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ANALYSIS OF THE DIETARY PRACTICES OF THE NATIONAL TEAM OF THE REPUBLIC OF BENIN DURING THE QUALIFYING ROUND OF THE 2015 UNDER-17 SOCCER AFRICAN CUP OF NATIONS

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ABSTRACT

Two practices characterize the diet of elite African soccer players. The first practice consists of the period just before and during competitions, when the players are grouped together in training camps (TC) and supported by sports federations, and the second practice consists of the period when the players are out of training camp (OTC), that is, when they live and eat with their families. This study aims to describe the two characteristic contexts of the diet of Benin's elite soccer players during the 2015 under-17 Soccer African Cup of Nations (U-17 ACN) qualifiers. This is a qualitative and comparative study conducted using an approach that focuses on food consumption practices. The 24-hour recall and food logbook techniques were used to collect food data from the 24 cadet soccer players, during the OTC and TC periods within the three and eight days prior to an U-17 ACN qualifying match. In both contexts, the players' diets were spread over three meals, except for four players in the OTC period. The players claimed that they ate to satiety and with appetite, meals which were mostly local and monotonous in the OTC period, but Western and made with seven out of eight food groups in the TC period. In OTC conditions, meals were presented as a single dish and were often consumed alone in 15 to 17 minutes at variable times. In the TC period, meals were consumed in groups at the tables and at fixed times for 22 to 41 minutes. The number of food groups served and the conditions under which meals were consumed during the training camp period make this context the best match for the players' benchmark goals as well as help identify the benchmark eating behaviours of the Beninese soccer players in this study. The results suggest that the trainers of the studied soccer players promote good food hygiene and a longer time devoted to meals by good chewing. Benin Soccer Federation and the Ministry of Sports must work together to daily provide these soccer players with three meals, prepared with local food and containing all eight food groups when they are outside of the training camps as well as during training camp periods.

Key words: Survey, Diet, Dietary Consumption, Meals, Eating Behaviour Exercise Training, Elite Soccer Players, Benin, African Cup of Nations

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INTRODUCTION

Eating is a vital act for people regardless of their age, sex, physiological or health status and level of physical activity [1]. The body derives the nutrients necessary for its functioning from daily food consumption [2]. However, the relationship of people to food is not limited only to the satisfaction of physiological needs. Human food also has socio-cultural and hedonic functions, which justify the diversity of behaviour observed in men [3].

Eating behaviours have been developed over time and adopted by individuals, by successive generations, based on the available foods. These behaviours are based on respect for norms and beliefs, as well as on the search for pleasure [4]. However, they have not prevented communities from suffering from the many nutritional-related diseases (for example, kwashiorkor, pellagra) that have caused ravages in the past [5]. Even today, the role of diet as a determinant of communicable diseases (for example typhoid fever, Hepatitis B, gastroenteritis) and chronic non-communicable diseases (for example, high blood pressure, non-insulin dependent diabetes Mellitus) is well established and is also high on the list of prevention elements of the latter [1,6,7].

It is, therefore, important to study diet and, more specifically, population eating behaviours, particularly those of at-risk groups. One of the groups most affected is that of soccer players. The players in sub-Saharan Africa, who practice in an environment marked by long dry seasons during which fruits and vegetables are scarce, as well as by often non-rational behaviours, constitute a particular at-risk group [8]. Indeed, even in periods of abundance, populations and even athletes or sports men do not consider fruit to be essential for meeting the body's needs, and as a result, they only consume fruit occasionally [9]. It is even more urgent to undertake such studies among African soccer players whose diets differ from those of their non-player peers only during training camps, which are short periods of grouping in preparation for competition. Outside of these training camps and, therefore, during most of the sporting season, players reside and eat with their respective families.

The Benin national team, which is the focus of this study, was invited to an eight-day final preparation training camp. During this camp, the players were accommodated in a hotel for intensive training and adequate food provided on site, in conjunction with the team doctor's advice. The dietary study of these soccer players within these two contexts, was of particular interest because of the insights on dietary intake practices that such a study could provide on the conditions under which these players prepare for competition.

Many previous studies have been carried out regarding the feeding practices of soccer players around the world and in Africa, at different times during the sports season [8, 10]. Most of these studies have focused on nutritional and energy aspects, highlighting nutritional deficiencies in iron and vitamins and inadequate energy intake. However, these studies did not address aspects related to eating practices, such as the organization of meals, the hedonic aspects and the positions (standing or sitting) adopted to consume them [11]. Nevertheless, a perspective of the dietary intake practices is useful to

understand and correct, if necessary, certain deficiencies observed in the diets of sports men and women, particularly those from Africa, whose behaviours may differ depending on whether they are in training camps or living with their families. The objective of this study was to determine the feeding characteristics of the Benin national soccer team during the preparatory training camp for the penultimate qualifying match of the Under-17 African Cup of Nations in 2015 and outside of the training camp. It was undertaken to understand some of the seldom-studied aspects of the diet of African soccer players.

