Proceeding Paper

Childhood Obesity and Associated Factors among Primary School Children in Adama Town, Oromia Regional State, Ethiopia [†]

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† Presented at the 4th International Electronic Conference on Foods, 15–30 Oct 2023; Available online: https://foods2023.sciforum.net/.

Abstract: Backgrounds: obesity is defined as abnormal or excessive fat accumulation due to energy imbalance that presents a risk to health. Childhood obesity is a major public health crisis over the world and its growing problem across the globe including low and middle income country. childhood obesity in children persisting in adulthood, this puts the person at risk of diabetes, high blood pressure and heart disease. **Objectives:** To assess Magnitude of childhood obesity and associated factors among school children in adama town, East show zone Oromia regional state, Ethiopia, 2022. **Methods**: A school based cross sectional study was conducted among primary schoolchildren from February to March. The study subjects were randomly selected 497 students by systematic random sampling. Data were collected using semi-structured questionnaire Data were entered EPI-info version 7 statistical packages and analyzed using SPSS version 20. In the analysis process, frequency distributions of variables were calculated. To ascertain the association between dependent and independent variables, odds ratio with 95% confidence interval were calculated. A multiple logistic regression was used to estimate the magnitude impact of each predictor variables on outcome variable after adjusting for all other predictors in the model. **Results**: The overall prevalence of childhood obesity was found to be 8.7% with 95% CI: 6.2, 11.3]. The finding of this study revealed that being female [AOR = 4.4; 95% [CI 1.747, 11.152], family size [AOR = 3.4; 95% CI 1.315, 8.812] and learn in private school [AOR = 3; 95%CI 1.144, 7.949]. Children who had no fruits consumption and vegetables consumption per weeks were three times [AOR = 2.6; 95%CI: 1.149, 6.445] and almost three times higher [AOR = 2.864, 95%CI: 1.140, 7.198] were obese respectively. Not perform sport activities [AOR = 4.37; 95%CI: 1.490, 12.823] were significantly associated]. **Conclusion and Recommendation**: The magnitude of childhood obesity was higher in current study area. School type, small family size, fast foods, snack intake, poor fruit and vegetable intake and Physical inactivity were significantly associated factors for childhood Obesity. Therefore, promoting a healthy life style such as improving fruit and vegetable intake and regular physical activity are essential.

Keywords: obesity; childhood; primary school; adama

1. Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A body mass index (BMI) over 25 is considered overweight, and over 30 is obese [1]. Worldwide rate of childhood obesity has more than triple over last four decade rising from 5% in 1788 to 18.5 in 2016 (6% of girls and 8% of boys) [1].

The Center for Disease Control and Prevention (CDC) defined overweight as at or above the 95th percentile of body mass index (BMI) for age and "at risk for overweight" as between 85th to 95th percentile of BMI for age [1,2]

Childhood obesity is a major public health crisis over the world and its growing problem across the globe. The fundamental cause of obesity is an energy imbalance between calories consumed and calories expended [3,4].

Majorly childhood obesity is associated with an increased intake of energy-dense foods that are high in fat and sugars; and an increase in physical inactivity due to the increasingly sedentary nature of many forms of work, changing modes of transportation, and increasing urbanization [5–8].

Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing, and education [9].

Obesity is one side of the double burden of malnutrition, and today more people are obese than underweight in every region except sub-Saharan Africa and Asia. Once considered a problem only in high-income countries, overweight and obesity are now dramatically on the rise in low- and middle-income countries, particularly in urban settings. [10–12].

Prevention of obesity is so vital in children because the likelihood of childhood obesity persisting into adulthood increases as the child ages. This puts the person at high risk of diabetes, high blood pressure, and heart disease [11,13]. There for the aim of this study is to assess magnitude and associated factors of childhood obesity that is base line information for prevention of obesity its problem.

2. Methods and Materials

2.1. Study Setting and Period

Study was conducted in Adama town; from February 2022 to March 2022.Adama is one of the town of Oromia National Regional States, located 100 km away from Addis Ababa, the capital city of Ethiopia. The town has six sub cities; they are Aba Geda sub-city, Bole sub-city, Denbela sub-city, Boku sub-city, Lugo sub-city and Dabe sub-city. Based on the 2007 Census, conducted by the Central statistical agency of Ethiopia (CSA), Adaam town has a total population of 448,462 of which 228,715 are males whereas 219,747 are females with an average family size of 4.8 and, the town has about 94,413 households.

