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Association Between Physical Activity Levels and Nutritional Status Among Undergraduate Young Adults at Kabarak University, Nakuru County, Kenya

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ABSTRACT: Physical inactivity is a leading risk factor for non-communicable diseases, yet more than 80% of young adults worldwide fall short of recommended physical activity levels. This study examined the association between physical activity levels and the nutritional status of undergraduate young adults at Kabarak University, Nakuru County, Kenya. Guided by the Social Ecological Model, the study employed a quantitative, cross-sectional survey design. A sample of 396 full-time undergraduate students aged 19 to 25 years was selected through proportionate cluster and systematic random sampling across six faculties, and 240 usable responses were obtained, a response rate of 60.6%. Physical activity was measured using the International Physical Activity Questionnaire–Short Form, while nutritional status was determined from measured height and weight using World Health Organization Body Mass Index (BMI) classifications. Data were analyzed using descriptive statistics and the chi-square test of independence at the 0.05 significance level. Results showed that 35.8% of students were physically inactive, while 54.2% had normal BMI, 23.7% were overweight, 8.3% were obese, and 13.8% were underweight. Physical activity level was significantly associated with nutritional status ($\chi^2 = 22.34$, df = 6, p = .001), and the null hypothesis was rejected. Highly active students recorded the largest proportion of normal BMI (68.1%), whereas inactive students recorded elevated proportions of both overweight/obesity (36.1%) and underweight (18.6%). The university should institutionalize structured physical activity programming and integrate routine physical activity and nutrition screening into student health services.

KEYWORDS: Body mass index, nutritional status, physical activity, undergraduate students, young adults

I. INTRODUCTION

The World Health Organization (WHO) advocates regular physical activity for all age groups to prevent and manage non-communicable diseases, including cardiovascular disease, type 2 diabetes, and some cancers, and to promote overall health (World Health Organization, 2024). Adults are advised to accumulate at least 150 minutes of moderate-intensity physical activity per week, or the equivalent of 75 minutes of vigorous-intensity activity (WHO, 2023). Despite these guidelines, more than 80% of adolescents and young adults globally do not attain recommended activity levels (World Health Organization, 2022), and activity declines consistently from childhood through adolescence into young adulthood, particularly within institutional settings (Aira et al., 2021; García-Hermoso et al., 2021). Physical inactivity contributes substantially to the global burden of cardiovascular morbidity and mortality (Bull et al., 2020).

University entry is a critical period during which young adults establish long-term health behaviors. Academic pressure, financial constraints, and independent living can disrupt physical activity routines and dietary habits (Jurado-Gonzalez et al., 2025). At the same time, both undernutrition and overweight/obesity are rising among Kenyan youth. National estimates place the prevalence of overweight and obesity among Kenyan adults at up to 31.13% (Mkuu et al., 2021), while the Department of Health Services, Nakuru County (2021) reports that approximately 30% of adults in the county are overweight or obese. This coexistence of underweight and overweight within the same population, the double burden of malnutrition, is increasingly documented across urban sub-Saharan African settings (Okeyo et al., 2020; Omer et al., 2022).

Fewer than half of university students globally meet recommended physical activity guidelines (Bailey et al., 2022), and institutional environments strongly shape activity and dietary behaviors (Edelmann et al., 2022). In Kenya, studies at public universities have documented rising overweight and obesity alongside persistent underweight among students (Ndung'u et al., 2025; Nyanchoka et al., 2022). However, private universities present a distinct context: student socio-economic profiles, on-campus catering, and institutional facilities differ from those of public institutions. This gap justified the present study, since without context-specific evidence, universities cannot design targeted interventions, and unaddressed physical inactivity risks entrenching poor nutritional outcomes during a formative life stage.

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The objective of this study was to examine the association between physical activity levels and the nutritional status of undergraduate young adults at Kabarak University, Nakuru County. Specifically, the study measured the physical activity levels of undergraduate students, determined their nutritional status using Body Mass Index, and tested the association between the two variables. The study tested the null hypothesis (H_0) that there is no significant association between physical activity levels and the nutritional status of undergraduate young adults at Kabarak University, Nakuru County.

II. METHODOLOGY

Research Design and Study Location

The study employed quantitative, cross-sectional survey design. This design permits simultaneous measurement of multiple variables at a single point in time and is suited to testing associations between behavioral and health-status variables across a defined population. The study was conducted at Kabarak University, a private chartered university located approximately 20 kilometers from Nakuru City in Nakuru County, Kenya.