MATERIALS AND METHODS

Study design

This was a prospective and comparative study, which was carried out using a dietary survey, that is, when the players were staying with their families, and during an eight-day training camp organized by the Benin Soccer Federation and outside the training camp, that is, when the players were lodged in a hotel in Porto-Novo. The study sample consisted of all the 24 U-17 soccer players from the Benin national team, selected to prepare for the match against their Malian counterparts. The model used to analyse the diets of these cadet soccer players refers to the determinants of their eating behaviours (Figure 1), as defined by different authors, outside of the training camp [4,11].

The out-of-camp survey lasted three days, during which the 24-hour dietary recall technique and mobile phones were used to collect the previous day's data of each player on a 12-item questionnaire form [11,12] by either the main researcher or a research-assistant.

Every evening between 10 pm and 11 pm, each player's answers to these items were collected by phone [13,14], and transcribed on the questionnaire. During the eight days of the training camp, however, the food journal technique was used at each meal [15], allowing each player to complete the same 12-item questionnaire as that of the out-of-camp period. The hotel's head cook, as well as seven previously trained Sports Science students, collaborated in carrying out the survey as research assistants. The prior authorisation of the officials of the Benin Soccer Association, as well as the informed and written consent of the players, were requested and obtained (Letter Ref: N° 295/2014/FBF/SG/SP/PT of July 15th 2014).

Study tools and data collection

The survey was conducted via a questionnaire sheet that included, in addition to identifying the respondents, four other parts corresponding to the determinants of their eating behaviours or habits [4,11], which were made operational as composite variables (Figure 1). A minimum score of 80%, which corresponded to at least ten desirable practices out of the 12 items of the questionnaire, was required to conclude that a respondent had good eating habits [15].

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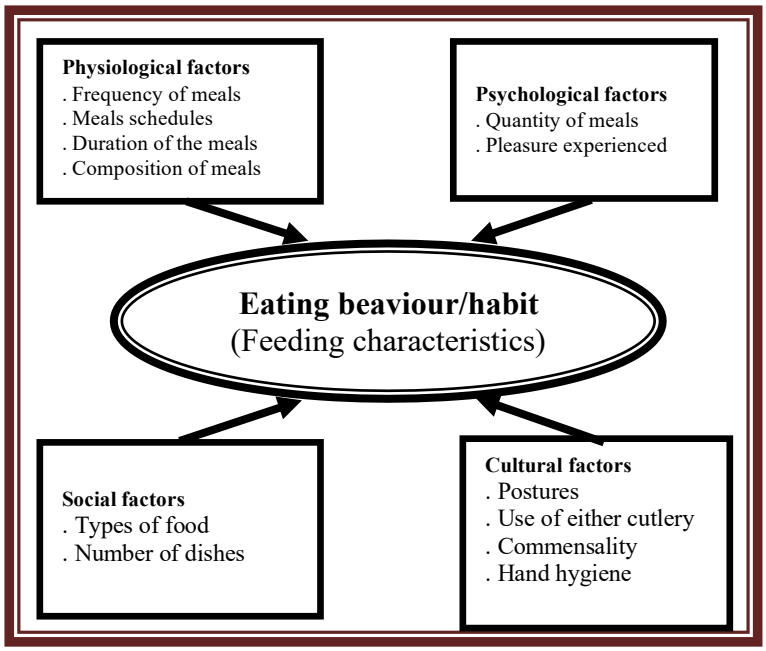

Figure 1: Adapted conceptual model for analyzing the athlete's diet in relation to his eating behaviour (Gedrich [4]; Talor *et al.* [11])

