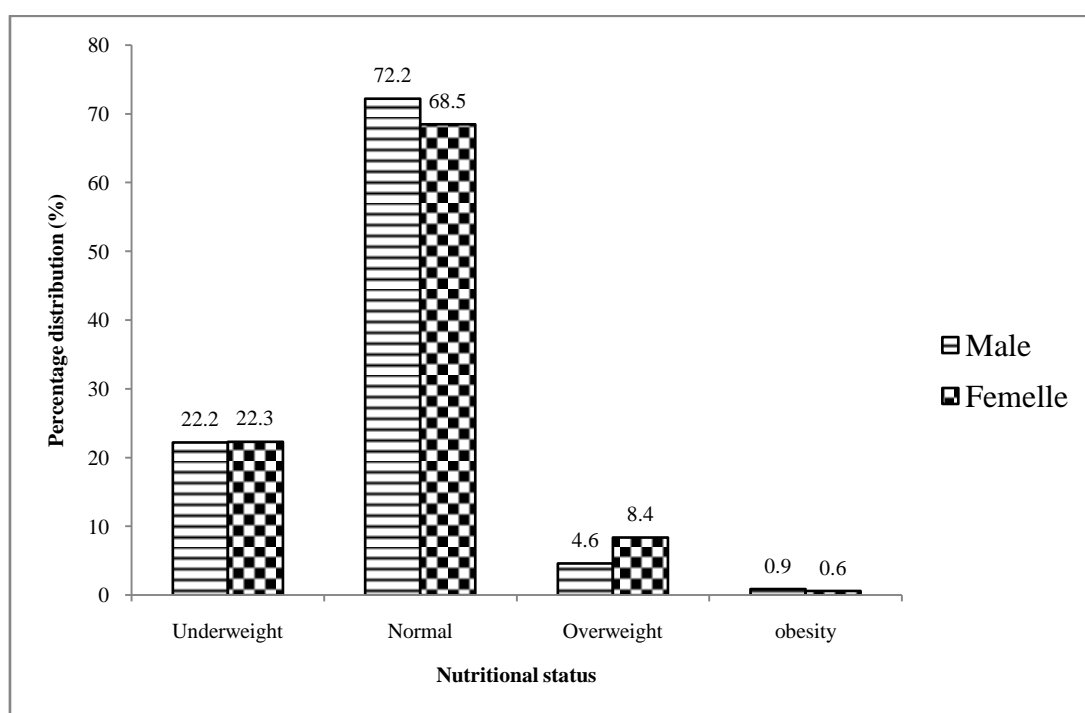


Fig. n° 1: Prevalence of nutritional status among male and female students in selected schools

Prevalence of malnutrition by school

Table n° 2 summarizes the prevalence of malnutrition among of the selected secondary school students in Yopougon. The malnutrition determined by underweight was higher among LKM School students (23.6%) compared to CCP school students (17.3%) with no significant difference. In both schools, it was higher in the girls than among boys. Similarly, overweight is higher at LKM than at the CCP, with an ever higher rate among boys. Obesity has not affected the CCP school children.

Table n° 2: Prevalence of malnutrition among respondents by school

School		Nutritional status (%)		
		Underweight	Overweight	obesity
LKM	Total	47(23.6)	13(6.5)	2(1)
	Male	22(11.1)	4(2)	1(0.5)
	Female	25(12.5)	9(4.5)	1(0.5)
CCP	Total	9(17.3)	3(5.8)	0(0)
	Male	2(3.8)	0(0)	0(0)
	Female	7(13.5)	3(5.8)	0(0)
Total		56(22.3)	16(6.3)	2(0.8)

Relationship between nutritional status and socio-demographic characteristics

Table n° 3 shows the distribution of the nutritional state according to the sociodemographic characteristics in the whole of the population of study. Malnutrition by deficiency and excess is higher in the age group of 10-11 compared to that of 12-15 years without significant difference. Deficiency malnutrition is very significantly high (24.4%) in households where household size is greater than 5, as well as that of excess among educated mothers (8.5%).

Table n° 3: Nutritional status by socio-demographic characteristics

	Underweight (%)	Normal (%)	Overweight + obesity (%)
Age group			
10-11	19(27,1)	44(62,9)	7(10)
12-15	37(20,4)	132(72,9)	12(6,6)
Household size			
≤5	11(16,4)	51(76,1)	5(7,5)
>5	45(24,4)	125(67,93)	14(7,60)
Sibling position			
≤4	53(22,45)	166(70,33)	17(7,20)
>4	3(20)	10(66,66)	2(13,33)
Level of father’s instruction			
Illiterate	2(22,22)	6(66,66)	1(11,11)
Educated	54(22,31)	170(70,24)	18(7,43)
Level of mother’s instruction			
Illiterate	2(11,11)	16(88,88)	0(0)
Educated	54(23,17)	160(68,66)	19(8,15)
Occupational status of father			
Unemployed	3(23,07)	8(61,53)	2(15,38)
Employed	53(22,26)	168(70,58)	17(7,14)
Occupational status of mother			
Unemployed	11(20,75)	40(75,47)	2(3,77)
Employed	55(26,44)	136(65,38)	17(8,17)
Marital status of parents			
Married	48(19,12)	122(64,89)	18(9,57)
Separate	8(12,69)	49(77,77)	6(9,52)

