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Overweight, Obesity and Associated Factors Among Private Lower-Secondary School Adolescents of Yeka Sub-City Addis Ababa, Ethiopia. A Cross Sectional Study

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Overweight, Obesity and Associated Factors Among Private Lower-Secondary School Adolescents of Yeka Sub-City Addis Ababa, Ethiopia. A Cross Sectional Study

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Abstract

Background

Non communicable diseases (NCDs) are by far the leading causes of death in the world and their impact is steadily growing. Moreover between 2005 to 2015, deaths due to NCDs are projected to increase by 17%. The prevalence of combined overweight and obesity rose by 27.5 for adults and 47.1 for children between 1980 and 2013. However, there is limited evidence on childhood overweight/obesity in our country.

Methods

School based cross-sectional study design was used among randomly selected 429 adolescents regular students from private schools in Addis Ababa from june17 to July9 2021. Data were collected from each student by taking anthropometric measurements and by direct face to face interview using pretested structured

questionnaire. Descriptive statistics was used to describe all independent variables in relation to the outcome variable. Bivariable and multivariable logistic regression analysis were used to identify factors associated with the outcome variable. Nutritional software, odds ratio along with 95% confidence interval were estimated to measure the strength of the association level of statistical significance was declared at p-value less than 0.05.

Results

The overall prevalence of overweight and obesity was found to be 24.1% 95CI(0.2008,0.2816) 19.1% and 5% respectively. The result of this study revealed that being aged 12 years [(AOR=6.36 with 95% CI: (1.92, 21.03)], eat burger most of the time [(AOR=4.45 with 95%CI: (1.78, 11.14)], maternal private business [(AOR=2.92 with 95% CI: (1.32, 6.44)],physical activity [(AOR=1.81 with 95% CI: (1.04,3.15)] and ridding bicycle [(AOR=2.03 with 95%CI: (1.03,4.02)] were significant and associated with overweight and obesity.

Conclusion

The observed magnitude of overweight/obesity is high. Finding showed that age of a student, maternal private business, eating junk foods most of the time, physical activity and ridding bicycle were significantly associated with overweight/obesity.

Key Words: overweight, obesity, adolescent, Addis Ababa, private, school

Background

Non communicable diseases are by far the leading causes of death in the world and their impact is rapidly growing. Overweight and obesity are emerging and growing health threats for children globally: because of globalization consumption of processed and unhealthy foods combined with decreased or luck of physical activity and sedentary life style which can contribute to killer diseases such as cancer, diabetes mellitus and heart diseases (1,2). Overweight and obesity have increased dramatically among children and adolescents aged 5 to19, from 4% in 1975 to over 18% in 2016.

In2016, 18 percent of girls and 19 percent of boys were overweight, indicating that the trend has continued. In1975, only 1% of children and adolescents were obese, but by 2016, there were over 124 million obese children and adolescents.

Today it is estimated that there are more than 300 million obese people world-wide. The term Obesity refers high amount of fat in the body and is associated with a huge number of weakening and life-threatening disorders(1). As the WHO interim report of 2015 showed between 1980 to 2013 the prevalence of combined overweight and obesity increased by 27·5% For adults and 47·1% for children, Globally nearly 22 million children under 5 years of age are overweight. Overweight and obese children are likely to stay obese in adulthood and more likely to develop NCD(3). Obesity reached epidemic globally and it is the fifth leading cause of death(4).

Obesity and overweight are associated with more fatalities than underweight around the world(5). For more than two decades, the number of children with wasting has remained an issue, while the number of children who are overweight continues to rise in all regions(6).

Childhood obesity is the result of a complex interaction of multiple behavioral, biological and environmental factors that adversely impact long term energy balance. The prevalence of childhood obesity remains high, and there are regional differences in both the level of obesity and rates of increase that have occurred over time(7).

Children in low- and middle-income countries are more vulnerable to inadequate perinatal, infant, and young child nutrition (4). The 2016 Ethiopian demographic and health survey report showed that the prevalence of childhood obesity at Addis Ababa to be 2.9%, with an increased percent(8). Therefore, the main objective of this study was to determine Overweight, Obesity and associated factors among private lower-secondary school adolescents of Yeka sub-city Addis Ababa, Ethiopia.

Methods

Study area and period

The study was conducted in Yeka sub city private lower-secondary schools in Addis Ababa from june17 to July 9, 2021. Addis Ababa is the capital and the largest city of Ethiopia.

Study design: Institutional based cross-sectional study design was used.

Source population: all adolescents in private lower secondary school in Yeka sub city who were enrolled in grade seven and eight.

Study population: all randomly selected adolescents in selected private lower-secondary schools who were enrolled in grade seven and eight in 4 woredas of Yeka sub city

Inclusion criteria: students who were in age ranges between 10 and 19

Exclusion criteria: severely sick child 2 weeks prior to the data collection day, absentees during the study period

Sample size determination

The required sample size was determined by using single population proportion formula

$$n= (Z\alpha/2)^2pq/d^2$$

Where: n- is the minimum sample size required

p- Is an estimate of the proportion of the overweight and obesity in the population 14.9%(23)

d- Margin of error for sampling = 0.05 and design effect of 2

Z- The standard normal value at (100%−α) confidence level.

$n= (1.96)^2\ 0.149(1- 0.149) /(0.05)^2$, n= 195. Since multistage sampling was employed, the calculated sample was multiplied by 2 for design effects to control the effect of sampling that could happen due to using sampling method so the sample size was 390 and when we add 10% non-response rate and the final sample size become 429.