Based on data from Adama Town education office, the town has 30 public and 95 private Primary schools, 11 public & 20 private secondary schools. In Adama town, there are 73,744 primary school of the total among this 39,439 are public and 34,305 are private students.

2.2. Study Design

A School-based cross sectional study was conducted.

2.3. Source Population

The source populations were all primary school students of Adama town administration.

2.4. Study Population

Randomly selected primary school of adama town during the study period

2.5. Eligibility Criteria

Inclusion criteria

All regular students of grade 1–8 in the academic year 2014 and age less than 13 Years old were included.

Exclusion criteria

Those who ill critically and absent during study period were excluded

2.6. Sample Size Determination

The sample size had determined using single population proportion formula assuming prevalence from previous study; then multiplied by a design effect of two and 10% nonresponse was added to get the final sample size.

The required sample size to assess the magnitude of obesity had been determined using a formula for single population proportion, n = (Za/2)² p(1p) deff/(d)2, with the following assumptions: the corresponding standard value (Za/2) at 95% confidence level 1.96, margin of error (d) 3%, design effect (deff) 2 and proportion of obesity (p) among school age children from previous study in Bahir Dar City 3.1% [7]. This resulted in a sample size of 324. Adding 10% for nonresponse rate, the sample size was **356**

$$N = \ \ (Z_{\alpha/2})^2 P$$

$$n = \frac{(z \propto /2)2\ p(1-p)}{d2}$$

$$n = \frac{(1.96)2(0.031)(0.969)}{(0.03)2}$$

$$128.2$$

$$128.2 * 2\text{design Effect}$$

$$256 + 10\% \ (26)$$

$$282$$

Calculation for second objective using STATCALC Epi-Info

Sample size calculation from prior related studies for some selected factors associated with Childhood obesity among school children in adama town, East show zone Oromia regional state, Ethiopia, 2022 from January to April 2022

Table 1. Calculation for second objective using STATCALC Epi-Info.

Variables	AOR	Childhood Obesity		Sample size	References
		Yes	No		
Dietary sweet foods	2.72 (1.04–7.23)	29%	13%	**226**	(Desalew et al., 2017)
Physical activity	3.86 (1.5–9.8)	5.5%	29.0%	*96*	(Desalew et al., 2017)

The desired sample size to identify factors associated with the occurrence of childhood obesity obtained from the second objective was calculated in Epi Info software version 7 with the following assumptions: confidence level = 95%, power 80%, unexposed to exposed ratio 1, design effect 2, proportion of obese (p1) among children who consumed sweet foods 29% and those who not consume (p2) 13% and 10% for non-response. This provided a sample size of **497**. Different predictor variables were assessed in the

calculation of sample size for the factors associated with the obesity. However, the variable 'consumption of sweet foods' provided the largest sample size.

2.7. Sampling Procedures

Multistage stratified sampling technique implemented to select the study sample. First, the primary schools located in Adama town were stratified into private and governmental schools using proportional to size allocation in which we assumed obesity could vary across public and private schools. Then, simple random sampling technique was used for selecting schools from a total of governmental schools, and from a total of private schools.

