The Composition of Foods
Commonly Eaten in East Africa

The Composition

of Foods

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(editors)

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CTA

Technical Centre for Agricultural and Rural Cooperation
(ACP-EEC Lomé Convention)

ECSA

Food and Nutrition Cooperation
A programme of cooperation between countries of East, Central and
Southern Africa in which issues related to food and nutrition are
discussed, planned and implemented.

Preface

This collection of data on food composition evolved from a table compiled for use in a joint research programme in Tanzania on vitamin A deficiency which was carried out by the Department of Human Nutrition of the Wageningen Agricultural University in conjunction with the Tanzanian Food and Nutrition Centre (TNFC) in Dar es Salaam.

The tables have been designed to give information about the composition of the most common foods eaten in East Africa, particularlyTanzania. The pre-publication editions of this work contained information on the content of macronutrients, minerals and vitamins. The scope of the present edition has been extended to include information on the amino acid content of selected foods. Sources of all the data included in the table have been listed. Although most of the data have been derived from other tables and the literature, analyses carried out in the laboratories of TFNC and the Department of Human Nutrition of the Agricultural University are also included.

Data included in the food composition table have been prepared in two other versions. A poster version with information on energy and eight important nutrients was printed early in 1987 and reprinted later in the same year. A version on a floppy disc containing all the nutrient data included in this book designed for use with the MicroNap database access software produced by Dr. Gustaaf P. Sevenhuysen of the University of Mannitoba in Winnipeg (Canada) will be made available at about the same time as this book (See Section 5).

A large number of people have contributed to the work involved in preparing this book. At TFNC, the Managing Director, Dr. T.N. Maletnlema, provided continual support. In Wageningen, the initial version of the table was prepared by Ineke Scholte with assistance from Lidwien van der Heijden. Further work and revision of the table was carried out by Werner Schultink and Wilma Jansen. Theo Dopheide was responsible for establishing the data files while the compilation of data on the amino acid composition of foods was carried out by Marga Ocké in conjunction with Wijnand Klaver. Hugo F.F. Albers has been responsible for the design and layout.

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Introduction 1

This book provides basic information on the nutrient content of foods consumed in East Africa. It is designed for use not only in nutrition research, but also in applied nutrition projects.The energy and nutrient values have been derived from other food composition tables, articles in the literature and from a limited number of analyses carried out in Dar es Salaam and Wageningen.

Data in food composition tables differ in reliability because of a number of factors (Southgate, 1974; Paul, 1982).

(i)   Apparently identical foods vary in composition especially with respect to the content of vitamins such as retinol, ß-carotene and vitamin C. Such variations are due to differences in methods of harvesting, transport and storage, and preparation. Values are the means of analyses of a large number of food samples which should be described as carefully as possible.

(ii) Data in food composition tables come from a variety of sources. Some values are based on original analyses, while others are derived from calculations, estimates and from other tables often without references to the original source.

(iii) Analytical methods vary considerably. For example, energy values may have been measured directly by bomb calorimetry or calculated from the caloric values of protein, fat, carbohydrate and alcohol. In general, these two methods do not give large differences. For the calculation of energy, various conversion factors exist, e.g., the simple factors 4, 9, 4 and 7 for protein, fat, carbohydrate and alcohol respectively; or the Atwater factors, as used in the FAO tables, with different factors for various types of foods. In practice, these different methods of calculation result in very small differences.

In compiling these table, choices have had to be made. In this introduction the method of selection of data for inclusion in the tables and a number of features of the tables are described.

1.1 Selection of data for inclusion in the tables

The list of foods included in the table was based initially on those included in the Tanzanian food tables (Maraelle, 1974). This list was supplemented with foods included in the table prepared for use in Kenya by the Royal Tropical Institute (1977) in Amsterdam and foods encountered during research within the vitamin A programme in

Tanzania. The foods included have been divided into 12 groups:

1. Cereals and grain products
2. Starchy roots, tubers and fruit
3. Grain legumes and legume products
4. Nuts and seeds
5. Vegetables and vegetable products
6. Fruit
7. Sugars and syrups
8. Meat, poultry and eggs
9. Fish and fish products
10. Milk and milk products
11. Oils and fats
12. Other

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All data available to the compilers have been recorded in an administrative file from which the most appropriate data have been selected for inclusion in the tables in this publication. The administrative file consists of a series of subfiles with data on the composition of one food derived from various sources including national and international food composition tables, and from references in the literature. The sources of the data are recorded in the subfiles using the codes listed in Section 4.2.

From all the information available, the most appropriate data have been selected and included in Section 2 (proximate composition, mineral and vitamin content) and Section 3 (amino acid content). Within each food group, the foods are listed in Sections 2 and 3 alphabetically by the English name of the food. The sources of each value can be found in Section 4.3 while cross-references of the English names to the scientific and Kiswahili names are listed in Section 6.

In order to select data for inclusion in the food tables, guidelines were drawn up. For the data on proximate composition and on the mineral and vitamin content of foods, the FAO food table for Africa (Wu Leung, Busson & Jardin, 1968) was used as basis. The data in this table was incomplete and some of the techniques available at the time are somewhat inaccurate. Thus data on vitamin A and carotene content have been derived from sources in which high performance liquid chromotography has been used. When possible, recent analyses have been used to replace data from the FAO table for Africa' and to provide data where no values are given. Since the FAO table for the Near East is the most recent major regional FAO table (Pollachi, McHargue & Perloff, 1982), data from this table was used where possible in order to fill in remaining missing values. The 1977 Royal Tropical Institute food composition table comprised 50 foods and was largely based on the FAO table for Africa. However, it contained information on a number of foods which was not available elswhere and thus provided a useful supplementary source (Royal Tropical Institute, 1977). Further data were obtained from the following sources (in the order shown):

- the British food composition tables (Paul & Southgate, 1978; Paul, Southgate & Russell, 1980)
- the FAO tables for East Asia (Wu Leung, Butrum & Chang, 1972), and
- the food composition tables for use in tropical countries prepared by Platt (1962).2

Since the Tanzanian tables prepared by Marealle (1974) were largely

derived from Platt (1962), the original source of the data was quoted where appropriate. However the Tanzania table proved very useful for providing the Kiswahili names for foods.

FAO published a comprehensive table on the amino acid content of foods in 1972 (Polacchi, McHargue & Perloff, 1972). Since that time, many analyses have been carried out on foods in Europe and North America and the tables produced often refer to the FAO table. Thus data from the tables have been preferred to those in the FAO table and to the older tables from Ethiopia and the Near East. Thus the sources of data for the amino acid content of foods, in order of preference, are as follows:

- the British food composition tables (Paul & Southgate, 1978; Paul, Southgate & Russell, 1980);

- the American food composition tables (USDA, 1976, 1979, 1982, 1983, 1984);

- the Danish food composition tables (Møller, 1983);

- the Swedish food composition tables (Statens Livsmedelsverk, 1986);

- the FAO table on the amino acid composition of foods: preference has been given to data obtained by column chromotography over that obtained by microbiological assay (Polacchi, McHargue & Perloff, 1972);

- the Ethiopian food composition table (Ågren, Eklund & Lienden, 1968); and

- the FAO food composition table for the Near East (Wu Leung, Butrum & Chung, 1972).

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1.2 Features of the food composition table

Data in the food composition tables (Section 2 and 3) are reported as follows:

(i)   Nutrient values are expressed per 100 grams edible portion.

(ii) When the nutrient values are not known, the "missing values" are denoted by a "-".

(iii) Nutrient values expressed in the source as "trace" or 0, are denoted as 0.

(iv) For nutrient values less than 100, values are rounded off to two significant figures: e.g. 9.13 is expressed as 9.1; 76.4 as 76; 0.2333 as 0.23. Values greater than 100 (except in the table of amino acid composition) are taken to the nearest 5 or 0; e.g. 393 is expressed as 395.

The units used for expressing the data for energy and various nutrients are presented in Table 1.

1.3 Considerations in relation to specific nutrients and to the calculation of energy

(i)   Waste. As values reported for the proportions of waste in individual foods as purchased vary widely, the data presented should be considered only as estimates. The values for waste are expressed as g per 100 g food "as purchased" (that is, including the waste). Therefore, the edible portion can be estimated by multiplying the amount of food as purchased by the factor 100(100 + x) where x is the value for waste in the table.

(ii) Moisture. The reported values for the moisture content of a particular food item vary from one to another. This is particularly

Table 1   The units used for energy and the various nutrients included in the food composition table.

Constituent	Unit (per 100 gram edible food).
Waste	gram
Moisture	gram
Energy	kiloJoule and kilocalorie
Protein	gram
Fat	gram
Total	
Saturated fatty acids (SFA)	
Mono-unsaturated fatty acids (MUFA)	
Polyunsaturated fatty acids (PUFA)	
Linoleic acid (Lin)	
Cholesterol (Chol)	milligram
Carbohydrate	gram
Total	
Mono- and disaccharides (mono + di)	
Polysaccharides (poly)	
Fibre	
Alcohol (alc)	gram
Ash	gram
Minerals	milligram
Calcium (Ca)	
Iron	
Phosphorus (P)	
Potassium (K)	
Sodium (Na)	
Vitamins	
Retinoids and carotenoids	microgram
Retinol	
ß-carotene (ß)	
Other provitamin A carotenoids	
Thiamin (B_1)	milligram
Riboflavin (B_2)	milligram
Pyridoxin (B_6)	milligram
Vitamin B_{12}	microgram
Nicotinic acid (niacin)	milligram
Folic acid	microgram
Ascorbic acid (Vitamin C)	milligram
Amino acids	milligram
Nitrogen	gram
Total amino acids	milligram
Total essential amino acids	
Cystine (Cys)	
Isoleucine (Ile)	
Leucine (Leu)	
Lysine (Lys)	
Methionine (Met)	
Phenylalanine (Phe)	
Threonine (Thr)	
Tyrosine (Tyr)	

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The Composition of Foods

(Table 1 continued)

Tryptophan (Trp)
Valine (Val)
Alanine (Ala)
Arginine (Arg)
Aspartic Acid (Asp)
Glutamic Acid (Glu)
Glycine (Gly)
Histidine (His)
Proline (Pro)
Serine (Ser)

so for foods with a high moisture content such as fruits and vegetables. Reported differences in nutrient content are often due largely to differences in moisture content rather than to differences in the nutrient content of the dry matter of the food. Thus, when data for foods with a high moisture content were derived from a number of sources, correction was made for the moisture content. For example, for onions most of the data are taken from the FAO food composition table for Africa so such data are recorded without adjustment. The water content of onions in the FAO table is given as 89%. However, some of the data for onions are derived from the McCance and Widdowson table in which the moisture content is given as 93% (Paul & Southgate, 1978) Therefore data derived from the McCance and Widdowson table are multiplied by the factor (100-89)-(100-93).

