

## The Nutrition of Schoolgirls in Northern Nigeria

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The territory of Nigeria (Fig. 1) is about four times the size of Britain and is composed of two large areas of pre-Cambrian granite separated by marine sediments in the Niger and Benue valleys. It is inhabited by many races that differ considerably in their social customs and reaction to western civilization. In the south, the eastern and western regions include the Ibo and Yoruba peoples, many of whom are eager for the education of their children; Moslem rulers in Northern Nigeria are anxious that their people should compete on an equal footing with southerners and are now encouraging a rapid expansion of schools; but there is as yet but little demand for women's education by northern races, and the number of girls going to school is relatively small.

The object of the present inquiry was to determine the nutriture (state of nutrition) of these northern schoolgirls and to make any necessary recommendations for their well-being.

### METHODS

Information was collected about the customary diets of eight main racial groups in Northern Nigeria: (a) Peoples belonging to the north—Plateau pagans including Beroms, Shuwa Arabs, Nupe, Hausa, Settled Fulani and Kanuri. (b) Two racial groups, Ibo and Yoruba, immigrants from the south, now living in the northern territory.

There are three types of school that northern girls may attend: (a) Boarding schools for girls of all ages, supported by the Government or by the Native Authority and staffed by qualified women teachers. (b) Senior and junior primary day schools, supported by Native Authorities for local northern children with northern teachers, most of whom are men, and in which, as a result of persuasion, a small number of young girls is included amongst the boy scholars. (c) Schools of voluntary agents, such as churches and missions, where most children come from the families of southern immigrants.

Between December 1952 and March 1953, which is the dry season in Northern Nigeria, visits were paid to urban and rural schools in the following provinces: Niger, Zaria, Kano and Bornu (Fig. 1). Representative groups of schoolgirls, aged 10–18 years, were examined. The girls were stripped to the waist, their legs were bare, and 284 records of their nutriture were obtained. The children were of various northern races: Nupe, Hausa, Settled Fulani, Kanuri, Shuwa Arab. There were also members of fourteen aboriginal tribes and Ibo and Yoruba schoolgirls. Since very few of the girls on the Plateau from 'pagan' tribes (so-called because they are neither

Moslem nor Christian) attend school, a nutritional assessment, made during the dry season of the previous year, of twenty-four young Berom mothers in the maternity wards of the 'bush' hospital at Vom is included for comparison.

The clinical examinations were made using the form illustrated in *Malnutrition and Starvation in Western Netherlands* (Sinclair, 1948).