The number and lists of eligible children were obtained from the directors' offices of the selected schools, and sampling frames were created for each selected school. The numbers of students included in this study were determined for each selected school by probability 2 Global Advances in Health and Medicine proportion to size (PPS) sampling. Finally, computer generated simple random sampling technique were employed to select individual student (actual study participant) from each school (Figure 2).
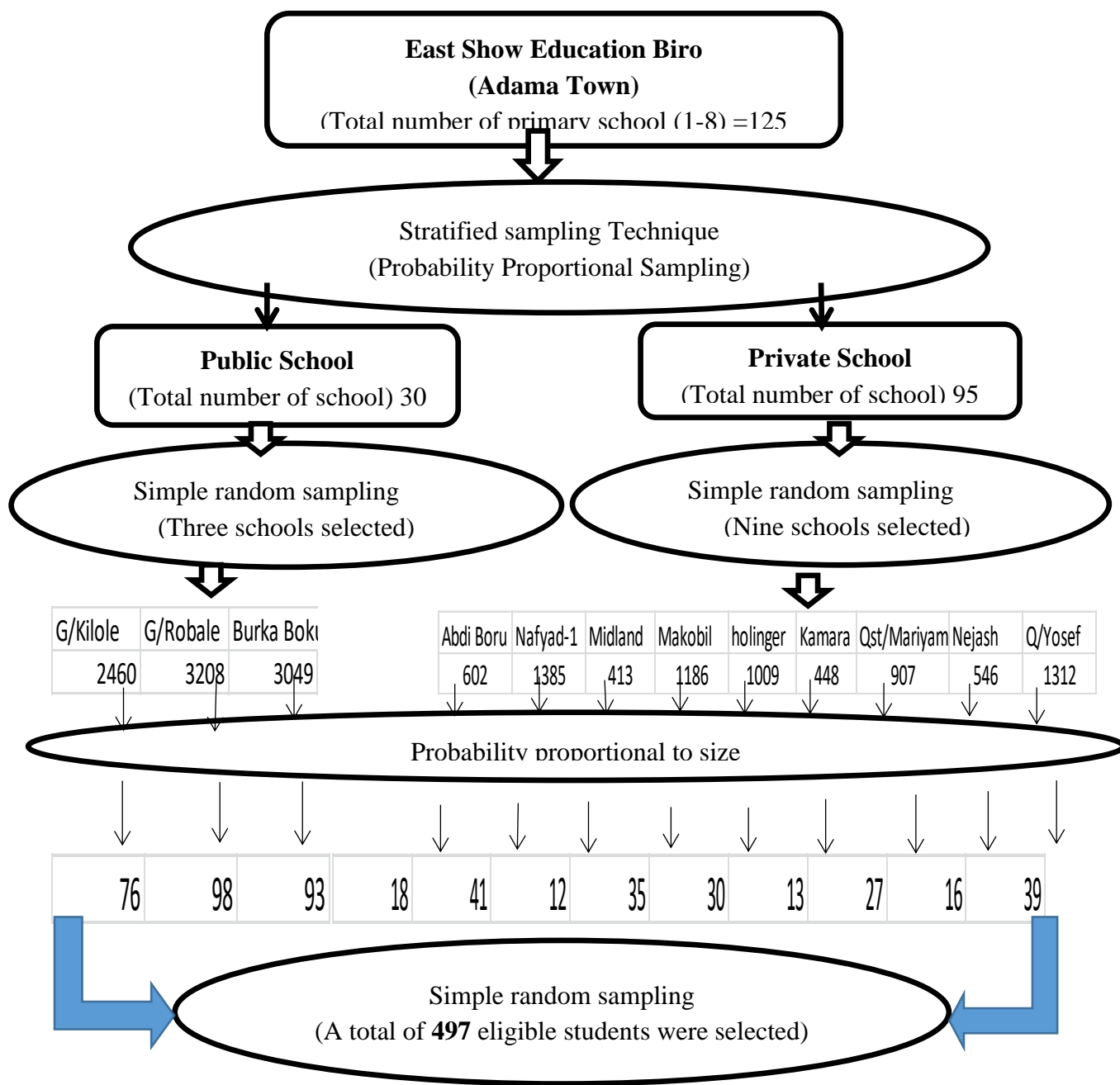
Figure 1. Sampling Procedure among Primary School Children in Adama, Ethiopia, 2022.

2.8. Data Collection Technique

A Semi-structured questionnaire had been adapted from literature reviewed to collect data by interviewing children. Questionnaires was prepared by English and translated to Afaan Oromo and Amharic. The questionnaires contain socio demographic characteristics and associated factors towards Obesity. Four clinical nurses as data collectors and two Health officers as supervisors were trained for data collection and supervision. Anthropometric measurements were done by trained data collectors using standard procedures and calibrated equipment according to the standardized procedures stipulated by the Food and Nutrition Technical Assistance (FANTA) 'Anthropometric Indicators Measurement Guide. Measurement of weight was recorded to the nearest 0.1

kg and the height was recorded to the nearest 0.5 cm. As much as possible, the weight was measured with minimum clothing.

