



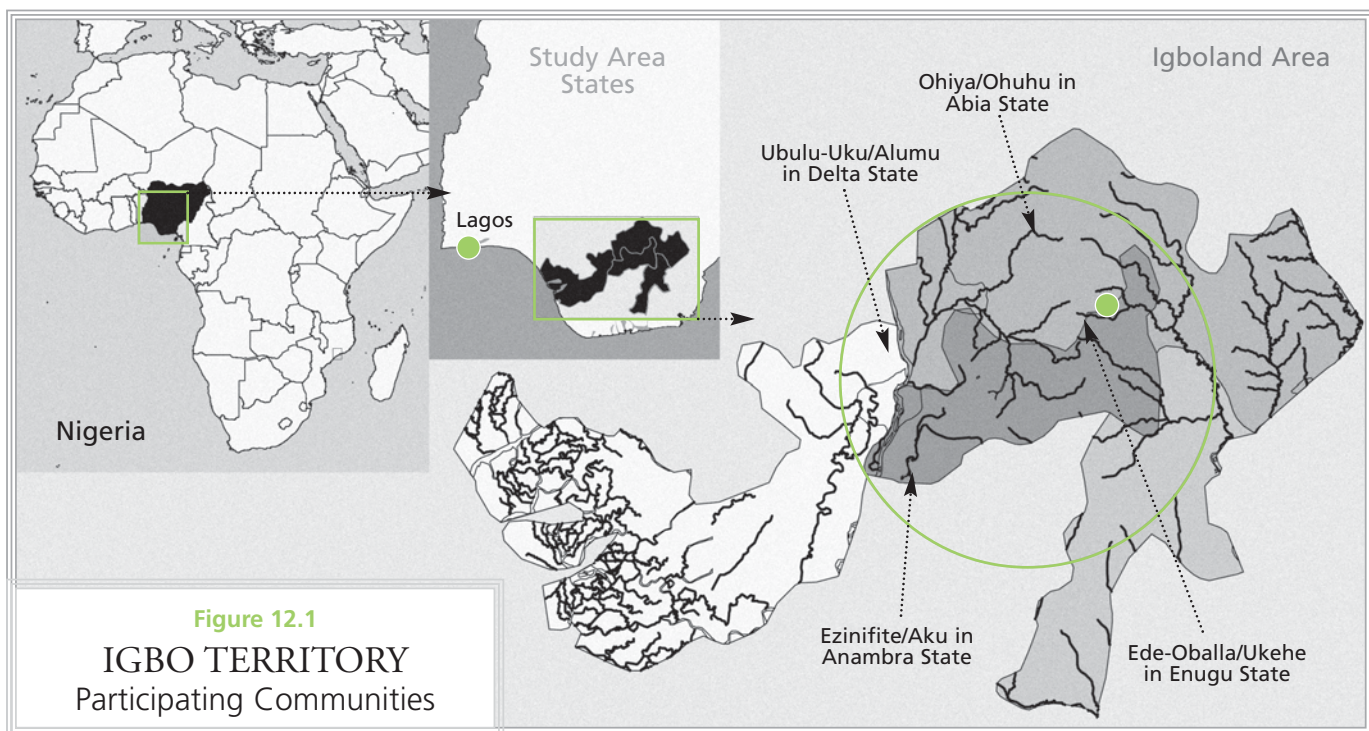
## Chapter 12

# The Igbo traditional food system documented in four states in southern Nigeria

● ELIZABETH C. OKEKE, PH.D.<sup>1</sup> ● HENRIETTA N. ENE-OBONG, PH.D.<sup>1</sup>

● ANTHONIA O. UZUEGBUNAM, PH.D.<sup>2</sup>

● ALFRED OZIOKO<sup>3,4</sup> ● SIMON I. UMEH<sup>5</sup> ● NNAEMEKA CHUKWUONE<sup>6</sup>



Data from ESRI Global GIS, 2006.  
 Walter Hitschfield  
 Geographic Information Centre,  
 McGill University Library.

1  
 Department of  
 Home Science,  
 Nutrition and Dietetics,  
 University of Nigeria,  
 Nsukka (UNN),  
 Nigeria

2  
 Social Science Unit, School  
 of General Studies, UNN,  
 Nigeria

3  
 Bioresources Development  
 and Conservation  
 Program, UNN,  
 Nigeria

4  
 International Centre  
 for Ethnomedicine and  
 Drug Discovery,  
 Nsukka, Nigeria

5  
 Department of  
 Crop Science, UNN,  
 Nigeria

6  
 Centre for Rural  
 Development and  
 Cooperatives, UNN,  
 Nigeria

Photographic section >> XXXVI

“Ndi mba ozo, na-azu  
na-anwu n'aguu.”

“People who depend on foreign food eventually die of hunger.”

Igbo saying

## Abstract

Traditional food systems play significant roles in maintaining the well-being and health of Indigenous Peoples. Yet, evidence abounds showing that the traditional food base and knowledge of Indigenous Peoples are being eroded. This has resulted in the use of fewer species, decreased dietary diversity due to household food insecurity and consequently poor health status. A documentation of the traditional food system of the Igbo culture area of Nigeria included food uses, nutritional value and contribution to nutrient intake, and was conducted in four randomly selected states in which the Igbo reside. Quantitative and qualitative data collection methods were employed. A total of 220 food species including many varieties were documented.

The study revealed existing knowledge gaps of the composition of Igbo traditional foods. A number of little-used, uncommon vegetables with perceived health benefits were identified in some areas. Key traditional staple foods in the Igbo culture area included: yams (*Dioscorea* spp.), cocoyam (*Colocasia/Xanthosoma* spp.), cassava (*Manihot* spp.), maize (*Zea mays*), some of which were status symbols. Other food groups such as legumes, nuts, seeds, wild fruits and vegetables were abundant. Animal foods were available but expensive; the availability of wild/bush animals was limited because of deforestation and urbanization. Breastfeeding was noted to be the traditionally accepted method of infant feeding, while quality complementary foods posed some problems.

Most traditional foods/diets were inadequate in meeting the energy, calcium, riboflavin and niacin needs of the population. Red palm oil contributed 70 to 85 percent of provitamin A intake. There were community variations in the contribution of specific food groups to nutrient intakes. Based on the findings of this research, intervention options and policy considerations are suggested.

## Introduction

### Overall description of research area

Two communities were randomly sampled in each of four states: Ohiya/Ohuhu in Abia State, Ezinifite/Aku in Anambra State, Ubulu-Uku/Alumu in Delta State and Ede-Oballa/Ukehe in Enugu State (Figure 12.1). The detailed fieldwork was conducted in these eight communities.

Ohiya/Ohuhu communities are located in Umuahia Local Government Area (LGA) in Abia State. Umuahia had a population of about 213 630 in 1992 according to the Nigeria Population Census (NPC, 1992), and residents in the study were just a few kilometres from the state capital, Umuahia. The vegetation is deciduous and the climate is tropical. There is a small river nearby where people fish and grow vegetables. Ohiya/Ohuhu communities are distinctively known for a stem vegetable called *achara* (*Pennisetum* spp.) used for soup preparation, and fermented oil bean seeds presented as kola on big occasions. The *achara* stem vegetable is not common in other communities studied.

Ezinifite/Aku communities are located in Aguata LGA of Anambra State. Aguata LGA had a population of 289 049 (NPC, 1992). Politically, Ezinifite organizes its traditional authority around the Igwe. They are situated in the hinterland within the deciduous forests. Their location greatly influences their production, consumption and preservation of foods. Their main foods are yam, cassava and a few legumes, which are also seasonal.

Ubulu-Uku/Alumu communities are located in Delta State. They are located near the river basin belt

of the Niger River that gave Nigeria its name. This location is a typical farming region, which explains why the inhabitants produce and consume many vegetables, cassava, yam, etc. Snails and bushmeat are also consumed. The traditional political organizations of Ubulu-Uku/Alumu communities are around the Obi of the communities.

Ede-Oballa/Ukehe communities are located at the heart of Nsukka LGA in Enugu State, near the University of Nigeria, Nsukka, and within the deciduous forest area. Its soils are very rich for the cultivation of legumes and vegetables. Unlike the other communities studied, Ede-Oballa/Ukehe may be one of the most fertile areas in the south-east zone of Igbo culture area. This area is rich in bushmeat and cultivated cereals. In 1992, Ede-Oballa had an estimated population of 12 447, with 5 760 males and 6 687 females (NPC, 1992).

## Geographic and environmental characteristics

Geographically, south-eastern Nigeria extends from latitudes 4° 40' to 7° 20' north latitude, and 6° 00' to 8° 20' east longitude. The culture area occupies about 50 000 km<sup>2</sup> of Nigeria's total area of 923 768 km<sup>2</sup> (Figure 12.1). The states of the Federal Republic of Nigeria occupied by the cultural group are Abia, Anambra, Ebonyi, Enugu and Imo States where they are the dominant group. In Rivers and Delta States, the Igbo cultural group occupies almost a third of the states.

The land surface of the Igbo culture area is dominated by plains which are less than 200 m above sea level, and which include some upland areas within the Udi, Plateau and Awka-Orlu regions which in some cases are greater than 520 m above sea level (particularly the Nsukka area). The plain – which is the dominant feature in the area (Ofomata, 1975) – may have resulted from alternating denudation activities. The areas covered by the plains are Anambra State within the Anambra-Niger River plain, Imo State at the foot of Awka-Orlu upland at the axis of Orlu, Owerri, Umuahia and Aba. This lowland joins the so-called Niger Delta plains. Ebonyi and Abia States fall within the Cross-River plain.

The annual rainfall of the area ranges from 4 000 mm in the southern area to about 1 700 mm at Nsukka in the northern area. There are considerable variations in total annual rainfall from year to year. In the southern part towards the coastal region, a tropical wet climate is experienced, while the rest of the region has a tropical dry climate (Koppen, 1940). According to Monanu (1975), although both classes of climate imply an average annual surplus, the seasonal distribution is more significant than the average annual rainfall total. Most soils are moist throughout the year.

The temperature pattern closely follows the rainfall distribution. The southern portion of the area has an average annual temperature between 26 and 27 °C, while that in the north is between 27 and 28 °C. There are two major seasons in the area: rainy and dry. The rainy season lasts from April to October in the northern part of the zone, while in the south the rains can start as early as March and last until November. The dry season lasts up to five months. Often, the dry season comes with the very dry northeast Trade Wind from the Sahara desert (the “Harmattan” wind). Some tourist attractions in the area are Agulu Lake, Ogbunike Cave, Green Lake and Enyigba Salt Lake.

## Environmental protection issues

Soil erosion – especially gully, rill and inter-rill including riverbank flooding – remains the most important environmental problem in the area. The well-known gully erosion sites are the Agulu-Nanka in Anambra State, Orlu and Uruala areas of Imo State, Ozuitem, Abriba, Ohafia and Amucha in Abia State. Active gully erosion is estimated to affect about 2 percent of the total land area of Igbo cultural group. This is highly detrimental to the agricultural production life and land of the people.

## Demographic characteristics

The population of the Igbo cultural group according to a 1991 national census was 25 million (NPC, 1992). The Owerri area has one of the highest population densities not only of Nigeria, but in the whole of Africa,

with Imo State up to Anambra State area having 460 persons per km<sup>2</sup> at that time. Education infrastructure in the states had not been fully developed and illiteracy was frequent. Only 41 percent of women aged 15 and older was literate in 1999, compared with 58 percent of men (FOS, 2000). The goal of achieving equal access to primary education by girls and boys had not yet been attained. The recent enrollment rates for both sexes declined from 87 to 84 percent in boys and 82 to 77 percent in girls (FOS/UNICEF, 2000). Education progresses through pre-primary, primary, secondary and post-secondary levels, and there are also technical schools and colleges of education.

## Cultural characteristics

Generally, the Igbo people share a common basic culture centred on a common language, common institutions and common religious and cosmological beliefs. This type of unity within a variable cultural complex has full expression in the area represented by kola-nut and white chalk customs, the vigour in Igbo music and dance movements, highly developed art of wall decoration and delicate body paintings, pottery designs, weaving, folklore, oral literature, “mmuo” dances and drama, traditional games and pastimes such as wrestling, acrobatics, archery and fencing (Uchendu, 1965). Due to its patrilineal nature, the society has a strong preference for the male child. The extended family system or network is predominant and functions not only as a kinship system but also as a social welfare and security mechanism. Cultural norms and practices coupled with the influence of religion have tended to determine the place of women in Igbo culture, with roots in tradition, culture and religion. Discrimination against women is no longer as static or as strong as previously because the government recognizes the rights of women, and women’s organizations work to ensure that the rights of women are protected (Onwuejeogwu, 1981).

Different parts of Igbo culture area still observe food taboos. Women still deliver their babies under the care of traditional birth attendants. Despite the campaign against early marriage and teenage pregnancy, these are

prevalent practices. Today women still do not participate in land issues, traditional kola nut practices, etc.

## General description of the food system circumstances

Agriculture is a long-standing occupation of the people of the zone. Farm size is small, about 1.5 hectares. Rainfed crop production is dominant. Cropping is based on fallow system on outlying farms while compound and other farms close to homesteads are continuously cropped (Ndiokwelu, 1998).

