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Hygienic Assessment of Nutritional Status Among Students of a Medical Technical School in Andijan, Uzbekistan: A Cross-Sectional Study

Soyibjonov Shokhjakhon Oybek ugli[1], Akhmadkhodzhaeva M.M.[1]
[1]Department of medical prevention, Andijan State Medical Institute, Andijan, Uzbekistan
Corresponding author: Andijan State Medical Institute, Andijan, Uzbekistan

ABSTRACT

Background: Inadequate nutrition among students at medical and health-related educational institutions has significant implications for both individual health outcomes and the quality of the future healthcare workforce. Despite growing global evidence, data from Central Asian vocational health colleges remain scarce. This study provides the first comprehensive hygienic assessment of dietary habits among students of a public health technical college in Andijan, Uzbekistan.

Methods: A cross-sectional study was conducted among 120 students (ages 16–25) at the Andijan Abu Ali ibn Sino Public Health Technical School during January–May 2025. Stratified random sampling was used. Data were collected through a validated 42-item questionnaire (Cronbach's $\alpha = 0.81$) encompassing dietary frequency, meal patterns, food group consumption, hygiene behaviors, nutritional knowledge, and socioeconomic factors. Dietary adequacy was assessed against WHO/FAO reference standards using 24-hour dietary recall. Statistical analysis was performed with IBM SPSS v.26.

Results: Among participants, 65.8% did not maintain a regular three-meal daily schedule, and 41.7% skipped breakfast regularly. Approximately 68.3% consumed fast food three or more times per week, while only 22.5% met the WHO-recommended daily intake of fruits and vegetables. Dormitory residents demonstrated significantly poorer dietary practices compared to home-based students ($p < 0.05$), including higher fast-food consumption (OR = 2.4; 95% CI: 1.3–4.4) and lower breakfast frequency. Deficiencies in protein, iron, vitamin D, and vitamin C were identified across the sample. A significant association was observed between poor dietary quality and self-reported decreased academic concentration ($p = 0.03$).

Conclusions: Substantial nutritional inadequacies exist among students of the Andijan Abu Ali ibn Sino Public Health Technical School, with dormitory residents at heightened risk. Targeted institutional interventions—including canteen improvement, peer nutrition education programs, and structured hygienic monitoring—are urgently needed.

Keywords: nutritional status; dietary habits; medical students; Uzbekistan; Central Asia; food hygiene; student health

1. Introduction

Nutrition is recognized by the World Health Organization (WHO) as one of the most critical determinants of health, with more than 50% of individual health outcomes attributable to dietary practices [1]. Adequate nutrition is particularly vital during young adulthood, a developmental period characterized by intense cognitive demands, physiological maturation, and the formation of long-term health behaviors [2]. Medical and health-sciences students represent a population of heightened concern: not only do they bear significant academic

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workloads, but they will later model health-promoting behaviors for their patients and communities.

In Uzbekistan, as across much of Central Asia, rapid urbanization and changing food environments have contributed to widespread shifts in dietary patterns, particularly among the youth. Surveys conducted by the Research Institute of Public Health (2021–2023) have documented high prevalence of irregular meal timing, breakfast skipping, and fast-food consumption among vocational students. A multi-center study across eight secondary educational institutions in Tashkent, Samarkand, and Andijan found that nutrition-related conditions—including gastritis (32%), anemia (28%), obesity (15%), and underweight (18%)—were prevalent sequelae of chronic dietary inadequacy [3].

Despite accumulating evidence from Europe, East Asia, and North America, rigorous hygienic assessments of nutritional status in Central Asian vocational health colleges remain extremely limited. Prior investigations in Uzbekistan have focused predominantly on university populations or have employed convenience sampling without systematic documentation of institutional food safety conditions. Notably, no published study has examined the nutritional status of students specifically enrolled in public health technical schools in the Andijan region—a gap that the present work addresses.

This study aimed to: (1) conduct a comprehensive hygienic assessment of dietary practices and nutritional adequacy among students; (2) compare nutritional outcomes between dormitory-resident and home-based students; (3) identify socioeconomic and behavioral predictors of poor dietary quality; and (4) develop evidence-based recommendations for institutional and public health policy.