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(iii) Ash. Values for ash have been taken from various sources.

(iv) Protein and amino acids. In the FAO tables, different factors have been used for the conversion of nitrogen to protein in foods (see Table 2). These factors have been calculated from the nitrogen content of proteins isolated from individual foods. When the protein value has been taken from another source where a different conversion factor has been used, this difference has not been taken into account because the error involved is generally quite small. In many cases, the values for the content of amino acids and nitrogen presented in Section 3 are derived from different sources then those used for the protein content in Section 2. If the values for protein (ie, nitrogen multiplied by the conversion factor) were different for the same food, the values in Section 3 were adjusted to bring them in line with those quoted in Section 2. The term "total essential amino acids" refers to the sum of the amino acids cystine, isoleucine, leucine, lysine, methionine,phenylalanine, threonine, tyrosine, tryptophan and valine.

(v) Fat. Most sources provide data only on the total fat content. Values for saturated, mono-unsaturated and polyunsaturated fatty acids and linileic acid were calculated, where possible, from values available in other sources.

(vi) Fibre. The values given are for unavailable carbohydrate, that is "crude fibre".

(vii) Carbohydrate. The values for total carbohydrate are given "by difference": that is 100 minus the sum of protein, fat, moisture, fibre, and ash. Most of the sources used give carbohydrate by difference including the unavailable carbohydrate (that is, crude fibre). However energy values were calculated using carbohydrate by difference less fibre. For total carbohydrate values taken from Platt (1962), crude fibre has already been

Table 2 Factors for converting nitrogen to protein used in the FAO table for Africa (Wu Leung, Busson &Jardin,1968)

Food	Conversion factor
Milk	6.38
Barley, oats and rye	5.83
Rice	5.95
Wheat flour, refined	5.70
Wheat, whole kernel	5.83
Almonds	5.18
Peanuts and brasilnuts	5.46
Soybeans	5.71
Nuts, seeds, and other	5.30

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substracted. Values for mono-, di- and polysaccharides were estimated using values from other sources.

(xiii) Energy. In view of the variation in the factors used for calculating the energy values in the various tables, it was decided to calculate these values on the basis of the values given in the McCance and Widdowson table (Paul & Southgate, 1978): protein, 4; fat, 9; carbohydrate, 3.75; alcohol, 7. These values convert gram of nutrient to kilocalorie of energy (1 kcal = 4.184 kilojoules). The factor 3.75 kcal/g for carbohydrate is based on the expected value for monosaccharides. For polysaccharides, the equivalent factor would be 11% higher. However, it is possibly justified to use the same factor for polysaccharides as this would assume a digestibility of 90%.

(ix) Cholesterol. Most of the values for cholesterol are taken from the McCance and Widdowson table (Paul & Southgate, 1978) or from the two Dutch food composition tables (Commissie Nederlandse Voedingsmiddelentabel, 1981; Kommissie UCV, 1983).

(x) Retinol, beta-carotene, other provitamin A carotenoids and total carotenoids. In selecting values for provitamin A carotenoids, preference has been given to the literature sources, in the following order: Pepping, Vencken and West (1988); Speek, Temalilwa and Schrijver (1986); Simpson (1983); Villard (1985) and Gomez (1981). As these sources give ß-carotene values for only a limited number of foods, values were also taken from other sources with preference being given to analyses carried out by high performance liquid chromotography. Calculations, when necessary, were made as follows (Bieri & McKenna, 1981):

1 IU vitamin A = 0.3 •g retinol or 0.6 mg ß-carotene.

1mg retinol equivalent = 6 mg ß-carotene.

In foods of vegetable origin, the retinol content was recorded as 0, and in foods of animal origin, the proportion of retinol and ß-carotene shown in Table 3 was used.

The method most commonly used for determining retinol and ß-carotene is that described by the Association of Official Analytical Chemists (1970), which measures total carotenoids after separation by column chromatography. It is known that this method overestimates the true value, as the newer method, high performance liquid chromatography (HPLC), which is more reliable, mostly gives lower values. Where possible, values

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**Table 3 Estimated distribution of sources of vitamin A activity in
various foods (from Wu Leung, Busson & Jardin, 1968)**

	From retinol	Pro vitamin A carotenoids	
		ß-carotene	Other
Animal origin:			
Meat and meat organs	90	10	
Poultry	70	30	
Fish and shelfish	90	10	
Eggs	70	30	
Milk and milk products	70	30	
Animal or fish oil	90	10	
Plant origin			
Cereals:			
Maize, yellow		40	60
Others		50	50
Legumes and seeds		50	50
Vegetables:			
Green vegetables		75	25
Deep yellow (carrots, sweet potatoes-deep orange type, etc.)		85	15
Others		50	50
Fruits:			
Deep yellow (apricot, sapote, etc.)		85	15
Other fruits		75	25
Vegetable oils:			
Red palm oil		65	35
Other vegetable or seed oils		50	50

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obtained by HPLC are presented.

Many of the sources consulted do not have values for other
provitamin A carotenoids and for total carotenoids. However,
these values could be estimated for data on the proportion of
retinol, ß-carotene and other carotenoids in different types of
foods presented in Table 3.

(xi) Other vitamins and minerals. Values for thiamin, riboflavin,
pyridoxin, niacin, vitamin B12, folic acid, ascorbic acid and
calcium, magnesium, iron, sodium and potassium were taken
from the various food composition tables, after the values had
been corrected for moisture content.

Proximate composition, mineral and vitamin content of foods 2

Proximate composition of foods

(per 100 grams edible portion)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat					Chol	Carbohydrates				Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin		total	mono	poly	fibre		
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
Cereals & grain products																	
1 Maize, yellow, immature on cob, fresh	30	58	695	165	5.0	2.1	0	1.0	1.0	1.0	0	34	2.0	32.0	0.8	0	0.7
2 Maize, white, whole kernel, dried	0	12	1445	345	9.4	4.2	0	2.0	2.0	1.8	0	72	5.0	67.0	1.9	0	1.2
3 Maize, yellow, whole kernel, dried	-	10	1480	355	10.0	4.8	0	2.3	2.3	1.8	0	72	5.0	67.0	2.0	0	1.2
4 Maize, white, on cob, toasted	-	7	1525	365	8.0	4.8	0	2.3	2.3	2.0	0	77	5.0	72.0	1.9	0	1.2
5 Maize, white, flour, 60 - 80% extraction	0	12	1395	335	8.0	1.0	0	0.5	0.5	0.4	0	77	3.0	74.0	0.6	0	-
6 Maize, yellow, meal (unga wa mahindi)	0	12	1430	340	9.3	3.8	0	1.8	1.8	1.6	0	72	5.0	67.0	1.9	0	1.3
7 Maize, white, meal (dona)	0	12	1435	345	10.0	4.5	0	2.1	2.1	1.9	0	70	-	-	1.9	0	1.3
8 Millet, finger, whole grain	7	11	1320	315	7.4	1.3	-	-	-	-	0	73	-	-	4.3	0	2.7
9 Millet, finger, flour	0	13	1320	320	5.6	1.4	-	-	-	-	0	74	-	-	2.6	0	3.4
10 Millet, bullrush, whole grain	0	12	1420	340	10.0	4.0	0.9	1.0	1.9	1.7	0	70	-	-	1.9	0	2.0
11 Millet, bullrush, flour	0	16	1395	335	5.9	3.5	-	-	-	-	-	71	-	-	0.6	0	3.
12 Rice, lightly milled, parboiled	0	12	1390	335	7.0	0.5	-	-	-	0	0	80	0	80.0	0.4	0	0.6
13 Rice, milled, polished	0	12	1390	335	7.0	0.5	0	0	0	0	0	80	0	80.0	0.4	0	0.6
14 Sorghum, whole grain	5	10	1435	345	11.0	3.2	0	1.5	1.5	1.0	0	72	4.0	68.0	2.4	0	1.9
15 Sorghum, flour	0	11	1410	335	9.5	2.8	-	-	-	-	-	73	0	73.0	2.1	0	1.4
16 Wheat, whole, parboiled	0	12	1380	330	12.0	1.8	0.3	0.2	0.9	0.9	0	71	2.0	69.0	2.2	0	1.4
17 Wheat, flour, 85% extraction	0	12	1425	340	11.0	2.0	0.3	0.2	0.9	0.9	0	74	2.0	72.0	0.8	0	0.9

Mineral and vitamin content of foods

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot.[**] β	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg

