



## Dietary Diversity of Rural Households in North Central Nigeria

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### Authors' contributions

*This work was carried out in collaboration between both authors. Author MOA designed the study, wrote the protocol, managed the literature searches and wrote the first draft of the manuscript. Both authors read and approved the final manuscript.*

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### ABSTRACT

**Aims:** To determine the dietary diversity score and diversity within food groups consumed and the probability of food security among rural households in North Central Nigeria.

**Study Design:** A cross sectional survey design was used.

**Place and Duration of Study:** The study was conducted among three ethnic groups in North Central Nigeria, between November and December, 2011. The ethnic groups were Tiv, Igala and Eggon in Benue, Kogi and Nasarawa States respectively.

**Methodology:** A sample of 340 households was interviewed to identify the variety of foods consumed over the previous 24 hours. Data from the food groups was analyzed using percentages. Since national dietary data is not available on mean Dietary Diversity Score, mean terciles were used to classify households into low, medium and high dietary diversity.

**Results:** The findings indicated that beside oil and fat (97%) and spices and condiments (96%), root and tuber crops (86%) constituted the food group consumed by most households. Most Tiv (96.7%) and Igala (94.4%) households reported use of root and tuber crops whereas most Eggon (78.6%) households reported use of cereals. Mean dietary diversity terciles were 2.90, 4.53 and 6.37 for low, medium and high dietary diversity respectively, with a mean of 4.60 for the study area.

**Conclusion:** Rural households in North Central Nigeria consumed an average of four to five food groups per day. However, the diet consumed is low in dietary variety. Consequently, access to nutritious foods remained a challenge in the region. Thus, farmers should be encouraged to

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produce and consume food of increased quality and diversity for improved nutrition and food security.

*Keywords: Dietary diversity; diet quality; food security; households; terciles.*

## 1. INTRODUCTION

Food security is defined as a situation in which all household members have both economic and physical access to enough, safe and nutritious foods to meet their needs, so that they do not live in hunger or fear of starvation. Food access refers specifically to adequate availability of quality foods for health and wellbeing [1]. Worldwide, around 925 million people are chronically hungry due to extreme poverty, while up to two billion people lack food security intermittently due to varying degrees of poverty [2]. Household food insecurity is directly influenced by low access to food. Consequently, households that do not have sufficient access to food have low dietary diversity, reflecting poor nutrient adequacy.

Dietary diversity is the number of different foods or food groups consumed by the household over a reference period not regarding the frequency of consumption [3]. It is an outcome measure of food security at the individual or household level [4]. In the present study dietary diversity refers to the number of food groups consumed over a 24 hours period.

Household dietary diversity is influenced by accessibility to food. It is estimated that close to 1 billion people in the world suffer from hunger and food insecurity, defined as not having enough calories to live a healthy life [5]. Nearly the entire undernourished people are in developing countries with worst scenarios in Asia (578 million) and sub-Saharan Africa (239 million) [6]. In the case of Nigeria, an estimated 61 percent of the people are malnourished [7]. The number of people in the world with poor access to nutritious foods rich in essential micronutrients such as fruits and vegetables, meat, fish, dairy products, and biofortified staple foods is staggering [8]. This leads to deficiencies in micronutrients such as vitamin A, iron, and zinc and affects the survival, health, development, and wellbeing of billions of people. However, it has been observed that the more food groups included in a daily diet the greater the likelihood of meeting nutrient requirements while monotonous diets, based mainly on

starches such as maize and bread, have been closely associated with food insecurity [9].

Findings from dietary diversity studies all suggest that food security conditions could be enhanced by consuming varieties of food [10,11,12,13]. However, this has not been extensively examined in North Central Nigeria. Therefore, the present study was carried out to assess the dietary diversity and the probability of food security among rural households in North Central Nigeria. The outcomes of this study could be used to guide the federal and state governments when formulating new approaches and interventions to address food access and ultimately food security in households in North Central Nigeria.

There are four dimensions to food security based on its definition, namely availability, stability, access and utilization. This study examined the access dimension of household food security using dietary diversity score (DDS) and mean dietary diversity terciles. The data examined in the study was part of a large questionnaire survey on the food security situation of households among selected ethnic groups in North Central Nigeria.

## 2. METHODOLOGY

The study was conducted in North Central Nigeria. North Central Nigeria is situated in the southern Guinea savanna agro-ecological zone and it comprises six states, namely Plateau, Nasarawa, Benue, Kogi, Niger and Kwara as well as the Federal Capital Territory, Abuja [14]. The region covers a land area of about 251,425 square kilometres [15,16] with a population of about 20,266,257 inhabitants [17]. Agriculture is the principal activity in the study area. It is, however, at a subsistence level. Farms are generally small, usually less than five hectares and rely on the use of manual labour and crude implements such as hoes and machetes. Cattle, sheep, goats, pigs, and poultry are some of the principal livestock kept by farmers. Like other regions of the country, the population is growing rapidly and urbanization is accelerating. This is

leading to worsening food deficit despite government efforts to rectify the situation.

