

Dietary Pattern and Body Composition of Professional Football Players in Ghana: Implications on Fitness and Performance

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Abstract

Optimal nutrition is essential for professional football performance, yet limited data exist on the dietary habits and body composition of athletes in African contexts. This gap hampers the development of culturally appropriate sports nutrition guidelines and may compromise both performance and long-term health amid ongoing nutritional transitions. The study aimed to identify the main dietary patterns of professional footballers in Northern Ghana, assess their body composition, and determine associations between dietary intake, food groups, and Body Mass Index (BMI). A cross-sectional study was conducted among 119 professional male footballers from five Division One teams. Dietary intake was assessed using a 7-day Food Frequency Questionnaire (FFQ), while body fat, muscle mass, and visceral fat were measured via bio-impedance analysis. Principal Component Analysis (PCA) identified dietary patterns, and linear regression examined associations between diet and BMI. Three dietary patterns explained 49.9% of total variance: "Fruits and Vegetables," "Modern Ghanaian" (soft drinks, plant protein), and "Typical Ghanaian" (starchy staples, animal protein). Anthropometric results showed 37.8% of players were overweight (35.3%) or obese (2.5%), with a mean BMI of 24.48 ± 4.0 kg/m². Visceral fat was strongly correlated with BMI ($r = 0.876$, $p < 0.01$), while muscle mass was negatively correlated with body fat ($r = -0.904$, $p < 0.01$). Animal protein and cereal/grain intake significantly predicted 8% and 18% of BMI variation, respectively. The high prevalence of excess body weight among professional footballers in Northern Ghana suggests a mismatch between dietary habits and athletic demands. Targeted, culturally sensitive nutrition education and structured body composition management are urgently needed to enhance performance and protect long-term health.

Keywords: Soccer, Dietary Behavior, Body Anthropometry, Sports Nutrition, Ghana.

Introduction

Nutrition is a critical, well-established determinant of athletic performance for professional football players, influencing energy, recovery, and physical conditioning (Ono et al., 2012).

The sport's high physiological demands require optimal dietary intake to sustain performance, minimize fatigue, and support a favorable body composition linked to speed and agility. Despite this, research consistently shows that professional players, including those in Western contexts, often fail to consume a diet adequate for optimal performance, frequently lacking sufficient carbohydrates (Aguinaga-Ontoso et al., 2023; Ono et al., 2012). A significant research gap exists regarding the dietary habits and nutritional status of professional players in non-Western contexts, particularly in Africa. The vast majority of sports nutrition guidelines and empirical data originate from studies on athletes in Europe, North America, and Australia (Aguinaga-Ontoso et al., 2023; Oukheda et al., 2024). This creates a problem because dietary patterns are deeply embedded in cultural and socioeconomic contexts, meaning guidelines based on Western populations may not be applicable or practical for athletes in regions like West Africa.

In Ghana, athletes' diets are shaped by a complex food environment (Kushitor et al., 2025). Traditional diets are rich in nutritious staples like yam, cassava, maize, and leafy vegetables, which offer a strong nutritional foundation (Galbete et al., 2017). However, the broader population, including athletes, is experiencing a "nutrition transition" characterized by increased consumption of energy-dense, ultra-processed, and sugar-sweetened products (Kushitor et al., 2025). This shift creates a dual challenge for athletes: navigating traditional food practices while being exposed to less healthy, modern dietary options (Kushitor et al., 2025).

Consequently, little is known about the body composition of professional footballers in West Africa or how their habitual dietary intake relates to it. The absence of this empirical data for populations like Division One footballers in Northern Ghana limits the ability of clubs and practitioners to design evidence-based, culturally appropriate nutritional support systems (Staśkiewicz et al., 2022). This study, therefore, aims to address this gap by identifying local dietary patterns and examining their associations with body composition indicators like BMI and body fat percentage.

The study's hypothesis is informed by the global nutrition transition and the sport's high energy demands. The researchers propose that the dietary patterns of professional footballers in Northern Ghana will be significantly associated with variations in their body composition metrics. They seek to determine whether the move towards more processed, energy-dense foods, within the context of traditional dietary practices, impacts the athletes' physical makeup.

