

Dietary Diversity among Students at Gaston Berger University of Saint-Louis, Senegal, in 2026: A Cross-Sectional Study

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Abstract

Background: Dietary diversity is a key indicator of the nutritional adequacy of a diet. University students represent a population particularly vulnerable to nutritional imbalances during their transition to independence. The dietary habits of students at Gaston Berger University (UGB) remain poorly documented at the institutional level. **Objective:** To assess dietary diversity among UGB students in 2026. **Methods:** A cross-sectional descriptive and analytical study was conducted from February 1 to April 30, 2026 among 400 students selected by proportional stratified random sampling by academic department (UFR) and sex. Data were collected using an electronic questionnaire administered via Open Data Kit (ODK) and analyzed with JAMOV. The individual dietary diversity score (DDS) was calculated using the FAO 24-hour dietary recall method across 13 food groups. Multivariate logistic regression was performed to identify factors independently associated with high dietary diversity. **Results:** The mean age of participants was 21.8 ± 2.6 years, with a near-equal sex distribution (51% male). The mean DDS was 7.1 ± 2.8 out of 13. Dietary diversity was low in 45.2% of students, moderate in 25.5%, and high in 29.2%. Cereals (85.8%), dairy products (81%), and meats (71%) were the most frequently consumed food groups, while dark green leafy vegetables (23%) and organ meats (23.8%) were the least represented. More than half of students (53.2%) subjectively perceived their diet as insufficiently diverse. In multivariate analysis, living with family (OR = 2.69; 95%CI [1.65 - 4.38]; $p < 0.001$), residing in the Ziguinchor region (OR = 2.79; 95%CI [1.00 - 7.77]; $p =$

0.05), and having access to a personal kitchen (OR = 1.68; 95%CI [1.02 - 2.76]; $p = 0.04$) were independently associated with high dietary diversity. **Conclusion:** The majority of UGB students exhibit insufficient dietary diversity. Family living arrangements and access to a personal kitchen emerged as protective determinants of dietary quality. These findings call for targeted interventions in nutritional education and improvement of the campus food environment.

Keywords

Dietary Diversity, University Students, Dietary Diversity Score, Associated Factors, Senegal, Sub-Saharan Africa

1. Introduction

Diet is one of the primary determinants of human health. Among the indicators used to evaluate the quality of dietary intake, dietary diversity occupies a central position. It is defined as the number of distinct food groups consumed by an individual over a given reference period, typically 24 hours. This qualitative indicator reflects the variety of foods ingested and the potential adequacy of essential nutrient intake [1].

Despite globally sufficient food production, food insecurity and malnutrition persist worldwide. The FAO estimated that 8.2% of the global population, approximately 673 million people, experienced hunger in 2024 [2]. In sub-Saharan Africa, dietary patterns remain frequently monotonous, dominated by starchy staples and deficient in essential micronutrients [3].

In Senegal, the nutritional situation is characterized by the triple burden of malnutrition, encompassing persistent micronutrient deficiencies, childhood stunting, and a rapidly increasing prevalence of diet-related non-communicable diseases (NCDs) among adults [4] [5]. The country has a predominantly young population, with 75% of individuals aged under 35 years according to the 2023 national census (RGPH5) [6].

University students constitute a nutritionally vulnerable population of particular interest. The transition to university life represents a significant disruption in lifestyle and dietary habits, typically characterized by increased autonomy in food choices, financial constraints, and an irregular daily schedule that may predispose students to unhealthy dietary behaviors [7]. Inadequate nutrition has been shown to negatively affect academic performance, overall well-being, and long-term health, with increased susceptibility to chronic diseases [8].

Gaston Berger University (UGB) in Saint-Louis, the second-largest public university in Senegal, provides a relevant setting for studying dietary habits among young adults. A previous study conducted by Togtoga *et al.* in 2023 among medical students at the UFR Health Sciences revealed high dietary diversity in only 31.9% of male and 28.7% of female students [9]. However, that study was limited to a single academic track.