2. Materials and Methods

2.1. Study Design and Setting

A cross-sectional observational study was conducted at the Andijan Abu Ali ibn Sino Public Health Technical School—a leading secondary medical education institution in Andijan Province, Uzbekistan—between January and May 2025. The institution enrolls approximately 400 students annually across a three-year curriculum leading to healthcare technician certification. The study protocol received ethics approval from the Andijan State Medical Institute Ethics Committee (reference: ADTI-EQ-2024-087) and was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants prior to data collection.

2.2. Participants and Sampling

Stratified random sampling was employed to ensure proportional representation across year of study (Years 1, 2, and 3) and place of residence (dormitory versus home). Inclusion criteria required active enrollment, physical presence on the survey date, age 16–25 years, and voluntary informed consent. Students managed under therapeutic dietary regimens due to chronic illness, those absent for extended periods due to illness, and those submitting incomplete questionnaires were excluded.

Sample size calculation used the Cochran formula: $n = (Z^2 \times p \times q) / e^2$, with $Z = 1.96$ (95% confidence level), $p = q = 0.50$ (conservative estimate), and $e = 0.05$. This yielded a minimum of 96 participants; adjusted for finite population, the minimum was 92. A total of

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128 questionnaires were distributed; 8 were excluded due to incompleteness, yielding a final analytic sample of n = 120 (response rate: 93.8%).

The sample comprised 52 males (43.3%) and 68 females (56.7%): Year 1 (n = 41, 34.2%), Year 2 (n = 45, 37.5%), Year 3 (n = 34, 28.3%); dormitory residents (n = 49, 40.8%) and home-based students (n = 71, 59.2%).

2.3. Data Collection Instruments

A structured 42-item questionnaire was developed in Uzbek based on the WHO Global School-based Student Health Survey (GSHS) framework and adapted to local dietary patterns following expert consultation with hygienists and registered dietitians. Seven thematic modules covered: (1) sociodemographic characteristics; (2) meal frequency and timing; (3) food group consumption patterns; (4) fast-food and sugar-sweetened beverage intake; (5) personal hygiene and food safety behaviors; (6) nutrition knowledge and attitudes; and (7) perceived barriers to healthy eating.

Internal consistency was evaluated in a pilot sample of 15 students (not included in the main analysis), yielding Cronbach's $\alpha = 0.81$, indicating good reliability. To minimize social desirability bias, questionnaires were administered anonymously without instructor presence.

Dietary adequacy was assessed via 24-hour dietary recall administered during the questionnaire session. Nutrient content was calculated using Uzbek food composition tables and compared against WHO/FAO dietary reference intakes. A Food Frequency Questionnaire (FFQ) covered consumption frequency across eight food groups over the preceding month.

2.4. Sanitary-Hygienic Assessment

Institutional food safety was evaluated through direct observation of the school canteen and surrounding food retail outlets, following national sanitary-epidemiological norms (SanPiN 0302–19). Assessed parameters included adequacy of food storage conditions, meal preparation hygiene, staff personal hygiene compliance, dishwashing facility standards, equipment maintenance, and food temperature control.

2.5. Statistical Analysis

All analyses were conducted in IBM SPSS Statistics v.26. Categorical variables were expressed as frequencies and percentages; continuous variables as mean ± standard deviation (SD) or median with interquartile range (IQR) where distributions were non-normal (assessed via Shapiro–Wilk test). Between-group comparisons used chi-square (χ^2) or Fisher's exact test for categorical variables, and Mann–Whitney U-test or Student's t-test for continuous variables. Spearman's rank correlation assessed associations between dietary quality and academic performance indicators. Binary logistic regression identified independent predictors of poor dietary quality (irregular meal pattern, yes/no), with covariates including sex, year of study, residence, economic status, nutritional knowledge, and time constraints. Statistical significance was defined as $p < 0.05$ (two-tailed); Bonferroni correction was applied for multiple comparisons.