Cereals & grain products

	Ca	Fe	P	K	Na	Reti-nol	β	other	B₁	B₂	B₆	B₁₂	Nia-cin	Folic acid	Vit C
1 Maize, yellow, immature on cob, fresh	18	1.8	140	250	2	0	360	0	0.16	0.08	0.10	-	1.3	-	8
2 Maize, white, whole kernel, dried	16	3.6	220	250	5	0	0	0	0.33	0.10	0.20	-	2.2	-	0
3 Maize, yellow, whole kernel, dried	13	4.9	220	250	5	0	125	0	0.32	0.12	0.20	-	1.7	-	4
4 Maize, white, on cob, toasted	2	3.0	270	-	-	0	0	0	0.02	0.09	0.20	-	2.2	-	-
5 Maize, white, flour, 60 - 80% extraction	6	1.1	100	200	2	0	0	0	0.14	0.05	0.12	-	1.0	-	0
6 Maize, yellow, meal (unga wa mahindi)	17	4.2	220	250	5	0	140	0	0.30	0.08	0.20	-	1.8	-	3
7 Maize, white, meal (dona)	12	2.5	-	-	-	0	0	0	0.35	0.13	-	-	2.0	-	3
8 Millet, finger, whole grain	395	17.0	245	260	67	0	25	0	0.18	0.11	-	-	0.8	-	1
9 Millet, finger, flour	315	54.0	205	-	-	0	25	0	0.22	0.10	-	-	0.8	-	0
10 Millet, bullrush, whole grain	22	21.0	285	-	-	0	25	0	0.30	0.22	-	-	1.7	-	3
11 Millet, bullrush, flour	17	39.0	170	-	-	-	-	-	0.18	0.22	-	-	1.0	-	-
12 Rice, lightly milled, parboiled	9	1.7	125	110	6	0	0	0	0.25	0.03	0.30	-	2.8	29	0
13 Rice, milled, polished	9	1.7	125	100	2	0	0	0	0.10	0.03	0.30	0	2.8	29	0
14 Sorghum, whole grain	26	11.0	330	200	5	0	20	0	0.34	0.15	0.25	-	3.3	-	0
15 Sorghum, flour	28	10.0	240	-	-	0	20	0	0.28	0.09	-	-	3.4	-	0
16 Wheat, whole, parboiled	54	6.1	280	400	5	0	0	0	0.36	0.09	0.35	0	3.8	57	0
17 Wheat, flour, 85% extraction	36	3.6	210	95	2	0	0	0	0.37	0.08	0.30	0	2.8	51	0

*1 gram=1000 mg=1,000,000 ·g   **See explanation in table 3

Proximate composition of foods

(per 100 grams edible portion)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
18 Wheat, flour, 70% extraction	0	12	1395	335	10.0	1.0	0.2	0.1	0.5	0.5	0	76	5.0	71.0	0.2	0	0.4
19 Bread, white	0	37	1005	240	7.7	2.0	0.3	0.2	1.0	1.0	0	51	4.0	47.0	0.3	0	1.7
20 Bread, brown	0	38	975	235	7.7	1.6	0.3	0.2	1.0	1.0	-	50	3.0	47.0	0.9	0	1.8
21 Breakfast cereals, corn flakes	0	4	1545	370	7.0	0.2	-	-	-	-	0	86	-	-	1.4	0	2.8
22 Macaroni, cooked, firm stage	0	60	645	155	4.7	0.9	-	-	-	-	0	31	-	-	0.2	0	3.5
23 Macaroni, cooked, tender stage	0	72	465	110	3.4	0.4	-	-	-	-	0	23	-	-	0.1	0	1.2
24 Spaghetti, cooked, firm stage	0	64	620	150	5.0	0.5	-	-	-	-	0	30	-	-	0.1	0	1.3
25 Spaghetti, cooked, tender stage	0	73	465	110	3.4	0.4	-	-	-	-	0	23	-	-	0.1	0	1.2
Starchy roots, tubers & fruits																	
26 Breadfruit, pulp, raw	34	72	415	99	1.5	0.3	-	-	-	-	-	24	-	-	1.8	0	0.9
27 Cassava, bitter, fresh	26	62	575	140	1.2	0.2	-	-	-	-	-	35	5.0	30.0	1.1	0	0.9
28 Cassava, meal	0	13	1320	320	1.6	0.5	-	-	-	-	-	82	13.0	69.0	1.7	0	1.7
29 Plantain, ripe, raw	34	65	535	130	1.2	0.3	-	-	-	-	0	32	7.0	25.0	0.5	0	1.0
30 Potato, raw	14	78	315	75	1.7	0.1	-	-	-	-	0	18	1.0	17.0	0.6	0	1.6
31 Sweet potato, yellow, raw	21	69	460	110	1.6	0.2	-	-	-	0	0	28	3.0	25.0	1.0	0	0.9
32 Sweet potato, pale, raw	21	69	460	110	1.6	0.2	-	-	-	0	0	28	3.0	25.0	1.0	0	0.9
33 Taro/Cocoyam, raw	16	73	395	94	1.8	0.1	-	-	-	0	0	23	2.0	21.0	1.0	0	1.2
34 Turnip/Swede, root, raw	32	94	76	18	1.0	0.0	-	-	-	0	0	4	0	3.8	0.9	0	0.8

Mineral and vitamin content of foods

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot." ß	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg
18 Wheat, flour, 70% extraction	27	2.2	76	100	2	0	0	0	0.07	0.04	0.12	0	1.0	31	0
19 Bread, white	37	1.7	95	100	500	0	0	0	0.16	0.06	0.07	0	1.0	28	0
20 Bread, brown	43	2.2	150	200	500	0	0	0	0.20	0.08	0.17	0	2.1	37	0
21 Breakfast cereals, corn flakes	3	13.3	45	110	975	0	0	0	0.20	0.03	0.60	0	4.8	9	0
22 Macaroni, cooked, firm stage	8	0.6	67	79	1	0	0	0	0.18	0.10	0.03	0	1.6	4	0
23 Macaroni, cooked, tender stage	8	0.9	50	61	1	0	0	0	0.14	0.08	0.02	0	1.3	3	0
24 Spaghetti, cooked, firm stage	11	1.1	65	79	1	0	0	0	0.18	0.10	0.03	0	1.6	5	0
25 Spaghetti, cooked, tender stage	8	0.9	50	61	1	0	0	0	0.14	0.08	0.02	0	1.3	4	0
Starchy roots, tubers & fruit															
26 Breadfruit, pulp, raw	28	2.0	34	395	13	0	5	10	0.08	0.05	-	-	0.7	-	31
27 Cassava, bitter, fresh	68	1.9	42	395	2	0	15	30	0.04	0.05	0	0	0.6	24	31
28 Cassava, meal	66	3.6	135	885	11	0	0	0	0.06	0.05	-	0	0.9	-	4
29 Plantain, ripe, raw	8	1.3	38	385	5	0	390	780	0.08	0.04	0	0	0.6	16	20
30 Potato, raw	13	1.1	51	600	10	0	12	26	0.07	0.03	0.25	0	1.3	14	21
31 Sweet potato, yellow, raw	33	2.0	38	20	30	0	1800	0	0.09	0.04	0.27	0	0.7	52	37
32 Sweet potato, pale, raw	33	2.0	38	20	30	0	35	0	0.09	0.04	0.27	0	0.7	52	37
33 Taro/Cocoyam, raw	51	1.2	88	200	10	0	0	0	0.10	0.03	0.20	0	0.8	-	8
34 Turnip/Swede, root, raw	38	0.5	42	205	34	0	7	14	0.03	0.05	0.10	0	0.5	18	75

* 1 gram=1000 mg=1,000,000 µg   " See explanation in table 3

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Proximate composition of foods

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
35 Yam, fresh	16	69	465	110	1.9	0.2	-	-	-	-	-	27	0	27.0	0.8	0	1.1
36 Yam, flour	0	14	1295	310	3.4	0.4	-	-	-	-	-	78	0	78.0	1.6	0	2.0
Grain legumes & legume products																	
37 Beans/peas, fresh, shelled	55	71	435	105	8.2	0.4	0	0	0	0	0	18	1.0	17.0	1.0	0	1.8
38 Beans, dried	0	12	1340	320	22.0	1.5	0	1.0	0.5	0.5	0	57	1.0	56.0	4.4	0	3.6
39 Beans, green in pod, raw	8	89	145	35	2.5	0.2	-	-	-	-	-	6	4.4	1.7	1.8	0	0.7
40 Bonavist/Hyacinth bean, dried	0	11	1270	305	23.0	1.0	-	-	-	-	-	54	1.0	53.0	8.6	0	3.2
41 Chickpea, whole seeds, raw, dried	0	10	1370	325	20.0	3.7	-	-	-	-	-	57	11.0	46.0	6.7	0	3.2
42 Cowpea, mature pods, dried	0	11	1330	320	23.0	1.4	0	0	1.0	1.0	0	57	7.0	50.0	4.8	0	3.3
43 Cowpea, young green pods, raw	-	89	165	39	3.7	0.6	-	-	-	-	-	5	-	-	1.2	0	0.8
44 Lentil, dried	0	10	1360	325	25.0	1.2	-	-	-	-	-	57	3.0	54.0	3.9	0	2.9
45 Mungbean, green, dried	0	10	1345	320	24.0	0.9	-	-	-	-	-	58	2.0	56.0	4.2	0	4.0
46 Mungbean, black, dried	0	10	1305	310	24.0	1.1	-	-	-	-	-	55	2.0	53.0	4.9	0	5.5
47 Pea, dried	0	11	1250	300	22.0	1.1	0.5	0.4	0.1	0.1	0	56	3.0	53.0	5.7	0	3.6
48 Pigeon pea, dried	0	10	1295	310	20.0	1.3	0	0	1.3	0	0	58	7.0	51.0	7.3	0	3.8
49 Soya bean, dried	0	11	1700	405	34.0	18.0	3.0	4.0	11.0	10.0	0	29	0	29.0	4.7	0	5.0
50 Velvet bean, dried	0	11	1380	330	21.0	4.4	-	-	-	-	-	55	2.0	53.0	4.6	0	3.5