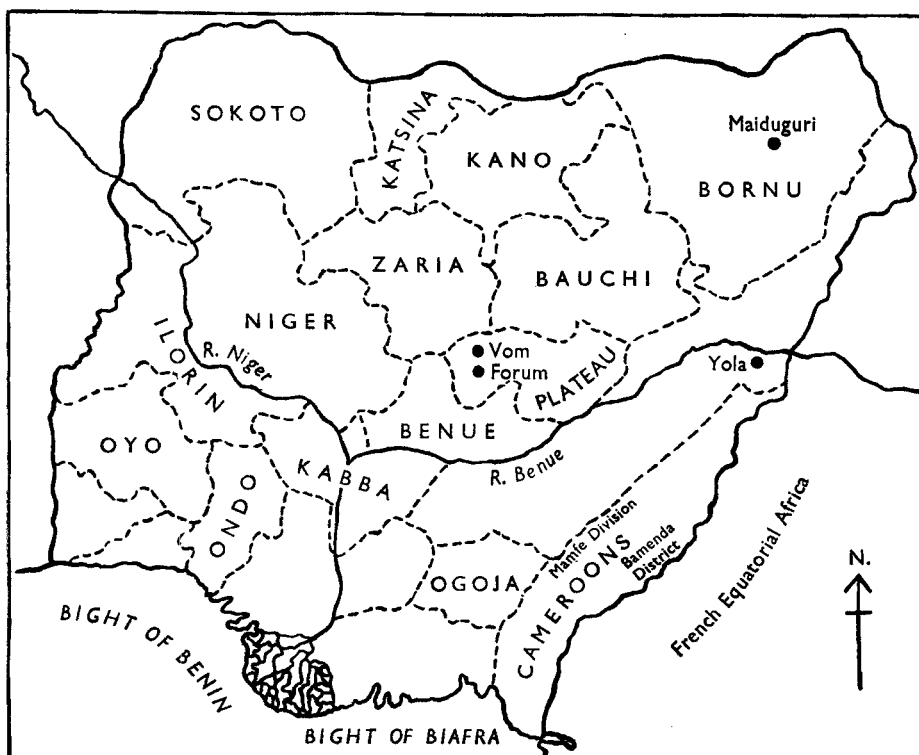


Fig. 1. Sketch-map of Nigeria.

## RESULTS

*Dietary findings.* Table 1 summarizes the types of dietary found in the eight racial groups.

In all groups the intake of calories was low for poorer members, although the balance of carbohydrates and proteins was good. For the poor there was probably a seasonal deficiency of ascorbic acid and, amongst the Hausa and the Plateau pagans, a seasonal deficiency of vitamin A. Many isolated members of Plateau pagan tribes and a few Kanuri made 'vegetable' salt from the stalks of millet or guinea corn and obtained but little sodium chloride. The pot ashes from the burnt stalks of a locally grown millet, *Penisetum spicatum*, used by the Beroms, were found on analysis to contain not more than 3.8% sodium chloride. The supply of iodine is discussed in a separate paper (Wilson, 1954).

*Clinical findings.* The nutriture of girls who had been for 2 or 3 years in a well-run boarding school was often excellent; that of those who had more recently entered

Table 1. Customary dietary patterns of races in Northern Nigeria

Foods	Northern races						Southern immigrants	
	Plateau pagans (1)	Nupe (2)	Hausa (3)	Settled Fulani (4)	Kanuri (5)	Shuwa Arabs (6)	Ibo (7)	Yoruba (8)
<b>Cereals</b>								
Wheat	-	-	+	-	-	+	-	-
Rice	+	++	-	+	+	+	+	+
Maize	S	S	S	S	S	S	S	S
Guinea corn	++	+	++	++	++	++	+	+
Millet	++	+	++	++	++	++	+	+
<b>Starches and starchy roots</b>								
Sweet potato	+	+	+	+	+	+	+	+
Cassava	+	++	+	+	+	+	++	++
Yam and roots	+	++	-	++	+	+	++	++
<b>Meats</b>								
Meat	-	+	+	+	+	+	+	++
Game	+	+	-	-	+	+	-	-
Vermin	++	-	-	-	-	-	-	-
<b>Freshwater fish</b>								
Fresh	-	+	-	-	-	-	++	+
Dried	+	+	-	-	+	+	-	-
<b>Eggs</b>								
Hen	-	-	-	±	-	-	+	+
Wild fowl	+	+	+	+	+	+	-	-
<b>Milk and milk products</b>								
Fresh milk	-	-	-	-	-	++	-	-
Buttermilk	+	+	-	++	-	++	-	++
Soured milk	-	-	++	-	+	++	-	-
Butter	-	-	-	+	-	+	-	-
<b>Pulses, nuts and seeds</b>								
Groundnuts	+	+	++	+	++	++	++	++
Beans and peas	++	++	++	++	++	++	++	++
Seeds	S	S	S	S	S	S	S	S
<b>Sugars</b>								
Sugar	-	+	+	+	+	+	+	+
Fresh cane	S	S	S	S	S	S	S	S
Wild honey	++	-	-	+	-	-	-	-
<b>Oils and fats</b>								
Red palm oil	+	+	-	-	-	-	++	++
Groundnut oil	+	+	+	+	++	++	+	+
Animal fat	+	+	-	+	+	+	-	-
<b>Fresh vegetables</b>								
Tomatoes	-	+	+	+	+	+	+	+
Onions	-	+	+	+	+	+	+	+
Green and yellow vegetables	S	S	S	S	S	S	S	S
Green leaves	S	S	S	S	S	S	S	S
<b>Fruits</b>								
Fresh	S	S	S	S	S	S	S	S
Dried	+	-	-	-	+	+	-	-

Symbols: -, negligible; S, seasonal (negligible in dry season); +, small amount; ++, considerable amount.

