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Physical Activity and Dietary Patterns in Relation to Weight Status Among University Students in Nairobi County, Kenya

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Abstract

This study examined the physical activity and dietary patterns of university students in Nairobi County and compared to their weight status. The study was a cross-sectional analytical design with a sample of 260 undergraduate students randomly selected from two private and two public universities. A semi-structured questionnaire was used to gather information from students. Students weight and height measurements were also obtained. Data was analyzed using SPSS version 22. The study results showed that 53.5% of the students met the recommended levels of moderate physical activity and 18.8% of the students met the recommended levels of vigorous physical activity. Majority of the students consumed fast foods sweetened beverages and pastries most times in a week. The study also showed that 31.2% of the students were overweight and 6.2% were obese. The study reveals that most students did not achieve the recommended levels of vigorous physical activity and showed some poor dietary patterns. Findings show clear evidence of high prevalence of overweight among university students but focus should be on fitness rather than fatness. Efforts should be made to promote physical activity participation and good dietary practices within university environments.

Keywords: Physical Activity, Dietary Patterns, Overweight, Obese, Chronic Diseases

Major classification: Health Science.

1. Introduction

1.1. Background to the Study

The transition of physical activity and nutrition in Kenya within university environments involving less participation in physical activity and consumption of foods with high calories containing poor nutrients has profound effects with regard to public health outcomes, risk factors and economic growth(mm.2019. This transition is manifested in the rising cases of obesity which contributes to the non-communicable diseases burden [8]. Physical inactivity and poor dietary patterns that form among university students drive the accelerating development of chronic diseases that persist beyond an individual's university years. Furthermore, university years present an opportunity to reinforce positive health behaviors which can later improve health outcomes among those within their middle and late adulthood.

University years are mostly the times students reside far from their homes and are faced with different food choices which culminate to poor dietary patterns. University students usually consume diet which lack

vegetables, fruits. Mostly their diets have high sugar, fat and sodium content due to consumption of fast food and frequent snacking. University students are known to skip breakfast which contributes to snacking among the students.

Health benefits of physical activity include improvement in muscular strength, improved levels of blood cholesterol and reduced risk of heart disease due to improvements in blood circulation. Despite the health benefits, participation among youth decreases significantly after high school. When the pressure of demanding schedule increases among university students, they eliminate planned exercises. University students participating in physical activity becomes challenging when there is lack of accountability and other responsibilities.

Physical inactivity and poor dietary habits lead to development of obesity as well as overweight which are risk factors for chronic illnesses. The rate of obesity among university students may be higher as compared to their counterparts who are not in college or universities. However, it is not enough to look at physical activity and poor dietary habits in relation to only overweight and obesity. Recent Research done has deduced that obese and overweight individuals who exercise adequately with good eating habits are healthier than their counterparts who have a normal BMI but do not exercise and eat foods detrimental to their health. Heavier people with more body fat who are active throughout the day can be more fit and healthier when compared to individuals with lower weight who sit all day and do not engage in any exercise, or those who confine their workouts to a single period of time.

Physical activity and good dietary habits need to go together with weight control. Physical activity and good nutrition when practiced together rather than independently have a synergetic effect providing great reduction of chronic diseases and risk factors.

1.2. Objectives of the Study

The specific objectives of the study were to:

1. To determine the physical activity levels of University students in Nairobi County.
2. To establish dietary patterns of University students in Nairobi County.
3. To assess the relationship between physical activity and weight status among university students in Nairobi County.
4. To assess the relationship between dietary patterns and weight status among university students in Nairobi County.
5. To determine the prevalence of overweight and obesity among University students in Nairobi County.

2. Materials and methods

A cross-sectional analytical study design was adopted in the study

2.1. Study population

The study population were undergraduate students in Nairobi County, Kenya.

2.2. Data Collection Tools

Data on physical activity participation and dietary patterns were collected using an interviewer administered questionnaire.