The determinants were grouped into 1) physiological factors, which were assessed by four items: the frequency of meals (3 or less than 3 per day); the meal schedules, which were considered fixed if the gap between the consumption hours for the same meal did not exceed two hours, and were considered variable otherwise; the duration of the meals (20 minutes and more to promote good chewing, or less than 20 minutes); and the composition of meals, which was considered good when the players were provided food from each of eight food groups (carbohydrates, vegetables, fruit, sugars, meat/fish or eggs, dairy products, vegetable fats, and animal fats) during the day and bad if the number of food groups consumed during the day was less than eight [16]; 2) psychological factors, which were measured by two items related to the hedonic aspects of nutrition, that is, the quantity of meals, which was categorized as either sufficient or insufficient, and the pleasure experienced while eating, which determined whether the meal was pleasant or not; 3) social factors, which were investigated by two items, that is, the type of food, which was categorized as local when the food and processing method used were African or otherwise {such as Western}, and the number of dishes per meal, which were either equal to or more than three to increase the chance of providing the eight food groups or otherwise less than three; and finally, 4) cultural factors, which dealt with: a) position, that is sitting at the tables or otherwise; b) the use of either cutlery or hands; c) commensality, which refers to the consumption of the meal either in a group (allowing conversation) or alone; and d) hand hygiene (washing or not washing hands, using or not using soap and drying hands with either an individual-use or a collective-use towel). Codes 0 and 1 were assigned to the different modalities of the items, depending on whether or not they are desirable practices. The players' behaviours were determined by adding the codes 0 and 1 obtained from the items constituting the composite variables.

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Data processing

The data from the training camp survey were processed with SPSS software version 22.0 (IBM, USA). The proportions corresponding to the absolute frequencies were calculated for each item or question by dividing the number of appearances of each modality, by the sample size. Corresponding percentages were calculated by multiplying the proportion obtained by 100. This statistical treatment was of no interest for the period of regrouping at the training camp, during which all the players consumed the same meals under the same conditions.

RESULTS AND DISCUSSION

Social demographic characteristics of the participants

The cadet national soccer team studied was composed exclusively of Beninese male youths aged 15.5 ± 0.5 years, weighing 68.7 ± 6.4 kg and measuring 174.0 ± 5.4 cm of height on average. They had all attended secondary school for 4 to 7 years and played international matches for at least two years.

Regarding their food during the OTC period, 20 players out of 24 (83.3%) used to eat three meals a day, including breakfast and lunch for 15 minutes, followed by dinner for 17 minutes. These meals were consumed together with the family for breakfast, lunch, and dinner by 16.7%, 75.0% and 87.5%, respectively of the players. The meal consumption schedules varied; the gaps for the same meals were 3 to 5 hours for 17 players (70.8%) at breakfast, 15 players (62.5%) at lunch and seven players (29.2%) at dinner. Meals were consumed alone by 22 (91.6%) players, and 13 (54.1%) players used to eat while standing up, especially at breakfast. Six different dishes were identified, five of which were local. These meals were presented in a single dish, and three of them appeared at each of the three meals (Table 1). All the players found their lunches and dinners to be appetizing and sufficient, while the breakfasts were insufficient and appetizing for six (25%) and 20 (83%) of them, respectively. In terms of food composition, three to five food groups were identified. Among the 20 respondents who said they washed their hands before meals, 17 (70.8%) did so with simple water, three (12.5%) did so with soap and water, and 16 (66.6%) dried their hands with collective-use towels.

In contrast, during the eight days of the TC period, all of the 24 players who were surveyed systematically ate three meals a day, which were made of 89.3% Western food (50 times out of 56) and which were considered sufficient and tasty and included seven food groups. Breakfast, lunch and dinner were consumed in groups, at the tables, at fixed times (9 a.m., 1 p.m. and 8 p.m.) and for an average of 22, 3 and 41 minutes, respectively. The two main meals consisted of three dishes (starter, resistance dishes and desserts). Over the period, three dishes were served twice, and some fruits, three times (Table 2). Finally, four players (16.6%) washed their hands with soap and water after leaving the table and dried them with individual-use napkins.

Regarding the choice of survey periods, one would expect the study to take place during the three classic periods of a sports season, that is, the preparation, competition and transition periods. However, only the phases both before and during the grouping

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of the players in the training camp, which were well situated within the competition period, were selected. There is no *a priori* difference in the diets of these players between the two periods of preparation and transition, which correspond to the periods both before and after the international competitions [9,17,18] during which the players live with their families.

To collect the data, a questionnaire using two food survey techniques was administered. The 24-hour recall technique used during the three days preceding the training camp is based on memory. This technique could be a source of bias; however, since this is a survey conducted to understand dietary practices as a whole, this technique can be considered relevant to this study [12,13].