Sampling technique and procedure

Multi stage sampling technique was used to select the study subjects. First, from twelve woredas four woredas (30%) was selected randomly. The selected woredas were W6, W8, W11 and W12. Secondly, from the selected four woredas the number of schools under each woreda was selected randomly (use 30% proportion for each woredas) which was eleven schools. For W6 crown youth academy and Abstruct was selected, W8 school of tomorrow, Magic carpet and sarina, W11 Noa youth, marvel school, selam school and Hill side schools were selected and forW12 Bright hope school and Noel schools were selected. Finally, allocating the number of student for each school by using systematic sampling after obtaining their list from student roster. The first student was selected by lottery method then the rest of the student in one class was selected every K^{th}. Moreover, the students were further interviewed and their height and weight measurements were taken.(**figure 1**)

Dependent variables: Overweight/ Obesity

Independent variables: Socio demographic characteristics, Age, Religion, Sex, Fathers education, Mothers education, Family size, Monthly income`, Physical activities, Time spent sitting. physical activity, Time spent watching TV, Means of transportation, Duration of sleeping, Diet related factors, Fruit intake, Vegetable intake, Soft drink, Fast food and packed food intake, Dietary diversity

Operational definitions

Nutritional status- for this study nutritional status of children includes thinness, well nutrition or over nutrition.

Obesity- Body mass index for age z-score equal or above positive two standard deviation (≥+2SD) according to WHO growth reference (27)

Overweight Body mass index for age z-score equal or above positive one standard deviation (≥+1SD) but less than_+2SD according to WHO growth reference (27)

Minimum dietary diversity- get at least five food groups out of ten food groups according to FAO(28)

Lower secondary school- it is from the fifth and last grade of primary school and lasts four years (grade 6-9).

Adolescents- those people age 10 to 19 years as WHO definition.

Data collection tool and procedure

Structured interviewer administered close ended questions were used to collect the quantitative data. In addition to this Anthropometric data were collected using digital weight scale (seca, Germany) and height with Stadiometer. Training was given for the data collectors. The questionnaires are adopted from WHO step instrument (26), individual dietary diversity (27) and surveillance, and from literature reviews. The questionnaire included socio-demographic factors, eating habit, playing area, physical activity, transportation, sleeping duration. The questionnaire was developed in English and translated to Amharic by fluent speakers of both languages and; then translated back to English by different language experts to ensure language consistency. The Amharic version questionnaire was used to collect data.

Data quality management

To maintain data quality, data collectors were selected based on educational level who has degree in nursing or related fields and experience of data collection and were trained adequately and also supervisor who had MPH and had experience on data collection and supervision. The questionnaire was developed by the principal investigator after reviewing different articles (29). Some questionnaires were adapted from similar studies that are previously conducted. There was a pre-test to 5% of the sample size which was 21 questionnaire at lower secondary school which are different from the selected schools to see for the accuracy of responses, language clarity, appropriateness of the tools and the necessary amendments were done based on the findings of the pretest. The amended tool was used for actual data collection at the selected schools. The collected data were reviewed and checked for mistakes, legibility of hand writing, completeness and consistency by principal investigator and supervisor on daily basis during data collection. Any mistake or ambiguity was cleared on the spot.

Results

Socio-demographic characteristics of the study participants

A total of 419 students had participated in this study out of 429 and gave a response rate of 97.6%. Of these 203(48.4%) and 128(30.5%) were thirteen years old and fourteen years old respectively. The mean (±SD) age of the students were 13.51 (± 0.87) years old and the minimum and maximum age were 12 and 15 respectively. Among the total students 189(45.1%) were male and 230(54.9%) were female. Almost above half of the students were orthodox 321(76.6%) and 71(16.9%) were protestant followers. About 272(64.9%) students mothers age were greater than or equal to thirty five years old while 142(33.9%) were 29-34 years old. Almost half of the students maternal educational back ground was secondary 191(45.6%) and one hundred sixty seven were tertiary and above. About 169(40.3%) of the students mother were government/ private employee and 129(30.8%) were owns private business. Three forth of the educational status of students father had tertiary and 179(42.7%) had secondary educational back ground and also 202(48.2%) of them had private business and 194(46.3%) of them were private or government employee. Around 296(70.6%) of the students family were owner of car, above half of the students, 372 (88.8) had four and above family size and the birth order of 223(53.2%) of them were second and above. The monthly house hold incomes of students' parents were classified under middle income level 194(46.3%) (**Table1**).

Physical activity and sedentary life style

Almost half of the students 174(41.5) of them walks, 126(30.1%) of them uses private car for transportation to go to school. Two hundred fifty eight students were sleep greater than or equal to eight hours per day, 227(54.2%) of them watches television greater than 2 hours per day. Among 419 students 285(68.0%) of them play with friends greater than or equal to three times per week, 211(50.4%) do physical activity greater than or equal to three times per week. Above half of the students, 235(56.1%) not ride bicycle and 100 (23.9%) ride bicycle greater than three days per week. Three fourth of the students, 337(80.4%) walks or use bicycle at least for ten minutes to move from places to place. 311(74.2%) of them do vigorous activity like running or playing football which needs high breathing at least for ten minutes as a recreational activity. From 419 students 284(67.8%) were uses moderate physical activity which needs moderate breathing like ride bicycle, brisk walk, swimming and volleyball playing at least for ten minutes per day (**Table2**).

Dietary habit

From the selected students 180(43.0%) of them eats enjera and 104(24.8%) of them prefers fast foods most of the time. About ¾ of the students, 367(88%) drinks water and 37(8.9%) uses soft beverages most of the time. The sweet consumption of the respondents were 189(45.1%) used once per week and 119(28.4%) used two times per week. 372(88.8%) and 24(5.7%) of them used vegetable oil and butter for food preparation (**Table3**).