2.3. Data Analysis

Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 20. Inferential and descriptive statistics were used to infer and describe quantitative data respectively. Demographic variables were analyzed by descriptive. Chi square test was used to establish the relationship between PA, dietary patterns and weight status. Ordinal logistic regression was used to determine dietary predictors of weight status. P-value below 0.05 was significant.

2.4. Ethical approval

Research approval to conduct the study was obtained from graduate school Kenyatta University and ethical approval was sought from Kenyatta University Ethical Committee. National Commission for Science and Technology and Innovation provided the permit to conduct the study. Informed consent was obtained from student. Confidentiality was ensured by concealing the students' identities.

3. Results

3.1. Demographic Characteristics of the University Students

Table 1 shows the demographic characteristics of university students. Over three quarters to three quarters of the students resided out of campus (77.3%) while a few students resided within their campuses (22.7%). Regarding relationship status of university students more than half of the students interviewed were single (64.2%) and very few were married (1.9%). Regarding the person university students lived with most of the students lived alone (29.6%) and with parents (28.5%). On classification of university students more than half of the students were male (60%) and (40%) were female.

	N = 260	
Characteristics	**n**	**%**
Gender		
Male	156	60.0
Female	104	40.0
Total	260	100.0
Residence		
Within campus	59	22.7
Off campus	201	77.3
Total	260	100.0
Person they lived with		
Alone	77	29.6
Parents	74	28.5
Friends	64	24.6
Relatives	25	9.6
Partner	20	7.7
Total	260	100.0
Relationship status		
Single	167	64.2
Dating	88	33.8
Married	5	1.9
Total	260	100.0
Year of study		
First Year	42	16.2
Second Year	65	25.0
Third Year	117	45.0
Fourth Year	36	13.8
Total	260	100

Table 1: Demographic Characteristics of University Student

3.2. Physical Activity Participation

Table 2 shows the students who indicated participating and meeting the recommended levels of vigorous physical activity. Less than a quarter (18.8%) of the university students were vigorously active meaning they met the recommended levels of at least 75 minutes of vigorous physical activity per week.

Table 2: Students Participating in Vigorous Physical Activity

	N=260

	n	%
Meeting reccomended levels of vigorous PA		
Vigorously active	49	18.8%
Vigorously inactive	211	81.2%
Total	260	100

Participation in Moderate Physical Activity

Table 3 shows the students who indicated participating and meeting the recommended levels of moderate physical activity. Slightly more than a half (53.5%) of the university students were vigorously active meaning they met the recommended levels of at least 150 minutes of moderate physical activity per week.

Table 3: Students Participating in Moderate Physical Activity

Characteristics	N=260	
	n	%
Meeting reccomended levels of moderate PA		
Moderately active	139	53.5%
Moderately inactive	121	46.5%
Total	260	100%

Physical Activity and Weight Status

Table 4 shows cross tabulation between physical activity and weight status among only the students who indicated participating in vigorous (N=113) and moderate physical activity (N=158). There was significant association of vigorous physical activity with weight status (Chi-square: p=0.049) while there was no association between moderate physical activity and weight status (Chi-square: p=0.049). Most of the students who met the recommended levels of vigorous physical activity were of Normal BMI. In moderate physical activity similarly to vigorous physical activity most of the students were of normal BMI. However, there were more overweight and obese students among those who were moderately active (met the recommended moderate physical activity levels).

Table 4: Cross Tabulation Physical Activity and Weight Status

Underweight	Normal	Overweight	Obese	χ^2df	p-value	
Vigorously active	2(4.1)	34(69.4)	9(18.4)	4(8.2)	7.087(3)	**0.049**
Vigorously inactive	3(4.7)	29(45.3)	25(39.1)	7(10.9)		
Moderately active	5(3.6)	84(60.4)	38(27.3)	12(8.6)	3.373(3)	0.338
Moderately inactive	2(4.1)	34(69.4)	9(18.4)	4(8.2)		

3.3. Dietary Patterns among Students

3.3.1. Dietary Patterns Over the Last 7 Days

Table 5 shows the dietary patterns of university students in Nairobi County over the last 7 days prior to the study. Regarding regular soda most university students consumed regular soda 2-4 days per week (38.5%) while few students consumed regular soda daily (9.6%) and 5-6 days per week (2.7%). More than half of the students consumed tea with sugar daily (60.8%) and majority reported not consuming tea without sugar (86.2%). On consumption of raw vegetables half of the students do not consume raw vegetables (50%) while less than 10% of the students consuming raw vegetables daily (6.2%). Regarding consumption of chips majority of the university

students consumed chips 2-4 days per week (38.1%) and 1 day per week (35.4%). On consumption of cooked vegetables most of the university students consumed cooked vegetables 2-4 days per week (32.3%) and daily (31.5%).