Academic performance of respondents

Table n° 4 revealed the academic performance (annual average) of the students from selected secondary school. This school performance indicates that only 2% of children in the study have a low level (annual average <10). Students with a Very good level are more numerous in the LKM School (19%) than CCP (15.4%) with no significant difference. Conversely, the percentage of students with good and fairly level is higher at the CCP School than at LKM, with no significant difference.

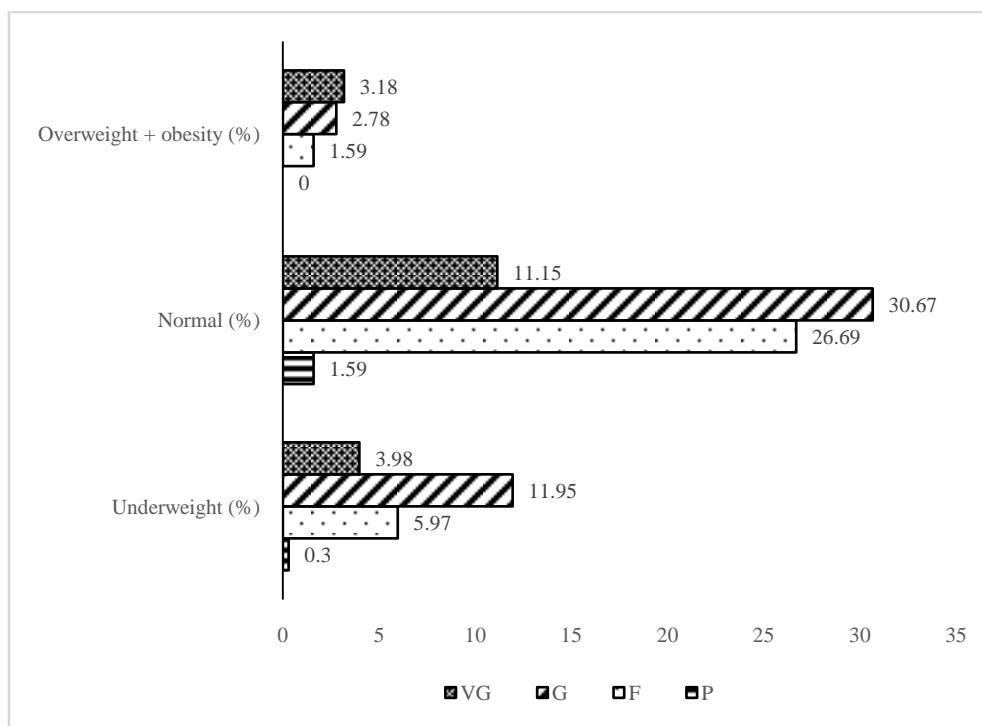
Table n° 4: Academic performance of schoolchildren

		Academic performance (%)			
		P	F	G	VG
Total population	TOTAL	2	34.3	45.4	18.3
	Male	1.8	32.4	44.4	21.3
	Female	2.1	35.7	46.2	16.1
CCP	TOTAL	0	38.5	46.1	15.4
	Male	0	19.2	17.3	5.8
	Female	0	19.2	28.8	9.6
LKM	TOTAL	2.5	33.2	45.3	19
	Male	1.0	12.6	19.6	10.0
	Female	1.5	20.6	25.6	09.0

VG: Very good; G: Good; F: Fair; P: Poor

Nutritional Status and academic performance

According to Fig n° 2 which shows the distribution of school performance based on nutritional status, students with a normal nutritional status has very significantly higher academic performance than those malnourished.



VG: Very good; G: Good. F: Fair;P: Poor

Fig 2: Distribution of school performance by nutritional status

Correlation between school performance and other sociodemographic and nutritional characteristics

The study of the correlation between school performance and socio-demographic and nutritional characteristics (Table n°4) reveals that school performance is very significantly negatively related ($P < 0.001$) to the size of the household and positively significantly to the level of education of the mother.