Primary data was obtained from a survey of households in the villages of three ethnic groups in North Central Nigeria between November and December, 2011. A multi-stage sampling procedure was adopted for the study. In the first stage, a purposive sampling technique was used to select three ethnic groups and one village per ethnic group based on differences in language and culture. In the second stage, a random sample of 120 Tiv, 108 Igala and 112 Eggon households were interviewed using the international standardized Household Dietary Diversity Score (HDDS) questionnaire. Culturally, females are responsible for household food preparation in North Central Nigeria and they constituted the respondents for this study. The interview was conducted in the homes of the interviewees by well trained interviewers who were knowledgeable about food preparations, including prevalent ethnic foods. The data collected covered the variety of foods and drinks from twelve food groups consumed by the households as a whole during the previous 24 hours [18].

Every food item in the meals was coded since quantities or proportions were not required. A dietary diversity score (DDS) was calculated by counting each of twelve food groups [18]. Since national dietary data is not available on mean DDS, terciles were used to classify the households into low, medium and high diversity [19]. Terciles were used because there are currently no international guidelines or recommendations on which to base cut-offs for low, average and high. A score of equal to or lower than three was considered as poor dietary diversity (and by association poor food security) while a score of six and above represents a very varied diet. The twelve food groups used in this study were: (1) cereals (maize, rice, millet, sorghum and fonio 'ácha'); (2) roots and tubers (yam, cassava, cocoyam and sweet potato); (3) vegetables (amarantus and talphairia); (4) fruits (orange, pawpaw, banana, fresh tomatoes); (5) meat and poultry (chicken, beef, goat or sheep and bush meat); (6) eggs; (7) fish (fresh fish and smoked frozen fish); (8) pulses, legumes and nuts (cowpea, groundnut and bambaranut); (9) milk and milk products; (10) oil (groundnut oil and red palm oil); (11) sugar; (12) condiments (pepper, salt and spices). The proportion of people who had consumed a food group at least once was also calculated.

### 3. RESULTS AND DISCUSSION

The proportion of households who consumed food from each food group in the previous 24 hours (Table 1) revealed that root and tuber crops constituted the food group consumed by most Tiv (97%) and Igala (94%) households whereas cereals constituted the food group consumed by most Eggon (79%) households. Over 50% of the households in each ethnic group consumed fish (fresh and smoked frozen fish) whereas about 30% of all the households consumed vegetables. Igala households consumed more fruits (35%) compared to Tiv (23%) and Eggon (17%) households. Conversely, Eggon households (46%) reported use of legumes compared to Igala (26%) and Tiv households (23%). The Tiv consumed meat the most (36%) and Eggon the least (7%). Overall, beside spices and condiments (96%) and oil and fat (93%), root and tuber crops (86%) constituted the food group most consumed in the study area. Few households reported use of legumes (32%), vegetables (26%) and fruits (25%) while meat (19%), sugar (17%), milk (10%) and egg (5%) were delicacies. These findings are consistent with the observation that lack of diversity is a particularly severe problem among populations in the developing world where diets are based predominantly on staples and often include only a few animal products at most and only seasonal fruits and vegetables [20].

The role of root and tuber crops in the diets of the study populations could result in a high prevalence of protein inadequacy. The diminishing role of pulses and animal products, two valuable sources of protein and micronutrients, suggests a low quality diet in North Central Nigeria. These findings concur with those of other researchers that poor households subsist on monotonous staple-based diets and lack access to nutritious foods such as fruits, vegetables, animal-source foods (such as fish, meat, eggs, and dairy products), or wild foods of high nutrient content [21,22,23]. Lack of diversity in the diet is strongly associated with inadequate intake and risks of deficiencies of essential micronutrients such as vitamin A, iron, and zinc [5]. Micronutrient deficiencies have far-reaching health and nutrition consequences in both the short and the long term [24,25,26]. These deficiencies affect the survival, health, development, and well-being of those afflicted. Children and women of reproductive age are especially vulnerable because they have particularly high micronutrient requirements

[25,26,27]. The limited access to nutritious food in the study area could be attributed to limited availability of nutritious foods, economic constraints and lack of knowledge and information [5].