Above three quarter of the respondents eat other vitamin A-rich fruits and vegetables 410(97.9%) followed by starchy setples 395(94.3%) and fats and oils 343(81.9%) in the meantime organ meat was found among the less consumed food groups 139 (33.2%). Among the students 397(94.7%) of them eat greater than or equal to five food groups or diversified foods (**Table4**).

Magnitude of overweight and obesity

The magnitude of overweight, obesity, thinness and normal weight were 80(19.1%), 21(5.0%),

29(6.9%) and 289(69.0%) respectively. The overall magnitude of overweight and obesity were 24.1%, 95 CI(0.2006,0.2816) (**Figure 2**)

Factors associate with overweight/obesity

In bi-variable logistic regression age of student, sex of the student, maternal age, maternal education, maternal job, sleeping hours per day, food most of the time eaten, oils used for food preparation, number of family, birth order, ridding bicycle, physical activity, sweet consumption, means of transportation, drinks used, fruit intakes were significant (Table 5)

In multi variable logistic regression age of the student, mother's job, father's job, physical activity, ridding bicycle and foods eaten most of the time were significantly associated (p-value <0.05) with overweight and obesity. As age increases by one year the likely hood of childhood over weight/ obesity will increase by six times [(Adjusted Odds Ratio (AOR) = 6.355, 95% CI: (1.920,21.030)]. The odds of being overweight/ obesity among child mothers who Owen private business was 2.9 times those students who had house wife mother (adjusted odds ratio [(AOR)=2.916 with 95% CI: (1.320,6.443)]. The odds of being overweight/ obese among students who eat or preferred to eat burger was 4.5 [(AOR=4.450 with 95% CI: (1.778, 11.141)] times higher than those who preferred to eat enjera. In addition, students who perform physical activity less than three days per week had two times higher odds of being overweight/ obese[(AOR= 1.812 with 95% CI: (1.043, 3.150)] compared to those

who did physical activity greater than or equal to three days per week. On the other hand ridding bicycle 1-2 times per week has 2 times [(AOR=2.033 with 95% CI: (1.030, 4.015)] greater risk than who ride bicycle >= 3 days per week **(Table 6).**

Discussion

In this study the prevalence of overweight and obesity among lower secondary school adolescent was 19.1% and 5% respectively. The Overall prevalence was 24.1% age of the student, maternal private business, preferable food eaten most of the time ,doing physical activity and ridding bicycle were significantly associated with overweight/obesity. This result was comparable with study done in Diredawa(9), Tanzania dare es- Selam(10) which was 20.5% and 22.6% respectively and urban Nepal(11). This study was lower than that of United States(12) and Ghana(13) the prevalence obesity was 18.9% and 21.2% obese respectively. This might be due to different socio economic status and different feeding practice.

This study were higher than a study done in Gulele sub-city(14), Dukem(12), Bole sub city(8), Addis Ababa(15), India13), Nairobi Kenya(16), BahirDar(8) and Kinondoni district Dares-selam(17) a prevalence of 14.9%, 9.2%,9.85, 12.7%, 14%, 19.0%, 12.5% and 14.7% respectively this may be due to Corona virus Epidemic the students stayed at their home for more than 7 month and also due to globalization increased energy dense food instead of healthy foods and also consumption of fatty and junk foods.

This study showed that overweight and obesity were significantly associated with lower age group which was age group of 12 years. This result was consistent with study done in Tanzania(8) the prevalence of overweight and obesity was higher in younger age group and study done in Bole sub-city(18) showed the prevalence was increased as age decreased 12 years. This might be due to they are prone to consume packed, unhealthy foods (19). It's also indicated that overweight and obesity were significantly associated with maternal private business which was consistent with study done in Bahirdar(20). This could be due to private business mother had a chance expose to buying food from super market, packed food and sweet food. In present study majority of overweight/obesity adolescents are those who perform

physical activity less than three days per week similar findings were observed in a study done in Ghana and Dredawa. In present study ridding bicycle 1-2 times per week had high risk of overweight/obesity than greater than 2 times per week.

Conclusions

The finding of this study showed that overweight and obesity were emerging nutritional problem among adolescents of lower secondary private schools and also tried to assess associated factors which are responsible for it. As a result, the finding showed that age of a student, maternal private business, physical activity, ridding bicycle and foods most eaten were associated with overweight/obesity. There for this study would play a great role in guiding health planners, policy makers and responsible bodies to develop proper management to reduce and prevent non communicable diseases which come due to overweight and obesity

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Authors' contributions

ZM developed research ideas, statistical analysis, GT,BB provided the critical review of the manuscript, FB statistical analysis and preparation of manuscript ,TG performed data collection and statistical analysis

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Data Availability

All supplemental supplemental materials for this article is available from the corresponding author based on reasonable request.