BMI-for-age Z-score (BAZ) was generated for each child using WHO AnthroPlus version 1.0.4 software. Then, BAZ -1 to +1SD was considered as Normal, BAZ greater than or equal to 1 Standard Deviation (SD) was considered as overweight, while BAZ greater than or equal to 2SD was considered as obesity.

2.9. Study Variable

Dependent variables:
Childhood obesity
Socio demographic and Economics
Age
Sex
School type
Family income
Dietary habit
Fruits intake
Vegetable intake
Using snack
Fast food
Physical Activity and Sedentary
Less Exercise
Screen time
Use transportation

2.10. Operational Definitions

Childhood: period of the human lifespan between <u>infancy</u> and <u>adolescence</u>, extending from ages 1–2 to 12–13 [45].
Obese: BMI-for-age (5–19 years) > +2 standard deviation above the WHO growth standard median [46].
Eating habit: Taking proper food and balanced diet.
Physical activity: refers to all movement during leisure time, for transport to get to and from places, or as a part of a person work, include walking or hiking, cycling, wheeling, sports, recreational and team sports (volleyball, soccer, etc.) [47]

2.11. Data Processing and Analysis

After the collected data compiled, organized, coded, entered to cleaned using Epi-info version 7.1 software packages and had been analysed using SPSS version 20. In the analysis process, frequency distribution of variables worked out in order to describe them.

Bivariable logistic regression analyses used and Crude Odds Ratio (COR) with 95% CI computed to assess the association between each independent and the outcome variables. Variables with *p*-value < 0.25 during the bivariable analyses were included in the multivariable logistic regression analysis. Multicollinearity between independent variables checked by using Variance Inflation Factor (VIF), and no significant (VIF > 10) collinearity was detected. Model goodness-of-fit were checked by Hosmer-Lemeshow test, and the final model were well fitted. The final model had performed to control for all possible confounding variables and identify factors associated with outcome variable by estimating AOR with 95% CI. Level of statistical significance was declared at *p*-value < 0.05.

2.12. Data Quality Management

To assure the quality of data, training of data collectors and supervisor was made. Instruments had been pre-tested to identify problems on the questionnaire and correction

was incorporated in the final questionnaires. Pre-test was conducted before the actual data collection on 5% of the sample size to identify problems on the questionnaires on primary school students in Bushoftu.

Regular and continues follow-up is made by the principal investigator to monitor quality of the data collection process and feed backs were given to data collectors. Double data entry with Epi-info and SPSS was used.

2.13. Primary Ethical Consideration

Ethical clearance was obtained from Institutional Review board of the college. Permission letter was written to the Adama Educational biro by department to conduct the study. All the study participants were informed about the purpose of the study and verbal consent were obtained before data collection. Participants were also informed that they have full right to discontinue or refuse to participate in the study. To ensure confidentiality, the name of interviewee was not written on the questionnaire. Besides, each respondent were assured that the information provided by them were confidential and used only for the purpose of research. Moreover, there was no risk or harms were happens from participation of the study.

2.14. Data Presentation and Dissemination

The results of this study will be disseminated to Adama Comprehensive hospital medical college, Regional health bureau, Ministry of health and other concerned bodies. Finally the findings will be presented in different seminars, meetings and workshops and I will be published in scientific journals

3. Results

3.1. Socio-Demographic Characteristics

A total of 497 children participated, with a response rate of 100%. The mean age of the children was 10.05 ± 2.01 years and 260 (52.3 children were female. Of the total, 266 (53.5%) were attending governmental/public schools and 286 (57.5%) were grade 4–8 students.

Regarding to the educational status of the students' parents 236 (47.5%) of mothers and 309 (62.2%) fathers were college and above and Only 24 (4.8), 26 (5.2%) Father and mothers were had no formal education. 40.4% fathers and 30.2% mothers were Governmental Employed.

Three hundred twenty one (52.1%) and 224 (36.4%) of fathers and mothers were self-employed, respectively and (17.1%) of mothers were house wives by occupational status 30.2% children's family had their own car, which they used for transportation. Majority (56.7%) of the parents had five and more family size (Table 2).