Most households (Tiv -61%; Igala-57%; Eggon-58%) reported consuming between four and five food groups the previous day. The mean dietary diversity terciles were 2.90, 4.53 and 6.37 with a grand mean of 4.60 (Table 2). The findings revealed that more than half of the households studied fell in the medium tercile and consumed between 4 and 5 food groups the previous day. Studies in other developing countries that have evaluated their dietary diversity scores showed a mean DDS of 4.91 for Filipino children aged 24-71 months using scores of nine food groups; in Burkina Faso the mean DDS was 4.6, in Laos 5.2 and 3.3 in Northern Uganda [10]. In the diets of adult South Africans, the DDS was 4.02 [28]. It

is apparent that poor dietary variety is a feature of many developing countries, and is not restricted to the North Central Nigerian population. Although the findings of this study showed that the population fell in the medium tercile, the commonly consumed food groups, other than spices and condiments and oil and fat, were roots and tubers among Tiv and Igala ethnic groups and cereals in Eggon households. Meat, eggs, vegetables, fruits, legumes, milk, sugar and honey were consumed the least often (Table 1). However, research has shown that increased dietary diversity improves the capacity of individuals to meet their daily requirements for a large number of essential nutrients [29]. This means that nutritional balance can be ensured through ensuring a variety of food. Therefore, the challenge for the local and state governments in the region is to evolve strategies that would increase access to varieties of food by the rural households.

**Table 1. Percentage distribution of food groups consumed by households in North Central Nigeria**

| Food groups                                | Tiv (n=120)<br>% | Igala (n=108)<br>% | Eggon (n=112)<br>% | Total (n=340)<br>% |
|--|------------------|--------------------|--------------------|--------------------|
| Cereals                                    | 28.3             | 7.4                | 78.6               | 38.2               |
| Roots and tubers                           | 96.7             | 94.4               | 67.0               | 86.2               |
| Vegetables                                 | 35.8             | 34.3               | 37.5               | 25.9               |
| Fruits                                     | 22.5             | 35.2               | 17.0               | 24.7               |
| Meat, poultry and offal                    | 35.8             | 13.9               | 7.1                | 19.4               |
| Eggs                                       | 4.2              | 3.7                | 7.1                | 5.0                |
| Fish                                       | 51.7             | 54.6               | 57.1               | 54.4               |
| Pulses, legumes and nuts                   | 23.3             | 25.9               | 46.4               | 31.8               |
| Milk                                       | 4.2              | 9.3                | 16.1               | 9.7                |
| Oil and fats (ground nut oil and palm oil) | 96.7             | 94.4               | 86.6               | 92.6               |
| Sugar and honey                            | 7.5              | 17.6               | 25.9               | 16.8               |
| Spices and condiments                      | 100.0            | 97.2               | 91.1               | 96.2               |

**Table 2. Distribution of food groups consumed by households in North Central Nigeria by dietary diversity terciles**

| Ethnic group    | Low<br>(≤ 3 food groups) |      | Medium<br>(4 & 5 food groups) |      | High<br>(6 ≥ food groups) |      |
|-----------------|--------------------------|------|-------------------------------|------|---------------------------|------|
|                 | Percentage               | Mean | Percentage                    | Mean | Percentage                | Mean |
| Anter (n = 120) | 3.33                     | 2.75 | 60.83                         | 4.43 | 35.83                     | 6.35 |
| Ikem (n = 108)  | 13.89                    | 3.00 | 57.41                         | 4.55 | 28.70                     | 6.45 |
| Randa (n = 112) | 9.82                     | 2.82 | 58.04                         | 4.62 | 32.14                     | 6.33 |
| Total (n = 340) | 8.82                     | 2.90 | 58.82                         | 4.53 | 32.35                     | 6.37 |

The strength of this study is in the realization that in spite of the various strategies by the Federal Government of Nigeria to improve food security in the country, the situation in North Central Nigeria is still a challenge because rural households are still unable to access nutritious foods in the right quantity and quality. However, the study is limited in the sense that the use of households rather than individuals meant that only households' economic access to food was assessed and not quality of individual's diet. Furthermore, the use of 24-hour recall instead of longer days for measuring household dietary diversity made it impossible to capture individual's usual food intake. Lack of internationally acceptable cut-offs for mean dietary diversity terciles made it unsafe for comparisons across different locations.

#### 4. CONCLUSION

The study concludes that rural households in North Central Nigeria consumed an average of four to five food groups the previous day. However, the diet consumed is low in dietary variety as the commonly consumed food groups were spices and condiments, oil and fat, roots and tubers, cereals and fish. Eggs, milk, meat, fruits, and vegetables were the least consumed. Consequently, access to nutritious foods remained a challenge in the region. The implication of the finding for the local and state governments in North Central Nigeria is to encourage farmers to produce and consume food of increased quality and diversity for improved nutrition and food security.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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