Mineral and vitamin content of foods

(per 100 grams edible portion)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot.''		Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
							β	other							
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg
35 Yam, fresh	52	0.8	61	295	10	0	15	10	0.11	0.02	-	0	0.3	-	6
36 Yam, flour	20	1.1	110	-	-	0	0	0	0.10	0.08	-	-	1.1	-	0
Grain legumes & legume products															
37 Beans/peas, fresh, shelled	22	1.8	95	250	2	0	150	25	0.15	0.15	0.05	0	1.6	36	25
38 Beans, dried	120	8.2	325	1250	2	0	0	0	0.37	0.16	0.20	0	2.4	180	1
39 Beans, green in pod, raw	43	1.4	48	300	7	0	94	188	0.08	0.12	0.07	0	0.5	60	27
40 Bonavist/Hyacinth bean, dried	90	9.0	330	-	-	0	30	60	0.54	0.14	0.15	0	2.3	22	0
41 Chickpea, whole seeds, raw, dried	250	11.0	270	1025	25	0	30	60	0.48	0.16	-	0	1.8	180	8
42 Cowpea, mature pods, dried	80	5.0	400	800	10	0	15	0	0.90	0.15	0.20	0	2.0	439	2
43 Cowpea, young green pods, raw	54	1.4	59	220	2	0	230	460	0.14	0.10	-	-	1.0	-	24
44 Lentil, dried	64	7.0	300	815	23	0	30	60	0.41	0.19	0.60	0	2.2	35	0
45 Mungbean, green, dried	100	7.0	440	1350	25	0	115	0	0.52	0.20	0.47	0	2.4	120	0
46 Mungbean, black, dried	110	8.9	380	-	-	0	23	45	0.48	0.21	-	-	2.3	-	0
47 Pea, dried	90	18.0	380	990	38	0	150	25	0.88	0.17	0.13	0	3.0	33	0
48 Pigeon pea, dried	160	5.0	285	1000	10	0	28	55	0.72	0.14	0.20	-	2.9	100	0
49 Soya bean, dried	185	6.1	540	1700	5	0	28	55	0.71	0.25	0.82	0	2.0	210	0
50 Velvet bean, dried	130	-	320	-	-	0	15	30	0.12	0.10	-	-	3.0	-	2

' 1 gram=1000 mg=1,000,000 ·g   '' See explanation in table 3

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Proximate composition of foods

(per 100 grams edible portion)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
Nuts & seeds																	
51 Bambara groundnut, fresh	25	10	1445	345	19.0	6.2	-	-	-	-	-	57	-	-	4.8	0	3.4
52 Cashew nut, dried	0	8	2345	560	17.0	43.0	5.0	29.0	7.0	7.0	-	28	-	-	1.4	0	2.4
53 Coconut, immature kernel, fresh	0	68	800	190	2.0	17.0	-	-	-	-	-	8	-	-	3.7	0	0.9
54 Coconut, mature kernel, fresh	35	43	1640	390	3.6	39.0	34.0	3.0	1.0	1.0	-	7	7.2	0	6.6	0	1.0
55 Groundnut, dry	30	7	2395	570	23.0	45.0	8.0	22.0	13.0	12.0	-	20	-	-	2.9	0	2.5
56 Melon seeds, without coa	25	6	2490	595	26.0	50.0	-	-	-	-	-	11	-	-	4.0	0	3.7
57 Pumpkin seeds, without coat	25	6	2415	575	23.0	46.0	-	-	-	-	-	19	-	-	2.2	0	3.4
58 Sunflower seeds, without coat	4	4	2475	590	20.0	46.0	5.0	10.0	31.0	24.0	0	26	0	26.0	3.4	0	4.1
Vegetables & vegetable products																	
59 Amaranth, leaves, raw	24	84	185	45	4.6	0.2	-	-	-	-	0	7	0	6.5	1.8	0	2.9
60 Amaranth, leaves, cooked	0	84	165	39	4.0	0.2	-	-	-	-	-	6	0	5.7	1.6	0	2.5
61 Bamboo shoots, raw	64	91	115	28	2.5	0.3	-	-	-	-	-	4	-	-	1.2	0	0.9
62 Baobab, leaves, raw	18	77	280	67	3.8	0.3	-	-	-	-	-	13	-	-	2.8	0	2.8
63 Bean sprouts, raw	20	64	545	130	13.0	0.8	-	-	-	-	-	19	-	-	0.6	0	2.2
64 Carrots, raw	26	89	145	35	0.9	0.1	-	-	-	-	-	8	8.2	0	1.4	0	0.8
65 Cassava, leaves, raw	20	72	375	90	7.0	1.0	-	-	-	-	-	14	-	-	4.0	0	2.0
66 Cauliflower, raw	44	92	105	25	2.0	0.1	-	-	-	-	-	4	-	-	1.2	0	0.9

Mineral and vitamin content of foods

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A β	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg
Nuts & seeds															
51 Bambara groundnut, fresh	62	12.0	275	-	-	0	10	0	0.47	0.14	-	-	1.8	-	0
52 Cashew nut, dried	76	18.0	580	405	25	0	3	4	0.65	0.25	-	0	1.6	-	7
53 Coconut, immature kernel, fresh	29	1.8	160	245	9	0	0	0	0.08	0.06	0.02	0	0.6	14	8
54 Coconut, mature kernel, fresh	21	2.5	105	440	17	0	13	24	0.03	0.03	0.07	0	0.6	26	2
55 Groundnut, dry	49	3.8	410	680	6	0	8	14	0.79	0.14	0.50	0	15.5	110	1
56 Melon seeds, without coat	53	7.4	760	-	-	0	0	0	0.10	0.12	-	-	1.4	-	-
57 Pumpkin seeds, without coat	57	2.8	900	-	-	0	9	18	0.15	0.12	-	-	1.4	-	2
58 Sunflower seeds, without coat	100	7.6	570	-	-	0	0	0	1.36	0.16	-	-	3.3	-	-
Vegetables & vegetable products															
59 Amaranth, leaves, raw	410	8.9	100	575	6	0	2300	85	0.05	0.42	-	0	1.2	85	50
60 Amaranth, leaves, cooked	360	7.7	87	-	-	0	1700	60	-	-	-	-	-	-	34
61 Bamboo shoots, raw	17	0.9	47	400	6	0	8	15	0.11	0.09	0.24	0	0.6	7	9
62 Baobab, leaves, raw	400	1.1	65	-	-	-	-	-	-	-	-	-	-	-	52
63 Bean sprouts, raw	110	8.2	380	-	-	0	15	30	0.17	0.14	-	-	2.0	-	7
64 Carrots, raw	35	0.7	38	250	49	0	6000	1050	0.04	0.04	0.25	0	0.6	8	8
65 Cassava, leaves, raw	300	7.6	120	605	6	0	3000	0	0.25	0.60	-	-	2.4	-	310
66 Cauliflower, raw	35	1.2	61	295	24	0	8	15	0.06	0.09	0.27	0	0.5	22	96

¹ gram=1000 mg=1,000,000 ·g   ** See explanation in table 3

Proximate composition of foods

(per 100 grams edible portion)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
67 Cucumber, raw	28	95	58	14	0.8	0.1	-	-	-	-	-	3	2.6	0	0.8	0	0.6
68 Cowpea leaves, raw, fresh	5	85	190	45	4.7	0.3	-	-	-	-	-	6	1.3	5.0	2.0	0	1.7
69 Cowpea leaves, raw, dried	5	10	1140	270	28.0	1.8	-	-	-	-	-	36	7.8	30.0	12.0	0	10.0
70 Egg plant, raw	22	90	125	30	1.0	0.2	-	-	-	-	-	6	6.0	0.4	1.3	0	0.6
71 Hare's lettuce, raw	20	93	84	20	1.9	0.3	-	-	-	-	-	3	-	-	0.4	0	1.6
72 Leaves, pale green, fresh	37	91	110	26	1.7	0.1	-	-	-	-	-	5	4.8	0	1.2	0	0.8
73 Leaves, medium green, fresh	20	92	105	25	1.8	0.2	-	-	-	-	-	4	-	-	0.9	0	1.1
74 Leaves, dark green, fresh	20	80	245	58	4.5	0.3	-	-	-	-	-	10	-	-	2.0	0	2.4
75 Lettuce, raw	30	94	84	20	1.2	0.2	-	-	-	-	-	4	3.7	0	0.6	0	0.6
76 Mushrooms, fresh	9	90	120	29	1.5	0.5	-	-	-	0	0	5	0	4.9	1.4	0	0.9
77 Okra, pods, raw	19	89	145	35	2.1	0.2	-	-	-	-	-	7	-	-	1.7	0	0.9
78 Okra, leaves, raw	20	82	245	58	4.4	0.6	-	-	-	-	-	9	-	-	2.1	0	2.2
79 Onion, shalot, raw	6	88	160	38	1.2	0.1	-	-	-	-	-	9	7.0	1.6	1.0	0	0.6
80 Pepper, capsules, sweet green, raw	14	86	185	44	2.0	0.8	-	-	-	-	-	8	7.7	0	2.6	0	0.8
81 Pepper, capsules, sweet red, raw	14	86	185	44	2.0	0.8	-	-	-	-	-	8	7.7	0	2.6	0	0.8
82 Pepper, leaves, raw	20	82	305	73	4.6	3.4	0	-	-	-	-	6	-	-	1.8	0	1.7
83 Pumpkin, squash, raw	23	93	96	23	1.0	0.1	0	0	0	0	0	5	2.0	2.7	0.8	0	0.8
84 Pumpkin, leaves, raw	-	89	105	25	4.0	0.2	-	-	-	-	-	2	0.5	1.5	2.4	0	2.2
85 Sweet potato, leaves, raw	20	83	205	49	4.6	0.2	-	-	-	-	-	8	-	-	2.4	0	2.0

