# Demographic Characteristics and Dietary Patterns Among Adolescents In Daura, Katsina State, Nigeria: A Cross-Sectional Assessment Using 24-Hour Dietary Recall

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**Abstract.** Adolescence is a critical period for nutritional interventions; however, there is a paucity of data on dietary habits among Nigerian adolescents. To drive a specific nutritional intervention, it is imperative to understand how population composition affects food patterns.

The objectives of the study included a demographic characterisation and dietary patterns of adolescents in Daura town, Katsina State, Nigeria, as well as the establishment of nutritional patterns using 24-hour dietary recall methodology.

The study was a cross-sectional study of 100 adolescents (71 males, 29 females) randomly sampled from seven wards in Daura town. Structured questionnaires were used to record sociodemographic characteristics, and trained interviewers used 24-hour dietary recalls. Statistical information was analysed using SPSS version 24.0, including frequency distributions and descriptive statistics.

Results indicate that the study population was men (71.0%), with a mean age distribution skewed toward older adolescents (26% aged 16 years). All respondents were Muslims and enrolled in secondary school. Breakfast food consumption remained conventional, with koko/kunu/kosai accounting for 31.0 %. Shinkafa (rice dishes) accounted for the smallest percentages, with 28.0% consumed at lunch and 31.0% consumed at dinner. Men and women differed in their meal timing and food choices.

The dietary habits of adolescents in Daura are characterised by low nutritional diversity and are highly traditional in terms of Hausa dietary practices. The high proportion of carbohydrate-rich foods indicates possible micronutrient deficiencies that may require exceptional dietary support.

**Keywords:** Adolescent nutritional barriers; food habits; 24-hour food recall; Africa and the Hausa culture in Nigeria.

## INTRODUCTION

Adolescents aged 10-19 years are a phase of significant physical, cognitive, and social growth that demands adequate nutrition to support optimal growth and future health [1]. The current nutritional status and the three-fold malnutrition burden of adolescents affect the health and nutrition of the current and the upcoming generations negatively. Adolescents make up approximately 23% of the Nigerian population, yet they receive

little attention in evidence-based nutritional research and policy formulation [2].

This systematic review, titled 'Adolescent Nutrition in Nigeria: A Systematic Review,' aims to examine adolescent nutrition in Nigeria, including dietary patterns and intakes, as well as nutritional status, and to identify key knowledge gaps in rural and northern Nigeria populations. The study in Katsina State, a northwestern tourist region of Nigeria, is conducted in a predominantly Muslim and agrarian community that holds onto traditional eating habits against the growing demands of urbanisation [3].



Figure 1 – Picture of an Adolescent in Kastina

Authors have described the 24-hour recall method [4] as a gold standard in studies of population dietary intake due to its unique features, which enable it to collect detailed dietary intake information within the shortest time possible and with minimal respondent burden. A 24-hour dietary recall (24HR) is a structured interview that captures details of all foods and drinks the respondent consumed over the immediately preceding 24 hours (most often from midnight to midnight of the previous night). The validity of the specific methodology has been confirmed across various populations [5], including those in an African context.

There is limited evidence on the association between diet-related predictors and childhood/adolescent malnutrition in Nigeria, particularly regarding demographic predictors of dietary habits. These relationships are crucial for developing culturally relevant and acceptable nutritional interventions. Other researchers have already reported the effects of socioeconomic status, sex, and geographical setting on dietary habits among Nigerian adolescents [6, 7].

Hausa traditional diets are standard in the northern region of Nigeria and consist mainly of grain-based staples, low amounts of animal protein, and seasonal vegetables [8]. These patterns influence cultural preferences, economic limitations, and agricultural practices that can impact adolescents' nutritional adequacy [9].
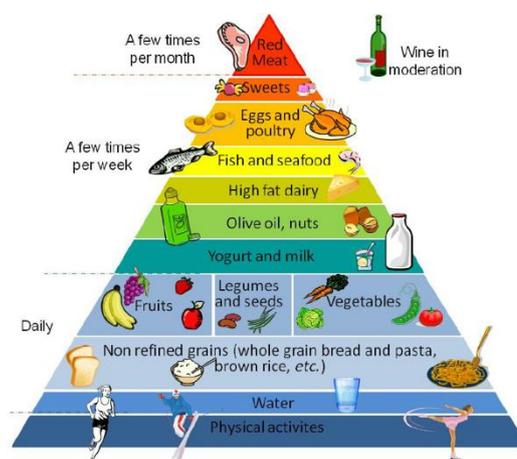


Figure 2 – Common Dietary Patterns

The objective of the study is to collect a comprehensive baseline dataset on the demographic and dietary habits of young people in Daura town, supplementing the scarcity of information on the nutritional habits of this demographic in northern Nigeria and supporting intervention strategies.