All crops are sold and a proportion is used for food. Industrial crops like cocoa, rubber and cotton are grown in minor quantities in the zone, but are cash crops. Yam (*Dioscorea* spp.), maize (*Zea mays*), cassava (*Manihot* spp.), cocoyam (*Colocassia* spp.), edible legumes, vegetables and rice (*Oryza sativa*) are grown extensively in some areas of the zone. Mixed cropping based on root/tuber crops is universally practised. Rice is grown as a sole crop in seasonal swamps. The dominant tree crops are oil palm, citrus, banana, plantain, kola, coconut, mango and rafia palm. There are still pockets of food gathering, hunting and fishing, but deforestation has made it difficult to hunt regularly. Fishing is carried out in the riverine areas, such as Delta Igbo or near Adani and Nkpologu areas in Enugu State. Livestock farming (local cow, goat, pig, chicken, rabbit and fish) is practised in the Igbo culture area. In rural areas local chickens brood anywhere, yet there are well-established poultry farms in both rural and urban areas of the Igbo culture area. Many useful fruit trees are exploited from semi-wild conditions. These include breadfruit (*Treculia* sp.), African pear (*Dacryodes* sp.), *Irvingia* sp. and *Pentaclethra macrophylla* (oil bean seed), *Dialium* sp., *Parkia vitex* and *Chrysophyllum* sp. Wild and semi-wild leaf vegetables of importance in the zone include *Pterocarpus* sp., *Pergularia* sp. and *Gnetum* sp.

## Overall health and nutrition status

### Water and sanitation

In 2000, household piped water coverage was less than 30 percent and sanitation was less than 20 percent.

Sanitary means of excreta disposal in the communities was accessible by 56 percent of the population (FOS/UNICEF, 2000).

### Nutritional status

Nutritional status of vulnerable groups in the country can be used as a measure to assess the nutritional status of the communities with whom we worked. The recently concluded Food Consumption and Nutrition Survey 2001–2003 found that, nationally, 42 percent of children were stunted, 25 percent were underweight and 9 percent were wasted (Maziya-Dixon *et al.*, 2004). The National Demographic Health Survey (NPC and ORC Macro, 2004) also showed that in the south-east (Igbo area), 20 percent of children were stunted, 5 percent were wasted and 8.5 percent were underweight. These values were lower than in other zones.

Micronutrient deficiencies were also of great public health importance in the Igbo culture area. Available data from the 1993 Participatory Information Collection (PIC) survey showed that the prevalence of vitamin A deficiency was 9 percent in children and 7 percent in mothers (FGN and United Nations Children's Fund, 1993; FGN/UNICEF, 1994). Key nutritional findings for children aged 6–71 months in the southeast zone showed vitamin A dietary risk with a vitamin A deficiency (VAD) prevalence of 16 percent and serum VAD 15 percent (OMNI, 1993). The Multiple Indicator Cluster Survey (FOS/UNICEF, 2000) showed that less than a quarter of children between the ages of 6 and 59 months had received a vitamin A supplement in the preceding 24 months. The data indicated that the regions with the most serious prevalence of VAD had received the least supplementation, while the proportion of children receiving vitamin A supplements was as high as 47 percent in the southeast.

The data also showed that vitamin A supplementation was much more available in the urban than in the rural areas. A 1993 study (FGN and United Nations Children's Fund, 1993) showed that the Nigerian southeast had the highest prevalence of iron deficiency anaemia (IDA) for mothers (61 percent), while the lowest prevalence was in the northwest (12 percent). The prevalence rate for anaemia among children was highest in the southeast

at 50 percent and lowest in the northeast (11 percent). Prevention is the best treatment of IDA, but it was only in UNICEF-assisted areas that supplementation was occurring. In the Igbo culture area, where anaemia was highest, only 16 percent of pregnant women received iron and folic acid supplements in the second trimester.

Iodine and zinc deficiencies have also been high. Historically, Nigeria has had one of the highest goitre rates in Africa (NPC and UNICEF, 2001), and the prevalence rates were much higher in the southwest (29 percent) and southeast (27 percent) than in the north (13 percent for both the northwest and northeast). The success of the Universal Salt Iodization (USI) can be gauged by the fact that in 1995 it was reported that 97 percent of all food grade salt manufactured in Nigeria was iodized (Egbuta and Hettiaratchy, 1996). Recently, it has been shown that 20 percent of children in Nigeria were deficient in zinc, higher (36 percent) in the moist savanna and lowest (6 percent) in the humid forest. In mothers and pregnant women, zinc deficiency was found in 28 percent and 24 percent, respectively (Maziya-Dixon *et al.*, 2004). Many food consumption studies have also highlighted deficiencies of other key nutrients such as calcium and B vitamins because of limited consumption of milk and animal products (Platt, 1975).

## Methodology

### Approach to the people

A letter of introduction was written to the Chiefs of the communities to be included in the study. The Chiefs then informed the villagers and explained the different stages of the process. The Chiefs asked the villagers to cooperate with the researchers at every stage, starting from focus group discussions to personal household visits. Informed consent in a culturally appropriate fashion was obtained from each participant involved in the study. No invasive procedures were performed; hence, the project posed limited risk to the individuals involved. No coercion was used to recruit individuals or to maintain their participation. Participants were informed that they could continue or discontinue the interviews at any time. They were also allowed to refuse

participation without penalty. Community consent was obtained through the process of creating a research agreement. Privacy and confidentiality were upheld through a data-coding system. It was understood that project results would be shared with the communities.

## Interview sampling method

The study was carried out from June 2004 to June 2005. Households were randomly selected from each of the communities by balloting (a random draw) for the individual interviews. Some households were purposively selected based on the presence of mothers, children and/or infants. One hundred households were selected from each community, giving a total of 800 households. Respondents for the key informant interviews, focus group discussion, market interviews and card sorts were not part of the 800 households interviewed. For key informant interviews approximately ten knowledgeable men and women participated in each community. There are seven states in Nigeria where Igbo reside. Due to logistical and financial challenges, four states were randomly selected in order to capture the variations among states.

## Data collection

The forms used in data collection were from the Centre for Indigenous People's Nutrition and Environment (CINE) with slight modifications ([www.mcgill.ca/cine/research/global](http://www.mcgill.ca/cine/research/global)).

## Key informant interviews

Chiefs and Elders of the communities were the key informants. They provided information concerning the structure of the village. They also guided the researchers in choosing knowledgeable people to be invited to participate in focus group discussions, as well as all other information that the researchers required.

## Focus group discussions

Focus groups, each comprising a small group of people – usually of the same age and gender, and who were

knowledgeable in a specific area – were assembled. The Chiefs of the communities helped the researchers gather groups of men and women farmers and adolescents, with eight to ten individuals in each group, who were capable of giving accurate information to the researchers. In each community, there were four groups of eight to ten people each, giving a total of 32 to 40 people per community. In total, for all communities there were 256 to 320 participants in focus groups.

A focus group guide was developed for use during discussions with the groups about the following topics: foods available and affordable and eaten in the community; foods eaten and liked by season; foods eaten and liked by mothers and children; foods seldom used or currently unused and reasons for their lack of use, patterns of food harvest.

## Market survey

A market survey was carried out in the local markets. This was aimed at identifying micronutrient-rich foods available in the market along with prices, sources and seasons of availability. It was possible to identify micronutrient-rich foods in the market that were consumed by children.

## Individual interviews

Using the community traditional food list and the selection of the shortlist of foods likely to be good sources of micronutrients – as developed from the previous steps – the researchers began individual interviews of 800 households. This activity aimed to identify the foods that were used in the communities and discover the meanings and other attributes that people attached to them. This guided the researchers to know whether and how these foods could be effectively used to improve micronutrient status.

## Card sort activity

Before this exercise (Blum *et al.*, 1997) could be carried out, 130 cards were prepared with colour photos of traditional Igbo foods and those sold in the market.

During the exercise, the pictures were given to individuals, especially mothers in households, to sort into groups. This exercise aimed at determining how people classified and grouped foods contained in the traditional food list and their reasons for that classification. Numbers were written behind the pictures for identification. The numbers of the foods in particular groups were recorded and the reasons for the groupings.

## Questionnaire

Questionnaires were distributed to 100 randomly selected households (determined by balloting) in each community, thereby giving out a total of 800 household questionnaires. Information was collected on the levels of taste appreciation among mothers and children on foods that were expected by the research team to be rich in micronutrients. Foods in the list of expected micronutrient-rich foods developed earlier were listed and the mothers and children were asked to score them based on their level of appreciation of these foods. Food scores ranged from one (1) (very much disliked) to five (5) (very much liked); a score of three (3) indicated indifference toward the food. With this, it was possible to identify taste preferences of popular foods. Each respondent was questioned about particular attributes of the foods on the shortlist before their introduction to infants as complementary foods. This procedure was also used to determine how these foods were useful to children between one and two years old. Their attributes were recorded. Infant food history was captured in an interview where the responding mother was asked about breastfeeding, complementary foods, period of solid food introduction, quantity eaten and frequency of intake.

## Twenty-four-hour recall/weighed food intake

In each household, two 24-hour recalls were conducted for the mother and a child within one week and a weighed food intake was conducted by the research assistants. The intention was to understand the foods commonly used, the source of the foods, whether they

are produced, purchased or gathered, the quantities consumed and the ingredients used in preparation.

## Anthropometric measurements

### Weight

Weight measurement was carried out on 100 children in each community using a beam weighing scale. The children were weighed wearing only shorts or minimum clothing. All measurements were made according to standardized procedure (Lohman, Roche and Martorell, 1988).

### Height

For children who were older than two years old, a vertical measuring rod was used to obtain height. Infants and children less than two years of age were measured using a wooden length board (baby length measurer) designed by the Appropriate Health Resources and Technologies Action Group, Ltd (WHO, 1987).

## Taxonomical identification of food species

Igbo food samples not found in Nigerian Tables of Food Composition were also analysed. Fresh samples of plants were collected, processed, preserved, mounted and identified for documentation during the field visits and then deposited in the internationally recognized herbarium of the Department of Botany of the University of Nigeria, Nsukka.

## Sampling, and laboratory analysis

Food samples were collected during field visits by the research team. Samples were placed in polyethylene bags and sent to the laboratory immediately for analysis. After drying and milling, the samples were analysed for several nutrients.

The analytical procedures of the Association of the Official Analytical Chemists (AOAC, 1995) were used for proximate composition, vitamin and mineral composition of the traditional foods. Protein from plant and animal sources was determined by the micro-



Kjeldahl method, which determined the amount of nitrogen in the sample. This was subsequently multiplied by a factor of 6.25. The fat content in the food samples was determined using the Soxhlet extraction apparatus. Moisture was determined immediately after harvest using a Mammot drying oven, by first weighing the sample in a top loading balance, drying it in an oven and re-weighing the dry sample. Moisture was calculated from the difference in weights. Ash was prepared by igniting a weighed portion of dried sample in a muffle furnace at 525 to 550 °C. The remaining residue (ash) was weighed. Dietary fibre was determined in the food sample after treatment with enzymes to digest starch and protein, after which the residue sample was re-weighed. Dietary fibre was computed after subtraction of protein and ash in the residue. Carbohydrate was calculated by subtracting the amount of moisture, protein, lipid and ash from a 100 g sample. Energy was calculated using the Atwater factors (Pearson, 1976). Iron, zinc, calcium and phosphorus were measured using atomic absorption spectrophotometer (Bosch, 200A). Ascorbic acid was obtained using 2, 6-dichlorophenolindophenol method, and  $\beta$ -carotene was determined using high performance liquid chromatography (HPLC Hewlet Packard LP1600). Folic acid was determined with a microbiological method using *lactobacillus casei* after the samples were hydrolyzed using enzymes (Lumley and Wiggins, 1981).

## Data analysis

Data from the questionnaires were keyed into the computer after coding using the Statistical Package for the Social Sciences (SPSS Version 12) software. The analysis included frequency distributions, percentages, means and correlations. Results of the weighed food intake calculations were presented as percentages of the recommended daily allowances established by FAO/WHO/UNU (FAO/WHO/UNU, 1985; FAO/WHO, 1988). Data from anthropometric measurements were analysed using National Center for Health Statistics (NCHS) standards of reference (NCHS, 1976). Indicators of nutritional status were

used to assess levels of stunting, wasting, underweight, and normal status among the children in the communities. The defining criteria of nutritional status were as follows:

- underweight: weight-for-age  $<-2$  standard deviation (SD) of the mean value of NCHS;
- wasting: weight-for-height  $<-2$  SD of the mean value of NCHS;
- severe wasting: weight-for-height  $<-3$  SD of the mean value of NCHS;
- stunting: height-for-age  $<-2$  SD of the mean value of NCHS;
- severe stunting: height-for-age  $<-3$  SD of the mean value of NCHS.

## Results and discussion

### Food list: identification and composition

The Igbo culture food list, including scientific names (where known) and their general uses, are shown in Table 12.1.

A total of 220 species and over 400 varieties of food items were documented. Of these, 174 were documented with their scientific names and 77 were found in the food composition tables currently in use in Nigeria (FAO, 1968), indicating the existing knowledge gap of the composition of Nigerian foods, and that of the Igbo culture area in particular. There is also a gap in the knowledge of the composition of foods and diets as they are currently consumed.

The composition of a number of little-used uncommon foods (mainly vegetables) reported to have health benefits were analysed. The composition of these foods is shown in Table 12.2. Most of these grow as weeds around the homesteads and are mainly eaten by the Igbos in the Delta area.

It is important to note that, apart from animal milk for infants, there was a lack of milk and milk products consumed in the Igbo culture area; generally, these foods are not within the food system. Milk and milk products are generally consumed by the rich, the vulnerable and the ill, but in very small quantities by children, owing to their high cost.