Mineral and vitamin content of foods

(per 100 grams edible portion)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot.[..] β	other	Vit B$_1$	Vit B$_2$	Vit B$_6$	Vit B$_{12}$	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg[*]	µg[*]	µg[*]	mg	mg	mg	µg[*]	mg	µg[*]	mg
67 Cucumber, raw	13	0.5	30	140	13	0	0	0	0.02	0.01	0.04	0	0.3	6	14
68 Cowpea leaves, raw, fresh	255	5.7	63	475	32	0	700	0	0.20	0.37	0.24	0	2.1	135	56
69 Cowpea leaves, raw, dried	1500	35	380	2850	290	0	3600	0	-	-	-	-	-	-	-
70 Egg plant, raw	14	1.3	26	350	4.4	0	17	34	0.05	0.05	0.10	0	0.5	29	9
71 Hare's lettuce, raw	130	3.1	37	-	-	0	1430	0	-	0.13	-	-	0.8	-	0
72 Leaves, pale green, fresh	47	0.7	40	250	15	0	75	50	0.04	0.04	0.10	0	0.3	79	54
73 Leaves, medium green, fresh	76	1.8	13	280	-	0	1350	900	0.04	0.16	0.30	0	0.7	50	41
74 Leaves, dark green, fresh	360	7.2	120	715	7	0	3300	0	0.15	0.53	-	0	1.2	105	80
75 Lettuce, raw	26	0.7	40	230	12	0	1950	0	0.06	0.15	0.20	0	0.4	89	10
76 Mushrooms, fresh	20	1.5	100	470	9	0	0	0	0.10	0.40	0.10	0	4.0	23	3
77 Okra, pods, raw	84	1.2	90	290	2	0	190	0	0.04	0.08	0.22	0	0.6	23	47
78 Okra, leaves, raw	530	0.7	70	-	-	0	730	0	0.25	2.80	-	-	0.2	-	59
79 Onion, shalot, raw	27	0.8	45	170	9	0	0	0	0.02	0.04	0.07	0	0.2	14	11
80 Pepper, capsules, sweet green, raw	29	2.6	61	440	10	0	730	190	0.12	0.15	0.37	-	2.2	24	140
81 Pepper, capsules, sweet red, raw	29	2.6	61	440	10	0	640	115	0.12	0.15	0.37	-	2.2	24	140
82 Pepper, leaves, raw	170	10.0	40	-	-	0	3500	1050	-	-	-	-	-	-	2
83 Pumpkin, squash, raw	25	1.4	32	350	8	0	1200	1100	0.05	0.02	0.10	0	0.5	8	8
84 Pumpkin, leaves, raw	475	0.8	135	500	50	0	1000	0	0.08	0.06	-	-	0.3	-	80
85 Sweet potato, leaves, raw	160	6.2	84	620	110	0	2620	875	0.10	0.28	-	-	0.9	-	70

[*] 1 gram=1000 mg=1,000,000 °g   [..] See explanation in table 3

Proximate composition of foods

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
86 Taro, leaves, raw	-	90	130	31	2.4	0.6	-	-	-	-	-	4	-	-	1.5	0	1.3
87 Tomato, raw	4	94	92	22	1.0	0.2	0	0	0	0	0	4	3.0	1.2	0.6	0	0.5
88 Turnip, leaves, raw	30	90	140	34	2.9	0.4	-	-	-	-	-	5	-	-	0.4	0	1.0
Fruit																	
89 Avocado, raw	50	80	505	120	1.4	11.0	3.0	5.0	2.0	2.0	0	4	3.0	1.3	1.8	0	0.9
90 Baobab, ripe, raw	72	16	1170	280	2.2	0.8	-	-	-	-	-	70	-	-	6.8	0	4.3
91 Banana, ripe, raw	37	77	345	82	1.5	0.1	0	0	0	0	0	20	17.0	3.0	0.9	0	0.8
92 Citrus, orange/tangerine, raw	25	88	185	44	0.6	0.4	0.1	0.1	0.1	0.1	0	10	9.0	1.0	0.6	0	0.5
93 Citrus, grapefruit/pomelo, raw	49	90	140	34	0.8	0.1	0	0	0	0	0	8	7.0	1.0	0.6	0	0.5
94 Citrus, lemon/lime, raw	41	90	165	40	0.6	0.8	0.1	0.3	0.2	0.2	0	8	5.0	3.0	0.7	0	0.4
95 Dates, dried	13	17	1230	295	2.7	0.6	-	-	-	-	0	74	70.0	4.0	3.9	0	1.9
96 Groundcherry/Cape gooseberry, raw	6	80	245	58	2.8	0.2	-	-	-	-	0	12	-	-	4.8	0	1.2
97 Guava, raw	19	82	190	46	1.1	0.4	0.1	0	0.2	0.1	0	10	-	-	5.3	0	0.6
98 Mango, ripe, raw, without skin	36	83	250	60	0.6	0.2	0	0	0	0	0	15	13.0	2.0	0.9	0	0.5
99 Mango, unripe, raw, without skin	36	84	230	55	0.5	0.1	0	0	0	0	0	14	6.0	8.0	0.7	0	0.3
100 Papaya, raw	26	91	125	30	0.4	0.1	0	0	0	0	0	7	6.4	1.0	0.9	0	0.4
101 Pineapple, fresh	33	87	200	48	0.4	0.1	0	0	0	0	0	12	12.0	0	0.5	0	0.3
102 Pomegranate, fresh	44	78	270	65	1.6	0.3	-	-	-	-	-	15	-	-	4.5	0	0.4

Mineral and vitamin content of foods

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	pro-vit A carot. other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg
86 Taro, leaves, raw	98	2.0	49	-	-	0	1530	540	0.17	0.35	-	-	0.8	-	11
87 Tomato, raw	10	0.6	24	300	10	0	380	135	0.06	0.04	0.06	0	0.6	28	26
88 Turnip, leaves, raw	160	1.9	130	550	100	0	1275	425	0.02	0.25	-	-	0.9	-	62
Fruit															
89 Avocado, raw	19	1.4	46	280	2	0	400	265	0.05	0.15	0.25	0	2.0	22	18
90 Baobab, ripe, raw	285	7.4	120	-	-	0	63	35	0.37	0.06	-	-	2.1	-	270
91 Banana, ripe, raw	9	1.4	21	400	2	0	90	60	0.03	0.03	0.35	0	0.6	19	9
92 Citrus, orange/tangerine, raw	28	0.1	17	150	2	0	730	0	0.02	0.03	0.05	0	0.2	37	46
93 Citrus, grapefruit/pomelo, raw	21	0.6	18	155	5	0	250	0	0.05	0.03	0.03	0	0.2	12	44
94 Citrus, lemon/lime, raw	19	0.7	21	150	5	0	8	4	0.03	0.02	0.04	0	0.3	-	45
95 Dates, dried	82	9.4	85	650	1	0	23	14	0.06	0.15	0.21	0	1.8	20	0
96 Groundcherry/Cape gooseberry, raw	55	0.9	67	416	4	0	900	600	0.15	0.05	0.04	0	1.6	-	4
97 Guava, raw	24	1.3	31	290	4	0	220	145	0.06	0.04	0.14	0	1.3	7	325
98 Mango, ripe, raw, without skin	24	1.2	22	215	3	0	2400	0	0.03	0.05	0.13	0	0.4	7	42
99 Mango, unripe, raw, without skin	7	1.4	8	215	3	0	60	0	0.02	0.03	0.10	-	0.2	7	86
100 Papaya, raw	21	0.6	15	220	4	0	300	0	0.03	0.03	0.02	0	0.4	1	52
101 Pineapple, fresh	16	0.4	14	200	2	0	70	45	0.06	0.03	0.09	0	0.1	11	34
102 Pomegranate, fresh	12	1.0	37	245	3	0	30	20	0.09	0.06	0.12	0	0.4	-	24

¯ 1 gram=1000 mg=1,000,000 ·g   ·· See explanation in table 3

Proximate composition of foods

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat						Carbohydrates				Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin	Chol	total	mono	poly	fibre		
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
103 Tamarind, dried	36	21	920	220	5.0	0.6	0.3	0.2	0.1	0.1	0	52	7.0	45.0	18.0	0	2.4
104 Tomato, tree, raw	27	83	190	45	1.5	0.2	-	-	-	-	-	10	-	-	4.2	0	1.1
105 Watermelon	50	94	92	22	0.5	0.1	-	-	-	-	0	5	5.1	0	0.4	0	0.3
Sugars & syrups																	
106 Soft drinks, commercial	0	87	190	45	0	0	0	0	0	0	0	12	12.0	0	0	0	0.0
107 Sugar cane	55	82	225	54	0.6	0.1	0	0	0	0	0	13	13.0	0	3.1	0	0.3
108 Sugar	0	0	1570	375	0	0	0	0	0	0	0	100	100.0	0	0	0	0.0
Meat, poultry & eggs																	
109 Bacon, fat, whole side	4	20	2620	625	9.1	65.0	26.0	29.0	5.0	4.0	-	1	-	-	0	0	4.8
110 Beef, moderately fat	20	63	980	235	18.0	18.0	8.0	8.0	1.0	1.0	75	0	0	0	0	0	1.0
111 Egg, hen	12	75	585	140	12.0	10.0	3.0	4.0	1.0	1.0	600	1	-	-	0	0	1.0
112 Goat, moderately fat	26	68	715	170	18.0	11.0	-	-	-	-	-	0	0	0	0	0	1.1
113 Heart, beef	-	77	440	105	17.0	3.6	-	-	-	-	-	1	-	-	0	0	1.3
114 Kidney, beef	-	77	485	115	14.0	5.5	2.4	2.4	0.2	0.2	-	3	-	-	-	-	1.3
115 Liver, beef	-	70	575	135	19.0	4.7	2.0	1.0	1.0	0.3	300	5 0	5.0	-	0	0	1.3
116 Mutton, moderately fat	20	61	1075	255	17.0	21.0	8.0	10.0	1.9	1.5	-	0	-	-	-	0	1.0
117 Pork, moderately fat	18	46	1705	410	12.0	40.0	-	-	-	-	-	0	0	0	0	0	1.0

Mineral and vitamin content of foods

(per 100 grams edible portion)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. ß	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg
103 Tamarind, dried	165	2.2	190	570	3	0	45	30	0.18	0.09	0.08	0	0.6	-	9
104 Tomato, tree, raw	71	0.7	30	-	-	0	70	45	0.04	0.03	-	-	1.0	-	25
105 Watermelon	8	0.3	9	98	3	0	190	125	0.04	0.05	0.10	0	0.1	3	8
Sugars & syrups															
106 Soft drinks, commercial	10	-	-	-	20	0	0	0	-	-	-	-	-	-	-
107 Sugar cane	8	1.4	6	-	-	0	-	-	0.02	0.01	-	-	0.1	-	3
108 Sugar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Meat, poultry & eggs															
109 Bacon, fat, whole side	13	1.3	120	69	514	0	0	0	0.40	0.10	0.53	7.7	1.9	56	0
110 Beef, moderately fat	11	3.6	195	350	100	24	5	0	0.26	0.15	0.25	1.4	4.0	7	0
111 Egg, hen	45	2.0	200	150	150	150	300	0	0.10	0.30	0.15	1.7	0.3	25	0
112 Goat, moderately fat	11	2.3	150	-	-	0	0	0	0.17	0.32	-	-	5.6	-	-
113 Heart, beef	9	4.8	170	-	-	40	10	0	0.28	0.28	0.36	13.0	2.7	0	1
114 Kidney, beef	13	4.6	190	265	230	300	0	0	0.28	1.50	0.45	19.0	5.8	52	10
115 Liver, beef	8	10.0	360	300	100	810	180	0	0.50	3.00	0.35	53.0	10.0	250	15
116 Mutton, moderately fat	10	2.0	150	250	61	10	0	0	0.12	0.17	0.40	2.9	3.1	-	-
117 Pork, moderately fat	11	1.8	175	-	-	0	0	0	0.60	0.14	0.38	5.5	3.1	40	-