Declaration

Ethical Approval and Consent to Participate

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from St. Paul's Hospital Millennium Medical College Institutional review Board (Ref.No PM23/361).Written informed consent was obtained from study participants .For adolescents under the age of 18, written informed consent was obtained from the parents or legal guardians prior to

participation. Additionally, assent was obtained from the adolescent participants themselves to ensure their willingness to take part in the study. Participants were informed about the study purpose, voluntary participation, and their right to refuse or withdraw at any time. Confidentiality was ensured through anonymous data collection, and information was kept strictly confidential

Consent for Publication

Not applicable

Competing interests

The authors declare no competing interests

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Figures

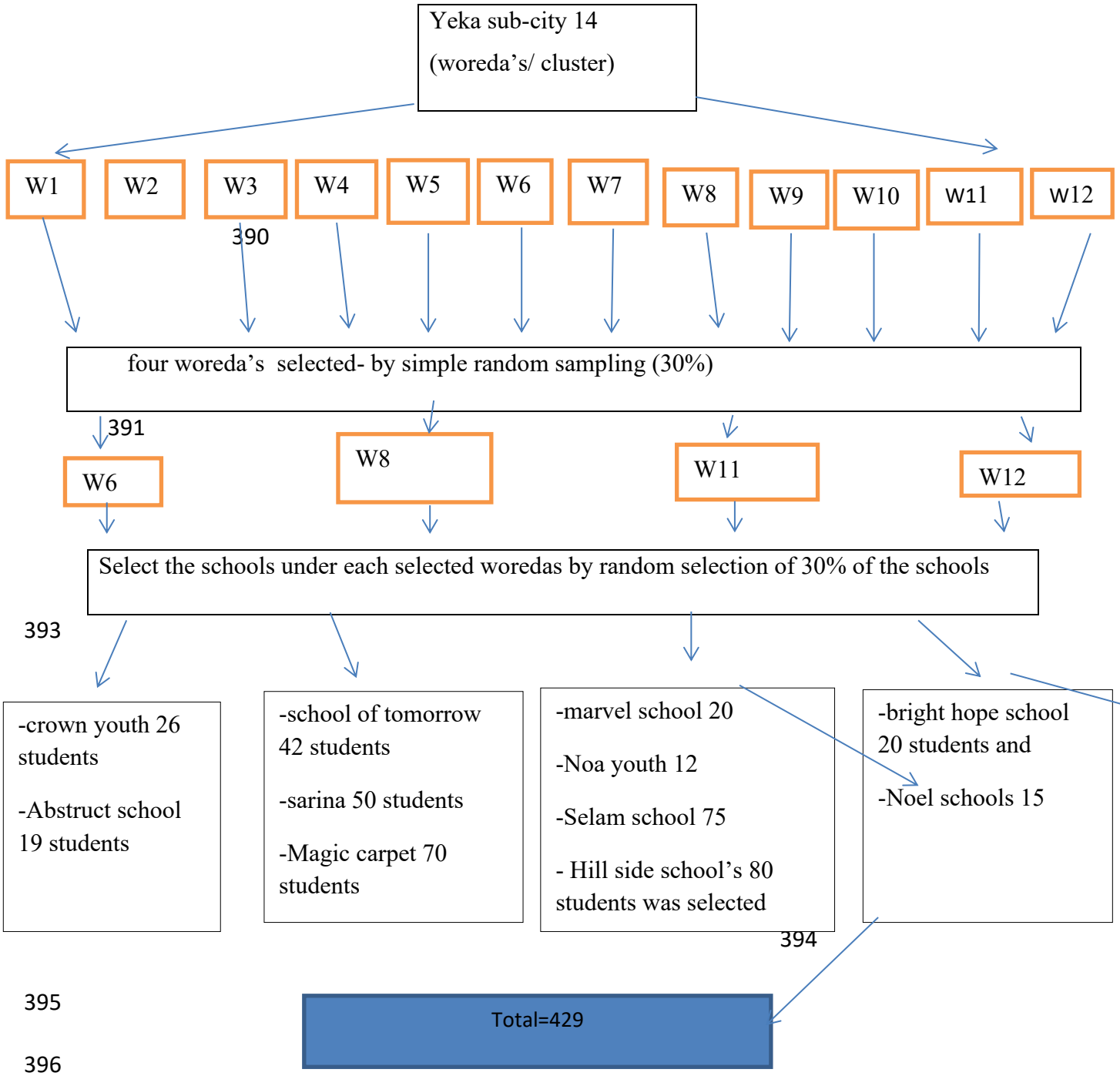
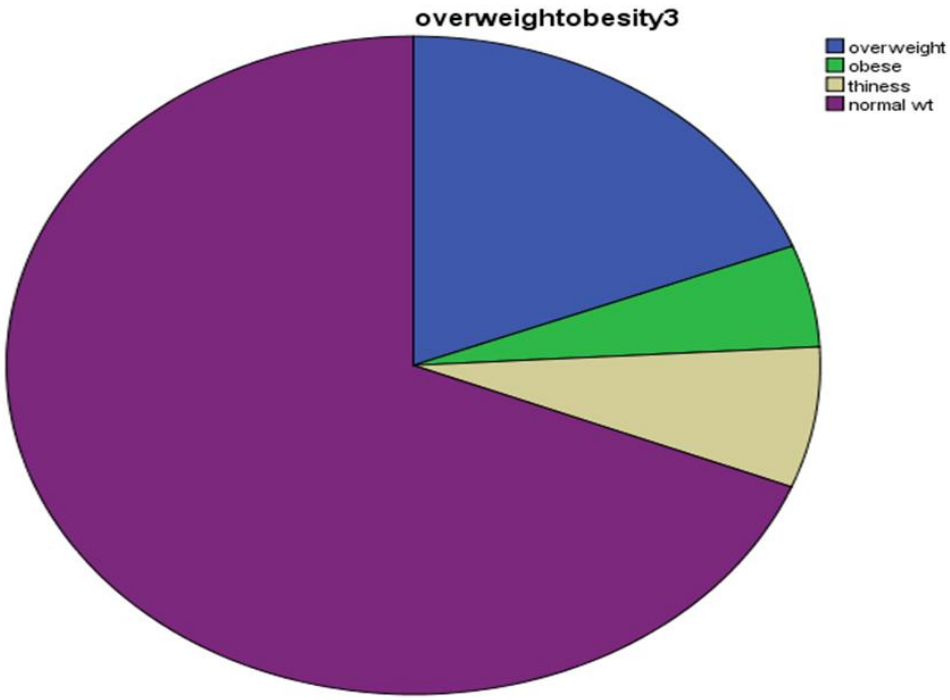