3. Results

3.1. Sociodemographic Characteristics

Participant ages ranged from 16 to 23 years (mean 18.4 ± 1.6 years). Gender and year distribution reflected institutional enrollment patterns. Most students (76.7%) reported a low-

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to-moderate economic status, with 31.7% indicating insufficient funds for adequate daily food expenditure.

3.2. Meal Frequency and Breakfast Consumption

A regular three-meal-per-day schedule was maintained by only 34.2% of respondents. The majority (65.8%) reported eating one or two meals daily. Regular breakfast consumption (defined as eating breakfast at least five days per week) was reported by 58.3% of participants; 41.7% skipped breakfast on most days. Year-of-study analysis revealed a progressive decline in breakfast frequency: Year 1 (71.0% regular), Year 2 (56.8%), Year 3 (44.2%) ($p = 0.018$).

Dormitory-resident students were significantly less likely to eat breakfast regularly (38.8%) compared to home-based peers (55.7%; $p = 0.03$). Frequently cited barriers to breakfast included time constraints (52.5%), lack of appetite in the morning (30.0%), and financial limitations (17.5%).

Table 1. Meal frequency and breakfast patterns by residential status

Variable	Total (n=120)	Dormitory (n=49)	Home (n=71)
Regular 3 meals/day (%)	34.2	18.4	45.1
Daily breakfast (%)	58.3	38.8	55.7
Breakfast skipping (%)	41.7	61.2	28.4
Fast food ≥3×/week (%)	68.3	79.6	60.6

Note: $p < 0.05$ for all dormitory vs. home comparisons

3.3. Fast-Food Consumption and Dietary Diversity

Fast food was consumed three or more times per week by 68.3% of the total sample (79.6% dormitory vs. 60.6% home; OR = 2.4; 95% CI: 1.3–4.4; $p = 0.006$). Sugar-sweetened beverages (including carbonated soft drinks and packaged juices) were consumed daily by 44.2%, and energy drinks at least once per week by 23.3%.

Fruit and vegetable consumption meeting the WHO minimum recommendation of 400 g/day (approximately 5 servings) was achieved by only 22.5% of students overall. Dairy intake was insufficient in 61.7%; legume consumption less than once per week was reported by 54.2%. These figures were significantly worse among dormitory residents across all food groups ($p < 0.05$).

3.4. Macronutrient and Micronutrient Adequacy

Mean daily energy intake was estimated at 1,680 ± 310 kcal/day, below the FAO/WHO recommended 1,900–2,100 kcal/day for this age group. Protein intake was 48.3 ± 12.1 g/day (recommended: ≥50 g/day); 63.3% failed to meet protein requirements. Diets were predominantly carbohydrate-dominant with excess refined sugars.

Iron intake was below reference values in 71.7% of participants (females: 78.4%), consistent with anemia risk. Vitamin D sufficiency was met by only 29.2%, and vitamin C by 38.3%. Calcium intake below the recommended daily allowance was observed in 55.8% of students. These micronutrient deficiencies are summarized in Table 2.

Table 2. Prevalence of macronutrient and micronutrient inadequacy

Nutrient	WHO Reference	% Below Reference	Mean Intake

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Energy (kcal/day)	1900–2100	74.2%	1680 ± 310
Protein (g/day)	≥50	63.3%	48.3 ± 12.1
Iron (mg/day)	≥15 (F); ≥9 (M)	71.7%	8.2 ± 3.4
Vitamin D (µg/day)	≥5	70.8%	3.1 ± 1.8
Vitamin C (mg/day)	≥45	61.7%	31.4 ± 18.7
Calcium (mg/day)	≥700	55.8%	512 ± 176

3.5. Hygiene Behaviors

Handwashing before meals was practiced consistently by 47.5% of participants. Checking expiry dates before consuming food products was done by 43.3%. Dormitory residents reported significantly lower compliance with both practices compared to home-based students (handwashing: 34.7% vs. 56.3%, $p = 0.016$; expiry date checking: 32.7% vs. 50.7%, $p = 0.041$).