* 1 gram=1000 mg=1,000,000 ·g   ** See explanation in table 3

Proximate composition of foods

(per 100 grams edible portion)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
118 Poultry, for example chicken	33	72	580	140	20.0	6.5	2.0	3.0	1.0	1.0	80	0	0	0	0	0	1.0
119 Turtle	70	80	335	80	16.0	1.0	-	-	-	-	-	2	-	-	-	0	-
Fish & fish products																	
120 Crustaceans, crab, lobster, prawn	40	75	400	95	18.0	0.6	-	-	-	-	-	5	-	-	0	0	1.6
121 Fish, average fillet	0	75	480	115	22.0	3.0	0.7	1.5	0.7	0.7	70	0	0	0	0	0	0.8
122 Fish, dried	-	14	1065	255	47.0	7.4	2.0	5.0	0.2	0.2	-	0	0	0	0	0	32.0
123 Small dried fish (Dagaa)	-	20	1335	320	44.0	16.0	-	-	-	-	-	-	-	-	-	0	-
Milk & milk products																	
124 Milk, cow, whole	0	85	330	79	3.8	4.8	2.0	2.0	0	0	10	5	5.4	0	0	0	0.8
125 Milk, cow, skimmed	0	90	160	38	3.5	0.8	0.4	0.4	0	0	4	4	4.4	0	0	0	0.8
126 Buttermilk	0	91	130	31	3.0	0	0	0	0	-	-	5	5.0	0	0	0	0.6
127 Milk powder, cow, whole	-	4	1935	465	26.0	24.0	15.0	7.0	1.0	0	80	38	38.0	0	0	0	0.0
128 Milk powder, cow, skimmed (DSM), vitamin A enriched	-	-	1495	355	36.0	-	-	-	-	-	-	-	-	-	-	-	-
129 Milk, goat	0	84	350	84	3.4	4.9	2.0	2.0	0	0	12	7	7.0	0	0	0	0.8
130 Milk powder, cow, special baby food, average	-	-	1815	435	16.0	-	-	-	-	-	-	-	-	-	-	-	-

Mineral and vitamin content of foods

(per 100 grams edible portion)

	Ca mg	Fe mg	P mg	K mg	Na mg	Reti-nol µg*	pro-vit A carot.** β µg*	other µg*	Vit B$_1$ mg	Vit B$_2$ mg	Vit B$_6$ mg	Vit B$_{12}$ µg*	Nia-cin mg	Folic acid µg*	Vit C mg
118 Poultry, for example chicken	10	1.1	200	300	100	75	60	0	0.10	0.15	0.20	0.3	3.7	-	0
119 Turtle	100	1.0	-	-	-	-	-	-	0.20	0.50	-	-	3.0	-	-
Fish & fish products															
120 Crustaceans, crab, lobster, prawn	260	1.6	265	300	515	100	50	0	0.05	0.10	0.15	2.5	2.5	65	0
121 Fish, average fillet	32	1.7	115	300	100	0	0	0	0.05	0.08	0.16	-	2.8	-	0
122 Fish, dried	1000	4.9	750	-	-	0	0	0	0.07	0.33	-	-	6.2	-	0
123 Small dried fish (Dagaa)	3000	8.5	-	-	-	-	-	-	0.10	0.20	-	-	6.0	-	0
Milk & milk products															
124 Milk, cow, whole	145	0	95	190	63	27	80	0	0.04	0.21	0.05	0.4	0.1	6	1
125 Milk, cow, skimmed	130	0.1	120	170	44	0	0	0	0.03	0.18	0.03	0.4	0.1	6	0
126 Buttermilk	120	0.1	90	150	50	0	0	0	0.05	0.15	0.04	-	0.1	-	1
127 Milk powder, cow, whole	1000	0.5	700	1250	400	400	345	0	0.28	1.30	0.25	-	0.7	-	0
128 Milk powder, cow, skimmed (DSM), vitamin A enriched	1260	1.0	-	-	-	1500	0	0	0.45	1.50	-	-	1.1	-	1
129 Milk, goat	160	0.1	135	245	51	25	0	0	0.06	0.22	0.04	0.1	0.4	-	1
130 Milk powder, cow, special baby food, average	330	5.8	-	-	-	300	0	0	0.44	0.44	-	-	3.6	-	39

1 gram=1000 mg=1,000,000 ·g   ** See explanation in table 3

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Proximate composition of foods

(per 100 grams edible portion)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat					Chol	Carbohydrates			fibre	Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin		total	mono	poly			
	g	%			g	g	g	g	g	g	mg	g	g	g	g	g	g
Oils & fats																	
131 Beef suet	0	0	3765	900	0	100.0	44.0	48.0	3.0	3.0	60	0	0	0	0	0	-
132 Butter, from cow's milk	0	21	2925	700	0	77.0	50.0	22.0	2.0	2.0	250	2	-	-	0	0	0.2
133 Coconut oil	0	0	3765	900	0	100.0	82.0	10.0	3.0	3.0	-	0	0	0	0	0	0.1
134 Fish liver oil	0	0	3765	900	0	100.0	42.0	29.0	9.0	1.4	-	0	0	0	0	0	0.0
135 Ghee, clarified butter	0	1	3700	885	0	98.0	69.0	22.0	2.8	1.5	-	1	-	-	0	0	0.2
136 Lard/animal fats	0	1	3730	890	0	99.0	42.0	42.0	9.0	0.8	-	0	0	0	0	0	0
137 Margarine, fortified	0	15	3125	745	0	83.0	42.0	32.0	9.0	8.0	25	0	0	0	0	0	0
138 Red palm oil, fresh	0	1	3735	890	0	99.0	45.0	41.0	8.0	8.0	0	0	-	-	0	0	0.1
139 Red palm oil, stale	0	1	3735	890	0	99.0	45.0	41.0	8.0	8.0	0	0	-	-	0	0	0.1
140 Salad oil	0	0	3765	900	0	100.0	15.0	23.0	62.0	56.0	0	0	0	0	0	0	0
141 Sunflower oil	0	0	3765	900	0	100.0	12.0	23.0	66.0	66.0	-	0	0	0	0	0	0
Other																	
142 Beer, local	0	-	105	25	0.2	-	-	-	-	-	-	-	-	-	-	3.5	-
143 Caterpillars, dried	-	9	1640	390	53.0	15.0	-	-	-	-	-	12	-	-	5.4	0	5.7
144 Coconut milk	0	94	89	21	0.2	0.4	-	-	-	-	-	5	4.5	0	0	0	0.5
145 Termites, fresh	-	45	1415	340	20.0	28.0	-	-	-	-	-	2	-	-	2.7	0	2.9
146 Yeast, baker's, dry	-	70	220	52	11.0	0.4	-	-	-	-	-	1	0	1.1	6.9	0	-

Mineral and vitamin content of foods

(per 100 grams edible portion)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A ß	carot." other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
	mg	mg	mg	mg	mg	µg*	µg*	µg*	mg	mg	mg	µg*	mg	µg*	mg
Oils & fats															
131 Beef suet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
132 Butter, from cow's milk	15	0	20	15	0	640	545	0	0.01	0.08	0	-	0.1	-	0
133 Coconut oil	2	0	3	-	-	0	0	0	0	0	-	-	0	-	-
134 Fish liver oil	-	-	-	-	-	-140000	30000	0	-	-	-	-	-	-	-
135 Ghee, clarified butter	2	0.4	3	-	-	270	230	0	-	0.01	-	-	-	-	-
136 Lard/animal fats	1	0.1	3	1	2	0	0	0	0	0	0	-	0	0	0
137 Margarine, fortified	10	0	10	5	300	680	0	0	0	0	0	-	0	-	0
138 Red palm oil, fresh	6	0	7	0	0	0	25000	10000	0.01	0.02	0	0	0	0	-
139 Red palm oil, stale	6	0	7	0	0	0	12000	4800	-	0.01	0.02	0	0	0	-
140 Salad oil	0	0	0	0	0	0	0	0	0	0	0	-	0	-	0
141 Sunflower oil	-	0	-	-	-	0	25	0	0	-	-	-	0	-	0
Other															
142 Beer, local	0	0.3	-	-	-	0	0	0	0.02	0.01	-	-	0.4	-	0
143 Caterpillars, dried	185	2.3	615	-	-	-	-	-	0.17	1.30	-	-	6.0	-	0
144 Coconut milk	24	0.3	18	130	5	0	0	0	0	0	0	0	0	-	3
145 Termites, fresh	12	1.0	-	-	-	0	0	0	-	-	-	-	-	-	-
146 Yeast, baker's, dry	25	5.0	390	610	16	0	-	-	0.71	1.70	0.6	-	11.0	-	0

* 1 gram=1000 mg=1,000,000 •g   " See explanation in table 3

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Amino acid content of foods **3**