Outside the group setting, the players indicated the dishes consumed at each meal, which made it possible, by a synthetic approach, to assess their frequency of consumption, even over the entire period. In the out-of-training camp context, the players did not consume the same foods, even if they lived in the same city or if they were from the same ethnolinguistic origin. During the training camp, however, the same meals were served to all the players, regardless of their origins and preferences. This situation, in fact, introduces a difference in the presentation of the data. This difference could be considered a limitation, as it is difficult to make some comparisons between the two periods in the survey, especially since Table 2 does not contain food consumption frequencies. However, this presentation allows internal comparisons to be made in order to highlight, for example, the range of food in each of the two contexts. Regarding the results of the study, the comparison of the components of food in the two contexts shows similarities, but above all, differences.

The players found the meals served in both contexts to be sufficient and appetizing, with the exception of breakfast and lunch, which 25.0% and 8.3% of players found to be insufficient, respectively, during the out-of-training-camp (OTC) period, that is, when they were at home. In general, these were dishes to which they are accustomed. However, regarding breakfasts and lunches bought in shops and consumed outside the home, the quantity served depends on the consumer's financial means, which may not be in line with the consumer's appetite. It can, therefore, be assumed that these players only acquired the quantities that corresponded to their means. Adolescents can be considered children and, therefore, dependent on their parents. Thus, they do not have the means to regularly consume breakfast sold in shops [19, 20]. In addition, the players' diet when they are at home is similar to that of the ordinary Beninese population, with no particular physical constraints [9].

The Western-style meals (for example spaghetti with gizzard, green salad with sausage, Russian salad, Plain rice, Raw vegetables with sausages) served during the training camp were not totally foreign to the soccer players, who have been able to get used to them and prefer them over the years. Otherwise, there would have been foodborne diseases caused by the change in foods, but there were no such diseases reported [21]. Similarly, group meals, which are opportunities to learn new social relationships with one's peers [22] may have facilitated the smooth acceptance of new behaviours such as:

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- the consumption of new food groups to which they were not accustomed (fruits, vegetables, dairy products);
- the consumption of Western-style meals consumed at fixed times;
- the consumption of starters and desserts not included in family meals; and
- the use of cutlery and eating at the tables during meals.

It is not appropriate to encourage breakfast skipping or exclusion of food groups that are essential to ensure a balanced and diversified diet for players who, in addition to being teenagers, take part in continental competitions. Their eating behaviours should be those of elite athletes with the three main daily meals, plus one or two snacks between meals [23, 24].

Food consumption patterns at home

Regarding other aspects of nutrition, when they are at home, some of the surveyed players ate their meals while standing up and at times that varied from day to day. One in six players ate only two meals a day. This organization of meals corresponds to that observed in Beninese families and in the "*maquis restaurants*", which are the places where players consume food when they are not at the training camp [25]. This home-based diet, which is composed of three to five food groups and characterized by the absence of fruit, vegetables, dairy products and animal fats, is also that of the entire Benin population, among whom fruit and meat consumption is scarce [9]. These high-cost food groups are essential for adolescents because of their high nutrient content, which is necessary for growth, physical effort and nutritional balance [26].

In terms of hand hygiene when living with their parents, four out of five (80,0%) of the soccer players washed them before eating, but only a third (33,3%) of them used soap. This attitude is proof that neither the education obtained from their parents nor their school lessons on awareness have succeeded in changing the players' behaviour [27]. Family hand washing is always performed with little water and generally without soap. In the retail trade, however, an increasing number of *restorers* (men or women who run a restaurant) are providing water and sometimes soap for hand washing.

Food consumption patterns at the training Camp

During the regrouping of the training camp period, the players consumed three Western-style meals daily and at fixed times. The main meals (lunch and dinner) were made up of three dishes (starter, main dish and dessert), reminiscent of the French model [28]. These were several meals made up of seven food groups, with only animal fats (for example butter) missing during the day [16]. Far from being new to soccer players, these meals seemed rather appetizing and sufficient. The meals served, as well as their composition, structure and organization, were fully accepted by the soccer players, whose bodies tolerated the change in diet [29]. The team doctor did not record any case of food-borne diseases during this period.

Food hygiene and eating arrangements

During the training camp, various meals were eaten at the tables, in groups and with individual plates and cutlery. This is part of the reason why the players did not feel the need to wash their hands before eating. In addition to this observation, the players sat at the tables in the mornings and evenings after their baths following their training

sessions. Thus, they told themselves that their hands were clean and that it was not necessary to wash them, especially since they used cutlery. However, even at noon when the players arrived at the tables after a break, they did not wash their hands, despite the possibility that their hands were not clean due to various activities such as greeting people with a handshake, playing video or board games, using the mobile phone or holding onto the staircase handrail, etcetera. Although this habit is not a good food hygiene practice, the young soccer players studied did not consider it useful to wash their hands before eating, if they had just taken a bath or if they had to use tableware.