**Table 12.1 Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation	
			Rainy	Dry	Mother	Children		
<b>Cereals, starchy roots and tubers</b>								
1	<i>Colocasia esculenta</i>	Cocoyam	ede ofe, ngbowa, akikara	X	X	–	–	Boiled, dry chips
2	<i>Colocasia var. esculenta</i>	Cocoyam	akonoko	X	–	3	2	Boiled and pounded with cassava
3	<i>Colocasia</i> spp. (3 var.)	Cocoyam	cocoiandia, nkpongngmbing, okoroko	X	X	–	–	Boiled and pounded with cassava
4	<i>Dioscorea alata</i>	Water yam	ji abana, ji mvula	X	X	2	1	Boiled, pounded
5	<i>Dioscorea bulbifera</i>	Aerial yam	adu, aduinu	–	X	2	1	Boiled
6	<i>Dioscorea cayenensis</i>	Yellow yam	ji oku	X	–	3	2	Boiled, roasted, pounded
7	<i>Dioscorea dumetorium</i>	Three leafed yam	ona, uno	X	–	2	1	Boiled
8	<i>Dioscorea praehensilis</i>	Yam	ji okpuru	X	–	2	1	Boiled
9	<i>Dioscorea rotundata</i>	White yam	jiocha, ji igwe	X	X	4	4	Boiled, roasted, fried, pounded
10	<i>Ipomoea batatas</i> (2 var.)	Potatoes, sweet white, potatoes, yellowish red	ji nwa nnu	–	X	3	4	Boiled, fried
11	<i>Manihot esculenta</i> (2 var.)	Cassava (bitter type)	akpu nkola inu	–	–	4	4	Fermented for foofoo; boiled and sliced for dry chips
12	<i>Musa paradisiaca</i>	Plantain	osukwu, obuunu	–	X	4	4	Boiled, roasted, fried and made into flour
13	<i>Musa sapientum</i> (many var.)	Banana	unele	–	X	3	4	Eaten as ripe fruit
14	<i>Oryza glaberrima</i>	Red rice	osikapa	–	X	1	1	Milled, boiled
15	<i>Oryza sativa</i>	Rice	osikapa	–	X	4	4	Boiled, milled
16	<i>Pennisetum</i> spp.	Millet	achara	X	–	3	1	Used for soup
17	<i>Xanthosoma mafaffa</i> (2 var.)	Cocoyam	ede oku, edebuji, akpahuri	X	X	4	2	Boiled, roasted
18	<i>Zea mays</i> (3 var.)	Maize	oka, azizi	X	X	3	3	Fresh boiled, roasted, milled
<b>Legumes, nuts and seeds</b>								
1	<i>Aframomum daniellii</i>	–	olima (ubulu – uku)	–	–	4	2	Milled and used as a spice
2	<i>Anacardium occidentale</i>	Cashew nut	nkpulu cashew	–	X	3	2	Toasted and eaten as snack
3	<i>Arachis hypogea</i> (2 var.)	Groundnut	opapa	X	X	4	4	Boiled, roasted. milled to paste
4	<i>Cajanus cajan</i> (3 var.)	Pigeon pea	agbugbu	–	X	4	4	Boiled, roasted and milled
5	<i>Canavalia ensiformis</i>	Jack bean	odudu	–	X	1	1	Roasted, milled used as thickener
6	<i>Citrullus vulgaris</i>	Melon seed	egusi	–	X	4	2	Milled for soup and meat substitute (patties.)
7	<i>Cocos nucifera</i>	Coconut	aku oyibo, akubekee	X	X	4	4	Eaten with other foods, milled to extract milk, sliced and roasted as candies etc

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
8 <i>Cola acuminata</i> (2 var.)	Kola nut	oji awusa	X	X	4	1	Eaten as stimulant and for cultural purposes
9 <i>Cola nitida</i> (2 var.)	Kola nut	oji igbo	X	X	4	1	Eaten as stimulant and for cultural purposes
10 <i>Cucurbita pepo</i>	Pumpkin seed	mkpuru anyu, ugboguru	X	–	3	2	Milled dry and used for soup
11 <i>Elaeis guineensis</i>	Palm nut	aku	–	X	3	4	Cracked and eaten with other fruits, roasted for oil extraction
12 <i>Glycine max</i>	Soya bean	–	–	X	–	–	Used as dried powder for infant feeding
13 <i>Irvingia gabonensis</i> (2 var.)	Dika nut	ogbono	–	X	4	3	Dry, milled and used as soup thickener
14 <i>Irvingia</i> spp.	Bush mango	ugiri	–	X	4	3	Dry, milled and used as soup thickener
15 <i>Keatingiella geocarpa</i>	Ground bean	akidi ani	–	X	2	1	Boiled, roasted, milled
16 <i>Mucuna</i> spp.	Winged bean	okwe	–	X	2	1	Roasted, milled
17 <i>Pentaclethra macrophylla</i>	African oil bean	ugba	–	X	4	3	Fermented sliced and used for various dishes
18 <i>Sesamum indicum</i>	Beniseed	–	–	X	3	2	Roasted, milled for soup.
19 <i>Sphenostylis stenocarpa</i>	African yam bean	okpa odudu	–	X	4	3	Boiled, roasted and eaten as snack
20 <i>Teleferia</i> spp.	Pumpkin seed	mkpuru ugu	–	–	4	3	Boiled and eaten as snack
21 <i>Tetracarpidium conophorum</i> / <i>Plukenetia conophora</i>	Conophor	ukpa	X	–	4	4	Boiled and eaten as snack
22 <i>Tetrapleura tetraptera</i>	–	kpokirikpo	–	X	1	1	Boiled
23 <i>Treculia africana</i> (2 var.)	Breadfruit seed	ukwa	–	X	4	3	Boiled roasted and eaten as snack.
24 <i>Vigna sinensis</i>	Cowpea	akidi	–	X	3	2	Boiled, roasted
25 <i>Vigna</i> spp.	–	okpa nkilisi	–	X	3	2	Boiled
26 <i>Vigna subterranea</i>	Bambara groundnut	okpa ibi	–	X	4	4	Boiled, milled, roasted, & eaten as snack
27 <i>Cola lepidota</i>	Conophor	achicha (yellow inside, velvet black cover)	–	–	3	4	Peeled and eaten as a fruit snack
<b>Fruits</b>							
1 <i>Abelmoschus esculenta</i>	Lady's finger	okwulu npiene	X	–	4	4	Used for soups
2 <i>Anacardium occidentale</i>	Cashew	mkpuru cashew	–	X	4	4	Roasted and eaten as a snack
3 <i>Ananas comosus</i>	Pineapple	akwuolu	–	X	4	4	Fruit eaten when ripe
4 <i>Anonas muricata</i>	Soursop	–	–	X	3	4	Fruit eaten when ripe
5 <i>Artocarpus communis</i>	Breadfruit	ukwa bekee	–	–	–	–	–
6 <i>Azadirachta indica</i>	Neem	dogoyaro	X	X	3	1	Used for malaria
7 <i>Canarium schweinfurthii</i>	Pear	ube okpoko	X	–	4	4	Soften in hot water and pulp eaten
8 <i>Carica papaya</i>	Pawpaw	okwuru ezi	–	X	4	4	Fruit eaten when ripe

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
9 <i>Chrysophyllum albiduum</i>	Bush apple	udala nkiti	–	X	4	4	Fruit eaten when ripe
10 <i>Citrus aurantifolia</i>	Orange	oroma nkirisi	X	–	2	1	–
11 <i>Citrus aurantium</i>	Orange	oroma	X	–	4	4	Fruit eaten when ripe
12 <i>Cocos nucifera</i>	Coconut	akuoyibe	X	X	4	4	Eaten raw with corn/maize
13 <i>Cola</i> spp.	Kola	oji ogodo	X	–	3	1	Chewed raw, medicinal
14 <i>Curcubita pepo</i> (2 var.)	Pumpkin	anyu, ugboguru	X	–	4	4	Used to cook yam or cocoyam. Soften on cooling. Boiled and eaten as snack
15 <i>Curcubita pepo</i> (1 var.)	Pumpkin	nkpuru anyu	X	–	4	3	Boiled, milled and used for soup
16 <i>Dacryodes edulis</i> (2 var.)	Pear	ube Igbo	X	–	4	4	Soften in boiled water or roasted and used to eat maize/corn or alone
17 <i>Dennettia tripetala</i>	Pepper fruit	mmimi	–	X	4	2	Hot pepper eaten alone or with garden eggs
18 <i>Dialium guineense</i>	Velvet tamarind	icheku	–	X	3	4	Eaten raw
19 <i>Elaeis guineensis</i>	Palm fruit	aku	X	X	–	–	Major source of cooking oil
20 <i>Garcinia kola</i>	Bitter cola	aki ilu	X	–	3	1	–
21 <i>Grewia</i> spp.	Jute plant	ayauma	X	–	–	–	–
22 <i>Husolandia opposita</i>	Mint	aluluisinmo	X	X	3	1	Used for upset stomach
23 <i>Ipacemia</i> spp.	–	urumbia	–	X	2	4	Eaten as a fruit
24 <i>Iringia</i> spp.	Bush mango	ugiri	–	X	4	3	Fruit eaten when ripe
25 <i>Landolphia owariensis</i>	Rubber plant	utu npiwa	–	X	3	4	Fruit eaten when ripe
26 <i>Landolphia</i> spp. (4 var.)	Rubber plant	akwari, utu mmaeso, utu mmaenyi, ubune	–	X	4	4	Fruit eaten when ripe
27 <i>Lycopersicum esculentum</i> (4 var.)	Tomatoes	tomatoes	–	X	4	4	Used for stews and other preparations
28 <i>Magnifera indica</i> (4 var.)	Mango	mangoro	–	X	4	4	Fruit eaten when ripe
29 <i>Myrianthus arboreus</i>	Ujuju fruit	ujuju	X	X	3	2	Eaten raw when ripe
30 <i>Pachystela breviceps</i>	Monkey apple	udala nwaenwe	–	X	3	4	Fruit eaten when ripe
31 <i>Persia Americana</i>	Avocado pear	ube oyibo	X	X	–	–	English pear is ripened and eaten alone
32 <i>Piper umbellata</i>	Sand pepper	njanja	X	–	3	1	Dry leaves used for soup during the dry season
33 <i>Psidium guajava</i>	Guava	gova	X	–	4	4	Eaten when ripe
34 <i>Senna occidentalis</i>	Niger plant	sigbunmuo	X	–	3	1	Used for cooking yam pottage
35 <i>Solanum macrocarpum</i>	Garden egg fruit	anyara	X	–	4	3	A fruit eaten with peanut butter or alone
36 <i>Sterculia</i> spp.	Kola (wild)	nkpuruamunwa ebunne	–	X	2	4	Wild fruit

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
37 <i>Uraria chamae</i>	–	okpaokuko	X	X	3	1	Used for soup, tuber used for insect bite
38 –	–	utabe efi	–	–	3	2	Wild fruit
<b>Vegetables and mushrooms</b>							
1 <i>Acanthaceae</i> sp.	–	azia	X	–	4	1	Used for soup, mixed with other vegetables for malaria
2 <i>Acanthaceae</i> sp.	–	ikpokpo	X	–	4	1	Used for soup; has cooling effect
3 <i>Ageratum conyzoides</i>	Goat weed	olulu – ogwai	X	–	4	1	Used for soup
4 <i>Alchornea cordifolia</i>	–	nkpokokwa agwu					Used for soup
5 <i>Amaranthus viridius</i>	Greens	inine	X	–	4	4	Used for variety of purposes
6 <i>Amaranthus</i> spp.	Greens	inine	X	–	4	2	For food preparation
7 <i>Aspilia</i>	Anwinwa ani	bush marigold	X	–	4	1	Used for soup, for eating new yam
8 <i>Asystasia gangetica</i>	–	ukpom	X	–	–	–	–
9 <i>Boerhavia diffusa</i>	Hog weed	azuigwe	X	–	4	1	Used for egusi soup, root chewed for stomach pain
10 <i>Brilliantaisia nitens</i>	–	agbolu – uku	X	X	4	1	Used for soups
11 <i>Bryophyllum pinnatum</i>	Life plant	mgbidingbi	X	X	4	1	Warm on the fire, squeeze for treating cough
12 <i>Chromolaena odorata</i>	Awolwo weed	kpugbum	X	X	4	2	Used for variety of food preparations water extract with chalk used for stomach pain
13 <i>Cissampelos mucrumatia</i>	–	obuaka enwe	X	–	4	2	Used for soup water extract plus chalk taken as a drink
14 <i>Colocasia esculenta</i>	Cocoyam	akanikwoede, ogbora	–	X	2	1	Used for soup and vegetable yam preparation
15 <i>Colocasia</i> spp.	Cocoyam flour	opi ede	X	–	3	1	Used for soups
16 <i>Corchorus olitorius</i>	Jute	arira, ahihara	X	–	4	3	Cut and used for soup and yam pottage
17 <i>Corchorus</i> spp.	Jute	kerenken	X	–	4	3	Cut and used for soup and yam pottage
18 <i>Cucurbita pepo</i>	Pumpkin	ugboguru	X	–	4	3	Used for soup and vegetable yam preparation
19 <i>Cymbogon citraus</i>	Lemon leaf	achalla oyibo	X	–	4	1	Medicinal, for soup, extract used for malaria
20 <i>Diospyros mespiliformis</i>	–	isi osisi	X	–	4	1	Used for improving appetite
21 <i>Elaeis guineensis</i>	Oil palm tree	ogbunkwu	–	X	4	1	Inflorescent ground and used for soup and for nursing mothers for cleansing
22 <i>Euphorbiaceae</i>	–	alicemose	X	–	4	1	Used for soup, used for after birth pain
23 <i>Euphorbia hirta</i>	Seeded herb	okpokokwa ogu	X	–	4	1	Mixed with chalk for treating dysentery
24 <i>Gnetum africanum</i>	African salad	okazi	X	–	4	3	Used for soup and for native salad