On consumption of crisps about half of the university students did not consume (49.2%) while less than 10% consumed crisps daily (3.5%). Regarding consumption of white bread most of the students consumed white bread on a daily basis (28.5%). Regarding brown bread close to half of the students did not consume brown bread (53.5%). Regarding consumption of sweets most of the students consumed sweets 1 day per week (32.3%). On consumption of fried snacks less than 10% of the students consumed fried snacks daily (8.1%) and 5-6 days per week (8.8%). Regarding consumption of pastries majority of the students consumed pastries 2-4 days per week (38.8%). Regarding consumption of fruits less than a half of the students consumed fruits 2-4 days per week (40%) while less than a quarter consumed fruits daily (19.2%).

Table 5: Dietary Patterns Over the Last 7 days

N=260 **Food item**	**Daily %**	**5-6 days times a week %**	**2-4 days per week %**	**Once a week %**	**Not consumed in the last 7 days %**
Regular soda	9.6	2.7	38.5	24.2	25
Tea with sugar	60.8	8.1	15.8	2.7	12.7
Tea without sugar	6.9	0.4	2.7	3.8	86.2
Raw vegetables	6.2	3.1	19.6	21.2	50.0
Chips	1.5	3.8	38.1	35.4	21.2
Cooked vegetables	31.5	19.2	32.3	11.9	5.0
Crisps	3.5	1.9	13.8	31.5	49.2
White bread	28.5	17.3	20.8	13.1	20.4
Brown bread	10.4	6.2	8.5	21.5	53.5
Sweets	11.9	8.1	29.2	32.3	18.5
Fried snacks	8.1	8.8	38.8	29.6	14.6
Pastries	17.3	12.3	38.8	20.4	11.2
Fruits	19.2	11.2	40.0	19.2	10.4

3.3.2. Cross Tabulation Dietary Patterns and Weight Status

Table 6 shows cross-tabulation of regular soda and weight status. Results indicate significant relationship between tea with sugar (p=0.035), raw vegetables (p=0.026), chips (p<0.001), cooked vegetables (p<0.001) and pastries (p=0.021) and weight status.

Table 6: Cross Tabulation Dietary Patterns and Weight Status

Cross tabulation dietary patterns and weight status

		Normal	Under weight	Overweight	Obese	X2(df)	p-value
Regular Soda	None	2(5.1)	22(56.4)	14(35.9)	1(2.6)	18.576(12)	0.099
	Daily	0(0)	8(44.4)	7(38.9)	3(16.7)		
	1 Day per Week	2(6.3)	21(65.6)	7(21.9)	2(6.3)		
	2-4 days per Week	2(3)	40(59.7)	17(25.4)	8(11.9)		
	5-6 days Per Week	1(50)	1(50)	0(0)	0(0)	.	
Tea with Sugar	None	3(16.7)	10(55.6)	4(22.2)	1(5.6)	22.243(12)	**0.035**
	Daily	3(3)	54(54)	34(34)	9(9)		
	1 Day per Week	1(33.3)	2(66.7)	0(0)	0(0)		
	2-4 days per	0(0)	17(63)	6(22.2)	4(14.8)		