Material and Methods

Sampling and Study Subjects

A cross-sectional study design was employed to evaluate the dietary behaviour and body composition of professional footballers in northern Ghana. Participants were drawn from five professional Division One football teams based in the Tamale Metropolis: Galaxy, Real Tamale United, Tamale All Stars, Gwan United, and Tamale Utrecht. The total registered player pool across these five teams was 191 individuals. Using a proportionate random sampling technique to ensure representation, a total of 119 professional footballers were

selected to participate. The number of players recruited from each team was as follows: Galaxy (n=25), Real Tamale United (n=31), Tamale All Stars (n=21), Gwan United (n=19), and Tamale Utrecht (n=23).

Inclusion and Exclusion Criteria

Participants had to be actively registered professional footballers with one of the five specified teams, be based in the northern region, and provide written informed consent. Individuals were excluded if they were not professionally registered, were unable to participate in regular training due to recent injuries or illnesses, or had undergone significant, medically-supervised dietary changes in the preceding six months that would not reflect their typical dietary habits.

Study Measures and Data Collection Procedure

Demographic Characteristics

A structured questionnaire was used to collect data on respondents' age, marital status, and highest level of education.

Food Frequency and Dietary Pattern

A 7-day Food Frequency Questionnaire (FFQ) was administered by trained interviewers to assess dietary intake. The FFQ included a list of over 100 food items commonly consumed in the region, which were categorized into eight main groups for analysis: animal protein, vegetable protein, vegetables, soft drinks and sweets, cereals and grains, tubers, fruits, and fruit juices. It is important to note that this FFQ was a tool to assess the frequency of consumption and was not validated to quantify portion sizes or total energy and macronutrient intake.

Body Composition and Anthropometry

Height was measured to the nearest 0.1 cm using a Charder HM200P portable stadiometer. Weight, Body Mass Index (BMI), percentage of muscle mass, percentage of body fat, and visceral fat were measured using an Omron Body Composition Monitor and Scale (Model HBF-516). To ensure measurement reliability, participants were instructed to abstain from strenuous exercise, caffeine, and alcohol for 12 hours prior to measurement and to void their bladder immediately before the assessment to ensure standardized hydration status. During measurement, participants stood erect on the device while holding the display unit with arms extended horizontally at a 90-degree angle to their body.

Data Analysis

Data were analyzed using SPSS version 20. Categorical variables were summarized using frequencies and percentages, while continuous variables were described with means and standard deviations. The reliability of items for Principal Component Analysis (PCA) was evaluated using Cronbach's alpha.

BMI was used to classify participants as underweight ($<18.5 \text{ kg/m}^2$), normal weight ($18.5\text{--}24.99 \text{ kg/m}^2$), overweight ($25.0\text{--}29.99 \text{ kg/m}^2$), or obese ($\geq 30.0 \text{ kg/m}^2$) according to World Health Organization (2023) classifications.

Dietary patterns were identified using PCA with varimax rotation on the eight food groups. The suitability of the data for factor analysis was confirmed using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. Components with eigenvalues > 1.0 were retained, and factor loadings > 0.4 were considered significant for interpreting the patterns. Simple and multiple linear regression analyses were used to determine the associations between food groups, dietary patterns, and body composition variables. Pearson's correlations were computed to assess relationships between anthropometric variables. The effect size measure eta-squared (η^2) was used to quantify the proportion of variance in the dependent variable explained by independent variables. Statistical significance was set at an alpha level of 0.05.

Ethical Clearance

Ethical approval was granted by the Ethics and Protocol Review Committee of the School of Biomedical and Allied Health Sciences at the University of Ghana (SBAHS-ET/0209831488/AA/7A/2012-2013). Permission was obtained from team management, and all participants provided written informed consent after receiving a thorough explanation of the study's purpose, procedures, risks, and benefits.

Results

Demographic Characteristics

A total of 119 professional footballers participated. The mean age was 21.57 ± 4.3 years, with the majority (58.0%) in the 20-29 age group. Most participants were not married (93.3%) and had completed Senior High School as their highest level of education (63.9%). (See Table 1).