The present study aimed to assess dietary diversity across all UGB students, regardless of academic department, in order to fill an existing data gap and inform the development of targeted nutritional interventions. The primary objective was to evaluate dietary diversity among UGB students in 2026, with three specific objectives: 1) to describe the sociodemographic and economic profile of students, 2) to characterize their dietary habits, and 3) to estimate individual dietary diversity scores and identify their associated determinants.

2. Methods

2.1. Study Setting

The study was conducted at Gaston Berger University (UGB), a public institution of higher education located 13 km from the city of Saint-Louis, along National Road N2, in northern Senegal. Founded in December 1990 and spanning 240 hectares, UGB enrolls approximately 18,839 students across eight academic departments (UFRs): Health Sciences (2S), Agricultural Sciences, Aquaculture and Food Technology (S2ATA), Legal and Political Sciences (SJP), Economics and Management (SEG), Civilizations, Religions, Arts and Communication (CRAC), Applied Sciences and Technology (SAT), Educational Sciences and Sports Training (SEFS), and Humanities and Social Sciences (LSH), as well as the Saint-Louis Polytechnic Institute (IPSL).

The UGB campus includes residential villages (A through Q) and food service infrastructure managed primarily by the Regional University Social Services Center of Saint-Louis (CROUS), comprising two public canteens (R1 and R2) and several privately operated restaurants.

2.2. Study Design and Period

This was a cross-sectional descriptive and analytical study conducted from February 1 to April 30, 2026, aimed at assessing dietary diversity among UGB students and identifying its determinants.

2.3. Study Population and Sampling

2.3.1. Study Population

The target population comprised all students regularly enrolled at UGB for the 2025-2026 academic year.

2.3.2. Inclusion and Exclusion Criteria

All regularly enrolled UGB students who provided free and informed consent were eligible for inclusion. Students unavailable during the data collection period or unable to complete the questionnaire for health-related reasons were excluded.

2.3.3. Sample Size

The sample size was calculated using the Schwartz formula for a proportion ($z = 1.96$; $p = 0.5$; $i = 0.05$). Based on 18,839 enrolled students as documented by the Office of Academic Registration and Statistics (DSOS), the minimum required

sample size was 377 participants, rounded up to 400.

2.3.4. Sampling Method

A proportional stratified random sampling strategy was applied. Strata were defined by academic department (UFR) and sex. The number of students to be interviewed within each stratum was proportional to the respective UFR enrollment relative to the total student population. Within each UFR-by-sex stratum, eligible students present at the data collection sites were enumerated and selected using systematic random sampling, with a sampling interval calculated to reach the stratum-specific quota; the starting point in each list was determined randomly. Recruitment continued until the calculated quota for each stratum was reached. Of the 430 students approached, 25 declined to participate and 5 were excluded for the reasons stated in Section 2.3.2, yielding the final sample of 400 students.

2.4. Data Collection

Data were collected using a structured electronic questionnaire designed on the Open Data Kit (ODK) platform and administered on mobile devices by trained research assistants at the academic campus and the main university entrance. Completed forms were automatically transmitted and securely stored on the ONA server. A pilot test was conducted prior to data collection to assess item comprehension and estimate interview duration.

The questionnaire comprised two sections: 1) sociodemographic and economic data, and 2) dietary habits, including meal frequency, food service utilization, living arrangements (family, shared housing, or alone), access to a personal kitchen, and food groups consumed in the preceding 24 hours. Students' subjective perception of their own diet was assessed using a single closed-ended question ("Do you consider your current diet to be sufficiently diverse?"), with a binary response option (yes/no); students answering "no" were classified as subjectively perceiving their diet as insufficiently diverse.

2.5. Measurement of Dietary Diversity

The individual dietary diversity score (DDS) was calculated using the FAO 24-hour dietary recall methodology [10]. Thirteen food groups were assessed: cereals; white tubers and roots; vitamin A-rich vegetables and tubers; dark green leafy vegetables; other vegetables; vitamin A-rich fruits; other fruits; organ meats; flesh meats; fish and seafood; legumes, nuts, and seeds; dairy products; and oils and fats. One point was attributed for each food group consumed. Diversity levels were defined based on tertiles of the score distribution: low diversity (score at or below the first tertile, T1 = 6), moderate diversity (between T1 and the second tertile, T2 = 8), and high diversity (above T2) [9].