## METHOD

The study will be conducted as a cross-sectional study in Daura town, Katsina State, Nigeria, from January to June 2023. The 2016 Estimates show that Daura has a population of 303,600, comprising 115,576 males, 109,308 females, and 78,716 children. The town is a principal trading and agricultural hub in the area.

*Study Population and Sampling*. Inclusion criteria: a significant disease and the degree of health-related quality-of-life dysfunction. The researchers selected participants using purposeful sampling.

The study population consisted of teenagers who appeared well, aged 13-19 years, and residents of the town of Daura. Since we are using the Fisher formula in cross-sectional studies, we have: $z = z^2 pq/d^2$; the Z value = 1.96 (95% confidence level); p = 0.15 (prevalence expected); d = 0.05 (precision).

This yielded a computed sample size of 102, rounded to 100 participants. The sample comprised 346 respondents and was selected using a stratified random sampling approach across seven administrative wards in Daura town, ensuring geographical representation.

Inclusion criteria: Patients aged 13-19 years, seemingly healthy, permanent residents of Daura town, mostly willing to sign the informed consent.

Exclusion criteria: Persons under or over the age group, medical conditions known to impinge on dietary intake, temporary residents, and inability to provide the dietary recall interviews.

Ethical Considerations. We obtained ethics approval from the Katsina State Ministry of Health Ethics Committee (ID: MOH/ADM/SUB/1152/1/432). All participants provided written informed consent after being thoroughly informed about the study methodology. Parental consent, accompanied by participant assent, was requested from participants under 18 years of age.

*Data Collection Procedures*

a) Demographic Observations as Data Collection. Answers to structured questionnaires completed by trained research assistants provided sociodemographic data, including age, gender, religion, education level, household composition, and socioeconomic indicators. The questionnaires to be used were translated into Hausa and back-translated to check accuracy.

b) 24-Hour Dietary Recall Administration 25.2. There is a lack of data on dietary nutrient intakes among adolescents in low- and middle-income countries (LMIC), partly because no validation studies of the 24 h recall have been available for adolescents. The method is, nevertheless, the most viable tool of population-based dietary assessment. Face-to-face 24h nutritional recalls were carried out by trained interviewers using a multiple-pass method:

*Quick list:* Participants wrote down all products they had consumed within the past 24 hours.

*Forgotten foods:* Investigating the commonly forgotten foodstuffs (snacks, beverages, condiments).

*Time and occasion:* The researchers meticulously recorded the time of day for meals and eating occasions.

*Detailed cycle:* The researchers specified the exact details of food preparation, including the quantity of each food and the ingredients to be used.

*Final review:* Authentication of all items registered.

The researchers used photographic aids, local food models, and household utensils to improve the accuracy of portion-size estimation. All the interviews were conducted in Hausa so that the participants could feel comfortable and understand.

c) Data Management and Analysis. The researchers entered the data into Microsoft Excel and then imported it into SPSS version 24.0. Descriptive statistics included percentages and proportions, means, and standard deviations. Demographic data were analysed using frequency distributions and meal-specific food-frequency analyses to assess dietary habits.

## RESULTS AND DISCUSSION

The sociodemographic profile of study participants is in Table 1. The sample consisted of 100 adolescents aged 13-19 years, with males predominating (71.0% vs 29.0% female). The age distribution was highest in the 16-year bracket (26.0%), followed by the 15-year bracket (20.0%), and then the 14-year bracket (15.0%). The lowest and highest representations of the youngest and oldest age groups were 10.0 and 4.0, respectively.

Table 1 − Sociodemographic Characteristics of Study Participants (n=100)

| Variable | Category | Frequency (n) | % |
|---|---|---|---|
| Gender | Male | 71 | 71.0 |
|  | Female | 29 | 29.0 |
| Age (years) | 13 | 10 | 10.0 |
|  | 14 | 15 | 15.0 |
|  | 15 | 20 | 20.0 |
|  | 16 | 26 | 26.0 |
|  | 17 | 13 | 13.0 |
|  | 18 | 12 | 12.0 |
|  | 19 | 4 | 4.0 |
| Religion | Islam | 100 | 100.0 |
| Education Level | Secondary School | 100 | 100.0 |

All participants were Muslims, indicating religious homogeneity in the study area. On the same note, all informants had access to secondary education and, as such, had good academic access to the study participants.

Table 2 presents the frequency distribution of foods consumed across three main meal categories derived from 24-hour dietary recall data.