Amino acid content of foods

	N	Total	total	Essential amino acids										Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
				Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val								
	g	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
Cereals & grain products																					
3 Maize, yellow, whole kernel, dried	1.52	9262	3820	147	350	1190	254	464	342	363	67	716	398	596	1800	351	258	182	850	473	461
8 Millet, finger, whole grain	1.18	7328	3212	192	324	701	213	383	310	266	107	458	331	479	1497	295	163	229	517	376	487
10 Millet, bullrush, whole grain	1.55	9530	4004	229	397	927	332	467	374	315	189	769	512	777	1801	364	237	239	595	471	535
12 Rice, lightly milled, parboiled	1.24	6870	2880	110	320	570	270	390	250	210	100	440	560	660	1120	340	160	170	340	370	490
13 Rice, milled, polished	1.09	6577	2627	110	260	560	250	330	230	270	87	390	510	650	1310	290	160	140	320	320	390
14 Sorghum, whole grain	1.62	9736	3945	152	397	1348	204	496	306	271	123	946	311	638	2141	301	217	141	821	416	507
16 Wheat, whole, parboiled	1.92	10279	3657	230	390	766	309	486	340	351	127	426	524	557	2682	463	248	190	1223	499	468
17 Wheat, flour, 85% extraction	2.25	13980	4540	360	470	950	320	630	380	430	160	430	590	610	4550	450	290	230	1730	790	610
18 Wheat, flour, 70% extraction	1.98	12390	4040	320	480	870	240	590	340	320	140	380	440	540	4080	400	260	200	1560	690	540
21 Breakfast cereals, corn flakes	-	-	-	140	320	1080	240	430	320	330	55	650	360	540	1630	320	240	170	770	430	410
23 Macaroni, cooked, tender stage	-	-	-	120	180	330	90	230	130	120	53	140	170	200	1550	150	98	75	590	260	200
25 Spaghetti, cooked, tender stage	-	-	-	120	180	330	89	220	130	120	52	140	160	200	1520	150	96	74	590	260	200
Starchy roots, tubers & fruit																					
27 Cassave, bitter, fresh	0.19	755	245	25	24	35	39	23	25	16	17	34	122	70	180	25	17	10	29	29	31
28 Cassave, meal	0.26	1186	405	23	46	64	67	41	43	26	19	61	178	106	262	42	34	22	45	53	54
30 Potato, raw	0.34	1909	779	27	88	130	120	92	82	65	31	78	110	390	270	71	41	34	82	88	110
31 Sweetpotato, yellow, raw	0.19	902	376	13	44	65	40	46	46	29	21	57	59	160	100	44	15	19	42	49	53

Amino acid content of foods

(per 100 grams edible portion)

	N	Total	total	Essential amino acids																
				Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
	g	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
32 Sweetpotato, pale, raw	0.19	902	376	13	44	65	40	46	46	29	21	57	59	160	100	44	15	19	42	49	53
35 Yam, fresh	0.32	1642	664	26	70	120	83	93	67	64	26	86	150	210	250	70	38	29	74	100	86
Grain legumes & legume products																					
38 Beans, dried	3.54	20130	8510	180	920	1700	1590	1170	890	570	210	920	1270	2660	3260	850	640	250	780	1240	1030
42 Cowpea, mature pods, dried	3.74	21086	8644	255	895	1647	1599	1209	842	610	254	962	1498	2580	3845	876	764	273	914	1003	1060
44 Lentil, dried	3.80	23040	9350	230	1030	1820	1710	1250	950	760	230	1030	2050	2740	3950	990	650	190	1030	1250	1180
45 Mungbean, green, dried	3.82	20342	8545	168	891	1686	1927	1170	799	597	191	925	1319	2738	3308	803	696	126	876	1132	990
46 Mungbean, black, dried	3.82	20342	8545	168	891	1686	1927	1170	799	597	191	925	1319	2738	3308	803	696	126	876	1132	990
47 Pea, dried	3.45	20050	8140	240	930	1480	1620	1000	860	590	210	900	2040	2380	3490	860	480	210	830	930	1000
48 Pigeon pea, dried	3.34	18461	7506	204	648	1316	1607	1727	608	421	117	882	1015	2004	3911	678	775	107	825	865	751
49 Soya bean, dried	6.44	39880	16020	650	1810	3160	2580	2000	1550	1290	520	1740	2900	4710	7550	1680	1030	520	2190	2060	1940
Nuts & seeds																					
52 Cashew nut, dried	2.90	16860	6550	280	730	1300	820	790	590	490	240	700	1740	1510	3620	800	400	270	690	850	1040
54 Coconut, mature kernel, fresh	0.61	3610	1321	61	150	260	130	170	130	100	43	170	500	340	710	170	79	67	140	180	210
55 Groundnut, dry	4.50	26500	9110	360	950	1800	990	1400	720	1080	320	1080	3150	3200	5130	1580	680	320	1220	1350	1170
Vegetables & vegetable products																					
59 Amaranth, leaves, raw	0.74	4120	1860	55	225	370	240	250	185	150	59	260	230	430	550	250	98	68	230	210	260

Amino acid content of foods

(per 100 grams edible portion)

| | N | Total | total | | | | Essential amino acids | | | | | | | | | | | | | | | |
	g	mg	mg	Cys mg	Ile mg	Leu mg	Lys mg	Met mg	Phe mg	Thr mg	Tyr mg	Trp mg	Val mg	Ala mg	Arg mg	Asp mg	Glu mg	Gly mg	His mg	Pro mg	Ser mg
60 Amaranth, leaves, cooked	0.64	3520	1590	47	190	315	205	215	160	130	51	225	195	370	470	215	83	58	195	180	220
62 Baobab, leaves, raw	0.61	3614	1703	-	190	324	225	267	183	141	68	251	202	381	434	217	76	80	156	194	225
64 Carrots, raw	0.70	500	155	8	21	31	26	19	20	15	6	33	31	80	130	20	10	8	20	22	31
65 Cassava, leaves, raw	1.12	6447	3061	77	339	600	437	386	327	274	102	421	381	671	717	365	157	118	342	332	401
67 Cucumber, raw	0.09	422	129	3	17	23	22	15	15	9	4	18	34	32	154	19	8	4	12	16	17
76 Mushrooms, fresh	0.64	2279	918	32	90	150	180	83	110	77	38	190	240	180	280	100	51	58	210	110	100
77 Okra, pods, raw	0.32	1357	620	19	69	105	81	65	65	87	17	73	84	145	271	44	31	21	45	44	91
78 Okra, leaves, raw	0.70	3771	1609	74	176	305	217	200	186	132	40	209	193	564	440	190	85	54	303	178	225
79 Onion, shalot, raw	0.19	886	301	21	42	41	56	30	28	29	17	33	158	64	190	49	19	10	37	35	27
80 Pepper, capsules, sweet green, raw	0.32	1610	605	38	64	105	89	61	73	42	26	82	96	285	265	73	40	24	87	80	85
81 Pepper, capsules, sweet red, raw	0.32	1610	605	38	64	105	89	61	73	42	26	82	96	285	265	73	40	24	87	80	85
84 Pumpkin, leaves, raw	0.64	4074	1942	38	218	400	254	250	204	196	52	254	292	406	490	236	90	80	182	182	250
87 Tomato, raw	0.14	770	197	12	21	33	33	23	22	15	7	25	22	123	327	22	13	8	17	24	23
88 Turnip, leaves, raw	0.43	2046	930	34	90	180	130	120	110	73	34	140	100	210	290	120	47	39	110	99	120
Fruit																					
89 Avocado, raw	0.22	1120	460	15	50	87	67	48	47	35	15	84	42	200	145	59	21	26	54	57	69
91 Banana, ripe, raw	0.18	907	367	31	45	58	49	47	34	29	13	50	65	120	100	47	68	14	47	43	47

Amino acid content of foods

(per 100 grams edible portion)

	N	Total	total	Cys			Essential amino acids														
					Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
	g	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
92 Citrus, orange/tangerine, raw	0.13	681	205	10	23	22	43	30	12	17	5	51	52	110	99	83	12	12	46	23	31
93 Citrus, grapefruit/pomelo, raw	0.13	518	124	2	13	20	25	13	14	9	5	27	53	140	56	13	8	4	62	35	19
95 Dates, dried	0.43	1765	690	57	61	115	73	78	73	39	73	125	90	160	285	120	39	35	160	90	86
98 Mango, ripe, raw, without skin	0.08	420	175	-	18	31	41	17	19	10	8	51	19	42	60	21	12	5	18	22	26
99 Mango, unripe, without skin	0.08	420	175	-	18	31	41	17	19	10	8	51	19	42	60	21	12	5	18	22	26
100 Papaya, raw	0.06	160	60	-	5	10	16	6	7	3	5	9	7	32	22	12	3	1	7	10	7
101 Pineapple, fresh	0.06	328	127	2	13	19	25	12	12	12	5	17	18	57	45	17	9	11	13	25	16
Meat, poultry & eggs																					
110 Beef, moderately fat	2.83	17163	7875	226	852	1435	1573	778	812	637	198	1033	1118	1590	2703	860	603	478	668	713	886
111 Egg, hen	1.97	12320	5990	220	690	1020	770	630	630	490	220	670	750	1320	1480	370	300	390	470	970	930
116 Mutton, moderately fat	2.72	16205	7475	307	933	1395	1580	598	764	375	212	1028	1300	1466	2320	794	454	441	598	770	870
117 Pork, moderately fat	1.90	11496	5203	133	608	897	961	496	583	426	162	654	756	1060	1718	676	391	321	542	496	616
118 Poultry, chicken, etc.	3.28	19800	8780	260	950	1540	1840	920	850	720	230	1180	1280	1870	3380	1020	620	490	850	820	980
Fish & fish products																					
120 Crustaceans, crab, lobster, prawn	2.56	16456	6968	202	745	1388	1262	645	730	581	184	1073	1326	1728	2499	1044	300	466	701	817	765
122 Fish, dried	6.40	40179	18284	435	2080	3238	3680	1594	1990	1248	422	2605	2419	4160	5830	2643	1242	1274	1370	1626	2323

Amino acid content of foods

		N	Total	total	Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
		g	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
						Essential amino acids																
Milk & milk products																						
124	Milk, cow, whole	0.52	3644	1682	31	180	330	270	180	160	150	47	130	130	280	750	73	99	94	310	190	240
126	Buttermilk	0.52	3498	1672	31	204	329	277	174	158	139	36	119	126	264	643	73	95	81	334	172	243
127	Milkpowder, cow, whole	4.13	27645	13023	243	1592	2578	2087	1271	1188	1271	371	908	953	1997	5512	557	714	660	2549	1432	1762
129	Milk, goat	0.56	3479	1718	46	207	314	290	155	163	179	44	118	119	210	626	50	89	80	368	181	240

Sources of data 4

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  8-1 Dairy and egg products: raw, processed, prepared, 1976.
  8-5 Poultry products: raw, processed, prepared, 1979.
  8-9 Fruit and fruit juices: raw, processed, prepared, 1982.
  8-10 Pork products: raw, processed, prepared, 1983.