	Week						
	5-6 days Per Week	0(0)	9(90)	1(10)	0(0)	.	
Tea without Sugar	None	5(3.6)	81(58.7)	41(29.7)	11(8)	13.881(12)	0.308
	Daily	2(20)	3(30)	4(40)	1(10)		
	1 Day per Week	0(0)	4(80)	0(0)	1(20)		
	2-4 days per Week	0(0)	3(75)	0(0)	1(25)		
	5-6 days Per Week	0(0)	1(100)	0(0)	0(0)		
Fruit	None	0(0)	6(66.7)	1(11.1)	2(22.2)	12.388(12)	0.415
	Daily	1(3.2)	14(45.2)	12(38.7)	4(12.9)		
	1 Day per Week	0(0)	22(64.7)	10(29.4)	2(5.9)		
	2-4 days per Week	6(8.7)	41(59.4)	17(24.6)	5(7.2)		
	5-6 days Per Week	0(0)	9(60)	5(33.3)	1(6.7)	.	
Raw Vegetables	None	0(0)	37(59.7)	18(29)	7(11.3)	23.165(12)	**0.026**
	Daily	2(33.3)	2(33.3)	2(33.3)	0(0)		
	1 Day per Week	2(4.8)	23(54.8)	11(26.2)	6(14.3)		
	2-4 days per Week	3(7)	28(65.1)	11(25.6)	1(2.3)		
	5-6 days Per Week	0(0)	2(40)	3(60)	0(0)	.	
Chips	None	0(0)	19(50)	19(50)	0(0)	41.386(12)	**0.000**
	Daily	0(0)	2(100)	0(0)	0(0)		
	1 Day per Week	6(11.1)	40(74.1)	6(11.1)	2(3.7)		
	2-4 days per Week	1(1.7)	30(50.8)	18(30.5)	10(16.9)		
	5-6 days Per Week	0(0)	1(20)	2(40)	2(40)	.	
Cooked Vegetables	None	2(25)	6(75)	0(0)	0(0)	42.665(12)	**0.000**
	Daily	0(0)	18(43.9)	18(43.9)	5(12.2)		
	1 Day per Week	4(25)	7(43.8)	3(18.8)	2(12.5)		
	2-4 days per Week	0(0)	42(70)	12(20)	6(10)		
	5-6 days Per Week	1(3)	19(57.6)	12(36.4)	1(3)		
Crisps	None	4(6)	39(58.2)	21(31.3)	3(4.5)	13.649(12)	0.324
	Daily	0(0)	2(33.3)	3(50)	1(16.7)		
	1 Day per Week	2(3.8)	34(65.4)	11(21.2)	5(9.6)		
	2-4 days per Week	1(3.6)	12(42.9)	10(35.7)	5(17.9)		
	5-6 days Per Week	0(0)	5(100)	0(0)	0(0)	.	
White Bread	None	0(0)	11(40.7)	13(48.1)	3(11.1)	15.037(12)	0.239
	Daily	4(10.8)	21(56.8)	7(18.9)	5(13.5)		
	1 Day per Week	1(4.2)	14(58.3)	7(29.2)	2(8.3)		
	2-4 days per Week	2(5)	26(65)	10(25)	2(5)		
	5-6 days Per Week	0(0)	20(66.7)	8(26.7)	2(6.7)		
		4(4.5)	56(63.6)	22(25)	6(6.8)		

Brown Bread	None					20.364(12)	0.06
	Daily	2(18.2)	3(27.3)	4(36.4)	2(18.2)		
	1 Day per Week	0(0)	23(63.9)	10(27.8)	3(8.3)		
	2-4 days per Week	0(0)	8(53.3)	4(26.7)	3(20)		
	5-6 days Per Week	1(12.5)	2(25)	5(62.5)	0(0)	.	
Sweets	None	2(10)	9(45)	8(40)	1(5)	18.226(12)	0.19
	Daily	1(7.7)	5(38.5)	3(23.1)	4(30.8)		
	1 Day per Week	2(3.6)	38(69.1)	14(25.5)	1(1.8)		
	2-4 days per Week	2(3.9)	30(58.8)	13(25.5)	6(11.8)		
	5-6 days Per Week	0(0)	10(52.6)	7(36.8)	2(10.5)		
Fried Snacks	None	2(11.1)	11(61.1)	5(27.8)	0(0)	11.702(12)	0.47
	Daily	0(0)	3(75)	1(25)	0(0)		
	1 Day per Week	2(4)	32(64)	13(26)	3(6)		
	2-4 days per Week	3(4.5)	36(54.5)	17(25.8)	10(15.2)		
	5-6 days Per Week	0(0)	10(50)	9(45)	1(1)	.	
Pastries	None	2(15.4)	7(53.8)	2(15.4)	2(15.4)	23.844(12)	**0.021**
	Daily	3(13)	15(65.2)	5(21.7)	0(0)		
	1 Day per Week	0(0)	24(75)	7(21.9)	1(3.1)		
	2-4 days per Week	2(3)	31(46.3)	24(35.8)	10(14.9)		
	5-6 days Per Week	0(0)	15(65.2)	7(30.4)	1(4.3)		