This behaviour is, however, contrary to the WHO's recommendations that to eliminate any risk of food contamination by hand, it is always necessary to wash one's hands with soap and water before eating [30]. Nutritional education sessions should be organized for these players to change their eating behaviours that are harmful to their health and good sports performance.

CONCLUSION

This study was undertaken to determine the nutritional characteristics of Benin's younger soccer players before and during a training camp organized by the National Soccer Federation in 2015. The data collected revealed that during the group activities while in training camps, the studied soccer players adopted their best eating behaviour by eating –seven out of eight food groups, spread over three meals, consumed at the tables, in groups and at fixed times. For most of the sporting season, the players reside with their families, and their diet in this context also determines the quality of their sporting results. This is why the Benin Soccer Federation and the Ministry of Sports must work together to daily provide these soccer players with three meals prepared with local food and containing all eight food groups when they are outside of the training camps. A periodic quantitative assessment of the energy and non-energy intake of the nutrients consumed should also be considered to assess their degree of adequacy regarding the needs of these young soccer players, who are committed to their high level of sports performance.

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Table 1: Typical meals consumed by the soccer players as surveyed in the family context during the three days preceding the training camp (n = 24)

Meals	n (%)
Breakfast	
1. Rice, bean, *atassi,* fried sauce, meat, egg, fish or cheese	14 (58,3)
2. Pasta, fried sauce meat, egg, fish or cheese	4 (16,7)
3. Porridge, sugar, milk, groundnut	4 (16,7)
4. Corn flour, tomato sauce, meat, egg, fish or cheese	1 (4,2)
5. *Gari*, sugar, milk, groundnut	1 (4,2)
Lunch	
1. Rice, bean, *atassi,* fried sauce, meat, egg, fish or cheese	12 (50,0)
2. Corn flour, tomato sauce, meat, egg, fish or cheese	5 (20,8)
3. *Gari*, sugar, milk, groundnut	4 (16,7)
4. Pasta, fried sauce meat, egg, fish or cheese	2 (8,8)
Dinner	
1 Corn flour, tomato sauce, meat, egg, fish or cheese	14 (58,3)
2. Rice, bean, *atassi,* fried sauce, meat, egg, fish or cheese	5 (20,8)
3. Pasta, fried sauce meat, egg, fish or cheese	4 (16,7)
4. Yam, beans, oil.	1 (4,2)

Legend: 1. n: the numbers in the table indicate the number of players and the corresponding percentages in brackets;

2. gari: dried cassava flour;

3. cheese: local cheese made in an artisanal method with cow's milk and *calotropis procera*;

4. atassi: bean mixture and seasoned rice (salt, pepper) and cooked water;

5. fried sauce: mixture of tomato, onion, shrimps, ginger, pepper, and salt, fried in oil.

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Table 2: Typical meals consumed by the soccer players as surveyed during the eight days of the training camp (n = 24)

Meals	Dishes	Composition of dishes
Breakfast		Bread with coffee or tea with milk and sugar, served plain or with sardines; scrambled eggs*; gizzard, chicken or sardine sandwich with spaghetti, depending on the day
	Appetizer	Cassoulet with a sausage, avocado, tuna salad composite; green salad with sausage*; spaghetti with gizzards, stuffed eggs, vegetables, and salad with bread each time
Lunch		
	Main dish	- Plain rice, jollof rice, Creole rice, or rice with beans *(atassi)* or pasta with fish or chicken and vegetables - *Pounded yams* + mutton with ground nut-based sauce
	Dessert	- Watermelon**, apple, pineapple*, banana*, yoghurt or crepe
	Appetizer	- Green salad with sausage*; frayed chicken or tuna; Russian salad; mixed salad with sardines or raw vegetables with sausage
Dinner		
	Main dish	- Corn flour, *agbéli, télibo* or *êba** and vegetable sauce (*gboman, crincrin, or assrôkouin*) with chicken or fish; - Rice and fried potatoes or steamed potatoes, spaghetti with fat and chicken or fish.
	Dessert	- Orange**, watermelon**, pineapple* or yoghurt

*Dishes or food consumed twice during the training camp; **Dishes or food consumed three times during the training camp; *Assrôkouin*: sticky sauce made with wild apple seed (*Irvingia Gabonensis*); *èba*: dough made with *gari (*cassava flour); *télibô*: dough made with yam pod flour; *agbéli*: dough made with cassava flour

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