Table 1: Socio-demographic characteristics of the footballers who participated in the study (n = 119)

Variable	Categorization	Number	Percentage (%)
Age	10 – 19	43	36.0
	20 – 29	69	58.0
	30 – 39	7	6.0
Marital Status	Married	8	6.7
	Not Married	111	93.3
Education	JHS	38	31.9
	SHS	76	63.9
	Diploma	5	4.2

SHS: Senior High School; JHS: Junior High School

Emerging Dietary Patterns

The principal component analysis (PCA) was found to be appropriate for the dataset, as indicated by a Kaiser-Meyer-Olkin (KMO) value of 0.648 and a statistically significant Bartlett's test of sphericity ($\chi^2 (28) = 104.664$, $p < .001$). Three distinct dietary patterns emerged from the analysis, collectively explaining 49.9% of the total variance in dietary intake. The first component, labeled "Fruits and Vegetables," accounted for 20.2% of the total variance. This pattern was characterized by a high consumption of fruits, fruit juice, and vegetables, reflecting a diet rich in plant-based foods. The second component, referred to as "Energy and Fiber Foods (Modern Ghanaian)," explained 16.0% of the variance. It was typified by higher intakes of soft drinks and plant protein, representing a dietary trend that blends traditional staples with more modern food items. The third component, named "Protein and Starchy Foods (Typical Ghanaian)," contributed 13.7% of the variance. This pattern was associated with a high intake of tubers, cereals and grains, and animal protein, reflecting a conventional Ghanaian diet centered on starchy staples and protein sources.

Table 2 Dietary patterns of footballers determined using principal component analysis

Components		% of variance	Label for dietary pattern
Component 1	Fruits	20.206	Fruits and vegetables
	Fruit juice		
	vegetables		
Component 2	Soft drinks	15.966	Energy and fiber foods (Modern Ghanaian)
	Plant protein		
Component 3	Tuber	13.744	Protein and starchy foods (Typical Ghanaian)
	Cereals and grains		
	Animal protein		

?: Percentage

Anthropometric Characteristics and Nutritional Status

The mean weight and height of the footballers were 65.04 ± 9.8 kg and 162.34 ± 16.4 cm, respectively. The mean BMI was 24.48 ± 4.0 kg/m². The average body fat was $20.25 \pm 3.7\%$, and visceral fat was $6.29 \pm 2.2\%$. Based on BMI classification (Figure 1), 60.5% (n=72) of players were of normal weight, while 35.3% (n=42) were overweight and 2.5% (n=3) were obese. In total, 37.8% of the players were classified as having excess body weight.