Table 2 – 24-Hour Dietary Recall Patterns by Meal Category (n=100)

| Meal Category | Food Items | Frequency (n) | % |
|---|---|---|---|
| Breakfast | Koko, Kunu, Kosai | 31 | 31.0 |
| | Fankasu and Miyan Taushe | 18 | 18.0 |
| | Wainar Gero | 20 | 20.0 |
| | Tea and Bread | 15 | 15.0 |
| | Noodles and Egg | 6 | 6.0 |
| | Others | 10 | 10.0 |
| Lunch | Shinkafa (Rice dishes) | 28 | 28.0 |
| | Shinkafa da Wake (Rice and beans) | 25 | 25.0 |
| | Taliya (Noodles) | 14 | 14.0 |
| | Dambu (Locust bean cake) | 10 | 10.0 |
| | Tuwo | 11 | 11.0 |
| | Danwake | 6 | 6.0 |
| | Others | 6 | 6.0 |
| Dinner | Tuwon Masara (Corn flour porridge) | 31 | 31.0 |
| | Tuwon Alkama (Wheat flour porridge) | 17 | 17.0 |
| | Tuwon Shinkafa (Rice flour porridge) | 16 | 16.0 |
| | Others | 36 | 36.0 |

Customary breakfast combinations prevailed in consumption. The koko and kunu with kosai combination – koko (millet porridge), kunu (grain-based beverage), and kosai (bean cakes) – was most popular among breakfast items and accounted for 31.0 % of respondents. The blend is a classic one, providing carbohydrates and plant-based proteins.

Millet pancakes, referred to as wainar gero, accounted for 20.0 % of breakfast types, with wheat cakes, taken to be a variation of fankasu (fankasu), accounting for 18.0 %. The last few options for modern breakfast were less popular, with tea and bread consumed by 15.0% of respondents and noodles with eggs by 6.0%.

Plain shinkafa is the most popular rice-based dish at lunch, accounting for 28.0% of lunch meals. Hinkafa da wake (rice and beans combination), with its more balanced nutritional profile, takes a narrow second place with 25.0%.

Wheat noodles (taliya) were the most consumed food at lunchtime, accounting for 14.0%, whereas traditional tuwo accounted for 11.0%. Local sources of protein, such as dambu (locust bean cake), were eaten at lunchtime (10.0%).

Dinner meals reflected the highest level of the classic dietary lifestyles. The majority, 31.0%, chose tuwon masara (corn flour thick porridge) as the main dish for dinner, with another 17.0% purchasing tuwon alkama (wheat flour porridge) and 16.0% buying tuwon shinkafa (rice flour porridge).

The consumption of tuwo-based evening meals is also very high, reflecting the conventional Diaspora eating habits, in which thick porridges serve as the primary source of carbohydrates and are usually accompanied by a variety of vegetable soups and very little animal protein.

Although the original methodology did not include a detailed statistical analysis by gender, it was observed that there may be variability in timing and food preferences between men and women, and that this needed further examination in follow-on studies.

Overall, the demographic characteristics of the study population are significant indicators of the adolescent population in northern Nigeria, as are the possible weaknesses in sample selection. This strong male preponderance (71.0% vs 29.0% female) could be due to cultural influences on female engagement in research affairs or to pos-

sible regional differences in female school attendance [10].

This research aimed to investigate eating behaviour, attendant norms, and acceptable channels of communication among adolescents in a Northern Nigerian setting, as a source of future nutrition project strategies. Daura is homogeneous mainly about religion (100% Muslim), which is a valid reflection of the demographic make-up of the town in Nigeria, but can be said not to be representative of other, more religiously diverse Nigerians.

The focus on mid adolescence (15-16 years: 46%) is particularly valuable for research on dietary patterns across age groups, as nutritional requirements are at their peak [11].

The analysis reveals a high level of persistence of the traditional Hausa diet across all meal types, consistent with reports for other populations in northern Nigeria [8]. Limited data on diet-related factors and child/adolescent malnutrition exist in Nigeria, and documenting these traditional patterns is therefore of great importance.

This preeminence of grain-based diets (koko, kunu, shinkafa, tuwo) is a result of not only local preferences but also of local agricultural production. Carbohydrates are mostly Plantains, millet, sorghum, rice, and wheat, consistent with the culture of the Hausa people [3].

*Nutritional Implications of the Observed Patterns.* The abundance of high-carbohydrate, low-protein, and micronutrient-dense foods is a concern due to their potential impact on nutritional adequacy. The proposed study aims to review the literature on the nutritional status of adolescents aged 10-19 years in Nigeria. The emerging trends point to possible gaps in:

Protein quality: Because legume-based dishes (kosai, wake) present sources of vegetal protein, it seems that animal proteins are not consumed abundantly

Micronutrient density: Iron, zinc, and B vitamins may be inadequate, and this can be a result of the prevalence of refined grain products

Variability in nutrient profiles: Extracted nutrient variability in meal classes suggests a limited food variety in the diet.