Population, Sample Size and Sampling Techniques

The target population comprised 5,680 full-time undergraduate students aged 19 to 25 years across six faculties: Law, Music, Business, Education, Health Science, and Engineering. Using Cochran's formula with a finite population correction and a 10% allowance for non-response, a sample of 396 students was determined. Proportionate cluster sampling by faculty ensured representation across academic disciplines, and systematic random sampling was used to select respondents within each faculty. Students outside the 19–25 age range, part-time and postgraduate students, and students with known chronic diseases were excluded.

Data Collection Instruments and Procedures

Physical activity was measured using the International Physical Activity Questionnaire–Short Form (IPAQ-SF), a validated instrument that converts self-reported activity into Metabolic Equivalent of Task minutes per week (MET-min/week) and classifies respondents as low (<600 MET-min/week), moderate (600–1,499 MET-min/week), or high (≥1,500 MET-min/week) (IPAQ Committee, 2005; Soares et al., 2019). Nutritional status was assessed objectively: trained research assistants measured height and weight using standardized equipment, and BMI was categorized according to WHO cut-offs as underweight (<18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²), or obese (≥30.0 kg/m²) (Zierle-Ghosh & Jan, 2023). The instrument was pre-tested on 30 students at a comparable institution, content validity was established through expert review, and internal consistency was confirmed using Cronbach's alpha against the 0.7 threshold. Data were collected on campus by the researcher and trained assistants, with completed questionnaires cross-checked for accuracy before secure storage.

Data Analysis

Data were cleaned, coded, and analyzed in SPSS version 27.0. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized activity levels and nutritional status, and a chi-square test of independence examined the association between the two variables at $\alpha = 0.05$.

III. ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Kabarak University Research Ethics Committee through the Institute of Postgraduate Studies, and a research permit was granted by the National Commission for Science, Technology and Innovation (NACOSTI). Institutional authorization was also obtained from the university administration before data collection commenced. Participation was entirely voluntary, and respondents provided written informed consent after being briefed on the purpose of the study, the instruments used, and the intended use of the findings; they retained the right to withdraw at any point without consequence. Questionnaires were anonymized using identification numbers instead of names, and anthropometric measurements were taken in a private room to protect participant dignity. Electronic data were stored on a password-protected computer accessible only to the research team, hard copies were kept in a lockable cabinet, and all data will be securely destroyed five years after project completion. The researcher declares no conflict of interest in the conduct of this study, and no participant suffered harm during the research process.

IV. RESULTS

Response Rate and Descriptive Statistics

Of the 396 questionnaires distributed, 240 usable questionnaires were returned, a response rate of 60.6%. This exceeds the 50% threshold considered adequate for survey-based research (Mugenda & Mugenda, 2008; Sataloff & Vontela, 2021). Female students constituted 55.0% of respondents, 45.0% were aged 19–21 years, and 65.0% resided in on-campus hostels.

Table 1 presents the distribution of physical activity levels. The largest proportion of respondents (44.6%) fell within the moderate category, 35.8% were classified as inactive, and only 19.6% were highly active. The finding that more than one-third of students did not meet recommended activity levels is consistent with global patterns among young adults (World Health Organization, 2022).

Table 1. Distribution of Physical Activity Levels (n = 240)

Physical activity category	Frequency	Percentage (%)
Low (inactive: <600 MET-min/week)	86	35.8
Moderate (600–1,499 MET-min/week)	107	44.6
High (≥1,500 MET-min/week)	47	19.6

Note. MET = Metabolic Equivalent of Task. Classification based on IPAQ scoring guidelines (IPAQ Committee, 2005; Soares et al., 2019).

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Table 2 presents nutritional status. More than half of the respondents (54.2%) had a normal BMI. However, a combined 32.0% were overweight (23.7%) or obese (8.3%), while 13.8% were underweight. The coexistence of underweight and overweight within the same student population reflects the double burden of malnutrition documented in urban sub-Saharan African settings (Okeyo et al., 2020; Omer et al., 2022), and the combined overweight/obesity prevalence closely mirrors the approximately 30% reported for adults in Nakuru County (Department of Health Services, Nakuru County, 2021).

Table 2. Nutritional Status Based on Body Mass Index (n = 240)

BMI category	BMI range (kg/m²)	Frequency	Percentage (%)
Underweight	<18.5	33	13.8
Normal weight	18.5–24.9	130	54.2
Overweight	25.0–29.9	57	23.7
Obese	≥30.0	20	8.3

Note. BMI = Body Mass Index. Categories based on WHO classification (Zierle-Ghosh & Jan, 2023).