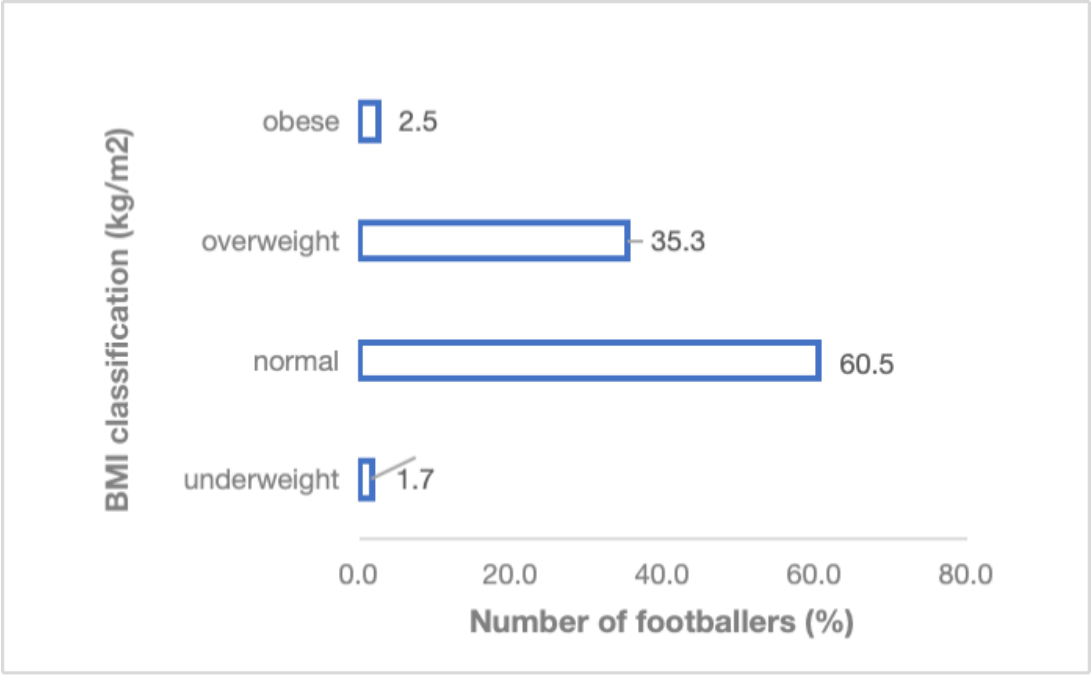


Figure 1: Nutritional status of the professional footballers based on BMI

Correlations and Associations

As shown in Table 3, significant negative correlations were found between percentage muscle mass and BMI ($r = -0.606$, $p < 0.01$), body fat ($r = -0.904$, $p < 0.01$), and visceral fat ($r = -0.756$, $p < 0.01$). Conversely, strong positive correlations were observed between visceral fat and BMI ($r = 0.876$, $p < 0.01$), and between visceral fat and body fat percentage ($r = 0.846$, $p < 0.01$).

Table 3: Pearson correlation between anthropometric variables

Anthropometric variables	Weight	BMI	%Muscle Mass	% Body Fat
BMI	.346**			
%Muscle mass	-.232*	-.606**		
% Body Fat	.147	.701**	-.904**	
Visceral Fat	.219*	.876**	-.756**	.846**

** $p < 0.01$

* $p < 0.05$

Regression analysis revealed that consumption of specific food groups was significantly associated with body composition. Animal protein consumption explained 8% of the variation in BMI, $F(4,119) = 2.446$, $p = 0.05$, while cereals and grains explained 18% $F(4,119) = 6.212$, $p < 0.001$. No significant association was found between the derived dietary patterns (as factor scores) and BMI.

Discussion

This study offers a novel and crucial examination of the dietary patterns and body composition of professional footballers in Northern Ghana, an under-researched athletic population. The findings reveal a complex interplay between traditional and modern dietary habits and, most critically, a high prevalence of overweight and obesity. This discussion contextualizes these results within both sports science and public health frameworks, exploring the immediate performance implications and the profound long-term health consequences for these athletes.

The most clinically significant finding is that a combined 37.8% of these elite footballers were classified as overweight or obese. This figure is exceptionally high and alarming, standing in stark contrast to data from European leagues where body fat is rigorously managed to optimize performance (Nunes et al., 2021). The immediate consequences of excess adiposity on the football pitch are severe. Excess body fat acts as non-functional mass, increasing the metabolic cost of high-intensity movements, thereby reducing exercise economy and accelerating the onset of fatigue during a match (Martin et al., 2021). This directly impairs key athletic qualities essential to football, such as acceleration, maximal sprinting speed, agility, and vertical jump capacity. (García-Pinillos et al., 2015). Furthermore, a growing body of evidence links higher body fat levels to an increased risk of non-contact injuries, as excess mass places greater strain on joints and soft tissues (Bogalho et al., 2022). That nearly two-fifths of this cohort carry excess weight points to a significant gap in the application of fundamental sports science principles within their clubs, suggesting deficiencies in nutritional support, individualized dietary prescription, and structured off-season conditioning (Hall et al., 2024).

Beyond the immediate impact on performance, these findings have grave long-term public health implications. A professional football career is fleeting, and establishing a trajectory of overweight or obesity in early adulthood places these young men at a significantly elevated risk for a host of non-communicable diseases (NCDs) later in life (DeAngelis et al., 2015). Once their mandatory high-level physical activity ceases upon retirement, they are highly susceptible to developing type 2 diabetes, hypertension, cardiovascular disease, and metabolic syndrome (Merghani et al., 2016). This study, therefore, documents the early emergence of a major public health risk in a population often perceived as being at the peak of health. It highlights that even elite athletes are not immune to the broader societal trends driving the obesity epidemic, and underscores the responsibility of sporting organizations to safeguard the long-term health of their players, not just their immediate performance.