Table 2. Socio-Demographic Characteristics of Children Attending Primary Schools in Adama town, Ethiopia, 2022 (n = 497).

Variables	Frequency	Percent
Age Category		
6–10	194	39
10–14	303	61
Sex		
Male	237	47.7
Female	260	52.3
School Type		
Public school	266	53.5

Private school	231	46.5
School grade level		
Grade 1–4	211	44.5
Grade 4–8	286	57.5
Family Size		
Less than 5	215	43.3
Greater than 5	282	56.7
Father Educational Status		
No formal education	24	4.8
Primary education	60	12.1
secondary education	104	20.9
College and Above	309	62.2
Mather Educational Status		
No formal education	26	5.2
Primary education	80	16.1
secondary education	155	31.2
College and Above	236	47.5
Religious Category		
Orthodox	232	46.7
Muslim	132	26.6
Protestant	110	22.1
Catholic	15	3.0
Others	8	1.6
Father Occupation		
Governmental Employed	201	40.4
Merchants	118	23.7
NGO employed	79	15.9
Self Employed	55	11.1
Daily Laborer	27	5.4
Farmer	17	3.4
Mather Occupation		
Governmental Employed	150	30.2
Merchants	136	27.4
NGO Employed	62	12.5
Self Employed	58	11.7
Housewife	85	17.1
Daily laborer	6	1.2
Family vehicles		
No	343	69.0
Yes	154	31.0

3.2. Dietary Habit of Children

Dietary habit of the respondents showed that 302 (60.8%) had consume fruit, 113 (22.7%) consume one per week 185 (37.2) consume two times per week. While frequency of vegetables consumption showed that 342 (68.8%) of the respondent consume vegetable per week, out of these 178 (35.8%) eat vegetable one times per week and only 29 (5.8%) eat vegetables three times or more per week. Of the total respondents 441 (88.7%) were use snack, out of these majority of respondents 433 (87.1%) were use snack one times per day. Regarding to frequency of meal 374 (75.3%) where meal three times per day and only 19 (3.8%) where eat four per day. One hundred fifty two 30.6 had Intake fast food (Table 3).

Table 3. ietary Characteristics of Children Attending Primary Schools in Adama town, Ethiopia, 2022 (n = 497).

Variables		Frequency	Percent
Fruit intake per weeks	Yes	285	57.3
	No	212	42.7
Number of vegetable intake per week	Yes	274	55.1
	No	223	44.9
Do You using Snake	Yes	433	87.1
	No	64	12.9
Number of meal intake other than snake	one/day	285	65.8
	two/day	117	27.0
	three/day	31	7.2
Ways of getting lunch	From Cafeteria	19	3.8
	From Home	478	96.2
Do you Intake of fast food	Yes	208	41.9
	No	289	58.1
Do you Intake of sweet food	No	272	45.7
	Yes	225	45.3
Food bought other than regular meal	Biscuit	256	51.5
	Cake	87	17.5
	Chocolate	84	16.9
	Ice cream	26	5.2
	Others	44	8.9
Eating while watching TV or Film	No	146	29.4
	Yes	351	70.6
Eating while Studying	No	358	72.0
	Yes	139	28.0
Soft drink intake per week	Not intake	49	9.9
	One times	232	46.7
	two times	92	18.5
	three times	124	24.9

3.3. Physical Activity and Sedentary Lifestyle

Four hundred eighty (84.1%) of children did some sport activities. Of these, 217 (51.9) Children spent less than 30 min for physical activities. More than half (64.8%) of children

had habits of extra home activities. Of these, three fourth (89.4%) of them perform greater than 30 min of Extra home activity. Regarding to moderate activity 65.0 respondents perform moderate activities. On the other hand, 96.6, 72.6, of children spent their free time in watching Television (TV), different videos and playing computer games, respectively (Table 4).

Table 4. physical activity and sedentary life of Children Attending Primary Schools in Adama town, Ethiopia, 2022 (n = 497).