Figure 1: sampling technique and procedure of adolescent overweight and obesity and associated factors among lower secondary school adolescents of Yeka sub-city September, 2021



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403 **Figure 2: Nutritional status of private lower secondary School adolescents in**
404 **Yeka Sub-City, Addis Ababa Ethiopia, September, 2021**

405 # Tables

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407 **Table1: Socio demographic characteristics of private lower secondary adolescent**
408 **of yeka sub-city September, 2021**

Variables	Frequency	**Percent (%)**
Age of the student		
12 years	32	7.6
13 years	203	48.4
14 years	128	30.5
15years	56	13.4
Sex of the student		
Male	189	45.1
Female	230	54.9
Age of the mother		
30-34	121	28.9
35-39	84	20.0
40-44	108	25.8
>=45	106	25.3

Religion		
Orthodox	321	76.6
Muslim	21	5.0
Catholic	6	1.4
Protestant	71	16.9
Other	0	0
Educational status of the mother		
Primary education	61	14.6
Secondary education	191	45.6
Tertiary education and above	167	39.9
Occupational status of the mother		
House wife	121	28.9
Government/private employee	169	40.3
Private business	129	30.8
Educational status of the father		
Primary	32	7.7
Secondary	179	42.7
Tertiary	208	49.6
Occupational status of the father		
Daily laborer	23	5.5
Government/private employee	194	46.3
Private business	202	48.2
Number of family members		
< 4 family member	47	11.2
> = 4 family members	372	88.8
Birth order		
Being first child	196	46.8
Second and above	223	53.2
Family income		
Higher income	125	29.8
Middle income	194	46.3
Lower income	100	23.9

Family member car ownership		
Yes	296	70.6
No	123	29.4

Table2: Sedentary life and physical activity related activities of private lower secondary adolescent September, 2021

Variables	Frequency	%
Time spent on watching tv.		
< 2 hours/day	192	45.8
> = 2 hours/day	227	54.2
how much time you sleep/day		
< 8 hours	161	38.4
>= 8 hours	258	61.6
How many days /week play with friends		
< 3 days	134	32.0
>= 3 days	285	68.0
Ridding bicycle per week		
Not ride bicycle	235	56.1
1-2 days/week	84	20.0
>= 3 days/week	100	23.9
Physical activity per week		
< 3 days/ week	208	49.6
>= 3 days / week	211	50.4
Means of transportation used		
Private car	126	30.1
Public bus	34	8.1
School bus	85	20.3
Walking	174	41.5
Using bicycle or walk		
No	82	19.6
Yes	337	80.4
Do you do vigorous activity		
No	108	25.8
Yes	311	74.2
Do you do moderate activity		
No	135	32.2
Yes	284	67.8

Table3: dietary habits of private lower secondary Adolescent of Yeka sub-city September, 2021

Food most of the time consumed	Frequency	%
Burger	45	10.7

Fast foods	129	30.8
Margarine, peanut butter	30	7.2
Sweet foods	35	8.4
Other	180	43
Sweet beverage consumption/week		
Not consume	16	3.8
1 day/ week	189	45.1
>=2 days/week	214	51.1
Oil used for food preparation		
Vegetable oil	372	88.8
Butter	24	5.7
Other	23	5.5
preferable drinks used most of the time		
Water	367	88
Soft drinks	37	8.9
Other	13	3.1
Days fruit intake per week		
No fruit intake	117	27.9
1-2 days per week	77	18.4
>= 3 days per week	225	53.7
Food group consumptions		
< 5 food group	22	5.3
>= 5 food groups	397	94.7

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421 **Table4: Dietary diversity of private lower secondary Adolescent of Yeka sub-**
422 **city September, 2021**

Types of food	Frequency	
	Yes	No
	n(%)	n(%)

Starchy steples	395(94.3)	24(5.7)
Dark green leafy vegetables	237(56.6)	182(43.4)
Other vitamin A- rich fruits and vegetables	410(97.9)	9(2.1)
Other vegetables and fruits	338(80.7)	81(19.3)
Organ meats	139(33.2)	280(66.8)
Meat and fish	295(70.4)	124(29.6)
Eggs	285(68)	134(32)
Legumes, Nuts and seeds	244(58.2)	175(41.8)
Milk and milk products	270(64.4)	149(35.6)
Fat and oils	343(81.9)	76(18.1)

Table 5: Results of Bivariable analysis on factors associated with overweight / obesity among private lower secondary school adolescent of yeka sub-city sep.2021

Variables	**Overweight/obesity**		**COR(95% CI)**
	Yes	No	
Age of the student			
12 years	13	19	2.799(1.066,7.351)
13 years	41	162	1.035(0.493,2.176)
14 years	36	92	1.601(0.746,3.435)
15 years	45	11	1.000
Sex of the student			
Male	39	150	1.000
Female	62	168	1.419(0.899,2.242)
Age of the mother			
30-34	22	99	0.720(0.378,1.371)
35-39	20	64	1.012(0.516,1.985)
40-44	34	74	1.489(0.813,2.726)
>=45	25	81	1.000
Educational status of the mother			
Primary	11	50	0.545(0.262,1.136)
Secondary	42	149	0.699(0.433,1.128)
Tertiary and above	48	119	1.000