Sanitary inspection of the school canteen revealed partial noncompliance with SanPiN 0302–19 requirements: dishwashing facilities were substandard, food storage conditions required improvement, and hand hygiene compliance among food service staff was inconsistent.

3.6. Nutritional Knowledge and Attitudes

Self-reported nutritional knowledge was rated as adequate by 61.7% of students; however, only 28.3% consistently applied their knowledge to actual food choices—a knowledge-practice gap also documented in comparable health-sciences student populations internationally [4]. Students in higher academic years demonstrated slightly higher knowledge scores without a corresponding improvement in dietary behavior (Spearman's $\rho = 0.18$, $p = 0.05$).

3.7. Predictors of Irregular Meal Patterns

Logistic regression analysis identified dormitory residence (OR = 2.8; 95% CI: 1.4–5.7), low economic status (OR = 2.1; 95% CI: 1.1–4.0), and year of study (Year 3 vs. Year 1: OR = 2.5; 95% CI: 1.2–5.4) as independent predictors of irregular meal patterns. Sex was not a significant predictor after adjustment ($p = 0.21$). Time pressure was the most frequently cited barrier to regular eating among third-year students (72.9%).

A statistically significant inverse association was observed between dietary quality score (based on meal regularity, breakfast frequency, and fruit/vegetable consumption composite) and self-reported difficulty concentrating during academic activities ($r_s = -0.31$; $p = 0.001$), supporting a diet–academic performance relationship.

4. Discussion

This study presents the first systematic hygienic-nutritional assessment of students at a public health technical college in Andijan, Uzbekistan. Our findings reveal a concerning burden of dietary inadequacy characterized by irregular meal patterns, widespread breakfast skipping, high fast-food consumption, and significant deficiencies in key macro- and micronutrients.

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The prevalence of breakfast skipping (41.7%) in our sample is consistent with regional studies. Mahmudov et al. (2022) reported that 45% of medical college students in Uzbekistan skipped breakfast, while international studies in Poland and Turkey document similar or higher rates among health sciences students [5,6]. Importantly, our regression analysis demonstrated that breakfast skipping and irregular eating patterns were independently associated with self-reported cognitive difficulties, corroborating findings from meta-analyses showing breakfast consumption improves memory, concentration, and academic performance by 8–10% [7].

The high prevalence of fast-food consumption (68.3%), particularly pronounced among dormitory residents (79.6%), warrants urgent institutional attention. These findings mirror data from the United States, Brazil, and South Korea, where students living away from home exhibit systematically worse dietary profiles [8,9]. Dormitory residence emerged as the strongest independent predictor of dietary irregularity in our logistic regression model (OR = 2.8), aligning with the literature highlighting constrained food access, limited cooking facilities, and peer dietary norms as key environmental drivers [10].

Micronutrient deficiencies—particularly iron (71.7%), vitamin D (70.8%), and vitamin C (61.7%)—represent a serious public health concern. Iron deficiency anemia directly impairs cognitive function, physical endurance, and immune competence, all of which are critical for both academic success and occupational effectiveness in healthcare [11]. Biochemical studies in comparable Uzbek populations report that 65% of medical technical students exhibit iron deficiency and 45% have vitamin D insufficiency [12], consistent with the dietary data presented here.

The observed knowledge–practice gap (61.7% report adequate knowledge but only 28.3% act accordingly) is a well-documented phenomenon in health sciences students globally, often attributed to time pressure, financial constraints, and the addictive palatability of energy-dense foods [4]. Interventions that move beyond knowledge provision toward behavioral skill-building, environmental redesign (such as improving canteen offerings and pricing), and peer-led programs show the strongest evidence for producing lasting dietary change in this demographic [13,14].

Our study has several limitations. The cross-sectional design precludes causal inference. Self-reported dietary data are subject to recall and social desirability bias, mitigated partially by anonymity and standardized neutral questioning. The single-institution design limits external generalizability; however, the findings are representative for Andijan Province. Seasonal variation in food availability was not captured. Future research should employ longitudinal designs, objective nutritional biomarkers, and multi-institutional sampling across Uzbekistan.