Variable	Frequency	Percent
Sport activity		
No	179	36.0
Yes	318	64.0
Number minutes at sport activity		
Less than 30minute	154	48.4
Greater than 30minute	164	51.6
Total	318	100.0
Extra home activity		
No	175	35.2
Yes	322	64.8
Total	497	100.0
Number of minute at Extra home activity		
Less than 30minute	288	89.4
Greater than 30minute	34	10.6
Total	322	100.0
Time at computer mobile game		
No	118	23.7
less than 60minute	244	49.1
greater than 60minute	135	27.2
Total	361	100.0
Watching TV		
No	17	3.4
less than 60minute	314	63.2
greater than 60minute	166	33.4
Total	480	100.0
Performing moderate activity		
Yes	152	34.60
No	345	65.40

3.4. Magnitude of Childhood Obesity

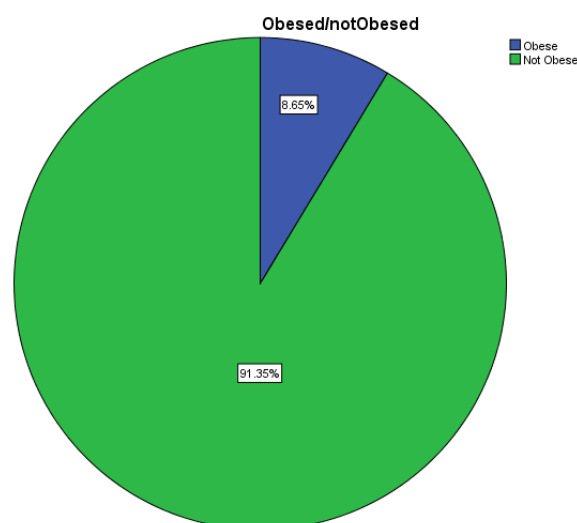The overall magnitude of obesity was 8.7 (95% CI = 6.2, 11.3) % (Figure 3).

Figure 5. Magnitude of childhood obesity among school children Attending Primary Schools in Adama town, Ethiopia, 2022 (n = 497).

3.5. Factors Associated with Childhood Obesity among Primary School Children

Bivariable and multivariable analyses were done. In the bivariable analysis Age, female, less family size, being from private school type, school grade level less than four, not eating fruit and vegetables, snack intake, eating fast food, form of transport, physical activity, moderate activity, watching TV and play computer or mobile game were candidate for multivariable logistic regression with ($p < 0.25$).

The multivariable logistic regression analysis revealed that; sex, family size, school type, fruit intake, vegetables intake, snack intake, fast food intake, number of minute at sport, performing moderate, activity, TV/screen time were significantly associated with childhood obesity.

Accordingly, the odds of childhood obesity among age group between 10–13 years were eight times higher compared to its counterpart [AOR = 8.25; 95%CI: 3.235, 21.052] and being females were four times higher as compared to males [AOR = 4.4; 95%CI: 1.747, 11.152] and Family size less than 5 were three times more likely obese than those having family size greater than five [AOR = 3.41; 95% CI: 1.315, 8.821]. Children who learn in private schools were almost three times [AOR = 3.01; 95%CI: 1.144, 7.949] more likely to be obese as compared to those learn in government schools.

Regarding to dietary habits of respondents; children who had no fruits consumption were two times [AOR = 2.6; 95% CI: 1.049, 6.445] and the same for students who not consume vegetables were almost three times higher [AOR = 2.87.057; 95% CI: 1.140, 7.198] obese compered to their counterparts respectively. In addition, children having habit of snack intake per day were almost three times obese [AOR = 3.5; 95% CI: 1.181, 10.379] and higher odds of childhood obesity found to be two times in children take fast food compered to counterpart [AOR = 2.6; 95%CI: 1.016, 6.686].

Similarly, use of transportation to and from school were two times [AOR = 2.4, 95% CI: 1.000,5.767] and the higher odds of childhood obesity were noted among children those who had not perform sport activities four times, perform sport activity less than 30minute per day four times and [AOR = 4.37; 95% CI: 1.490,12.823] and [AOR4.1; 95% CI: 1.461,11.590] those who did not perform moderate physical activity [AOR = , 2.5, 95% CI: 1.117,5.950].