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
25 <i>Grongronema latifolius</i>	Africana salad	utazi	X	-	4	1	Used for soup or lactating mother or the sick
26 <i>Heinsia crinita</i>	-	atama	X	-	3	1	Used for soups
27 <i>Heliotropium indicum</i>	-	isi – udele					Used for soups
28 <i>Husolondia opposite</i>	-	alulu isi mo					Used for soups
29 <i>Jatropha curcas</i>	-	ulu – oyibo					Used for soups
30 <i>Leptadenia</i> spp.	-	obi ogbome	X	X	4	1	Used for soup and squeezed for malaria and dysentery
31 <i>Manihot crantz</i>	Cassava leaf	ipoto (mpoto)	X	X	4	1	Steamed, crushed and used for soup
32 <i>Merremia</i>	-	agiliezi	X	-	4	1	Used for afterbirth pains
33 <i>Merremia</i>	-	olili	X	-	4	1	Used for soup, cut leaves used for rice; water extract used for stomach ache
34 <i>Momordica charantia</i>	-	ubafuncha	X	-	4	1	Used for soup, mixed with clay for malaria
35 <i>Moringa oleifera</i>	-	okwe – oyibo	-	-	-	-	-
36 <i>Myrianthus arboreus</i>	-	ujuju leaf	X	X	4	3	Used for soups
37 <i>Ocimum gratissimum</i>	Fever plant, Tea bush	nchuanwu,	X	X	-	-	Used to flavor variety of dishes
38 <i>Piper guineense</i>	Black pepper	uziza	X	-	4	2	Used for boiling met and flavoring soups
39 <i>Piper umbelata</i>	Sand pepper	njanja	X	-	3	1	Dry leaves used for soup during the dry season
40 <i>Pleurotus tuber</i>	Fungus	osu	X	-	4	2	Milled with melon seeds for soups and patties, eaten as snack or meat substitute
41 <i>Pterocarpus soyauxii</i>	Camwood	oha	-	X	4	3	Used for soups
42 <i>Polygalaceae</i>	-	ilenagbelede	X	-	4	1	Used for soup to improve appetite
43 <i>Portulaco oleracea</i>	Ntioke	water leaf	X	-	4	1	Used for increasing appetite, mixed with other vegetables for malaria
44 <i>Psychotria</i> spp.	-	anya – azu	X	X	4	3	Used for palm fruit soup
45 <i>Senna alata</i>	Senna plant	upulutu	X	-	4	1	Used for soup, used as a laxative
46 <i>Senna occidentalis</i>	Nigero plant	sigbommuo	X	-	3	1	Used for cooking yam pottage
47 <i>Solanum macrocarpum</i>	Anara leaf	olubu	X	-	4	3	Used for vegetable yam and as garnish for native salad

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
48 <i>Spathodea campanulata</i>	Flame tree	ulumilli	X	X	4	1	Used for soups
49 <i>Talinum triangulare</i>	Water leaf	ngbolodi	–	X	4	3	Used with other vegetables for soups and stews
50 <i>Telfeiria occidentalis</i>	Fluted pumpkin	ugu	X	–	4	3	Used for soups and other dishes
51 <i>Uvaria chamae</i>	–	okpa okoko	X	–	4	3	Used as vegetable and in yam preparation.
52 <i>Verbenaceae</i>	–	ifulu – nkpiri	X	–	4	1	Used for soup for pregnant and lactating mothers, water extract taken
53 <i>Veronia amygdalina</i>	bitter leaf	olugbu	X	X	4	2	Used for soups, chewed raw or washed as cure for malaria and managing diabetes
54 –	Soft mushroom	ero akuru	X	–	4	2	Used for soups
55 –	Bright mushroom	ero awagaa	X	–	4	2	Used for soups
56 –	Marked mushroom	ero chirikwio	–	–	4	2	Used for soups
57 –	Mushroom	ero/elo onyekamete	X	–	4	2	Used for soups
58 –	White mushroom	ero/elo ngbawa	X	–	4	2	Used for soups
59 –	Blue mushroom	ero nkpu	X	–	4	2	Used for soups
60 –	Tough mushroom	ero nku	X	–	4	2	Used for soups
61 –	Black mushroom	ero nkwu	X	–	4	2	Used for soups
62 –	Naked mushroom	ero ikpikpa	X	–	4	2	Used for soups
63 –	Purple mushroom	ero ububa	X	–	4	2	Used for soups
64 –	Smooth mushroom	ero ubakiri	X	–	4	2	Used for soups
65 –	–	nkanka	–	–	–	–	Used for soups
66 –	–	osusu	–	–	–	–	Used for soups
<b>Meat, poultry, eggs</b>							
1 <i>Achatina</i> spp.	Snail	ejula, ejuna	X	–	3	4	Boiled, roasted and eaten with other foods
2 <i>Achatina</i> spp.	Snail eggs	akwa ejuna	X	–	2	1	Boiled and eaten
3 <i>Anas</i>	Duck	obogwu	X	X	1	1	Boiled, roasted and eaten with other foods
4 <i>Antilocarpa americana</i>	Antelope	ene	–	X	2	3	Boiled, roasted and eaten with other foods

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)			Preparation
			Rainy	Dry	Mother	Children		
5 <i>Bos spp.</i>	Beef (cow)	efi, ehi	X	X	4	4	Boiled, fried roasted or dried and used for a variety of purposes	
6 <i>Canis cupus</i>	Bush dog	nkita ohia	–	X	1	1	Boiled, roasted and eaten with other foods	
7 <i>Canis familiaris</i>	Dog	nkita	X	X	1	1	Boiled and eaten as a delicacy	
8 <i>Capra eagagrus</i>	Goat	ewu	X	X	4	4	Boiled, fried roasted or dried and used for a variety of purposes	
9 <i>Crocodiles mississippiensis</i>	Alligator	–	–	X	2	2	Boiled, roasted and eaten with other foods	
10 <i>Duicker</i>	Deer	mgbada	–	X	1	2	Boiled and eaten	
11 <i>Erethizontidae</i>	Porcupine	ebintu	–	X	2	2	Boiled, roasted and eaten with other foods	
12 <i>Gallus gallus</i>	Chicken meat	okuko	X	X	4	4	Boiled, fried roasted or dried and used for a variety of purposes	
13 <i>Gallus gallus</i>	Chicken eggs	akwa okuko	–	X	4	4	Boiled and eaten	
14 <i>Hyaenidae</i>	Hyena	edi	–	X	1	1	Boiled, rsted & eaten with other fds.	
15 <i>Meleagris gallopavo</i>	Turkey	tolotolo	X	X	4	4	Boiled, fried, roasted or dried and used for a variety of purposes	
16 <i>Meleagris gallopavo</i>	Turkey eggs	akwa tololoto	X	X	4	4	Boiled or fried and used for a variety of purpose	
17 <i>Munida meleagris</i>	Guinea fowl	ogazi	–	X	4	4	Boiled, fried roasted or dried and used for a variety of purposes	
18 <i>Munida meleagris</i>	Guinea fowl eggs	akwa – ogazi	–	X	4	4	Boiled and eaten as a snack	
19 <i>Oryctolagus cuniculus</i>	Rabbit	ewi	–	X	3	2	Boiled, fried roasted or dried and used for a variety of purposes	
20 <i>Sciuridae spp.</i>	Squirrel	osa, Uze	–	X	3	2	Boiled, roasted and eaten with other foods	
21 <i>Squamata spp.</i>	Snake	agwo	X	X	1	1	Boiled, roasted and eaten with other foods	
22 <i>Sus scrofa</i> (2 var.)	Bush pig, Pig	ezi ohia, ezi	–	X	2	3	Boiled, roasted and eaten with other foods	
23 –	Cow skin	kanda	X	X	3	4	Boiled, roasted or dried and eaten with other foods	
24 –	Wild pigeon	okwa	–	X	2	3	Boiled, roasted and eaten with other foods	
25 –	Wild pigeon	apa	–	–	2	3	Boiled and eaten	

*Continued*



**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
26	Local pigeon	ndo	–	–	2	3	Boiled and eaten
27	Grass cutter	nchi	–	–	3	4	Boiled and eaten
28	Monkey	Enwe	–	X	4	3	Boiled and eaten
<b>Fish</b>							
1	Crayfish	usha	–	X	4	4	For soups and other food preparation
2	Snake – like fish	efi	X	–	4	4	For soups and other food preparation
3	Crab	igbeni, nshiko	X	–	3	3	For soups and other food preparation
4	Grass eater	ejo	X	–	4	4	For soups and other food preparation
5	Trunk fish	asa	X	–	4	4	For soups and other food preparation
6	–	okpo	X	–	4	4	For soups and other food preparation
7	–	bonga	X	–	3	4	For soups and other food preparation
8	–	elili	X	–	4	4	For soups and other food preparation
9	–	igboboalem	X	–	4	4	For soups and other food preparation
10	Cat fish	ishì	X	–	4	4	For soups and other food preparation
11	–	oshisho manu	X	–	2	3	–
12	–	pii (oshuasa)	–	X	3	3	–
<b>Insects/larvae</b>							
1	Beetle	ebe	–	X	2	4	Roasted
2	Termite	aku – mkpu, aku – mbe	X	X	3	3	Fried or steamed
3	Larvae (3 var.)	akpa – nkwu, akpa – ngwo, nzam (palm, raffia palm)	X	X	2	3	Roasted
4	Cricket	abuzu	–	X	3	4	Roasted
5	Locust	wewe, igurube	–	X	3	3	Roasted
<b>Soup condiments/ thickeners</b>							
1	–	olima	X	X	4	2	Used for soups and for lactating mothers
2	–	ose oji	X	–	4	1	Hot spice for soup for lactating mothers
3	–	akparata	–	X	4	3	A soup thickener
3	–	achi	–	X	4	3	A soup thickener

*Continued*

**Table 12.1 (continued) Igbo traditional food (220 species/varieties)**

Scientific name	English/ common name	Local name	Seasonality		Appreciation Score 1–4 (4= highest)		Preparation
			Rainy	Dry	Mother	Children	
4 <i>Capsicum frutescens</i>	Pepper (Africana)	ose – igbo	X	–	3	1	For preparing all traditional dishes
5 <i>Citrillus vulgaris</i>	Melon seed	ogiri egusi	–	–	4	3	A soup thickener
6 <i>Detarium macrocarpum</i>	Detar plant	ofo	–	–	4	3	Used as soup condiment
7 <i>Hippocratea welwischii</i>	Local onion	obulungbede	X	X	4	2	Bark of root scrapped and used to flavor soup
8 <i>Mucuna flagellipes</i>	Velvet bean	ukpo/ibaa	–	X	4	3	A soup thickener
9 <i>Myristica fragrans</i>	Nutmeg	ehuru	–	X	4	2	For flavoring soup and peanut butter
10 <i>Parkia biglobosa</i>	Africana magi	ogiri ugba	–	X	3	1	A fermented product used for traditional soup
11 <i>Piper guineense</i>	Black pepper	uziza	X	–	4	1	Hot spice for soup for lactating mothers
12 <i>Prosopis vitex</i>	Africana magi	okpei	–	X	4	3	Used for flavouring soups
13 <i>Ricinus communis</i>	Castor oil	ogiri igbo	–	X	3	2	A fermented product used for traditional soup
14 <i>Vitex doniana</i>	–	ushakirisha	–	X	4	2	Used for nsala or white soup
15 <i>Xylopia aethiopica</i>	–	uda	–	X	4	1	Hot spice for boiling meat, for lactating mothers to clear womb
<b>Oils</b>							
1 <i>Arachis hypogea</i>	Groundnut oil	mmanu opapa	–	X	3	3	For cooking
2 <i>Cocos nucifera</i>	Coconut	mmanu akuoyibo	X	X	3	2	For cooking
3 <i>Elaeis guineensis</i>	Palm oil	mmanu akwu	–	X	4	4	For cooking many traditional dishes
4 <i>Elaeis guineensis</i>	Palm kernel	ude – aku	–	X	2	1	For preparing local creams and medicines
<b>Beverages</b>							
1 <i>Cocos nucifera</i>	Coconut water	mmiri akuoyibo	–	X	4	4	For drinking, oral rehydration and antidote
2 <i>Cocos nucifera</i>	Coconut milk	miliki akuoyibo	X	X	4	2	For food preparations
3 <i>Elaeis guineensis</i>	Palm wine	mmanya	X	–	4	4	A local beverage
– No data.							