*Cultural and Economic Influences.* The continued popularity of traditional breakfast choices (koko-kunu-kosai) reflects the resiliency of the cultural food system. In contrast, economic constraints and cultural preferences may limit the intake of new types of food (such as tea-bread, noodles, and eggs) [7].

The practice of consuming large quantities of tuwo-based evening meals is consistent with the traditional Hausa eating behaviour of experiencing satiation after a full day of activities through heavy carbohydrate intake [9]. Nevertheless, the pattern can lead to postprandial glucose spikes and long-term metabolic problems.

*Comparison with Regional and National Data.* Compared to southern Nigerian teenage demographics, the research group is more homogeneous in terms of consumption patterns and more committed to the traditional food system [6]. The adolescents in low- and middle-income countries, including those in Nigeria, are more likely to be poorly fed, especially with obesity. However, the nature of the food consumed suggests a greater risk of underfeeding than overfeeding.

The sparse food processing practices contrast with the urban southern Nigerian population, which has a much more Westernised diet [2].

*Methodological aspects.* Limited data exist on the nutrient intakes of adolescents in low- and middle-income countries (LMIC), partly because validation studies of the 24-h recall method in adolescents are lacking. Despite this shortcoming, the 24-hour recall method was instrumental in providing insight into dietary patterns; however, single-day recalls do not accurately reflect day-to-day variation or seasonal factors.

The local food-adaptation models and the Hausa-language administration of the study improved data quality and cultural sensitivity. Estimating portion size, however, is challenging in populations without standardised serving sizes [4].

*Public Health Implications.* The empirical records of dietary habits will have a profound merit as far as the nutritional interventions are concerned:

Fortification efforts: Grain-based foods are rich in micronutrients, indicating a need for micronutrient fortification.

Diversification of diets: Interventions should increase the intake of nutrient-rich foods within an acceptable cultural context.

Protein supplementation: Promoting cheap protein sources, especially animal protein, can benefit nutritional livelihoods.

*Study Limitations*. The researchers should mention several limitations. A cross-sectional approach cannot make causal inferences or evaluate time trends.

Single 24-hour recall: It may fail to reflect usual eating habits and seasonal differences in intake.

Issue of gender imbalance: Reduces applicability to female adolescents.

Geographic specificity: The results cannot be considered representative of other northern Nigerian groups.

Lack of nutrient analysis: non-quantitative nutrient profile description.

## CONCLUSIONS

The paper provides significant information on the demographic patterns and dietary habits of teenagers in Daura, Katsina State, and demonstrates a close alignment with traditional Hausa dietary culture. The overwhelming amount of carbohydrate-rich foods based on grains and the limited diet imply the inadequacy of particular nutrients, which require special interventions.

Main findings include:

a) High cultural affinity to the traditional meal pattern on all occasions of eating.

b) The low diversity of the diet with a high level of dependency on carbohydrate sources.

c) The use of small quantities of modern processed food indicates preservation of the traditional food systems.

d) Possible nutrient deficiencies of potentially low protein and micronutrient intakes are tied to dietary preferences.

These trends are evidence of intricate relationships among preferences, economic capacity, and food resources in the area, emphasising the necessity of culturally acceptable nutritional interventions that build on what is currently available without replacing it.

Based on the study's findings, the researchers can give the following recommendations:

1. The Immediate Interventions.

Introduce culturally appropriate nutritional diversification schemes within the framework of meals, as they are.

Devise micronutrient-fortification interventions for the most commonly consumed grains.

Encourage the consumption of more protein sources available in the country.

2. Policy Recommendations.

Incorporate indigenous dietary habits into national nutritional policies in northern Nigeria.

Develop dietary recommendations tailored to locally organised food systems.

Promote food self-sufficiency through the cultivation of nutrient-dense traditional foods.

3. Future Research Priorities. Finally, future research priorities include tighter integration of databases with graphical interfaces and advanced features of graphics cards.

Conduct a longitudinal dietary study across Q variants of seasons.

The quantitative nutrient content in the traditional foods.

Analysis of gender dietary practices and preferences.

Evaluation of the correlation between the original diet and the nutritional status indices.

4. Program Development.

Design youth nutrition education materials with ALC combinations of foods.

Deploy interventions in schools that are complementary, rather than supplanting, conventional food patterns.

Establish local nutrition programs focused on local cuisine, including traditional food preparation methods.

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