Sedentary life like watching TV greater than one hour were 3.6imes [AOR = 3.633, 95% CI: 1.098, 12.020] and playing computer and mobile game were three times [AOR = 3.63, 95% CI: 1.251,10.506] respectively (Table 5).

Table 5. Association between explanatory variables and childhood obesity among primary school children in Adama town of Eastern Ethiopia, June 2022 (n = 497).

Variables		Obese Category		COR[95%CI]	AOR[95%CI]
		Obese	Not Obese		
Age	6–9	34 (79.1%)	160 (35.2%	1	1
	10–13	95 (20.9%)	294 (64.8%)	6.942 (3.248, 14.836) ***	8.252 (3.235, 21.052) ***
Sex	Male	32 (74.4%)	205 (45.2%)	1	1
	Female	11 (25.6%)	249 (54.8%)	3.533 (1.738, 7.184) ***	4.414 (1.747, 11.152) **
Family size	<5	11 (25.6%)	205 (44.99)	2.374 (1.168, 4.826) *	3.406 (1.315, 8.821) *
	≥5	32 (74.4%)	250 (55.1%)	1	1
School Type	Public	34 (79.1%)	232 (51.1%)	1	1
	Private	9 (20.9%)	222 (48.9%)	3.615 (1.695, 7.710) **	3.015 (1.144, 7.949) *
Fruit intake	Yes	32 (74.4%)	253 (55.7%)	1	1
	No	11 (25.6%)	201 (44.3%)	2.311 (1.137, 4.699) *	2.600 (1.049, 6.445) *
Vegetables intake	Yes	34 (79.1%)	240 (55.1%)	1	1
	No	9 (20.9%)	214 (47.1%)	3.369 (1.579, 7.185) **	2.864 (1.140, 7.198) *
Snack Intake	Yes	33 (76.7%)	402 (88.1%)	2.245 (1.047, 4.811) *	3.502 (1.181, 10.379) *
	No	10 (23.3%)	53 (11.9%)	1	1
Fast food intake	Yes	11 (25.6%)	197 (43.4%)	2.230 (1.097, 4.534) *	2.607, (1.0166.686) *
	No	32 (74.4%)	257 (56.6%)	1	1
Form of transport	Walking	25 (58.1%)	150 (33.0%)	1	1
	Transport	18 (41.9%)	304 (67.0%)	2.815 (1.489, 5.320)	2.401 (1.000, 5.767) *
Sport activity	No	8 (18.6%)	169 (37.2%)	2.260 (1.067, 4.786) **	4.371 (1.490, 12.823) **
	<30	11 (25.6%)	145 (31.9%)	3.621 (1.578, 8.313) *	4.115 (1.461, 11.590) **
	>30	24 (55.8%)	140 (30.8%)	1	1
Moderate sport activity	Yes	30 (69.8%)	144 (31.7%)	1	1
	No	13 (30.2%)	310 (68.3%)	4.968 (2.516, 9.808) ***	2.578 (1.117, 5.950) *
Watching TV	>60	9 (20.9%)	142 (31.3%)	3.005 (1.315, 6.866)	3.633 (1.098, 12.020) *
	<60	14 (32.6%)	207 (45.6%)	2.816 (1.368, 5.799)	1.555 (0.491, 4.919)
	No	20 (46.5%)	105 (23.1%)	1	1
Computer /mobile Game	Yes	19 (44.2%)	291 (62.1%)	2.255 (1.199, 4.241) *	3.626 (1.251, 10.506) *
	No	24 (55.8%)	163 (35.9%)	1	1

1 reference, CI confidence interval, COR crude odds ratio, AOR adjusted odds ratio * *p*-value < 0.05; ** *p*-value < 0.01; *** *p*-value < 0.001.

4. Discussion

This study revealed that the magnitudes of childhood obesity among school aged children are 8.7% with [95% CI: 6.2, 11.3]. The finding of this study consistent with study done in Tamale Metropolis Ghana 7.5% [48], Kirkos Sub-City Addis Ababa, Ethiopia (7.5%) [8] The results of this study was high compared to study done in Gulele Sub-City 4.9% [39], Dire Dawa Ethiopia (5.8%) [36], the discrepancy may be due to increasing the trends of childhood obesity from time to time and lower prevalence compered to prevalence in Palestinian 15.7% [49] and Moshi Municipality, Kilimanjaro, Tanzania 22.9% [50]. This may be due to difference in study area, dietary and sedentary life style [6,13].