The dietary patterns identified in this study reflect Ghana's position within a global nutrition transition. The "Typical Ghanaian" pattern, rich in energy-dense starchy foods like tubers and grains, is well-suited to meet the high energy demands of football. However, without careful nutritional periodization—the practice of matching energy intake to daily training load—this pattern can easily lead to a chronic energy surplus and subsequent fat gain, especially during the off-season or periods of injury (Ruiz-Castellano et al., 2021). The concurrent emergence of a "Modern Ghanaian" pattern, featuring soft drinks, is a hallmark

of the nutrition transition and the increasing penetration of the food environment by ultra-processed, nutrient-poor products (Kushitor et al., 2023). This dietary duality exemplifies the "double burden of malnutrition," where challenges of undernutrition can coexist with rising rates of obesity (de Juras et al., 2021). These findings suggest that athletes are navigating a complex food environment shaped by socio-environmental factors, including the availability, affordability, and marketing of unhealthy foods, which may override nutritional knowledge (Kontele & Vassilakou, 2021).

Our regression analysis showed that more frequent consumption of energy-dense food groups like animal protein and cereals was associated with higher BMI. In an athletic context, this does not suggest these foods are inherently "bad"; rather, it indicates that their consumption is likely not being appropriately managed in the context of overall energy balance (Esquivel, 2021). The lack of association between the broader dietary patterns and BMI further supports this, suggesting that the quantity of food consumed is a more powerful determinant of body composition than the specific type of diet followed in this cohort (LeCroy et al., 2021; Mosha et al., 2022). This reinforces the need for interventions that move beyond simple dietary advice and towards building a deeper health literacy. This involves empowering not just the athletes but the entire club ecosystem—including coaches, managers, and support staff—with the skills to understand and apply principles of energy balance, nutrient timing, and periodization (Madden & Tupper, 2024).

The implications of this study extend beyond the participating clubs. Professional footballers are influential role models, and their physical condition can shape societal perceptions of health and body norms. The high prevalence of overweight in this visible group could inadvertently normalize larger body sizes, posing a wider public health challenge (Vicente et al., 2025). Therefore, interventions must be multi-levelled. At the club level, there is a clear need to invest in qualified nutrition professionals and implement systematic body composition monitoring (Staśkiewicz-Bartecka et al., 2024). At a policy level, national football governing bodies should consider establishing mandatory health and nutrition standards for professional clubs (Staśkiewicz et al., 2023). Such standards could include regular health screenings and requirements for clubs to provide players with access to evidence-based nutritional support and health education, ensuring that the long-term well-being of athletes is prioritized alongside their athletic careers.

Limitations

This study has several limitations. Its cross-sectional design precludes the establishment of causality. Longitudinal research is needed to track how dietary patterns and body composition evolve across a competitive season and into the off-season. Second, the dietary data was collected using a non-validated FFQ that could not quantify portion sizes, total energy, or macronutrient intake. This prevents a detailed analysis of energy balance and dietary adequacy, which is a significant limitation. Future studies should employ more robust methods like validated food diaries or 24-hour recalls. Finally, body composition was assessed using bio-electrical impedance analysis (BIA), which is less accurate than gold-standard methods like Dual-Energy X-ray Absorptiometry (DXA).

Conclusion

This study provides crucial insights into the dietary habits and body composition of professional football players in Northern Ghana. It identifies a co-existence of traditional and modern dietary patterns and, most critically, reveals a high prevalence of overweight and obesity. This excess adiposity has significant negative implications for athletic performance and long-term health. The findings underscore an urgent need for professional football clubs in the region to implement evidence-based sports nutrition programs. These programs should include regular body composition monitoring, individualized nutritional counseling that is culturally sensitive, and education on periodizing nutritional intake to match the demands of training and the off-season. Such interventions are vital for optimizing player fitness, maximizing performance, and safeguarding athlete health.

Declarations

Ethics Approval and Consent to Participate

Approval was obtained from the Ethics and Protocol Review Committee of the School of Biomedical and Allied Health Sciences (SBAHS-ET./0209831488/AA/7A/2012-2013). All methods were carried out in accordance with relevant guidelines. All participants provided written informed consent.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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This study was self-funded.

Authors' contributions

KA, FEAH and CAB conceptualized the idea. KA, FEAH and CAB worked on the methodology and designed the study. KA, WKA and ARA helped with data analysis and drafting of first version of the manuscript. All authors participated in revising the article and approved the final version.

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