Table 1 (*continued*)

Foods	Northern races						Southern immigrants	
	Plateau pagans (1)	Nupe (2)	Hausa (3)	Settled Fulani (4)	Kanuri (5)	Shuwa Arabs (6)	Ibo (7)	Yoruba (8)
Miscellaneous								
Fermented locust-bean seeds	+	+	+	++	+	+	+	-
Groundnut meal	+	-	++	-	-	-	-	-
Home-brewed beer	++	+	-	-	-	-	-	-
Palm wine	-	-	-	-	-	-	++	++
Fermented roselle seeds	++	-	-	-	-	-	-	-
Salts								
Imported	+	++	++	++	+	++	++	++
Vegetable	++	-	-	-	+	-	-	-

the school was less satisfactory. In rural day schools, the condition of the children reflected the level of the family economy; thus, in good agricultural country, the school-children were well nourished; in towns, the nutriture was definitely associated with social status, and the teachers maintained that children did not get enough to eat in poorer urban districts.

The outstanding signs found on clinical examination in the dry season of 284 northern schoolgirls are classified in Table 2.

There was one case of congenital heart disease. Hepatic enlargement was not found. Amongst the Nupe peoples the uvula was often removed during infancy 'to facilitate swallowing'.

All of the twenty-four young Berom mothers from the bush (whose exact ages were unknown, but who married at about 16 years) were thin; the skin was slack, giving an appearance of flatness over the buttocks and other body contours. They used cereal salt of very low sodium content, and midday specimens of urine did not give a positive reaction for chloride. Thickness of the subcutaneous tissue of the arm, measured with calipers over the triceps muscle in seven cases, was half that of more sophisticated young women of the same tribe who lived nearer industrial centres and bought imported salt.

The menarche occurred relatively late (about 14½ years) in the hot, dry climate of the northern savannah and on the more temperate central Plateau, but from a study of the age of menarche in the tropics (Wilson & Sutherland, 1953) it is concluded that in Northern Nigerian latitudes the onset of menstruation is not determined solely by the climate.

In mixed schools boys as well as girls were examined, but the observations are not included in Table 2. The nutriture of boys compared unfavourably with that of girls; girls ate with the women's group of the household which did the cooking, and so probably obtained more food. Some of the children in these mixed schools were stunted in growth and many had rough skins and ringworm of the scalp; sores and scars on the legs were not uncommon; the gums were frequently swollen and bleeding. Six samples of well water from Maiduguri town (Bornu province) were

Table 2. Outstanding clinical signs in girls and young mothers in Northern Nigeria during the dry season (December to March)

Place of observation	No. examined	Race	Nutrition (poor, thinness)		Umbilical hernia		Skin (roughness, seborrheic rashes)		Gums (red, swollen, bleeding)		Lips (dry, cracked)		Eyes (conjunctivitis, xerosis conjunctivae)		Thyroid gland* ('visible at rest')		Teeth (Caries (naked-eye examination), Dental fluorosis ('mottled enamel'))			
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Schoolgirls aged 10-18 years																				
Day schools, Niger Province	65	Nupe	12	18.5	18	27.7	12	18.5	12	18.5	11	16.9	13	20.0	5	7.7	16	24.6	12	18.3
Day schools, Zaria and Kano Provinces	96	Southern immigrants	41	42.7	22	22.9	31	32.3	25	26.0	48	50.0	9	9.4	10	10.4	18	18.8	15	15.6
Boarding schools, Kano Province	85	Hausa	7	8.2	1	1.2	24	28.2	41	48.2	25	29.4	7	8.2	18	21.2	23	27.1	11	12.9
Boarding schools, Bornu Province	38	Fulani, Kanuri, Shuwa Arabs	2	5.3	0	0.0	10	26.3	11	28.9	6	15.8	3	7.9	8	21.1	0	0.0	6	15.8
Young Berom mothers																				
Maternity wards, Vom 'bush' hospital	24	Plateau pagans	24	100	Not recorded	23	95.8	14	58.3	20	83.3	24	100	14	58.3	13	54.2	1	4.2	