2.6. Data Analysis

Data exported from the ONA server were analyzed using JAMOV software. Descriptive statistics were computed: continuous variables were summarized as

means with standard deviations, minimum, and maximum values; categorical variables were described using absolute and relative frequencies. Bivariate analysis was performed to examine associations between dietary diversity level and socio-demographic, economic, and lifestyle variables. Variables with a p-value below 0.25 in bivariate analysis were entered into a multivariate logistic regression model using a backward stepwise procedure to identify factors independently associated with high dietary diversity. Results are reported as adjusted odds ratios (OR) with 95% confidence intervals (95% CI). The significance threshold was set at 5%. For the multivariate logistic regression, the outcome variable was coded as a binary variable, with students classified as having high dietary diversity (coded 1) compared against the combined low- and moderate-diversity groups (coded 0). The variables entered into the final multivariate model were sex, academic level, marital status, accommodation type, living arrangement (living with family vs. shared housing/alone), access to a personal kitchen, scholarship status, primary income source, and region of origin (Ziguinchor vs. other regions).

2.7. Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki governing research involving human participants. Approval was obtained from the Department of Public Health and Social Medicine of the UFR Health Sciences at UGB (approval reference no. 000114/UGB/UFR2S/DSPMS). Informed consent was obtained from all participants prior to enrollment. Participation was voluntary, with the right to withdraw at any time without consequence. Anonymity and confidentiality were ensured: no personally identifiable data was collected. The study involved no biological sampling or psychosocial risk.

3. Results

3.1. Sociodemographic and Economic Profile

A total of 400 students were enrolled in the study. The mean age was 21.8 ± 2.6 years, ranging from 17 to 35 years. The sex distribution was nearly equal, with 204 males (51%) and 196 females (49%). The vast majority of participants were single (95.2%) and of Senegalese nationality (93.5%).

The most represented academic departments were Humanities and Social Sciences (LSH) and Legal and Political Sciences (SJP), each accounting for 23.5% of participants, followed by Civilizations, Religions, Arts and Communication (CRAC) at 19.5%. First- and second-year undergraduate students (L1 and L2) together accounted for 66.6% of participants. Among Senegalese students, the regions most represented were Dakar (22.9%), Saint-Louis (18.1%), and Thiès (15.2%).

Regarding accommodation, 47% of students lived off-campus, 40.5% on Campus 1, and 12.5% on Campus 2. Seventy percent lived in shared housing. Economically, 62% of students received a government scholarship; the main income sources were parental support (43.5%) and scholarship allowances (42.2%). Only

7.2% of students were employed alongside their studies. Detailed sociodemographic characteristics are presented in **Table 1**.

Table 1. Sociodemographic and economic characteristics of students (n = 400).

Variable	Category	n	%
Sex	Female	196	49.0
	Male	204	51.0
Marital status	Single	381	95.2
	Married	19	4.8
Nationality	Senegalese	374	93.5
	Other nationalities	26	6.5
Academic level	Undergraduate (L1 - L3)	320	80.1
	Master's (M1 - M2)	68	17.0
	Doctoral (D1 - D3)	12	3.0
Scholarship recipient	Yes	248	62.0
	No	152	38.0
Primary income source	Parental support	174	43.5
	Scholarship	169	42.2
	Combined sources	39	9.8
	Employment	18	4.5
Accommodation	Off-campus	188	47.0
	Campus 1	162	40.5
	Campus 2	50	12.5

3.2. Dietary Habits

Regarding daily meal frequency, 62.7% of students reported consuming three meals per day, while 27.8% ate only two. Nevertheless, 64.2% declared skipping at least one meal per day. Breakfast was the most frequently skipped meal (61.9%), followed by lunch (22%). With respect to food sourcing, students reported eating primarily at University Restaurant 2 (R2, 44%), University Restaurant 1 (R1, 29%), private restaurants (13.3%), or preparing their own meals (22.3%).