**Table 12.2 Nutrient composition of selected Igbo traditional foods (per 100 g fresh edible portion)**

Food	Moisture g	Energy kcal	Protein g	Fat g	CHO g	Fibre g	Ash g	Vit A (RE) µg	Thiamin mg	Riboflavin mg	Niacin mg	Folate µg	Vit C mg	Calcium mg	Phosphorus mg	Iron mg	Zinc mg	
<b>Legumes nuts and seeds</b>																		
Black pepper seed	10.5	324	1 354	3.4	0.2	77.1	4.2	4.6	38.6	0.08	2.3	1.0	3	14.4	254.6	533.2	5.7	3.7
Castor oil seed	39.7	337	1 409	27.4	18.9	14.3	0.3	1.2	54.1	0.14	1.83	1.7	5	25	517.5	450.1	15.3	4.2
Ehulu seed	15.6	321	1 342	3.8	0.2	76.0	1.3	3.1	-	-	-	-	-	-	55.8	549	13.3	2.8
Olina seed	29.2	272	1 137	14.7	0.1	53.1	1.1	1.8	-	-	-	-	-	-	5.4	21.6	12.0	1.8
Pumpkin seed	60.3	121	506	4.8	2.6	19.6	2.1	0.6	29.9	0.37	1.94	1.7	12	1.6	170.5	626.1	3.7	1.4
Seeded herb	56.7	140	585	3.9	0.1	30.8	4.4	4.1	44	0.24	0	3.8	7	4.7	166.8	125.3	3.4	2.4
Uda seed	42.7	247	1 032	3.6	12.4	30.2	6.8	4.3	53.8	0.27	0.34	0.9	10	1.8	-	-	-	-
<b>Vegetable and mushroom</b>																		
Black pepper leaf	67.6	114	477	16.9	1.3	8.7	3.1	2.4	19.4	0.14	0.91	0.7	5	11.7	245.8	13.7	6.4	1.2
Bitter leaf	62.1	154	644	14.6	2.1	19.2	0.4	1.6	31.2	0.13	0.56	0.6	4	8.6	278.3	228.4	3.4	2.2
Cam wood	56.3	144	602	3.5	0.8	30.8	4.8	3.8	29.9	0.37	1.94	1.7	12	1.6	5.3	126.2	9.0	0.9
Ero awaga	67.4	130	543	4.6	1.6	24.2	1.6	0.6	4.1	0.22	0.42	4.5	7	2.3	20.5	240.9	11.2	1.7
Water leaf (wild)	56.7	163	681	22.7	0.1	17.9	1.2	1.4	31.2	0.39	0.28	2.0	13	38.4	114.4	152.9	1.6	11.4
Water leaf	70.2	74	309	2.4	0.8	14.2	1.0	1.8	-	-	-	-	-	-	89	128.2	1.6	11.4
<b>Uncommon vegetables</b>																		
Agbolukwu	71.1	107	447	7.9	0.4	18.0	1.7	0.9	18.9	0.28	0.36	3.0	0	4.48	529.0	188	2.0	1.3
Agili ezi	57.9	160	669	6.4	0.3	33.0	0.7	1.6	-	-	-	-	-	-	4.1	15.7	5.4	1.1
Alice mose	65.7	121	506	14.8	0.7	13.9	2.1	2.9	-	-	-	-	-	-	380.9	127.8	11.1	1.6
Aluluisi	36.0	319	1 333	4.6	1.2	72.4	1.6	3.4	55.5	0.09	0.93	1.2	30	18.0	657.6	338.3	9.5	3.3
Anyaa-zu	66.4	131	548	12.8	1.3	17.1	0.6	1.8	25.7	0.18	1.1	1.5	6	22.9	166.2	134.6	14.6	1.0
Awolowo weed	47.3	192	803	9.6	0.4	37.4	2.1	3.2	69.5	0.17	0.52	2.4	6	30.8	582.1	326.2	5.8	2.5
Azei	60.8	117	489	4.2	0.4	24.1	6.3	4.2	6.9	0.18	0.36	1.1	6	2.9	43.4	85.0	11.9	1.0
Bush marigold	52.9	181	757	6.8	0.6	37.0	0.9	1.8	-	-	-	-	-	-	473.4	235.6	5.4	2.4
Flame tree	44.0	212	886	8.6	0.3	43.7	0.8	2.6	28.3	1.3	0.54	2.0	44	31.5	76.1	33.8	5.4	2.4
Hog weed	65.9	121	506	8.6	0.2	21.3	1.6	2.4	19.4	0.69	0.86	1.1	23	16.4	65.7	233.8	2.1	1.8
Ifulu nkpsi	46.0	192	803	6.8	0.2	40.7	2.1	4.2	69.5	0.32	0.54	3.7	11	54.4	260.4	131.5	9.4	1.1
Ilennabelede	32.9	210	878	16.4	1.4	32.9	4.6	1.4	32.7	0.36	0.94	1.2	12	16.1	367.4	405.2	9.9	3.3

*Continued*

**Table 12.2 (continued) Nutrient composition of selected Igbo traditional foods (per 100 g fresh edible portion)**

Food	Moisture g	Energy kcal	Energy kJ	Protein g	Fat g	CHO g	Fibre g	Ash g	Vit A (RE) µg	Thiamin mg	Riboflavin mg	Niacin mg	Folate µg	Vit C mg	Calcium mg	Phosphorus mg	Iron mg	Zinc mg	
<b>Uncommon vegetables (continued)</b>																			
Ikpo kpo	61.6	130	543	2.8	0.4	28.7	2.8	3.7	28.3	0.29	0.43	2.6	1	3.6	263.3	84.0	2.7	2.3	
Inine	77.8	109	456	15.4	1.2	9.1	1.5	1.2	64.5	0.15	0.04	13	20	1.2	91.1	137.7	2.0	0.8	
Isii osisii	59.3	135	564	3.4	0.9	28.3	4.3	3.8	33.5	0.22	0.13	0.8	7	1.7	32.7	252.8	1.9	0.8	
Isi-udefe	44.6	211	882	4.8	0.2	47.6	2.1	1.3	4.1	0.22	0.42	4.5	7	2.3	330.9	267.1	10.3	1.8	
Lemon grass	47.7	204	853	4.3	0.4	45.8	0.4	1.4	18.2	0.21	0.9	1.2	7	16.1	118.5	154.1	2.7	2.7	
Local onion	56.4	142	594	3.8	0.6	30.4	5.2	3.6	41.8	0.57	0.3	2.0	20	2.9	56.9	145.6	6.5	1.2	
Mgbidi mgbi	69.7	113	472	2.9	0.1	25.2	1.2	0.9	-	-	-	-	-	-	584	127.3	2.3	3.7	
Mint	56.7	147	614	7.3	0.7	27.8	3.9	3.6	-	-	-	-	-	-	488.7	18.8	1.0	1.5	
Nghotoncha	49.9	166	694	4.7	0.8	35.1	3.6	5.9	-	-	-	-	-	-	471.6	171.6	7.3	1.2	
Nigero plant	56.7	146	610	8.9	0.5	26.4	3.9	3.6	-	-	-	-	-	-	42.7	143.5	5.0	0.8	
Obi-ogbene	69.5	106	443	4.8	1.2	18.9	1.0	4.6	44.0	0.28	1.10	2.0	9	30.3	326.5	122.0	3.2	1.4	
Obu aka enwe	38.4	230	961	6.9	0.3	50.0	1.6	2.6	18.9	0.28	0.36	3.0	0	4.48	42.3	431.1	4.9	1.8	
Ogbunkwu	18.6	249	1041	2.1	0.1	60.0	12.3	6.9	0.0	0.12	0.0	1.0	0	0.0	110.6	198.1	3.5	2.0	
Ogume okpe	41.2	230	961	6.8	0.8	49.0	1.1	2.1	20.5	0.35	1.7	3.8	16	58.0	162.3	332.9	7.7	2.7	
Onunu gaover	35.4	248	1037	3.3	0.1	58.5	0.9	1.8	6.8	0.42	0.32	1.6	0	10.6	152.4	389.8	8.6	3.1	
Onunu iluoygbo	69.3	102	426	2.4	0.6	21.8	1.4	4.5	30.9	0.62	0.11	1.6	0	3.6	117.5	88.2	2.4	1.7	
Otulu ogwai	42.5	206	861	6.9	0.4	43.7	3.1	3.4	35.9	1.62	0.58	1.8	0	22.8	198.4	417.1	5.75	2.6	
Pumpkin	69.0	125	523	22.8	2.8	2.2	1.8	1.4	-	-	-	-	7	-	147.4	130.2	0.3	0.8	
Senna plant	58.4	159	665	6.8	0.6	31.5	0.9	1.8	51.7	0.45	1.4	1.3	15	18.6	314.3	307.3	6.2	1.5	
Ugbfoncha	57.2	140	585	8.6	1.1	23.8	2.4	6.9	30.4	0.24	0.6	1.4	0	26.4	295.5	231.5	4.5	1.9	
Ujuju	58.1	148	619	8.3	1.2	25.9	2.1	4.4	16.0	0.23	0.87	1.3	8	18.4	3.3	176.0	1.6	0.8	
Utazi	56.7	172	719	18.0	4.8	14.2	3.6	2.7	20.4	0.3	0.82	0.2	0.0	0.3	258.6	204.9	8.1	1.4	
<b>Meat</b>																			
Canda (skin)	38.4	320	1338	28.3	16.8	13.9	0.0	2.6	30.9	0.62	0.11	1.6	0	3.6	8.15	160.0	5.4	2.0	
Snail	65.7	126	527	10.6	1.2	18.2	0.0	4.3	-	-	-	-	-	-	204.8	161.6	5.8	1.0	

- No data.

**Table 12.3a Key micronutrient-rich traditional foods by food groups / species**

<i>Food group/species</i>	<i>Local name</i>	<i>Scientific name</i>	<i>Major micronutrient(s)</i>
<b>Cereals</b>			
Yellow maize	Oka	<i>Zea mays</i>	β-carotene
<b>Starchy roots/tubers</b>			
Sweet potatoes	Ji nwanu	<i>Ipomaea batatas</i>	Iron, β-carotene
Three leaf yam	Ona	<i>Dioscorea dumentorum</i>	Iodine, β-carotene
Yellow yam	Ji Oku/Okwu	<i>Dioscorea cayenensis</i>	β-carotene, iodine, iron
<b>Starchy fruits</b>			
Banana	Unele, Ogede	<i>Musa sapientum</i>	Zinc, folate, iron, β-carotene
Plantain	nba/jioko Obughunu	<i>Musa paradisiaca</i>	Zinc, folate, iron
African bread fruit	Ukwa	<i>Treculia africana</i>	Iron, zinc
<b>Legumes/nuts &amp; seeds</b>			
	All legumes/nuts	<i>All legumes/nuts</i>	Iron, zinc, copper
Cashew	Mkpuru/Mkpulu cashew	<i>Anacardium occidentale</i>	Iron, zinc
<b>All fruits</b>			
	Mkpulu Osisi	All fruits	Iron, zinc, carotenoids, copper, selenium, vitamin C, vitamin E
Palm fruit	Aku	<i>Elaeis guineensis</i>	β-carotene
<b>All vegetables</b>			
	Akwukwo nni	All vegetables	Iron, zinc, carotenes
Mushroom	Ero/elo	Not yet properly identified	Iron, copper, zinc
<b>All animal foods</b>			
	See Table 12.1	See Table 12.1	Iron, zinc, vitamin A

## List of key micronutrient-rich traditional foods

The list of key micronutrient traditional foods according to food groups and dishes is presented in Tables 12.3a and 12.3b, respectively. Traditional foods/diets of the Igbo culture area were found to be rich in β-carotene, iron and zinc. With 95 percent of Nigerians using iodized salt, it is expected that sufficient iodine was present in the diet. Unfortunately, deficiency of several nutrients still exists. The major source of ascorbic acid in the diet was fruit. However, fruits were not eaten in conjunction with meals, but consumed between meals as snacks (Okeke and Nnayelugo, 1989).

## Patterns of harvest, storage and preparation of key traditional foods

Key traditional foods in the Igbo culture area were found to be yam, cassava, cocoyam, maize, legumes and vegetables. Cereals and starchy staples were also

very important foods, and dishes were named after them, for example, *nni ji* (yam *fufu*), *nni akpu* (cassava *fufu*), *nni oka* (maize/corn *fufu*). Their accompanying sauces were named after the major vegetable or ingredient used, e.g. *Onugbu* (bitterleaf) soup, *okazi* (*Gnetum* spp.) soup, *oha* (*Pterocarpus soyauxili*) soup, *egusi* (melon), *ogbono* (dikannt), *achi* (*Brachystegia eurycoma*) soup, etc. Yam was viewed as a man's crop, where a man who owns a certain number of yam barns is known as "Diji". Important festivals are linked to yam, such as the New Yam Festival. During the 2005–2006 research period, Igbo researchers documented the following food descriptions.

**Yam:** The white yam, which is produced in the largest quantity, is planted from the months of January to March, while the yellow yam (*D. cayenensis*) can be planted in December. In some communities mounds are made, while in others holes are dug in the ground for yam planting. The planting, staking and tending of yam are labour-intensive activities. Harvesting is done from July to October and into

November for the yellow yam. Harvesting is also labour intensive and care is taken not to bruise or break the yam tubers. Yams are prepared in a variety of ways. They can be boiled, baked, roasted and eaten with fresh palm oil (*Ji nmanu*), or fried and eaten with a sauce. Roasted yam with palm oil is popular in most urban centres.