Occupational status of the mother			
House wife	17	104	1.000
Gov./priv. employee	42	127	2.023(1.088,3.762)
Private business	42	87	2.953(1.571,5.552)
Sleeping hours per day			
< 8 hours	47	114	1.558(0.990,2.451)
> 8hours	54	204	1.000
Preferable food eaten most of the time			
Burger	20	25	3.2(1.602,6.394)
Fast foods	25	104	0.962(0.544,1.699)
Margarine	9	21	1.714(0.724,4.059)
Sweet foods	11	24	1.833(0.822,4.087)
Other(injera)	36	144	1.000
Oils used for food preparation			
Vegetable oil	88	284	1.000
Butter	10	14	2.305(0.989,5.372)
Other	3	20	0.484(0.141,1.668)
Number of family members			
< 4 member	16	31	1.74(0.910,3.338)
>4 member	85	287	1.000
Birth order			
Being first	53	143	1.351(0.863,2.116)
Other order	48	175	1.000
Ridding bicycle per week			
Not ride	61	174	1.495(0.838,2.665)
1-2 times	21	63	1.421(0.704,2.869)
>= 3 times	19	81	1.000
Physical activity per week			
< 3days	64	144	2.090(1.318,3.314)
>= 3 days	37	174	1.000
Sweet consumption per week			
No consumption	26	69	1.000
1 times	26	93	5.106(0.657,39.688)
>=2 times	49	156	4.815(0.621,37.334)
Means of transportation used			
Private car	30	96	1.241(0.714,2.157)
Public bus	10	24	1.655(0.725,3.778)
School bus	26	59	1.750(0.968,3.163)
Walking	35	139	1.000
Preferable drinks used most of the time			
Water	86	281	1.000
Soft drinks	12	25	1.568(0.756,3.253)
Other(juice, milk)	3	10	0.980(0.264,3.642)
Days fruit intakes per week			
No fruit intake	24	93	0.859(0.498,1.481)
1-2 days	25	52	1.599(0.906,2.828)

434

435 **Table 6: Results of Multivariable analysis on factors associated with overweight /**
436 **obesity among private lower secondary school adolescent of yeka sub-city**
437 **sep.2021**

Variables	Overweight/obesity		COR(95% CI)	AOR(95%CI)
	Yes	No		
Age of the student				
12 years	13	19	2.799(1.066,7.351)	**6.355(1.920,21.030)***
13 years	41	162	1.035(0.493,2.176)	1.305(0.528,3.222)
14 years	36	92	1.601(0.746,3.435)	2.143(0.844,5.444)
15 years	45	11	1.000	1.000
Sex of the student				
Male	39	150	1.000	1.000
Female	62	168	1.419(0.899,2.242)	1.236(0.712,2.146)
Age of the mother				
30-34	22	99	0.720(0.378,1.371)	0.748(0.347,1.612)
35-39	20	64	1.012(0.516,1.985)	1.196(0.548,2.606)
40-44	34	74	1.489(0.813,2.726)	1.694(0.838,3.428)
>=45	25	81	1.000	1.000
Educational status of the mother				
Primary	11	50	0.545(0.262,1.136)	0.798(0.313,2.035)
Secondary	42	149	0.699(0.433,1.128)	0.738(0.395,1.379)
Tertiary and above	48	119	1.000	1.000
Occupational status of the mother				
House wife	17	104	1.000	1.000
Gov./priv. employee	42	127	2.023(1.088,3.762)	1.942(0.898,4.201)
Private business	42	87	2.953(1.571,5.552)	**2.916(1.320,6.443)***
Sleeping hours per day				
< 8 hours	47	114	1.558(0.990,2.451)	1.599(0.938,2.728)
> 8hours	54	204	1.000	1.000
Preferable food eaten most of the time				
Burger	20	25	3.2(1.602,6.394)	**4.450(1.778,11.141)***
Fast foods	25	104	0.962(0.544,1.699)	0.893(0.456,1.748)
Margarine	9	21	1.714(0.724,4.059)	1.456(0.518,4.091)
Sweet foods	11	24	1.833(0.822,4.087)	2.307(0.867,6.139)
Other(injera)	36	144	1.000	1.000
Oils used for food preparation				
Vegetable oil	88	284	1.000	1.000
Butter	10	14	2.305(0.989,5.372)	2.265(0.791,6.482)
Other	3	20	0.484(0.141,1.668)	0.476(0.119,1.914)
Number of family members				
< 4 member	16	31	1.74(0.910,3.338)	1.578(0.884,2.815)
>4 member	85	287	1.000	1.000
Birth order				
Being first	53	143	1.351(0.863,2.116)	1.452(0.822,2.564)
Other order	48	175	1.000	1.000
Ridding bicycle per week				