3.3. Dietary Diversity Score

The mean dietary diversity score was 7.1 ± 2.8 out of a maximum of 13, ranging from 1 to 13. The distribution by diversity level showed that 45.2% of students had low dietary diversity, 25.5% moderate diversity, and 29.2% high diversity (**Table 2**). More than half of students (53.2%) subjectively perceived their diet as insufficiently diverse.

Analysis of food group consumption (**Table 3**) revealed a predominance of ce-

reals (85.8%), dairy products (81%), oils and fats (71.2%), meats (71%), and fish and seafood (66.2%). Conversely, dark green leafy vegetables (23%), organ meats (23.8%), legumes/nuts/seeds (29.5%), and vitamin A-rich vegetables (38%) were the least consumed food groups.

Table 2. Dietary diversity levels among students (n = 400).

Dietary Diversity Level	n	%
Low	181	45.2
Moderate	102	25.5
High	117	29.2
Total	400	100

Table 3. Frequency of food group consumption during the preceding 24 hours (n = 400).

Food Group	Consumed (n)	Consumed (%)
Cereals	343	85.8
Dairy products	324	81.0
Other vegetables	290	72.5
Oils, fats, and palm oil	285	71.2
Flesh meats	284	71.0
Fish and seafood	265	66.2
Other fruits	229	57.2
White tubers and roots	221	55.2
Vitamin A-rich vegetables and tubers	152	38.0
Vitamin A-rich fruits	149	37.2
Legumes, nuts, and seeds	118	29.5
Organ meats	95	23.8
Dark green leafy vegetables	92	23.0

3.4. Factors Associated with High Dietary Diversity

Multivariate logistic regression identified three factors independently associated with high dietary diversity (**Table 4**). Living with family was the most strongly and significantly associated factor (OR = 2.69; 95%CI [1.65 - 4.38]; $p < 0.001$). Residing in the Ziguinchor region was associated with an approximately three-fold higher likelihood of high dietary diversity (OR = 2.79; 95%CI [1.00 - 7.77]; $p = 0.05$), although this association should be interpreted cautiously as it borders the conventional significance threshold. Having access to a personal kitchen was also independently associated with better dietary diversity (OR = 1.68; 95%CI [1.02 - 2.76]; $p = 0.04$).

Table 4. Factors associated with high dietary diversity—Multivariate analysis (n = 400).

Variable	OR (95%CI)	p-value
Residence in Ziguinchor region	2.79 [1.00 - 7.77]	0.05*
Access to a personal kitchen	1.68 [1.02 - 2.76]	0.04
Living with family	2.69 [1.65 - 4.38]	<0.001

*Borderline statistical significance (p = 0.05; 95% CI: 1.00 - 7.77); wide confidence interval reflects a small sub-group sample size.

4. Discussion

4.1. Sociodemographic Profile

Our study enrolled 400 students with a near-equal distribution of males (51%) and females (49%), reflecting the proportional stratification applied during sampling. The mean age of 21.8 ± 2.6 years corresponds to the young adult transitional period, a phase consistently identified in the literature as critical for the formation of lasting dietary habits. University entry represents, for many students, their first experience of full dietary autonomy, often unprepared and subject to multiple competing constraints [7].

The high proportion of scholarship recipients (62%) and students whose primary income source is either a scholarship (42.2%) or parental support (43.5%) reflects substantial economic dependency. Financial constraints are well-documented determinants of dietary quality: across multiple studies conducted in sub-Saharan Africa, economic precarity is consistently associated with reduced dietary diversity and greater reliance on inexpensive staple foods [3] [7]. The fact that only 7.2% of students held concurrent employment further underscores their economic and, consequently, nutritional vulnerability.