Yam can be incorporated into other dishes, e.g. legume pottages, *ayaraya ji* and yam pottage. The most popular form of preparation of yam is the pounded

yam, prepared by peeling, slicing, boiling and pounding the yam with mortar and pestle into smooth, slightly elastic dough. The white or yellow yam is usually better than the water yam for this purpose. The pounded yam is consumed with traditional soups/sauces. A special delicacy is pounded yam and *nsala soup* (white soup or pepper soup). This is used for feeding lactating women in the first few days after birth. The hot spices in the *nsala* soup are believed to help purify and cleanse the system of the nursing mother.

**Table 12.3b Key micronutrient-rich traditional food dishes**

<i>Traditional soups/dishes</i>	<i>Description/composition/major ingredients</i>	<i>Major micronutrients</i>
(Ogbono, egusi, bitter leaf vegetable soups /sauces) Banga or palm fruit soup	Vegetables, meat/fish, crayfish, pepper, palm-oil, condiments (melon/dikanut/cocoyam/other soup thickeners)	Iron, β-carotene, zinc
Ayaraya oka	Corn mixed with pigeon pea, vegetable, oil bean, palm oil, pepper	Vitamin A, iron, zinc
Achicha	Dried cocoyam mixed with pigeon pea, oil bean, palm oil, green leafy vegetables	Iron, zinc, β-carotene, vitamin C
Moimoi	Wet or dry milled dehulled cowpea paste mixed with palm oil, pepper, onion, crayfish, pieces of meat, fish or egg (optional), steamed into a pudding	Iron, zinc, β-carotene, folate, copper
Akara	Wet or dry milled dehulled cowpea paste, whipped and mixed with pepper, onion, salt and deep fried in balls in vegetable oil	Iron, zinc
Yam pottage	Yam cubes boiled with palm oil crayfish, fish (optional), green leafy vegetables	Iron, β-carotene
Ukwa (Afuoka)	Breadfruit mixed with corn, pieces of fish or meat, bitterleaf, salt, pepper	Iron, zinc, β-carotene
Utipiri	Corn mixed with Ugbo-guru (pumpkin leaf), oil bean, and pepper, salt	Iron, zinc, β-carotene
Bean pottage	Cowpea or other legumes mixed with palm oil, salt, pepper, onion,	Iron, zinc, β-carotene
Okpa	Bambara ground nut flour paste mixed with palm oil, pepper, salt and spices (optional)	Protein, iron, niacin, magnesium, β-carotene
Okpa fufu and soup	Okpa fufu is a gelatinized dough made from bambara flour and eaten with traditional soups/sauces	Iron, zinc β-carotene
Ukpo-ogede	Dried plantain flour, over ripped plantain paste, palm oil, pepper, salt	β-carotene, iron, zinc
Igbangwu-Oka	Parboiled dried maize wet milled and mixed with palm oil, pepper, onion, crayfish, fermented oil bean, green leafy vegetable and steamed into a pudding. Termites are added in some areas	β-carotene, iron, zinc
Native/local Salads	Dried cassava slices mixed with palm oil, leaf green vegetable ( <i>Solanum</i> spp. or <i>Gnetum</i> spp.). Dried cassava slices mixed with fermented oil bean seed slices with or without leafy green vegetable, palm oil, salt, pepper. Raw <i>Gnetum</i> spp. Slices mixed with palm oil. Note: In all the above. varieties of salad, the palm oil maybe mixed with "trona" ( <i>akanwu</i> , in Igbo) or potash to produce a yellow paste <i>ncha</i> (soap) Also crayfish, pieces of cow skin ( <i>kpomo/kanda</i> ) are added	β-carotene, iron, vitamin C, zinc
Otunke or alibo agworoagwo	Cracked dry cassava/yam chips, soaked, steamed and mixed with Ugbo-guru (pumpkin leaf), okro, arira ( <i>Corchorus olitorious</i> ), ukpaka (fermented oil bean slices), palm oil, salt, and pepper	β-carotene, iron, zinc, copper, vitamin C, iodine
Agbalatui	Osu ( <i>Pleurotus</i> spp.) + melon (egusi), pepper, and salt molded into patties which are cooked and eaten as meat substitutes or snacks	Iron, zinc, copper

The water yam (*D. alata*) is less sugary and is frequently used by diabetics. It can also be grated, mixed with salt, pepper and onion and fried in balls in vegetable oil in some communities. Yam flour is also prepared and used to make yam *fufu* (more popular in the Yoruba culture than the Igbo). As yam is mainly consumed fresh, it is stored in the fresh form in barns. It is a highly perishable food crop and, therefore, is stored in a cool and airy environment. Constant inspection of the yams in the barn and storage places in the homes is necessary to discard spoiled yams. It is important to note that in the rural areas yam peels are sun dried alongside the fleshy tuber and milled for consumption, thereby yielding a high dietary fibre product.

**Cassava** (*Manihot esculenta* Crantz): Its importance as a high-energy food (providing over 70 percent of daily energy) can be deduced from the various names given to it, e.g. “Man power”, “Number one” and “Six to Six”. It is planted between March and June. Harvesting occurs approximately 6–18 months after planting depending on the type. Only the bitter variety of cassava is popular in the Igbo culture area. Its cultivation and harvest is less tasking than that of yam. Cassava has several advantages as a food crop. According to Ihekoronye and Ngoddy (1985) cassava provides high returns in calorie value per effort and resources invested. It grows relatively well in poor soils and under dry conditions and is, therefore, highly valued as a safeguard against the risk of failure of other staples food crops. On the other hand, cassava tubers are extremely perishable since their edible roots are not organs of dormancy. It also contains two cyanogenic glycosides: linamarin and lotaustralin, which hydrolyse in the presence of the enzyme linamarase to release hydrogen cyanide. The prussic acid concentration is highest in the bitter varieties of cassava, which is found in the Igbo culture area (FAO, 1989).

One of the ways of making cassava for human consumption is through fermentation. In the Igbo culture area, cassava is soaked in water in a container or swamps by the river for a minimum of three or four days to allow it to ferment. The fermented tuber is then washed through a sieve to remove the unfermented

midrib and fibres. The slurry is put in a bag and the water is expressed. The resulting meal is referred to as *akpu* (Ihekoronye and Ngoddy, 1985). This is cooked in water for about 10–15 minutes to gelatinize, pounded in a mortar, moulded into balls and dropped into the cooking water for another 10–20 minutes. It is then pounded alone or in combination with yam or cocoyam, as is done in some Igbo communities. The resulting dough is eaten with soup/sauce. It can also be processed into *gari*, another popular form. The cassava is peeled and grated, and the grated mash is put in a bag and allowed to ferment for at least 24 hours, during which time the water is removed by hydraulic press. Then the hydraulic-pressed cassava is dried and then sifted to remove fibre and other unwanted materials. The sifted meal is toasted in a large, hot frying pan and cooled before storing.

A popular product of cassava is known as *abacha* (tapioca), which can be dry or in wet slices. The wet slices are eaten with coconut or groundnuts as a snack or incorporated into bean dishes. The dry slices are used to prepare African salad (*abacha ncha*). *Abacha* is prepared by peeling and slicing the cassava tuber and cooking it in boiling water. Cooked cassava are sliced into desirable sizes and allowed to remain in water for another 12–24 hours before consumption. During the soaking, the water is changed at least twice. Wet slices remain wet, while some slices are dried in the sun to produce dry slices.

Cassava is also processed into raw chips simply by peeling, cutting, soaking for 24 hours, washing and then sun drying. Dry cassava chips are milled into flour (*alibo*) and used to make *fufu*. *Fufu* is made by pouring the flour into hot water and stirring it continuously until gelatinized elastic dough is obtained. This again is eaten with traditional soups/sauces. The dried cassava chips could also be cracked and used in preparing a traditional dish referred to as *otunke* or *alibo agworoagwo*. Cassava is highly perishable. A day or two after they are harvested, the tubers begin to deteriorate rapidly. They develop vascular discoloration, which make the roots unpalatable and unsuitable for subsequent processing. Cassava can be stored as fermented cassava meal in containers, as *gari*, dried

cassava chips and flour. In these forms, cassava can be preserved for a long time.

**Cocoyam:** Two major species of cocoyam, *Colocasia* spp. and *Xanthosoma* spp., were documented. Mainly women in Igbo culture area produce this crop. Cocoyam is planted from March to June and harvested in November/December. Indian cocoyam (or cocoindia) a *Colocasia* spp. is planted in March and can be harvested as early as July/August/September. Cocoyam grows well in wet, damp or shady places.

The *Xanthosoma* spp. can be boiled or roasted like yams. The *Colocasia* spp. requires prolonged heating (6–12 hours) before they can be consumed. This is because of their high level of raphides (slender, sharp irritant crystals formed from calcium oxalate monohydrate). They are cooked and pounded into *fufu* and consumed with traditional soups/sauces. Some (*ede-ofe*) are used as thickening agents in a popular traditional soup/sauce *ofe onughu* (bitter-leaf soup). This is a popular and important soup/sauce among the Igbos and is served at very important functions. Cocoyams are also prepared in the form of dried chips (*Abacha*). *Abacha* is produced by prolonged cooking, slicing and sun drying of the food crop. It is a very popular food in Enugu State. Cocoyams are mainly stored as dried chips. These are placed in cool, dry places or over the fireplace and taken when needed, especially during the lean planting season.

**Maize (*Zea mays*):** The major cereal of the Igbo culture area is maize/corn. This is a highly valuable food that provides a substantial amount of the total energy of the Igbo people. Three types of corn are common in this area: white, yellow and variegated. Corn is planted at the beginning of the rains in March/April and harvested between June and August. It is a reliable source of food during seasons of food scarcity, particularly in the months of March and June. Corn is either boiled or roasted in the fresh form and eaten with coconut or local pears (*Dacryodes edulis*). Additionally, it can be ground to prepare *Ukpo oka* or *Igbangwu* (see Table 12.1). These are becoming popular snack foods in the Igbo culture area and others parts of Nigeria.

Dry maize kernels can also be ground into meal and used to prepare gelatinized dough known as *nni/nni*

*oka*, which is eaten with traditional soups/sauces. Dry maize can also be processed into maize gruel (*pap*), popularly known as *akamu*, which is a traditional weaning food and is also consumed by all population sub-groups. It is prepared by soaking dry maize/corn in water for at least 48 hours. The soaked grain is milled and washed through a sieve. The slurry obtained is put in a cloth bag and the water is pressed out. The resulting paste is *akamu*. The gruel is made by pouring boiling water into the slurry of the *akamu*. Sugar, milk, soybean flour and crayfish can be added to enrich it. Maize gruel is high in moisture and of low nutrient density. There are other recipes based on maize, for example, *akara oka*, *akara* and *agidi*. Maize cobs are normally stored over the fireplace. There, the heat and smoke from the fire keep the moisture content low and repel insects. Maize grains are also sun dried prior to storage. They can be stored in plastic containers after drying or put in hermetically sealed clay pots with pepper added.

**Legumes:** Although there are numerous indigenous legumes to the Igbo culture area, the black-eyed cowpea (*Vigna unguiculata*) is most commonly consumed, as well as pigeon pea (*Cajanus cajan*), *akidi* (*Vigna* spp.), African yam bean (*Sphenostylis stenocarpa*) and groundbean (*Kertingiella geocarpa*) *akidi ani*. However, the bambara groundnut has now assumed a prominent place in Igbo areas and in many large cities. The bambara groundnut seed is milled and sieved several times to produce the flour, which can be used in several ways. It is mainly used in preparing a form of pudding *okpa*, a popular meal and snack. It can be eaten with maize gruel, soaked *garri* or alone. Some people cut cooked *okpa* into small pieces and mix it with steamed vegetables and pepper and onion sauce. Bambara groundnut flour can be used to produce a gelatinized cooked dough or *fufu*. This, like cassava/yam *fufu*, is eaten with traditional soups/sauces. The flour can be incorporated into other dishes to enrich them or used in making sauce for eating yam or cocoyam. Bambara groundnut in the fresh form can be boiled and eaten alone as a snack. It can also be roasted and eaten as snack. Some of the popular dishes prepared with pigeon pea are *ayaraya oka* (pigeon pea and corn); *ayarayaji* (pigeon pea and



yam) and *abacha* (pigeon pea and dried cocoyam chips) (Table 12.4). Fermented oil bean seeds are added to these as a supplement. Occasionally, the seeds are roasted, ground and sieved for making sauces and soups that go with yam or cassava *fufu*.

*Akidi* is a traditional cowpea variety. It is consumed as fresh pods and as dried seeds. Others are *olaludi* and *apama*. The major characteristics of these are their small seed sizes and shiny seed coats. Fresh *akidi* is used as a vegetable in the preparation of many dishes, e.g. yam pottage, *ayaraya*, and *achicha*. The dried ones are used as grains to replace pigeon pea in some of these traditional dishes. It can also be boiled and added to tapioca salad. *Akidi* is planted in April/May and harvested in June–July.

African yam bean is inter-planted with yam in April–June and supported on the same stake used for yams. It has a long growing season, with seeds maturing in 150 to 300 days (Ezueh, 1984). In most communities, it is boiled and eaten with other staples (yam, plantain, cassava, corn/maize, etc.). It is also roasted and eaten with palm kernel. This is a popular snack food sold particularly in the Enugu/Nsukka area. The African yam bean is usually cooked overnight because it is hard to cook. Hence, traditionally, *akanwu* (sodium sesquicarbonate,  $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$ ) is used to reduce cooking time, a practice that needs to be discouraged since it destroys B vitamins (Edijala, 1980), which have been found to be lacking in the diets of the people (Nnanyelugo *et al.*, 1984). The African yam bean is stored in its pod over the fireplace. The seeds can also be put in sacks, bags, calabashes and basins.