\* The criteria used for thyroid enlargement were those suggested by the Medical Research Council (Murray, Ryle, Simpson & Wilson, 1948).

sent to Professor Margaret Murray for analysis and were found to have fluorine contents varying from 0.1 to 1.2 p.p.m. Many girls in boarding schools there had the pearly white teeth that are a sign of an adequate fluorine absorption (Murray & Wilson, 1948); 15.8% had a moderate degree of dental fluorosis (mottled enamel); all the thirty-eight girls examined had teeth free of caries. Except in Bornu province, where a special examination of schoolchildren by the Field Medical Unit had shown heavy infestation with bilharzia and other worms, the rate of parasitism amongst schoolchildren was not known.

#### DISCUSSION

Surveys in different parts of Nigeria (Chartres, 1951; Nicol, 1952) have drawn attention to the influence of seasonal variation in diet on the clinical signs of nutritional deficiency. The present observations were made late in the dry season, after a period of food shortage. A higher incidence of poor nutriture and thinness was found in children attending day schools than in school boarders whose food intake was more assured. Amongst day scholars, nutrition was poorer in the urban groups of southern immigrants than amongst the more favourably placed Nupe, who had an agricultural background. The degree of umbilical hernia was closely associated with poor nutriture and slackness of the abdominal muscles, though the origin of the condition must be sought in the indigenous methods of treatment of the umbilical cord at parturition.

Seasonal deficiency of ascorbic acid was suggested, especially amongst the Hausa and pagan tribes, by the red, swollen and bleeding gums, which could not primarily be attributed to defective hygiene. The severity of lesions of the skin, of the lips and of the eyes must be ascribed to the dusty dry climate, although in some cases inflammation may have been aggravated by a low intake of vitamin A. These conditions were most evident amongst the very primitive Beroms who lived in very dirty round-huts, full of smoke.

The degree of dental caries varied inversely with the degree of dental fluorosis.

Clothes conferred social prestige, and were often bought by northern families instead of an adequate amount of food. Many mothers went out early as traders, so that their children did not have a morning meal before attending school. In Niger province a mid-morning meal was cooked on the school premises from cereals and greens which the parents were encouraged to provide. Favourable reports came from Ilorin province, where the food that the schoolchildren bought at the mid-morning break from women traders was supervised by the school authorities. To supplement the intake of calorie-yielding food in other provinces, it should be possible to encourage traders to provide nourishing, inexpensive snacks, made, according to season, from guinea corn (*Sorghum vulgare*), bulrush millet (*Penisetum typhoideum*), maize (*Zea mays*) and groundnuts (*Arachis hypogaea*) and, when available, sugar-cane (*Saccharum officinarum*) and fresh fruits. Such meals would avoid starchy roots and tubers such as cassava (*Manihot utilissima*) and yams (*Dioscorea sativa* and *Colocasia antiquorum*) which, although good sources of energy, consist almost entirely of carbohydrates and are deficient in body-building proteins and protective minerals and vitamins. The low iodine content of many Nigerian drinking waters (Wilson, 1954) suggests the advisability of using iodized salt at school meals.

## SUMMARY

1. The customary dietaries of eight main races in Northern Nigeria were investigated.
2. The nutriture of representative groups of schoolgirls and young mothers was investigated and is discussed in relation to their diets.
3. Suggestions are made for extending the supplementation of diets of school-children by the provision of suitable snacks in the mid-morning school break.

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