3.3.3. Ordinal Logistic Regression Dietary Patterns and Weight Status

Table 7 shows ordinal logistic regression and weight status. Results indicate regular soda, tea with sugar, chips, cooked vegetables and pastries were strong predictors of weight status

Table 7: Ordinal Logistic Regression Dietary Patterns and Weight Status

					95% Confidence Interval	
		Estimate	**df**	**Sig.**	**Lower Bound**	**Upper Bound**
Regular Soda	None	2.034	1	0.142	-0.684	4.752
	Daily	4.297	1	**0.002**	1.566	7.028
	1 Day per Week	3.963	1	**0.004**	1.275	6.651
	2-4 days per Week	3.105	1	**0.021**	0.462	5.749
	5-6 days Per Week	Ref	0	.	.	.
Tea with Sugar	None	-1.546	1	0.146	-3.63	0.538
	Daily	0.403	1	0.578	-1.017	1.823
	1 Day per Week	-4.193	1	**0.005**	-7.095	-1.292
	2-4 days per Week	1.362	1	0.091	-0.215	2.94
	5-6 days Per Week	Ref	0	.	.	.
Tea	None	1.267	1	0.741	-6.252	8.786

without Sugar	Daily	3.158	1	0.413	-4.398	10.714
	1 Day per Week	2.351	1	0.553	-5.424	10.125
	2-4 days per Week	1.659	1	0.676	-6.127	9.445
	5-6 days Per Week	Ref	0	.	.	.
Fruit	None	-1.508	1	0.072	-3.153	0.136
	Daily	0.451	1	0.46	-0.745	1.647
	1 Day per Week	0.11	1	0.871	-1.22	1.439
	2-4 days per Week	-0.81	1	0.172	-1.97	0.351
	5-6 days Per Week	Ref	0	.	.	.
Raw Vegetables	None	0.954	1	0.384	-1.194	3.101
	Daily	-0.072	1	0.956	-2.606	2.462
	1 Day per Week	0.3	1	0.797	-1.988	2.588
	2-4 days per Week	-0.364	1	0.747	-2.577	1.849
	5-6 days Per Week	Ref	0	.	.	.
Chips	None	-1.425	1	0.099	-3.116	0.266
	Daily	-4.269	1	**0.042**	-8.377	-0.161
	1 Day per Week	-2.836	1	**0.001**	-4.519	-1.153
	2-4 days per Week	-1.696	1	**0.045**	-3.359	-0.034
	5-6 days Per Week	Ref	0	.	.	.
Cooked Vegetables	None	-2.225	1	**0.015**	-4.018	-0.432
	Daily	0.922	1	0.084	-0.122	1.967
	1 Day per Week	-0.223	1	0.733	-1.506	1.06
	2-4 days per Week	0.17	1	0.729	-0.791	1.131
	5-6 days Per Week	Ref	0	.	.	.
Crisps	None	1.092	1	0.421	-1.57	3.754
	Daily	1.496	1	0.37	-1.774	4.767
	1 Day per Week	1.142	1	0.406	-1.551	3.836
	2-4 days per Week	0.771	1	0.588	-2.015	3.558
	5-6 days Per Week	Ref	0	.	.	.
White Bread	None	0.395	1	0.544	-0.879	1.668
	Daily	-0.631	1	0.222	-1.643	0.381
	1 Day per Week	0.523	1	0.44	-0.806	1.852
	2-4 days per Week	-0.441	1	0.417	-1.504	0.623
	5-6 days Per Week	Ref	0	.	.	.
Brown Bread	None	0.156	1	0.837	-1.334	1.646
	Daily	1.382	1	0.191	-0.69	3.455
	1 Day per Week	0.062	1	0.938	-1.494	1.618
	2-4 days per Week	1.069	1	0.248	-0.743	2.882
	5-6 days Per Week	Ref	0	.	.	.
Sweets	None	-0.519	1	0.522	-2.108	1.07