*Akidi ani* (groundbean) is an important under-explored legume. It develops pods under the ground similar to groundnuts (*Arachis hypogea*) and bambara groundnuts (*Vigna subterranean*). It is however, confined to a few communities. It is planted in July/August and harvested in November/December. Ground bean can be boiled or roasted and eaten alone or in combination with staples such as plantain, yam, cocoyam, rice, sweet potato, cassava and maize.

**Oil bean seed** (*Pentaclethra macrophylla*): This is an important food crop in the Igbo culture area. As a delicacy, it is consumed in the fermented form

and is known as *ugba* or *ukpaka*. This fermented product is obtained by boiling the oil bean seed overnight, after which it is dehulled by hand and then the cotyledon is sliced. The sliced cotyledons are boiled again for about 2 hours, washed in water and put in a covered basket and left in a warm environment to ferment for at least 12 hours. Fermentation can be prolonged depending on the temperature of the environment. The fermented slices can be eaten alone or in combination with other foods as described earlier. The delicacy prepared with this food is *ugba agworogwu* – *ugba* mixed with palm oil, pepper, salt and *akanwu* (*trona*). Variations to the food were noted as crayfish, fish, cowskin (*kpomo* or *canda*), cassava slices, solanum leaf or various fruits being added. *Ugba* is used for several social activities such as marriage, naming ceremonies and union meetings. They are sold and served in hotels and other eating houses popularly known as “*Ugba joints*”. It is a tree plant and the seeds are picked or harvested between August and November. The seeds are stored in containers until ready for use.

Vegetables abound in the Igbo culture area. However, there are community peculiarities in terms of the types and form in which vegetables are consumed. For example, *okazi* (*Gnetum africanum*) and *achara* (*Pennisetum* spp.) are typical of Igbos from Imo and Abia States, while bitterleaf (*Vernonia amygdalina*) is most popular in Anambra State. The Igbos in the Enugu and Delta States sprinkle vegetables on their food. A lot of uncommon vegetables were found to be consumed in the Delta area. Some of them grow as weeds around the homesteads and farmlands. It is also interesting to note that most of these uncommon vegetables are used in small quantities and ground before use in preparing soup. Most of them are used because of their medicinal value.

Most vegetables are cooked before eating either by steaming or cooking in soups/sauces, with the tendency of overcooking them. Only a few traditional vegetables are eaten raw. They include *anara* leaf (*Solanum* spp.) and *okazi* (*Gnetum africanum*), and are used in making native salads. The bitter leaf is chewed raw after the leaves have been washed several times to reduce its bitter taste. Bitter leaf chewing is

**Table 12.4 Nutrient composition of selected Igbo traditional recipes (mean ± SD per 100 g edible portion)\***

Food	Moisture g	Energy kcal	Energy kJ	Ash g	Fat g	Protein g
African Bread fruit	47.36 ± 0.2	242	1 015	3.6 ± 0.6	10.1 ± 0.2	11.9 ± 0.2
Cassava	53.3 ± 0.1	179	750	1.4 ± 0.0	0.01 ± 0.0	0.6 ± 0.0
Cassava strips & black cowpea	50.14 ± 0.3	212	891	1.8 ± 0.6	4.5 ± 0.0	3.4 ± 0.1
Plain bambara pudding	57.75 ± 0.4	165	692	1.7 ± 0.6	0.9 ± 0.0	14.6 ± 0.02
Dried cocoyam & pigeon pea	49.72 ± 0.2	211	885	2.0 ± 0.1	3.98 ± 0.01	2.78 ± 0.02
Dried cocoyam pudding	51.83 ± 0.45	182	763	2.2 ± 0.0	0.00	0.57 ± 0.05
Melon & grain millets & okazi	64.81 ± 0.25	153	641	3.7 ± 0.10	5.98 ± 0.05	5.14 ± 0.01
Steamed maize pudding with vegetables	47.25 ± 0.50	214	896	4.8 ± 0.06	5.8 ± 0.06	6.49 ± 0.05
Dika nut	65.22 ± 0.22	151	635	0.4 ± 0.07	3.1 ± 0.05	3.34 ± 0.04
Banga soup	76.04 ± 0.4	112	469	1.7 ± 0.01	5.0 ± 0.01	4.03 ± 0.02
White soup	56.25 ± 0.1	182	764	5.25 ± 0.06	7.00 ± 0.06	5.38 ± 0.03
Bambara pudding	44.28 ± 0.2	246	1 033	3.84 ± 0.04	8.91 ± 0.03	10.36 ± 0.04
African yam bean & fermented oil bean seed pottage	55.42 ± 0.4	170	714	3.12 ± 0.05	2.05 ± 0.02	6.55 ± 0.26
Cowpea & fermented oil bean seed pottage	52.6 ± 1.18	207	867	1.71 ± 0.1	5.0 ± 0.02	7.92 ± 0.3
Dried cassava fufu	54.85 ± 0.06	177	741	0.68 ± 0.25	0.05 ± 0.01	0.27 ± 0.01
African yam bean & wet cassava & garden egg leaves	55.37 ± 0.20	168	707	3.35 ± 0.07	1.32 ± 0.05	3.48 ± 0.05
Unripe and ripe plantain pudding	54.38 ± 0.00	192	804	1.60 ± 0.00	3.42 ± 0.12	2.05 ± 0.12

\* Analyses in duplicate or triplicate.

popular with the Igbos from Anambra State. Apart from the bitter leaf, all other vegetables can be used directly without any form of processing. Vegetables are most often consumed fresh, while some are preserved by sun or shade drying. Dried vegetables are used when they are not in season. Before use, they are soaked and washed in water. Dried vegetables are stored in bags or containers until ready for use.

### Preferences of family members (mothers and children) described in 2005–2006

#### Starchy roots, tubers and fruits

Yams are especially popular with children when boiled and eaten with palm oil, cooked as pottage without greens or incorporated into bean pottage. Adults, on the other hand, like yam especially as pounded yam eaten with soups/sauces. Children also enjoy sweet potato because of the sweet taste, while adults believe

it can cause worms (worm infestation). The three-leaf yam (*ona*) is liked and well known by adults, whereas children report not liking them and are not familiar with them. Cassava and their products are enjoyed and eaten by all members of the family. However, there are preferences in the soups/sauces used: ripe plantain, especially in the fried or boiled form, is preferred by children, while adults prefer green plantain either roasted or used in preparing plantain pottage.

#### Cereal

Cereals and cereal products have a special place in children's food preferences. They are fond of pap, *agidi*, *igbangwu* and rice in any form. Adults eat these foods but regard rice as "bird food".

#### Legumes

Legume dishes were reported to be liked by everyone in the family. However, children highly enjoy *okpa*,

Fibre g	CHO g	Iron mg	Copper µg	Zinc µg	Phosphorous mg	Vit A RE µg	Vit C mg	Folic acid µg
1.2 ± 0.5	25.99 ± 0.0	0.6 ± 0.01	2.3 ± 0.03	0.3 ± 0.03	14.2 ± 0.2	7.7 ± 0.02	14.5 ± 0.06	7.1 ± 0.02
0.6 ± 0.2	44.21 ± 0.1	0.6 ± 0.0	3.4 ± 0.0	0.2 ± 0.01	12.9 ± 0.1	3.9 ± 0.02	4.6 ± 0.01	3.1 ± 0.04
0.5 ± 0.0	39.73 ± 0.1	0.6 ± 0.2	3.1 ± 0.01	0.3 ± 0.01	14.0 ± 0.06	11.2 ± 0.01	21.4 ± 0.01	11.2 ± 0.02
0.3 ± 0.1	24.7 ± 0.03	0.3 ± 0.2	3.4 ± 0.05	0.25 ± 0.0	13.8 ± 0.0	1.93 ± 0.01	8.0 ± 0.01	3.06 ± 0.01
0.35 ± 0.0	41.13 ± 0.01	0.3 ± 0.01	3.4 ± 0.01	0.2 ± 0.02	13.6 ± 0.47	5.42 ± 0.03	8.96 ± 0.05	5.45 ± 0.00
0.43 ± 0.05	45.0 ± 0.02	0.44 ± 0.1	3.38 ± 0.03	0.32 ± 0.0	15.3 ± 0.02	11.42 ± 0.02	2.6 ± 0.01	2.76 ± 0.10
0.7 ± 0.32	19.68 ± 0.02	0.6 ± 0.01	3.1 ± 0.01	0.28 ± 0.01	15.89 ± 0.78	9.56 ± 0.01	25.2 ± 0.01	12.14 ± 0.0
1.69 ± 0.03	34.02 ± 0.03	0.32 ± 0.01	3.25 ± 0.03	0.25 ± 0.02	14.9 ± 0.26	9.27 ± 0.02	14.2 ± 0.12	5.04 ± 0.04
0.35 ± 0.01	27.64 ± 0.03	0.4 ± 0.01	4.0 ± 0.05	0.31 ± 0.00	14.2 ± 0.01	5.86 ± 0.02	29.3 ± 0.06	18.67 ± 0.01
0.48 ± 0.00	12.77 ± 0.02	0.44 ± 0.00	3.4 ± 0.05	0.35 ± 0.05	14.5 ± 0.33	8.72 ± 0.03	18.92 ± 0.01	6.53 ± 0.01
1.58 ± 0.26	24.54 ± 0.03	0.45 ± 0.01	4.06 ± 0.05	0.23 ± 0.02	15.7 ± 0.06	6.25 ± 0.05	16.32 ± 0.2	7.64 ± 0.01
1.28 ± 0.26	31.33 ± 0.01	0.77 ± 0.03	3.1 ± 0.28	0.15 ± 0.03	16.5 ± 0.18	8.18 ± 0.01	17.2 ± 0.40	6.4 ± 0.10
1.34 ± 0.17	31.52 ± 0.04	0.74 ± 0.00	3.5 ± 0.43	0.1 ± 0.03	13.8 ± 0.06	5.79 ± 0.00	14.0 ± 0.06	7.33 ± 0.02
0.14 ± 0.00	32.63 ± 0.11	0.23 ± 0.00	3.1 ± 0.10	0.20 ± 0.01	13.6 ± 0.00	7.79 ± 0.20	18.4 ± 0.01	6.97 ± 0.02
0.12 ± 0.06	44.01 ± 0.01	0.45 ± 0.01	3.1 ± 0.01	0.16 ± 0.02	13.2 ± 0.35	3.94 ± 0.02	5.02 ± 0.10	6.99 ± 0.01
0.71 ± 0.01	35.77 ± 0.01	0.56 ± 0.01	3.5 ± 0.03	0.15 ± 0.01	16.9 ± 0.31	6.16 ± 0.05	14.4 ± 0.05	6.06 ± 0.01
0.26 ± 0.05	38.29 ± 0.03	0.3 ± 0.00	3.1 ± 0.00	0.14 ± 0.00	14.0 ± 0.06	6.40 ± 0.00	9.13 ± 0.01	5.87 ± 0.02

*moi moi* and *akara*, especially since they are bought as snack foods.

### Vegetables

Children referred to in this study generally did not like vegetables and would avoid dishes with a lot of them included. There are some vegetables that children prefer because of certain qualities they possess. For example, children like *arina* (*Corchorus olitorius*) *kerenkere* (*Corchorus* spp.), *ujuju* (*Myrianthus arboreus*) and *anyazu* (*Psychotria* spp.), where they are available, because of their viscous or drawing consistency and sweet taste. They also do not like vegetables with a bitter taste (e.g. bitter leaf) or strong smell (*nchuanwu*, *Ocimum gratissimum*). Mothers, on the other hand, highly enjoy vegetables in any form.

### Fruits

Children express a great liking for a variety of fruits, unlike the adults. Traditional fruits particularly liked by children are *utu* (*Landolphia owariensis*), *udala*

(*Chrysophyllum albidum*), *icheku* (velvet tamarind, *Dialium guinense*) *ube* or pears (*Dacryodes edulis*) and *ube okpoko* (*Canarium schweinfurthii*). They do not like bush mango (*Irvingia* spp.) because of its very strong smell, while mothers and other adults really enjoy this fruit.

### Soups/sauces

Children like most soups/sauces except *egusi* (melon) and bitterleaf soups. *Egusi* and bitterleaf soups are very important soups/sauces in the Igbo culture area. They are used for entertaining guests at different functions. Palm fruit pulp soup, popularly known as *banga* soup or *ofe akwu*, is a special soup of the Anambra and Delta Igbos, but is gradually becoming very popular everywhere. It can be made using a variety of staples and is enjoyed by all.

### Animal foods

Meat, fish and poultry are enjoyed by children, although these are given to them in small quantities. Children

are given milk and milk products mostly when they are very young. They also like other traditional animal foods like beetle, cricket, termites, snails, rabbit, squirrel larvae and snail eggs. Mothers also like animal foods. *Nchi* is one of the cherished bush meats used in the local cuisine. In some Igbo communities, it is forbidden for pregnant women because it is said to prolong labour. The termite is a cheap source of protein, which is cherished by children and some adults. It is usually roasted and eaten alone or steamed and included in some traditional food preparations, such as *ikpo-oka* (corn pudding).

In the past, children and mothers were denied these animal foods. However, with increasing awareness of the nutritional needs of these vulnerable groups, such taboos are followed less strictly. Their limited consumption now could be attributed to availability and cost. There are also certain animals that are still prohibited for spiritual or cultural reasons, e.g. hyena, snakes, snails, etc.