Table n°4: Pearson correlation between school performance and other sociodemographic and nutritional characteristics

	SEX	AGE	Nutritional status	Household size	Sibling position	Occupational status of father instruction	Occupational status of mother	Level of father's instruction	Level of mother's instruction
Academic performance	0,20	-0,12	-0,04	-0,38**	0,00	-0,15	-0,10	0,24	0,31*

IV. Discussion

The present study was intended to relate the nutritional status to the school performance of children attending private secondary establishments in the city of Yopougon a popular district of the town of Abidjan.

About a third of the student population (29.4%) suffer from malnutrition. This rate of malnutrition is higher than that observed in a study among primary school children (26.7%) aged 5 to 11 in the same district of Abidjan¹² and Yopougon (20.25%)⁷. This suggests that malnutrition is as much a problem for young children as it is for high school children with a higher prevalence among children. Malnutrition is therefore still present in the child population in Côte d'Ivoire. Within Africa, prevalence of undernutrition among adolescents has been reported in Nigeria (35.4%), in Senegal (29.8%), Benin (23%) and Sudan (25%)^{13,14,15,16}.

Both types of malnutrition namely deficiency and excess are present in the population. Overweight and obesity of 7.1% in the study population indicates that this form of malnutrition is growing in developing countries.

Indeed, the growth of the overweight and obesity rate is increasingly observed in studies in Africa, for example Kruger et al. in South Africa (7.8%)¹⁷, J. Faye et al. in Senegal (9.34%)¹⁸, Sofien Regaie et al. in Tunisia (8.7%)¹⁹.

The findings, all these confirm that all studies conducted both in industrialized and developing countries indicate a rapid increase in the number of children who are overweight or obese²⁰. Ivorian adolescents are also affected by the increase in overweight and obesity rates. The sociodemographic characteristics influencing malnutrition in this study are the age group, the size of the household and the level of education of the mother. The 10-11 age group is more malnourished than the 12-15 age group. Malnutrition decreases progressively with increasing age. It is also higher in large households. This assertion corroborates the conclusion of the study of Azzaoui et al.²¹ conducted in the Gharb plain which stipulates that the large size of the household as well as low income all lead to a nutritional imbalance, or even malnutrition. Concerning the school performance, the low level is higher in the girls (2.1%) than in the boys (1.8%). This is contrary to the performance observed by Sri Gajapathy Sarma et al.²², in Sri Lanka where it is significantly higher in boys. In Côte d'Ivoire, girls are most often subjected to housework, unlike boys who have no occupation and have more time to devote to their studies. This explains the poor performance of girls, although other reasons may be involved. School children with a normal nutritional status have a very significantly higher academic performance than those malnourished. Several studies have reported improved academic performance from nutritional supplementation program to school^{23,24}. There is a negative correlation between household size and academic performance. Students from smaller households have higher performance. Also, those having mothers with a higher educational level present a higher school performance. On the other hand a relation between the school performance and the nutritional status is not established in this study. Positive impact of the engagement of certain members of the family whose in particular mother educated, by strict control of the school work of the child, the follow-up and development of relations with the school and also various incentives as reported by the World Bank²⁵ contributes to the increase in the school performance.

V. Conclusion

Overall malnutrition by deficiency or excess is always present in the Ivorian school child population. It is always related to the sociodemographic situation of the households from where the children come. The study showed a good overall academic performance. This school performance is nevertheless not linked to nutritional status but rather to the socio-demographic status of households. Nevertheless, school canteen programs must also be developed in secondary schools in Côte d'Ivoire to improve this performance.