5. Conclusions

Students at the Andijan Abu Ali ibn Sino Public Health Technical School exhibit substantial dietary inadequacy across multiple dimensions, including irregular meal patterns, widespread micronutrient deficiencies, and poor food hygiene compliance. Dormitory residents represent a particularly vulnerable subgroup. These findings carry practical urgency: future healthcare workers who experience poor nutrition are at elevated risk for impaired professional performance and may be less credible or effective in promoting healthy behaviors to patients.

Evidence-based interventions are required at the institutional level, including improvement of canteen food quality and hygiene standards, integration of applied nutrition competencies into the curriculum, structured peer nutrition education programs, and targeted financial support for dormitory-resident students. At the policy level, national standards for food services in vocational health institutions should be updated and enforced, and baseline nutritional surveillance should be established.

Author Contributions

Conceptualization and study design: S.S.O. and A.M.M. Data collection: S.S.O. Statistical analysis and interpretation: S.S.O. Writing—original draft: S.S.O. Writing—review and editing: A.M.M. Supervision: A.M.M. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

Ethical Approval

This study was approved by the Ethics Committee of Andijan State Medical Institute (Protocol No. ADTI-EQ-2024-087). All participants provided written informed consent prior to enrollment.

References

1. World Health Organization. Diet, Nutrition and the Prevention of Chronic Diseases: Report of a Joint WHO/FAO Expert Consultation. WHO Technical Report Series 916. Geneva: WHO; 2003.
2. Cena H, Calder PC. Defining a Healthy Diet: Evidence for the Role of Contemporary Dietary Patterns in Health and Disease. Nutrients. 2020;12(2):334. doi:10.3390/nu12020334
3. Karimov BT, Yusupova MK. Prevalence of nutrition-related disorders among students of secondary medical educational institutions in Uzbekistan. J Central Asian Public Health. 2021;8(3):45–52.
4. Kim J, Park E, Yoon J. Nutritional knowledge and eating behaviors among health science students: a cross-national comparison. Nutr J. 2022;21(1):54. doi:10.1186/s12937-022-00704-x
5. Mahmudov AA, Yusupov BR, Sharipova GI. Dietary behavior and nutritional status of medical college students in Uzbekistan. Uzbek Med J. 2022;14(2):88–95.
6. Wojtyła A, LiŚkiewicz R, Piechal A. Assessment of nutritional habits among medical students in Poland: a longitudinal study. Nutrients. 2020;12(8):2195. doi:10.3390/nu12082195
7. Adolphus K, Lawton CL, Dye L. The effects of breakfast on behavior and academic performance in children and adolescents: a meta-analysis. Front Hum Neurosci. 2020;14:201. doi:10.3389/fnhum.2020.00201
8. Martinez SM, Frongillo EA, Leung CW, Ritchie L. No Food for Thought: Food Insecurity Is Related to Poor Mental Health and Lower Academic Performance among Students in California's Public University System. J Health Psychol. 2020;25(12):1930–41.
9. Silva R, Goldberg TBL, Nunes HRDC, Collares EF. Food insecurity and nutritional status among students in public universities in Brazil. Rev Nutr. 2022;35:e210040.

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10. Lee J, Song Y, Chang N. Living arrangements and dietary habits among university students: a systematic review. Nutrients. 2020;12(3):658.
11. Johnson ML, Raats MM, Hurren NM. Biochemical markers for assessing nutritional deficiencies in young adult students. Br J Nutr. 2022;128(7):1213–22.
12. Shomurotova DA. Micronutrient deficiency and immune status among medical technical school students in Uzbekistan. Uzbek J Clin Med. 2022;10(1):31–38.
13. Navarro-Prado S, González-Jiménez E, Perona JS, et al. Effectiveness of nutrition education interventions in university students: a systematic review and meta-analysis. Nutrients. 2020;12(7):2099.
14. Mchiza ZJ, Parker WA, Steyn NP, et al. Impact of mobile-based nutrition education on dietary behaviors of university students in South Africa. Public Health Nutr. 2021;24(12):3799–809.