The finding revealed that; being teenage, female, family size less than five, private school type, grade level 4–8, not intake fruit and vegetables, snack intake, fast food intake, lack physical activity, sedentary life like spent times TV/screen, playing computer or mobile game were significantly associated with childhood obesity. This is similar with other finding [10,23].

The prevalence of obesity was higher eight times in age groups between 10–13 years compared to age 6 to 10 years. Being female was four times more likely obese than male children. The present study findings supported by findings reported in Addis Ababa gulele sub city [39] and Arada sub city, Ethiopia [32].

The current study showed that learning in private school was three times more likely associated with childhood obesity. This was similar with studies conducted in Ghana were 2.38 [27], Addis Ababa Ethiopia [8,35]. This could be explained as students who learn in private schools are from families having better socio-economic status. Students from families with higher socioeconomic background have more access to vehicles and purchasing power for calorie-dense and nutrient-poor fast foods.

In addition, students who come from small households (less than 5 family members) had four times higher odd of being obese compared to those who come from large family (family members of five and above). Similar results were reported among children in gulele sub city Addis Ababa [39] and Nairobi, Kenya [51]. Having fewer siblings implies less sharing of available food (as well as other family resources), and may result in excess energy intake. Children from smaller families may also consume more energy per person compared to children from larger families.

The study also indicated that having no fruit intake were two times and not vegetable intake almost three times significantly associated with higher risk of being obese. The finding was in line with the previous studies from Bahidar [7]. This could be due to the fact that their bulk and low energy density of fruit and vegetable (with high amount of water and fiber) are believed to reduce energy dense food consumption and helps to easily attain satiety [23,52].

The odds of being obesity were two times higher among children who had taken fast food compared to those children who didn't take any fast food during the week and two times higher odds of being obese among those respondents who take snack compared to its counterpart. Similar findings were reported in Bahirdar, Addis Ababa, [7,33]; this might be related to the higher energy content of most of the fast foods.

Children who had no sport activity had four times and moderate physical activities were two times more likely to become obese as compared to children who had performed sport and moderate physical activities, which is supported by the previous studies [7,35]. Physical activity determines number of calories that are spent or stored in the body as fat and maintains healthy weight status because of its potentially major impact on metabolism, body composition, and increasing energy expenditure [5,10,53].

This study also revealed that Children who spent their free time by watching TV more than >60 min were three times more likely to be obese compared to those who not spent their time to watch TV. This finding similar with the findings of studies conducted in Dire dawa [36] and Ghana [27]. This might be, watching TV may decrease the amount of time spent on playing outdoor which might resulted in weight gain.

5. Limitation of the Study

Firstly, the study is not free from the pitfalls of cross sectional study design. Consequently, the result of the study didn't show the temporal cause and effect relationship between the outcome and the independent variables. Recall bias may be the second limitation of the study mainly in measuring the child's dietary habit and level of physical activity. Lastly, expected obese students felt shame when they asked to measure their weight.

6. Conclusions

The magnitude of childhood obesity was higher among school children students compared to other study done in Ethiopia. Age greater than 10 years, family size, school type, Snack and fast food takers, poor fruit intake and vegetable consumptions, were significantly associated. Similarly, childhood obesity were associated with children those who perform sport activities less than 30 min per day and those who did not perform moderate physical activity. Sedentary life style like spent free time in watching TV and game was significantly associated with childhood obesity.

7. Recommendations

Governmental and NGO working on policy making, implementation of nutritional standard for all foods and beverages served on school grounds.

Families and students; should play their role by promoting a healthy life style such as improving fruit and vegetable intake (legumes, whole grains nuts) and Limit fast food intake, Regular physical activity (>30 min a day for children), limit more time spent to watch TV, video and game.

Stakeholders in education, health & sports context: should measure each student weight, height, and BMI annually, Provide physical education classes that last 30–60 min each day, expand opportunities for all students to engage in physical activity >30 min/day, more over researcher should conduct further study on cause and effect of child hood obesity

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