References

- [1]. Pollitt, E., Nutrition and Educational Achievement. Nutritional Education Series, 1984; Issue 9. ED84/WS/66. UNESCO, Paris
- [2]. Gabriela da Silva LL., Juliana NS., Thaís de Souza CdO., et al. The influence of nutritional status on school performance. Rev. CEFAC. Set-Out 2014; 16(5):1541-1547
- [3]. Grantham-McGregor S. Can the provision of breakfast benefit school performance? Food and Nutrition Bulletin. 2005 ; 26(2):S144-158.
- [4]. Favre B. et al. Famille, école et collectivité : La situation des enfants de milieu populaire. Service de la recherche en éducation, Genève. 2004; 3-16.
- [5]. N'go PK., Azzaoui FZ., Ahami AOT., et al. Socioeconomics, environments and nutritional factors in low school performance: case of schoolchildren living in Soubre cocoa area (Ivory Coast). Antropo. 2012; 28:63-70. www.didac.edu.es/antropo
- [6]. Soualem A., Aboussaleh Y., Ahami AOT, et al. Impact du statut socioéconomique sur le développement cognitif et comportemental chez l'enfant scolarisé au Maroc. Journal de Thérapie Comportementale et Cognitive. 2005 ; 15:55-60.
- [7]. Zahe KYAS, Méité A., Ouattara H., et al. Impact of the Nutritional Status of the Schoolchildren of Yopougon, Town of the District Abidjan (Côte D'Ivoire) on Their School Performance. 2016; 5(6): 407-412
- [8]. Bruce C. Guide de Mesure des Indicateurs Anthropométriques in Food and Nutrition Technical Assistance Project (FANTA). 2003 ; Pp: 104
- [9]. WHO. Measuring Change in Nutritional Status. Guidelines for Assessing the Nutritional Impact of Supplementary Feeding Programmes for Vulnerable Groups. Geneva: WHO. 1983; Pp: 61
- [10]. Cole TJ., Flegal KM., Nicholls D. et al. Body mass index cut offs to define thinness in children and adolescents: international survey. BJM. 2007; 335: 194-197.
- [11]. Cole TJ., Bellizzi MC., Flegal KM et al.. Establishing a standard definition for child overweight and obesity worldwide: international survey. BJM. 2000; 320: 1240-1243.
- [12]. Bleyere MN., Kokore BA., Konan AB., et al. Prevalence of Child Malnutrition Through Their Anthropometric Indices in School Canteens of Abidjan (Côte D'Ivoire). Pak. J. Nutr. 2013; 12 (1): 60-70,
- [13]. Essien E., Haruna M.J. and Emebu P.K.. Prevalence of Malnutrition and its Effects on the Academic Performance of Students in Some Selected Secondary Schools in Sokoto Metropolis. Pak. J. Nutr. 2012; 11 (7): 511-515
- [14]. Benefice E., Caius N. and Garnier D. Crosscultural comparison of growth, maturation and adiposity indices of two contrasting adolescent populations in rural Senegal (West Africa) and Martinique (Caribbean). Public Health Nutr. 2003; 7: 479-485.
- [15]. Kurz K.M., and Johnson-Welch C.. The Nutrition and Lives of Adolescents in Developing Countries. Findings from the Nutrition of Adolescent Girls Research Program. International Center for Research on Women (ICRW): Washington D.C. 1994.
- [16]. Inoussa S. Influence of Women's Social Status on the Nutritional Status of Adolescent Girls in Benin. Nutrition of Adolescent Girls Research Program. International Center for Research on Women (ICRW): Washington D.C. 1994; No. 8.

- [17]. Kruger R, Kruger HS and Macintyre UE. The determinants of overweight and obesity among 10- to 15-year-old schoolchildren in the North West Province, South Africa - the THUSA BANA (Transition and Health during Urbanisation of South Africans; BANA, children) Study. *Public Health Nutr* 2006; 9(3):351–8
- [18]. Faye J., Diop M., Gati OR. et al. Prévalence de l'obésité de l'enfant et de l'adolescent en milieu scolaire à Dakar, *Bull. Soc. Pathol. Exot.* 2010 ;1-4 ; DOI 10.1007/s13149-010-0101-9
- [19]. Sofien R.,Nadia C.,Lobna T.,et al. Prévalence et facteurs de risque du surpoids et de l'obésité dans une population d'enfants scolarisés en milieu urbain à Sfax, Tunisie, *Pan Afr Med J.* 2014; 17: 57
- [20]. OMS, Obésité et surpoids. Aide-mémoire no 311. 2016 ; <http://www.who.int/mediacentre/factsheets/fs311/fr/>
- [21]. Azzaoui FZ., Ahamil AOT and Khadmaoui A., Relation entre les facteurs socio-économiques, environnementaux et la malnutrition: Cas d'enfants âgés de 6 à 8 ans de la plaine du Gharb (Nord-Ouest Marocain).2008 ; 17 :1-5. www.didac.ehu.es/antropo
- [22]. Sri Gajapathy MS., Wijesinghe DGNG. andSivananthawer T. The Effects of Nutritional Status on Educational Performance of Primary School Children in the Plantation Sector in NuwaraEliya Educational Zone. *Tropical Agricultural Research.* 2013; 24 (3): 203-214
- [23]. Alaimo K., Olson CM. and Frongillo E.A. Food insufficiency and American children's cognitive, academic and psychosocial development. *Pediatrics.* 2001; 108(3):824b.
- [24]. Kleinman R.E., Hall S., Green H. et al. Diet, breakfast and academic performance in children. *Annals of NutritionalMetabolism.* 2002 ; 46(1) :24-30.
- [25]. World Bank. Situation des filles dans quatre pays de l'Afrique francophone. Le Burkina Faso, la Guinée, le Mali et la Mauritanie : le rôle de la famille, Washington : The World bank group, Findings, no 173, Janvier 2002.

Baudouinangoua Kokorel "Nutritional status, sociodemographic status and academic performance of students in two selected secondary schools in Yopougon, Abidjan (Côte d'Ivoire). "IOSR Journal of Research & Method in Education (IOSR-JRME) , vol. 8, no. 4, 2018, pp. 38-44.