The geographic distribution of Senegalese students—predominantly from the regions of Dakar (22.9%), Saint-Louis (18.1%), and Thiès (15.2%) —closely mirrors the national population distribution as documented in the 2023 RGPH5 [6], supporting the representativeness of our sample.

4.2. Dietary Habits and Meal Skipping

The finding that 64.2% of students skip at least one meal daily, primarily breakfast (61.9%), constitutes a major nutritional concern. Breakfast skipping is consistently described in the international literature as the most prevalent dietary behavior among university students. Analysis of the 2023 CDC Youth Risk Behavior Survey data found that 72.6% of students skipped breakfast at least once a week, with significant associations with poorer academic outcomes and deteriorated emotional well-being [11]. A recent study conducted among university students in Bangladesh identified female sex, tobacco use, and poor sleep quality as factors associated with breakfast skipping [12]. In Nigeria, a study of 800 undergraduate students reported a breakfast skipping rate of 56%, similar to ours, with a significant association with sex (p = 0.010) [8]. Together, these findings suggest that

meal skipping among students is a near-universal phenomenon, driven by time constraints, limited food budgets, and separation from the family household.

The consequences of meal skipping, particularly breakfast omission, extend beyond immediate caloric deficits. A study conducted in Morocco demonstrated that breakfast skipping impairs cognitive function, concentration, and short-term memory, with adverse effects on academic performance [13]. Furthermore, students who habitually skip breakfast tend to compensate through increased consumption of energy-dense, nutrient-poor foods outside regular mealtimes, which may paradoxically worsen overall dietary imbalance [12].

The high utilization of University Restaurant 2 (R2) as the primary eating venue (44%) underscores the pivotal role of collective food service in shaping student dietary behaviors. A German interventional study conducted in a university canteen demonstrated that the introduction of clearly labelled, readily accessible healthy food options significantly increased user satisfaction with nutritional quality and boosted vegetable and fruit sales [14]. These findings argue in favor of food environment interventions within university catering facilities, rather than relying solely on educational approaches.

4.3. Dietary Diversity Score: Level and Comparisons

The mean DDS of 7.1 ± 2.8 out of 13 indicates moderate dietary diversity across the sample. The proportion of students achieving high dietary diversity in our sample (29.2%) is comparable to that reported by Togtoga *et al.* in 2023 among medical students at the same institution (31.9% of males and 28.7% of females). This consistency is noteworthy given the greater sociodemographic heterogeneity of the present sample, which encompasses all academic departments and study levels [9]. This difference may be attributed to the greater sociodemographic heterogeneity of the present sample, which encompasses all academic departments and study levels.

In a Nigerian study of 800 undergraduate students, 49% exhibited high dietary diversity, a proportion well above ours (29.2%), and the rate of low dietary diversity (26.5%) was also markedly lower than the 45.2% observed in our sample [8]. Similarly, a study among medical students across three state universities in Cameroon reported widespread dietary imbalance and poor consumption of fruits and vegetables, reinforcing the regional consistency of these findings [20]. In Benin, a study of secondary school students in the Lokossa district reported inadequate dietary diversity in 68.8% of participants [15], a proportion comparable to the combined low and moderate diversity categories in our sample (70.7%). These regional comparisons suggest that insufficient dietary diversity among young people in educational settings is a structural and persistent problem across West Africa, irrespective of educational level.

At the national level, Senegal's nutritional situation provides important interpretive context. According to the 2023 Demographic and Health Survey, only 23.61% of children aged 6 - 23 months met the recommended minimum dietary

diversity threshold [16]. Although this population differs from ours, this figure illustrates the depth of dietary diversity deficits across all age groups in Senegal, suggesting that the poor dietary variety observed among students is embedded within a broader, unfavorable national nutritional continuum.

4.4. Under-Represented Food Groups

The low consumption of dark green leafy vegetables (23%), legumes/nuts/seeds (29.5%), and vitamin A-rich vegetables (38%) warrants particular attention, as these three groups are critical sources of essential micronutrients for young adults. Dark green leafy vegetables are the primary contributors to non-haem iron, folate, calcium, and vitamin A intake in sub-Saharan African diets: a study conducted in Tanzania demonstrated that their consumption is the strongest predictor of iron and vitamin A status among women of reproductive age [17]. Their underrepresentation in our study is particularly concerning for female students, who face a cumulative risk of iron deficiency attributable to menstruation and dietary insufficiency.