Not ride	61	174	1.495(0.838,2.665)	0.601(0.281,1.288)
1-2 times	21	63	1.421(0.704,2.869)	**2.033(1.030,4.015)***
>= 3 times	19	81	1.000	1.000
Physical activity per week				
< 3days	64	144	2.090(1.318,3.314)	**1.812(1.043,3.150)***
>= 3 days	37	174	1.000	1.000
Sweet consumption per week				
No consumption	26	69	1.000	1.000
1 times	26	93	5.106(0.657,39.688)	5.547(0.624,49.296)
>=2 times	49	156	4.815(0.621,37.334)	3.914(0.441,34.748)
Means of transportation used				
Private car	30	96	1.241(0.714,2.157)	0.887(0.447,1.760)
Public bus	10	24	1.655(0.725,3.778)	2.018(0.759,5.367)
School bus	26	59	1.750(0.968,3.163)	1.558(0.750,3.237)
Walking	35	139	1.000	1.000
Preferable drinks used most of the time				
Water	86	281	1.000	1.000
Soft drinks	12	25	1.568(0.756,3.253)	1.632 (0.646, 4.123)
Other(juice, milk)	3	10	0.980(0.264,3.642)	1.172 (0.270, 5.088)
Days fruit intakes per week				
No fruit intake	24	93	0.859(0.498,1.481)	0.894(0.478,1.672)
1-2 days	25	52	1.599(0.906,2.828)	1.746(0.882,3.456)
>= 3 days	52	173	1.000	1.000

Additional files

Annexes

Consent Form

Subject information sheet

Good morning/afternoon. My name is _____and I am from ____. I am a member of a data collector team on behalf the study conducted by Zerfeshwal Mekonnen who is a Masters of Public health nutrition student at St. Paul Hospital Millennium Medical college .

Title of the project: childhood overweight,obesity and associated factors among private primary students of yeka sub-city

Principal Investigator: Zerfeshwal Mekonnen

Superviso: Wubshet Anota

Coordinating office: Saint Paul Hospital Millennium Medical College

Introduction: childhood overweight and obesity is very high in urbun settings in most parts of the world. Yeka sub-city is among the sub city with high socio economic status.

Purpose: The purpose of this research is to determine the magnitude of childhood over weight, obesity and associated factors among private primary school children of Yeka sub-city, Addis Ababa Ethiopia. This research undertaking is for partial fulfillment; research of master's thesis in Public health nutrition.

Procedure and participation: The method of this research is a cross-sectional study design. The expected duration of the study participant for one time contact with the interviewer will not be more than 30 minutes. You will be asked to participate in this research since the truthful information which you will provide is important for the understanding of the proposed research project. However, your particular participation is affirmed by the procedure of probability sampling technique which provides equal chance of selection.

Confidentiality: In order to establish secured safeguards of the confidentiality of research data, the data collector will use codes during the data collection period instead of using names. The original data will be locked in cabinets until the data analysis is carried out and no person shall have access to it except the principal investigator and the supervisor for data checking and cleaning purposes. The use of information for any purpose other than that to which participants ascent is unethical to the participants. The information you provide is not disclosed in the way that may identify your personal characteristics or violate privacy.

Benefit: The research does not have short term financial, healthcare and capacity-building benefits to the research participant as an individual or as a group. In the long run, the outcome of this study will help the concerned organizations and policy makers in consideration, direction and formulation of strategy and design of programs.

Risk: The research does not have any inhuman treatment of the research participants or any physical harm, social discrimination, psychological trauma and economic loss.

Inducement, incentive and compensation: This study process will not have any form of inducement, or coercion and the study does not bring any risks that incur compensation.

Freedom to withdraw: If you want to participate in the study, you have also the full right to withdraw from the study at any time you wish without any penalty. Nobody will ask or enforce you to explain the reason for withdrawal.

Person to contact: The participant has the right to ask information that is not clear about the research context and content before and during the research work. You can contact the principal investigator and the data collector's supervisor. In addition this research had undergone ethical review and approval by Saint Paul Hospital Millennium Medical College, college of public health. If you want more information about this research project, you can contact the following people.

1. Saint Paul Hospital Millennium Medical College, School of public health----------

2. Principal investigator name and address: Zerfeshwal mekonnen. Telephone:0906552751

3. Supervisor name and address: Helen Wubishet Anota. Telephone:+251-960333840

8.1.2: Informed consent agreement form, English version

Title of the thesis: Childhood overweight, obesity and associated factors among private primary children of yeka sub-city, Addis Ababa. I am aware that this research undertaking is a masters' of public health nutrition research project which is Conducted by a principal investigator Zerfeshwal Mekonnen. I have been also fully informed in the language I understood and about the research project objective to determine the magnitude of childhood over weight, obesity and associated factors among private primary school children of Yeka sub-city, Addis Ababa Ethiopia. I have been informed that all the information I shall provide to the interviewer will be kept confidential. I understood that the research has no risk and no compensation. I also know that I have the right to withhold information, skip questions to answer or to withdraw from the study any time. I have been informed that nobody will impose on me to explain the reason of withdrawal. It is also clear that there will be no effect at all in my health benefit or other administrative effect that I get from the district. I have been assured of the right to ask information that is not clear about the research before and/or during the research work by contacting:

1. Saint Paul Hospital Millennium Medical College, School of public health----------

2. Principal investigator name and address: Zerfeshwal Mekonnen 0906552751

3. Supervisor name and address: Wubishet Anota 0960333840

I have read this form (it has been read to me in the language I comprehend) and I understood the condition stated above; therefore, I am willing and confirm my participation by signing this consent form. Mothers/caregivers who are agreed that their child participate in the study: (Mark one of them for verbal/oral consent)

Yes _____

No _____

Name of interviewer _____

Signature _____ Date _____

Thank you for your participation

8.2 Questionnaire

How are you?

My name is ……..…... I am collecting data for the study done by SPHMMC on childhood overweight, obesity and associated factors among private primary school children in Yeka sub city. I am going to ask you some questions that will be relevant to this study. Any information collected will be treated with confidentiality.