	Daily	1.371	1	0.123	-0.373	3.115
	1 Day per Week	-1.263	1	0.106	-2.795	0.269
	2-4 days per Week	-0.193	1	0.772	-1.497	1.111
	5-6 days Per Week	Ref	0	.	.	.
Fried Snacks	None	-1.339	1	0.156	-3.19	0.512
	Daily	-1.545	1	0.167	-3.734	0.644
	1 Day per Week	-0.748	1	0.302	-2.17	0.674
	2-4 days per Week	-1.046	1	0.149	-2.468	0.375
	5-6 days Per Week	Ref	0	.	.	.
Pastries	None	-0.918	1	0.326	-2.752	0.915
	Daily	-1.844	1	**0.021**	-3.406	-0.281
	1 Day per Week	-0.392	1	0.559	-1.706	0.922
	2-4 days per Week	0.443	1	0.427	-0.651	1.537
	5-6 days Per Week	Ref	0	.	.	.

3.3.4. Weight Status of University Students

Table 8 shows weight status of university students in Nairobi County. Results indicated that more than half of the university students were of normal BMI (59.6%), more than a quarter (31.2%) were overweight, less than 10% were obese (6.2%) and only 3.1% were underweight

Table 8: Weight Status of University Students

Body Weight Status	Frequency	Percent
Underweight	8	3.1
Normal	155	59.6
Overweight	81	31.2
Obese	16	6.2
Total	260	100

4. Discussion

It is alarming that less than a quarter of the students were not meeting the required levels of vigorous physical activity which places the students at a higher risk of poor health considering that physical inactivity contributes greatly to poor health. Previous studies have similarly low levels of vigorous activity participation among university students. This study therefore shows that most of the students in Nairobi County participated more in moderate physical activity considering more than half of the students were able to meet the recommended moderate physical activity level. Participation in moderate physical activity higher than previous studies conducted. Because moderate physical activity includes brisk walking it can be attributed to most students walking around the campus as they go to their lectures around the campus and as they walk to campus from home. There were more overweight and obese students among those who participated in moderate and vigorous physical activity, showing that focus should be on fitness rather than fatness results.

There was high consumption of fast foods and soft drinks among the students. Fast foods have higher amounts of fats, carbohydrates and calories which predisposes students to overweight and obesity. The findings are consistent with a study that reported similar results. High consumption could be attributed to the convenience and availability of fast foods and soft drinks within the university environments. Consumption of vegetables of university students remains low less than half of the students consumed vegetables on a daily basis considering vegetable consumption showed relationship with weight status. Consumption of vegetables and fruits is lower than previous studies. Low consumption of fruits and vegetables could be due to decreased appetite for fruits and vegetables as they are not appealing as compared to foods such as fast foods.

This study has revealed that most students consume breakfast on a daily basis contrary to past behaviour where students used to skip breakfast consumption. This might be due to university students recognizing breakfast as an important meal.

There findings indicate high prevalence of overweight and obesity among the students which is higher than previous studies.

5. Conclusion

Relevant ministries and universities in Kenya should be encouraged to develop nutrition & health policies that promote engagement in physical activity particularly vigorous physical activity regardless of weight and encouraging healthy eating among university students. Universities in Kenya should strive to come up with institutional strategies and more interventions which educates university students and encourages them to adopt healthier lifestyle in their university years and beyond by meeting the recommended levels of physical activity and adopting good dietary practices.

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