The low intake of legumes, nuts, and seeds (29.5%) is equally noteworthy in an African context where these foods represent important, locally available, and affordable sources of protein and lipids. Their absence from student diets suggests that economic constraints alone do not fully explain their exclusion—factors related to food preferences, preparation requirements, and limited availability within university catering merit further investigation.

Conversely, the adequate representation of cereals (85.8%), dairy products (81%), and animal proteins (meats 71% and fish 66.2%) reflects satisfactory macronutrient and protein intakes. These findings are partly attributable to the food offerings of university restaurants, which typically provide rice-based dishes accompanied by fish or meat characteristic of emblematic Senegalese dishes such as *thiéboudienné* and *yassa*. This observation highlights the strong anchoring of traditional Senegalese cuisine within student dietary practices, even in a university setting, and represents a nutritional asset that should be leveraged in future interventions.

4.5. Determinants of Dietary Diversity

Multivariate analysis identified three independent determinants of high dietary diversity: living with family, access to a personal kitchen, and region of origin (Ziguinchor). These findings are logically consistent and align with available evidence in the literature.

Living with family was the most strongly and statistically significant factor associated with high dietary diversity (OR = 2.69; $p < 0.001$). This association is well-established in nutritional science: the family environment promotes more structured mealtimes, greater variety in food preparation, and resource-sharing that broadens access to diverse food groups [7]. By contrast, students living alone or in shared housing (representing 70% of our sample) face time constraints, limited

cooking skills, and budget restrictions that narrow their dietary variety. These results are consistent with findings from studies conducted in West Africa, where the dissolution of family meal patterns upon university entry has been identified as a nutritional vulnerability factor [8].

Access to a personal kitchen was also independently associated with better dietary diversity (OR = 1.68; $p = 0.04$). Having this resource allows students to prepare their own meals, conferring autonomy in selecting and combining food groups without being constrained by the available university catering offer. A study conducted in a Southeast Asian university setting showed that students who prepared their own meals consumed significantly more vegetables and fruits than those relying on collective food services [18]. Expanding access to shared kitchen spaces across campus residential buildings therefore constitutes a concrete and actionable lever for improving student dietary diversity.

The association between residing in the Ziguinchor region and higher dietary diversity (OR = 2.79; $p = 0.05$) is an original and exploratory finding, to be interpreted with caution given its borderline statistical significance and the limited sub-sample size of students from this region. Ziguinchor, the capital of the Casamance region in southern Senegal, is widely recognized for the richness and diversity of its traditional cuisine, characterized by an abundance of vegetables, fruits, legumes, and locally sourced fish products. This regional culinary heritage may translate into more diverse food preferences and dietary habits that are at least partially maintained during university life. Dedicated studies on regional dietary practices in Senegal would be needed to further characterize this phenomenon.

4.6. Dietary Perception and the Knowledge-Practice Gap

The finding that 53.2% of students negatively perceived the quality of their own diet is noteworthy on multiple levels. It reflects genuine nutritional awareness that educational interventions could build upon. It also illustrates the well-documented disconnect between knowledge of healthy practices and their effective adoption, a phenomenon classically described in behavioral nutrition science as the “nutrition knowledge-practice gap” [7].

This discrepancy is driven by multiple and interconnected barriers: economic (cost of fresh and diverse foods), logistical (preparation time, market access), environmental (limited healthy options in university food venues), and social (peer dietary norms, cultural habits). A meta-analysis of canteen-based interventions found that approaches combining improvements to the food offer with targeted visual communication are more effective than educational interventions alone in improving dietary behaviors [19]. These findings suggest that a systemic approach, acting simultaneously on the food environment and individual knowledge, is necessary to durably improve dietary diversity among UGB students.