### Foods readily available, as described in the research period

The most readily available traditional staple in the Igbo culture area is cassava (*Manihot esculenta*). It is a staple that is found in one processed form or another in every household, irrespective of social status and season of the year. Other staples that are available year-round

may not be seen in some households because of their high cost, e.g. yam and plantain. Among the cereals, maize appears to be the most readily available, since most households produce maize. Thus, it can be found in wet or dried form depending on the season.

The most readily available legume is the cowpea (*Vigna unguiculata*). This can be found in every community and local market in larger quantities than the indigenous ones. The production of traditional legumes is low.

Fruits and vegetables abound in the Igbo culture area but are highly seasonal. However, vegetables such as bitter leaf, *Amaranthus* (green), *okazi* (*Gnetum* spp.) and pumpkin (*ugu*) are available year-round, but are expensive during the dry season. Among the vegetables used less frequently *obiogbome* (*Peptadentia* spp.), *anya-azu* (*Psychotria* spp.), *kpugbum* (*Chromolaena odorata*), *ujuju* (*Myrianthus arboreus*), *ulumiri* (*Spathodea campanulata*), *Olili* (*Brillantaisia merrenia* spp.) *aluluisimmo* (*Husolandia opposita*) and *okpanwaokuko* (*Aduraria chamae*) are said to be available throughout the year. These are mainly obtained from the wild except *Merremia* spp., *Spathodea campanulata* and *Psychotria*, which are found in home gardens. Bananas and citrus fruits, particularly oranges, are the most readily available fruits.

Most nuts and seeds are available throughout the year, since they are usually dried and preserved.

**Table 12.5 Cost of meeting iron requirements with some traditional Igbo recipes**

Food	Serving <sup>a</sup> portion (g)		mgFe/100g <sup>a</sup>	Cost/100g <sup>b</sup> (₦)	Cost of meeting the iron requirement for children (8mg) (₦)
	Children	Women			
Bean Pottage	275	600	2.27	15.0	52.86
MoiMoi	200	350	2.70	5.0	14.81
Okpa	225	450	2.27	10.0	35.24
Akara	100	150	2.85	10.0	28.07
Igbangwu	250	375	2.48	5.0	16.13
Cassava and Egusi soup	300	600	2.04	20.0	78.43
Cassava and Bitterleaf	325	625	1.90	20.0	84.20
Cassava and Okro soup	325	650	1.69	20.0	94.67

<sup>a</sup> Madukwe and Ene-Obong, 2006.

<sup>b</sup> Okeke and Eze, 2006.

US\$ 1 ≈ ₦127 (Oct, 2007).

The oil bean seed, groundnuts, melon and *dikanut* are always available, although they may be expensive at times.

The animal foods, meat, fish, poultry and eggs are available but very expensive. Bush animals are not readily available because of limited forest for hunting and the migration of men to the cities. Insects and larvae are available, but only children in the rural communities collect them for food.

## Cost of foods

The nutritive cost of some basic staples to provide 20 g protein and 4.2 MJ of energy (necessary to meet the need of a pre-school child) was determined (King *et al.*, 1984; Okeke and Eze, 2006). The data showed that maize was the cheapest staple providing energy for the child, while frozen fish and cowpea were the cheapest in providing protein. Table 12.5 shows the cost of providing a pre-school child's requirement for iron. Here, *moi moi* (a bean-based recipe) was the cheapest (₦14.80), followed by *igbangwu* (₦16.13), a maize-based pudding. The cassava and soup/sauce recipes were more expensive (₦78 to ₦95) as sources of iron for children. This was probably because of bulk and high moisture content.

## Dietary evaluation

### Infant-feeding practices reported by Igbo researchers

Breastfeeding was found to be the traditional method of feeding infants in the Igbo culture area, with over 90 percent of Igbo mothers breastfeeding their infants. However, exclusive breastfeeding was not fully accepted by Igbo mothers, since they would not stop giving water to the infant. About 95 percent of mothers had given their infants colostrum. Most mothers (62 percent) stopped giving their children breastmilk between the age of 15 and 17 months; 18 percent stopped between 21 and 25 months, while 3.5 percent breastfed beyond 25 months.

Apart from maize gruel (pap), complementary foods were generally those foods consumed by adults

in these communities. They were introduced before four months of age or later. Foods considered good for infants were *akara*, *ukwa* (African breadfruit), *ukpo oka*, African yambean, plantain pottage and boiled plantain and *ujuju* soup. Fruit was rarely given. Other milks fed to children included powdered milk, soy milk and liquid whole cow's milk, and 31.7 percent gave their children commercial cocoa-based beverages.

### Contribution of traditional foods to nutrient intake

Using the weighed food intake method, the nutrient intake of traditional foods and their contribution to total energy and nutrient intake were calculated. The traditional diet of the Igbo culture is plant-based, with little contribution made by meat and their products. Simple processing (e.g. fermentation) and cooking methods (e.g. steaming, baking and roasting) were used in preparing traditional foods.

Traditional foods/diets are high in moisture content as shown by the proximate composition in Tables 12.2, 12.3a and 12.3b (in most cases above 50 percent), bulky and of low energy and nutrient densities. However, traditional foods contributed over 90 percent of the energy intake of rural communities in Igbo culture area. There are community variations in the contribution of specific food groups. In the Anambra area, starchy roots and tubers, nuts and seeds made substantial contributions to energy intake, while in Enugu area, starchy roots and tubers, legumes and cereals significantly contributed to the intake of energy. The bulk of ascorbic acid came from vegetables in Anambra area (34 to 62 percent), while in Enugu area, much of the ascorbic acid (51 to 58 percent) came from starchy roots and tubers. Red palm oil was used in preparing most traditional dishes and recipes and thus is the major source of  $\beta$ -carotene, a precursor of vitamin A. It contributed 70 to 80 percent of vitamin A.

Although traditional foods/diets made substantial contributions to nutrient intakes of the Igbo culture area, they did not adequately meet the needs for energy, calcium, riboflavin and niacin. The adequacy of vitamin A and protein intake from the traditional

diet needs to be interpreted with caution, since the diets are plant-based and, therefore, likely to be of low bio-availability and digestibility (Madukwe and Ene-Obong, 2006).

In considering the significance of traditional Igbo foods to food sources of nutrition of the population, a calculation was made of the percent of energy in the daily diet derived from locally available foods. This percentage was 97 percent for children zero to two years of age, 92 percent for children three to five years of age, 95 percent for children 6 to 12 years of age, and 96 percent for mothers (Okeke *et al.*, in press).

### Nutritional status

In the Ede-Oballa community, stunting was found in 38.6 percent of males and 31.8 percent of females, close to the national level of 42 percent (Maziya-Dixon *et al.*, 2004). Wasting was found to be 14 percent and 12 percent in males and females, respectively. Undernutrition was more prevalent in children under two years of age with about 84 percent of children undernourished compared to 16 percent of children two to five years of age. There was no prevalence of under-nutrition in children between 6 and 12 years of age.

### Food attributes/card sorts

The general perception of food among the Igbos was that it gives blood and nourishment. Foods that were believed to give blood included animals, legumes, some seeds and vegetables. This was shown by all the communities studied. Plantain (*Musa paradisiaca*) was believed to be rich in iron and is a blood-giving food. Also in one community, honey was mentioned as food that provided blood. In these communities, iron-giving foods and body-building food were synonymous with blood-giving foods. Igbo people have good knowledge of foods rich in energy since most carbohydrate and fatty foods were sorted for energy. These included cereals, starchy roots, tubers, fruits and their products, vegetable oils and oily seeds like groundnuts. In some cases, fruits (pawpaw) and vegetables (cucumber, *utazi*, and carrots) were included.

Perception of specific mineral and vitamin-rich foods was interesting and worth noting. *Natron trona*

(*akanwu*), a sodium salt, was thought to be rich in calcium. Palm oil and vegetable oil were also perceived to give calcium. Calcium is correctly associated with strong bones by the Igbos but it appears that their knowledge of its food sources was lacking. Cowskin (*candalkpomò*) was incorrectly mentioned in one of the communities as being associated with helping to build bones. Interestingly, they had little difficulty identifying vitamin A rich foods associated with improvement of the eyes. In this regard, fruit, vegetables and palm oil were mentioned. A general lack of knowledge of fibre-rich foods was observed in most Igbo communities. Only mango, orange and *achara* (*Pennisetum* spp.) were mentioned in two of the communities visited.

Igbo concepts of cold and hot food were noted. Cold foods were those that keep the body cool and calm. Such foods included paw-paw, African breadfruit, pap, waterleaf, onion, tomatoes, pumpkin, *utazi* leaf (*Piper guineense*) *osu* (*Pluerotus* spp.), dry *okro*, coconut, avocado, pear and *nchuanwu* (*Ocimum viridias*). Hot foods on the other hand were those that keep the body hot or warm. They included *uziza* seed (*Piper guineense*), ginger, hot pepper, *nmimi* (*Dennettia tripetala*) alligator pepper (*Aframomun melegueta*) *uda* (*Xylophia aethiopipa*) and *efu* (*Monodora myristica*). Thus, hot foods consumed by the Igbos were mainly hot spices, while cold foods were those that do not cause any “disturbance” in the body after consumption.

### Conclusions

The Igbo were shown to have knowledge of an extensive and diverse food system that contains all the necessary nutrients for human nutrition. Despite this, the research study showed that there was considerable undernutrition, particularly in children. Education and agricultural sustainability were seen as major interventions that would help communities develop their resources within the local cultural context to provide better advantages for health. Food processing technology would also assist to lighten women’s work. This research has provided the opportunity for understanding the food system, and its nutritional

potential, as well as the cultural definitions to make more high-quality foods available, accessible and acceptable. With concerted effort, food security can be improved by empowerment of the local community members to take best advantage of what they have in their local environment.

Intervention strategies are suggested to address protein-energy malnutrition and micronutrient deficiencies as devastating public health problems in the Igbo culture area, and in Nigeria generally. In addition to provisioning of protein foods, micronutrient deficiencies need to be specifically addressed through multiple measures, including consumer education, social marketing, widespread distribution of supplements, fortification of staple foods and the continued iodization of salt. For maximum effectiveness, interventions must be inter-sectoral, involving the health, agriculture, education, information, media and planning sectors.

Improving access to protein foods (legumes, bush food, etc.) for young children, and improving access to micronutrients through the local food system, as well as the health care system, will contribute greatly to the control of childhood infections, improved child survival and improved women's health, thereby contributing to overall national development ●

## Acknowledgements

Firstly, we gratefully acknowledge the continuous support from the community leaders, without which this project could not have been undertaken: Eze Ohanyere 1, Abia State (His Royal Highness, HRH) Ohiya/Ohuhu; Ichie Godwin Ezeoke, Anambra State (Prime Minister) Ezinifite/Aku; Chief I.S. Ofolue Ozoma, Delta State (His Royal Highness) Ubulu-Uku/Alumu; Igwe P.E. Eze, Enugu State (His Royal Highness) Ede-Oballa/Ukehe.

We acknowledge with sincere gratitude the spirit with which the Canadian Institutes of Health Research supported this project. We also acknowledge with many thanks the collaborators from Canada especially Professor Harriet Kuhnlein without whom this project would not have been possible. We wish to say that hard work does not kill but hard work pays; this is with respect to Harriet Kuhnlein. Her visit to our project sites, her criticisms, and wisdom was what brought this work to this stage. Project team members also very important to our end product are Chief Bill Erasmus, Chair of the Governing Board of the Centre for Indigenous Peoples' Nutrition and Environment, and Chief, Dene Nation and

Assembly of First Nations, Yellowknife. We also thank Peter and Lisa Kuhnlein (Anacortes, Washington) for their excellent documentation. As a sign of their appreciation for including Igbo communities as part of the collaboration, the community presented the visitors from Canada with the highest valued symbol in Igbo land representing love, unity, honesty, and peace: the Ofo staff.

We would like to thank all team members for their contributions. Additional sincere thanks to the community partners without whom, this work would not have taken place. The community participants were interested in the project and very cooperative during the interview sessions. We thank you all for your wonderful support. We also thank our typist Mr Chukwuka Oluebube.

## Students on the Project:

- Ifeoma, N., M.Sc. – Project Topic 'Food systems and nutritional status of Indigenous Peoples in four communities in Enugu and Anambra States' Nigeria';
- Mama, B.C., M.Sc. – Project Topic 'Intergenerational studies: grandmother-mother-daughter nutritional study in an Igbo culture area of Nigeria';
- Isocha, S., M.Sc. – Project Topic 'Documenting community food systems data tables for Igbo culture area of Nigeria';
- Uduji, J., M.Sc. – Project Topic 'Assessing nutritional status and traditional foods of Indigenous People in Igbo culture area of Abia State, Nigeria';
- Ibeh, G. N., B.Sc. – Project Topic 'Body weight perception of Igbos in the University of Nigeria, Nsukka community of Nigeria';
- Eze, C., B.Sc. – Project Topic 'Traditional processing and nutritive cost of Igbo traditional foods commonly eaten in Nsukka, Enugu State of Nigeria';
- Igattah, N., B.Sc. – Project Topic 'Health benefits of traditional foods'.

> Comments to: [elizchinwe@yahoo.com](mailto:elizchinwe@yahoo.com)

>> Photographic section p. XXXVI