Date of assessment……/……/…

Time of assessment begins……. ends…… Code……

English version Questionnaires

SECTION- ONE ANTHROPOMETRIC DATA OF THE CHILD

Measurements	**1st**	**2nd**	**Average**	**z-scores**
Weight to the nearest 0.1 kg				
Hight to the nearest 0.1 cm				

SR. No	Questions	Coding categories	If No, skip	Code
SECTION- TWO SOCIOECONOMIC AND DEMOGRAPHIC CHARACTERISTICS**(29)**				
201	Sex	1.female 2. male		
202	age of the student	…….		
203	Age of the mother in year	Age in completed year ---------- 1 30-34 years 1 35-39 year 2 40-44 years 3 45+		

204	Religion	1 Orthodox 1 Muslim 2 Catholic 3 Protestant 4 Others (specify)		
205	Educational status of the mother/care giver	1 No formal education 1 Primary education 2 Secondary 3 Tertiary and above		
206	mothers job	1 house wife 2 daily laborer 3 government or private employee 4 private business		
207	fathers educational status	1 No formal education 2 Primary education 3 Secondary 4 Tertiary and above		
208	fathers job	1 no job 2 daily laborer 3 government or private employee 4 private business		
209	Family size	----------		
210	your birth order	----------		
211	Monthly income of the household in ETB	----------birr		
212	Does anyone of your family own a car?	1 Yes 1 No		
SECTION THREE- physical activity and sedentary life style				

301	How many hours a day usually spent on watching television?	1 Doesn't watch television 1 <two hours 2 >two hours		
302	Sleeping hours per day	3 < 8 hrs 4 > 8 hrs		
303	how many times per week you do playing with friends	……..		
304	how many times per week ride bicycle	……		
305	how many times per week you do sport/physical activity	……..		
Core; physical activities				
means of transportation				
306	what type of means of transportation do you use when you go to school	1.private car 2. public bus 3. walking 4 other specify…..		
307	Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?	1. yes 2. no	if no skip to 605	
308	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days……		

309	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes └─┴─┘ : └─┴─┘ hrsmins		
Core: physical activity cont…				
Recreational activities				
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure),				
310	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?	1. yes 2. no	if no go to 608	
311	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?	Number of days……..		
312	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours: minutes …….hrs., …….mins		
313	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, and volleyball] for at least 10	1. yes 2. no	if no go to 610	

	minutes continuously?			
314	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Number of days……..		
315	How much time do you spend doing moderate-intensity sports, fitness or recreational activities on a typical day?	…….hrs…….minutes		
316	how much time do you usually spend sitting	hours; minutes ……..hrs., ……mins		
SECTION FOUR- Dietary habit				
401	what kind of food do you most of the time eat	1. burger 2.pizza 3.fast foods 4.vegitables 5.sweeten foods 6. Other specify….		
402	what kind of drinks do you consume most of the time	1.soft drinks 2.juice 3.water 4. Other…..		
403	how many times do you use sweet beverage's	1 not using sweet beverages 2. one 3. two 4. three and above		

404	In a typical week, on how many days do you eat fruit?	Number of days…… Don't Know		
405	How many servings Number of servings of fruit do you eat on one of those	Number of servings don't know		
406	In a typical week, on how many days do you eat vegetables?	Number of servings don't know		
407	How many Number of servings servings of vegetables do you eat on one of those days?	Number of servings don't know		
408	What type of oil or fat is most often used for meal preparation in your household?	1.Vegetable oil 2.Lard or suet 3. Butter or ghee 4. Margarine 5.Other 6.If Other,		
409	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner.	Number…… don't know		

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531 **Dietary Diversity Questionnaire** (30)
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Question number	Food group	Examples	YES=1 NO=0
1	CEREALS	corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + insert local foods e.g. porridge or pastes or other locally available grains	
2	VITAMIN A RICH VEGETABLES AND TUBERS	pumpkin, carrots, squash, or sweet potatoes that are orange inside + other locally available vitamin-A rich vegetables (e.g. red sweet pepper)	
3	WHITE TUBERS AND ROOTS	white potatoes, white yams, white cassava, or other foods made from roots	
4	DARK GREEN LEAFY VEGETABLES	dark green/leafy vegetables, including wild ones + locally available vitamin-A rich leaves such as amaranth, cassava leaves, kale, spinach etc	
5	OTHER VEGETABLES	other vegetables (e.g. tomato, onion, eggplant) , including wild vegetables	
6	VITAMIN A RICH FRUITS	ripe mangoes, cantaloupe, apricots (fresh or dried), ripe papaya, dried peaches + other locally available vitamin A-rich fruits	
7	OTHER FRUITS	other fruits, including wild fruits	
8	ORGAN MEAT (IRONRICH	liver, kidney, heart or other organ meats or blood-based foods	
9	FLESH MEATS	beef, pork, lamb, goat, rabbit, wild game, chicken, duck, or other birds	
10	EGGS	chicken, duck, guinea hen or any other egg	
11	FISH	fresh or dried fish or shellfish	
12	LEGUMES, NUTS AND SEEDS	beans, peas, lentils, nuts, seeds or foods made from these	
13	MILK AND		

	MILK PRODUCTS	milk, cheese, yogurt or other milk products	
14	OILS AND FATS	oil, fats or butter added to food or used for cooking	
15	RED PALM PRODUCTS	Red palm oil, palm nut or palm nut pulp sauce	
16	SWEETS	sugar, honey, sweetened soda or sugary foods such as chocolates, candies, cookies and cakes	
17	SPICES, CONDIMENTS, BEVERAGES	spices(black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages or local examples	
Individual level only	Did you eat anything (meal or snack) OUTSIDE of the home yesterday?		

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