4.7. Study Limitations

Several limitations should be considered when interpreting these results. First,

data were based on self-reported declarations, which are subject to recall and social desirability biases. Second, the absence of quantitative dietary intake measurements precludes any estimation of adequacy relative to recommended nutrient intake levels; the DDS captures the variety of food groups consumed but not the degree to which individual nutrient requirements are met. Third, the lack of biological data (specifically, hemoglobin, ferritin, vitamin A, and zinc assays) prevents any direct linkage between observed dietary diversity levels and the actual nutritional status of students. Future studies combining dietary recall with biochemical measurements would substantially strengthen the evidence base. Fourth, the data collection period (February–April), coinciding with the dry season in Senegal, may have influenced the availability and consumption of certain food groups, particularly fresh fruits and vegetables, potentially introducing seasonal bias into the findings. Finally, recruitment at common campus spaces may have resulted in selection bias, with less campus-present students being underrepresented.

5. Conclusions

This cross-sectional study conducted among 400 students at Gaston Berger University of Saint-Louis in 2026 reveals that nearly half of students (45.2%) exhibit low dietary diversity. Dark green leafy vegetables, organ meats, and legumes were the least consumed food groups, while cereals, dairy products, and animal proteins were well represented. Meal skipping, particularly breakfast, affects nearly two-thirds of students.

Multivariate analysis identified three independent determinants of high dietary diversity: living with family, access to a personal kitchen, and residence in the Ziguinchor region. These findings highlight the protective role of family living arrangements and culinary autonomy on students' dietary quality.

These results confirm the existence of significant dietary deficits within the UGB student population and underscore the need for targeted, multi-level interventions. Priority actions should include nutritional education programs tailored to the university context, improvements to food offerings in university canteens and restaurants, expanded access to kitchen facilities within campus residential buildings, and economic support measures for the most financially vulnerable students. Future analytical studies incorporating biochemical nutritional assessments would allow for confirmation of the health consequences of the dietary deficits identified herein and facilitate the design of more precisely targeted interventions.

Declarations

Ethical Approval

The study was approved by the Department of Public Health and Social Medicine of the UFR Health Sciences at Gaston Berger University No. 000114/UGB/UFR2S/DSPMS. Informed consent was obtained from all participants prior to enrollment.

Authors' Contributions

Togtoga L conceived the study and supervised all phases. All authors contributed to data collection, analysis, or critical manuscript review. All authors approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Swindale, A. and Bilinsky, P. (2006) Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v2). FHI 360/FANTA.
- [2] FAO, IFAD, WHO, WFP and UNICEF (2025) The State of Food Security and Nutrition in the World 2025. FAO.
- [3] Bricas, N. (2022) Since the 1960s, Africa Has Diversified Its Staple Food Sources. Ci-rad, UMR MoISA and UNESCO Chair Alimentations du Monde.
- [4] Ministère de la Santé et de l'Action Sociale (MSAS), OMS and ANSD (2016) Enquête nationale sur les maladies non transmissibles STEPS 2015. MSAS.
- [5] MSAS and JICA (2021) Enquête de base sur les maladies non transmissibles. MSAS.
- [6] Agence Nationale de la Statistique et de la Démographie (ANSD) (2023) Les principaux résultats du 5ème Recensement Général de la Population et de l'Habitat du Sénégal. ANSD.
- [7] Ramón-Arbués, E., Granada-López, J., Martínez-Abadía, B., Echániz-Serrano, E., Antón-Solanas, I. and Jerue, B.A. (2021) Factors Related to Diet Quality: A Cross-Sectional Study of 1055 University Students. *Nutrients*, **13**, Article No. 3512. <https://doi.org/10.3390/nu13103512>
- [8] Oimage, K. and Omuemu, V.O. (2018) Assessment of Dietary Pattern and Nutritional Status of Undergraduate Students in a Private University in Southern Nigeria. *Food Science & Nutrition*, **6**, 1890-1897. <https://doi.org/10.1002/fsn3.759>
- [9] Togtoga, L., Niang, K., Ndiaye, P. and Bah, M.S. (2023) Lifestyle Habits and Dietary Diversity among Medical Students at Université Gaston Berger (UGB) of Saint-Louis in 2023. *Food and Nutrition Sciences*, **14**, 1172-1182. <https://doi.org/10.4236/fns.2023.1412073>
- [10] FAO (2011) Guidelines for Measuring Household and Individual Dietary Diversity. FAO.
- [11] Sliwa, S.A., Merlo, C.L., McKinnon, I.I., Self, J.L., Kissler, C.J., Saelee, R., *et al.* (2024) Skipping Breakfast and Academic Grades, Persistent Feelings of Sadness or Hopelessness, and School Connectedness among High School Students—Youth Risk Behavior Survey, United States, 2023. *MMWR Supplements*, **73**, 87-93. <https://doi.org/10.15585/mmwr.su7304a10>
- [12] Khan, M.S.I., Paul, T., Al Banna, M.H., Hamiduzzaman, M., Tengan, C., Kissi-Abrokwa, B., *et al.* (2024) Skipping Breakfast and Its Association with Sociodemographic Characteristics, Night Eating Syndrome, and Sleep Quality among University Students in Bangladesh. *BMC Nutrition*, **10**, Article No. 38. <https://doi.org/10.1186/s40795-024-00860-y>
- [13] Bouchefra, S., El Ghouddany, S., Ouali, K. and Bour, A. (2023) Is Good Dietary Diversity a Predictor of Academic Success? *Acta Biomedica*, **94**, e2023014.