Inferential Analysis

A chi-square test of independence examined the association between IPAQ-classified physical activity levels and BMI-based nutritional status categories. Table 3 presents the cross-tabulation.

Table 3. Physical Activity Level by Nutritional Status Category (n = 240)

Physical activity level	Underweight (%)	Normal weight (%)	Overweight (%)	Obese (%)
Low (inactive)	18.6	45.3	28.0	8.1
Moderate	10.3	57.9	24.3	7.5
High	12.8	68.1	17.0	2.1

Note. $\chi^2 = 22.34$, df = 6, p = .001.

The test yielded a statistically significant result ($\chi^2 = 22.34$, df = 6, p = .001). The null hypothesis (H_0) that there is no significant association between physical activity levels and the nutritional status of undergraduate young adults at Kabarak University was therefore rejected. Students classified as highly active had the largest proportion with normal BMI (68.1%) and the lowest prevalence of overweight (17.0%) and obesity (2.1%). In contrast, inactive students had the smallest normal BMI proportion (45.3%) and the highest combined overweight and obesity prevalence (36.1%). Notably, inactive students also recorded the highest underweight proportion (18.6%), indicating that inactivity was associated with poor nutritional outcomes at both ends of the BMI spectrum.

V. DISCUSSION

The significant association between physical activity and nutritional status confirms the protective role of regular activity against overweight and obesity in university students. The gradient across activity categories, with normal-weight prevalence rising from 45.3% among inactive students to 68.1% among highly active students, aligns with international evidence that students meeting activity guidelines maintain healthier body weight (Bailey et al., 2022; Bull et al., 2020). Regular activity supports energy balance, muscle maintenance, and metabolic health in young adults, which explains the concentration of normal BMI among the most active students. The finding that only 19.6% of students achieved high activity levels, against WHO recommendations of at least 150 minutes of moderate-intensity activity weekly (WHO, 2023), highlights the gap between guidelines and practice in this population and parallels patterns documented at Kenyatta University (Ndung'u et al., 2025).

The elevated underweight proportion among inactive students (18.6%) demonstrates that physical inactivity can coexist with several forms of poor nutritional status. Underweight in this group may reflect inadequate dietary intake, skipped meals, and financial constraints, while overweight and obesity may reflect sedentary routines combined with energy-dense convenience foods (Milanese et al., 2025; Nyanchoka et al., 2022). Interpreted through the Social Ecological Model, these outcomes are shaped by the institutional environment, including timetabling that limits free time, the accessibility of sports facilities, and the campus food environment (Edelmann et al., 2022; Owusu et al., 2023). Interventions that target only obesity would therefore overlook a nutritionally vulnerable underweight subgroup within the same inactive population.

The study has limitations. Physical activity was self-reported through the IPAQ-SF, introducing possible recall bias, and the cross-sectional design establishes association rather than causation. BMI, while objective and standardized, does not distinguish fat mass from lean mass. Future research should employ longitudinal designs to establish causal pathways, incorporate body-composition measures such as bioelectrical impedance or handgrip strength, and compare public and private university settings to strengthen generalizability. A testable proposition emerging from this study is that improving the institutional activity environment would shift the BMI distribution toward the normal range at both extremes.

VI. CONCLUSION

Physical inactivity was common among undergraduate students at Kabarak University, with 35.8% not meeting recommended activity levels. Physical activity level was significantly associated with nutritional status ($\chi^2 = 22.34$, df = 6, p = .001), and the null hypothesis was rejected. More active students were more likely to maintain a normal BMI, while inactive students showed higher rates of both overweight/obesity and underweight. Physical activity is therefore a modifiable, cost-effective lever for improving nutritional outcomes in this population.

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VII. RECOMMENDATIONS

Based on the conclusion, Kabarak University should prioritize structured, timetabled physical activity opportunities within campus health-promotion programs, accessible to all students and aligned with the WHO recommendation of at least 150 minutes of moderate-intensity activity per week. Active lifestyles should be integrated into students' daily routines and the campus environment through accessible sports facilities and institution-wide activity initiatives. Targeted support should be provided for students at risk at both ends of the nutritional spectrum, addressing food insufficiency among underweight students alongside obesity prevention. Finally, student health services should strengthen routine physical activity and nutrition screening, enabling early identification and referral of at-risk students.

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Conflict of Interest

There was no conflict of interest regarding the research, authorship, or publication of this article.

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