- [14] Schneider, M., Nössler, C., Carlsohn, A. and Lührmann, P.M. (2023) Environmental Intervention in a University Canteen with Focus on Decision Guidance: An Evaluation Study Regarding Food Consumption, Nutrient Intake, Perception, and Satisfaction by Canteen Users. *Journal of Public Health Research*, **12**, e60.
- [15] Sagbo, H. and Kpodji, P. (2023) Dietary Diversity and Associated Factors among School-Aged Children and Adolescents in Lokossa District of Southern Benin: A Cross-Sectional Study. *BMJ Open*, **13**, e066309. <https://doi.org/10.1136/bmjopen-2022-066309>
- [16] Mekonen, E.G., Choudhary, N. and Sayeed, A. (2025) Minimum Dietary Diversity and Its Associated Factors among Children Aged 6-23 Months in Senegal: Evidence from the Demographic and Health Survey, 2023. *PLOS ONE*, **20**, e0332215. <https://doi.org/10.1371/journal.pone.0332215>
- [17] Stuetz, W., Goweke, V., Kinabo, J., Bundala, N., Mbwana, H., Rybak, C., *et al.* (2019) Consumption of Dark Green Leafy Vegetables Predicts Vitamin A and Iron Intake and Status among Female Small-Scale Farmers in Tanzania. *Nutrients*, **11**, Article No. 1025. <https://doi.org/10.3390/nu11051025>
- [18] Sakai, Y., Rahayu, Y.Y.S. and Araki, T. (2022) Nutritional Value of Canteen Menus and Dietary Habits and Intakes of University Students in Indonesia. *Nutrients*, **14**, Article No. 1911. <https://doi.org/10.3390/nu14091911>
- [19] Mandracchia, F., Tarro, L., Llauro, E., Valls, R.M. and Solà, R. (2021) Interventions to Promote Healthy Meals in Full-Service Restaurants and Canteens: A Systematic Review and Meta-Analysis. *Nutrients*, **13**, Article No.1350. <https://doi.org/10.3390/nu13041350>
- [20] Bede, F., Cumber, S.N., Nkfusai, C.N., Venyuy, M.A., Ijang, Y.P., Wepngong, E.N., *et al.* (2020) Dietary Habits and Nutritional Status of Medical School Students: The Case of Three State Universities in Cameroon. *Pan African Medical Journal*, **35**, Article No. 15. <https://doi.org/10.11604/pamj.2020.35.15.18818>