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8-11 Vegetables and vegetable products: raw, processed, prepared, 1984.

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4.2 Codes used for sources of data

Code	Reference
1	Marealle, 1984
2	Wu Leung, Busson & Jardin, 1968
3	Platt, 1962
4	Ågren & Gibson, 1968
5	Polacchi, McHargue & Perloff, 1982
6	Paul & Southgate, 1978
7	Royal Tropical Institute, 1977
8	Wu Leung, Butrum & Chang, 1972
9	Kommissie UCV, 1983
10	Commissie Nederlandse Voedingsmiddelentabel van de Voedingsraad, 1981
11	Simpson, 1983
12	Villard, 1985
13	Gomez, 1981
14	Sreeramulu, Ndossie & Mtotomwema, 1983
15	USDA, 1971
16	Souci, Fachmann & Kraut, 1962 and 1964
17	Kraut and Cremer, 1969
18	McLaren, 1961
19	Speek, Temalilwa & Schrijver, 1986
20	Pepping, Vencken & West, 1988
21	Estimated values
51	Polacchi, McHargue & Perloff, 1972 (column chromatography)
52	Polacchi, McHargue &Perloff, 1972 (microbiological)
53	Statens Livsmedelsverk, 1986
54	Møller, 1983
55	Renner & Renz-Schauen, 1986
56	Gonçalves Ferreira & Da Silva Graca, 1985
57	Souci, Fachmann & Kraut, 1986
58	USDA, 1976, 1979, 1982, 1983 and 1984
59	Ågren, Eklund and Lienden, 1968

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4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
Cereals & grain products																	
1 Maize, yellow, immature on cob, fresh	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	0	2
2 Maize, white, whole kernel, dried	21	2	0	0	2	2	7	7	7	7	7	2	7	7	2	2	2
3 Maize, yellow, whole kernel, dried	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
4 Maize, white, on cob, toasted	-	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
5 Maize, white, flour, 60 - 80% extraction	7	7	0	0	7	7	7	7	7	7	7	7	7	7	7	7	-
6 Maize, yellow, meal (unga wa mahindi)	21	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
7 Maize, white, meal (dona)	-	1	0	0	1	1	21	21	21	21	21	0	-	-	0	21	0
8 Millet, finger, whole grain	4	2	0	0	2	2	-	-	-	-	21	2	-	-	2	0	2
9 Millet, finger, flour	21	2	0	0	2	2	-	-	-	-	21	2	-	-	2	21	2
10 Millet, bullrush, whole grain	0	2	0	0	2	2	5	5	5	5	21	2	-	-	2	0	2
11 Millet, bullrush, flour	-	2	-	2	2	2	-	-	-	-	2	-	-	2	-	2	-
12 Rice, lightly milled, parboiled	21	2	0	0	2	2	-	-	-	-	21	2	-	-	2	21	2
13 Rice, milled, polished	21	2	0	0	2	2	-	-	-	-	21	2	-	-	2	-	2
14 Sorghum, whole grain	18	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
15 Sorghum, flour	21	2	0	0	2	2	-	-	-	-	-	2	7	7	2	21	2
16 Wheat, whole, parboiled	3	2	0	0	2	2	6	6	6	6	7	2	7	7	2	21	2
17 Wheat, flour, 85% extraction	21	2	0	2	2	2	6	6	6	6	21	2	6	6	2	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
Cereals & grain products															
1 Maize, yellow, immature on cob, fresh	2	2	2	7	7	21	7	-	2	2	7	-	2	-	8
2 Maize, white, whole kernel, dried	2	2	2	7	7	21	20	-	2	2	7	-	2	-	2
3 Maize, yellow, whole kernel, dried	2	2	2	7	7	21	2	-	2	2	7	-	2	-	2
4 Maize, white, on cob, toasted	2	2	2	-	-	21	2	-	2	2	7	-	2	-	-
5 Maize, white, flour, 60 - 80% extraction	7	7	7	7	7	7	7	-	7	7	7	-	7	-	7
6 Maize, yellow, meal (unga wa mahindi)	2	2	2	7	7	21	2	-	2	2	7	-	2	-	2
7 Maize, white, meal (dona)	1	1	-	-	-	21	-	-	1	1	-	-	1	-	-
8 Millet, finger, whole grain	2	2	2	5	5	21	20	-	2	2	-	-	2	-	4
9 Millet, finger, flour	2	2	2	-	-	21	20	-	2	2	-	-	2	-	3
10 Millet, bullrush, whole grain	2	2	2	-	-	21	20	-	2	2	-	-	2	-	2
11 Millet, bullrush, flour	2	2	2	-	-	-	-	-	2	2	-	-	1	-	-
12 Rice, lightly milled, parboiled	2	2	2	6	6	21	2	-	2	2	6	-	2	6	3
13 Rice, milled, polished	2	2	2	7	7	6	6	-	2	2	6	6	2	6	6
14 Sorghum, whole grain	2	2	2	7	7	6	20	-	2	2	7	-	2	-	2
15 Sorghum, flour	2	2	2	-	-	21	20	-	2	2	-	-	2	-	2
16 Wheat, whole, parboiled	2	2	2	7	7	21	2	-	2	2	7	6	2	6	6
17 Wheat, flour, 85% extraction	2	2	2	5	5	21	2	-	2	2	6	6	2	6	6

4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat						Carbohydrates			fibre	Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin	Chol	total	mono	poly			
18 Wheat, flour, 70% extraction	21	2	0	0	2	2	6	6	6	6	7	2	7	7	2	21	2
19 Bread, white	0	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
20 Bread, brown	21	2	0	0	2	2	7	7	7	7	-	2	7	7	2	21	2
21 Breakfast cereals, corn flakes	-	1	1	1	1	1	-	-	-	-	1	1	-	-	1	-	1
22 Macaroni, cooked, firm stage	-	-	2	2	2	2	1	1	1	1	1	2	-	-	2	-	2
23 Macaroni, cooked, tender stage	-	1	1	1	1	1	1	1	1	1	1	1	-	-	1	-	1
24 Spaghetti, cooked, firm stage	-	1	1	1	1	1	1	1	1	1	1	1	-	-	1	-	1
25 Spaghetti, cooked, tender stage	-	1	1	1	1	1	1	1	1	1	1	1	-	-	1	-	1
Starchy roots, tubers & fruit																	
26 Breadfruit, pulp, raw	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27 Cassava, bitter, fresh	2	2	0	0	2	2	-	-	-	-	-	2	7	7	2	21	2
28 Cassava, meal	2	2	0	0	2	2	-	-	-	-	-	2	7	7	2	21	2
29 Plantain, ripe, raw	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
30 Potato, raw	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
31 Sweet potato, yellow, raw	-	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
32 Sweet potato, pale, raw	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	7	2
33 Taro/Cocoyam, raw	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
34 Turnip/Swede, root, raw	2	2	0	0	2	2	21	21	21	21	21	2	21	21	2	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	other	Vit B1	Vit B2	Vit B6	Vit B12	Nia-cin	Folic acid	Vit C
18 Wheat, flour, 70% extraction	2	2	2	7	7	6	6	-	7	7	7	6	7	6	6
19 Bread, white	2	2	2	7	7	2	0	-	2	2	7	6	2	6	2
20 Bread, brown	2	2	2	10	10	6	6	-	2	2	10	6	2	6	10
21 Breakfast cereals, corn flakes	1	1	1	1	1	1	1	-	1	1	1	1	1	1	1
22 Macaroni, cooked, firm stage	2	2	2	1	1	6	1	-	1	1	1	1	1	1	1
23 Macaroni, cooked, tender stage	1	1	1	1	1	6	1	-	1	1	1	1	1	1	1
24 Spaghetti, cooked, firm stage	1	1	1	1	1	6	1	-	1	1	1	1	1	1	1
25 Spaghetti, cooked, tender stage	1	1	1	1	1	6	1	-	1	1	1	1	1	1	1
Starchy roots, tubers & fruit															
26 Breadfruit, pulp, raw	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27 Cassava, bitter, fresh	2	2	2	7	7	21	21	21	2	2	19	8	2	8	2
28 Cassava, meal	2	2	2	8	8	21	2	-	2	2	-	6	0	-	2
29 Plantain, ripe, raw	2	2	2	7	7	21	20	20	2	2	7	6	2	6	2
30 Potato, raw	2	2	2	7	7	21	20	20	2	2	7	6	2	6	2
31 Sweet potato, yellow, raw	2	2	2	7	7	21	20	-	2	2	7	6	2	6	2
32 Sweet potato, pale, raw	2	2	2	7	7	21	8	-	2	2	7	6	2	6	2
33 Taro/Cocoyam, raw	2	2	2	7	7	21	2	-	2	2	7	8	2	-	2
34 Turnip/Swede, root, raw	2	2	2	5	5	21	21	20	2	2	6	6	5	6	2

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4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
35 Yam, fresh	2	2	0	0	2	2	-	-	-	-	-	2	21	21	2	21	2
36 Yam, flour	-	2	0	0	2	2	-	-	-	-	-	2	21	21	2	21	2
Grain legumes & legume products																	
37 Beans/peas, fresh, shelled	3	5	0	0	5	5	7	7	7	7	7	5	7	7	5	21	5
38 Beans, dried	-	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
39 Beans, green in pod, raw	2	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
40 Bonavist/Hyacinth bean, dried	3	2	0	0	2	2	-	-	-	-	-	2	9	9	2	21	2
41 Chickpea, whole seeds, raw, dried	3	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
42 Cowpea, mature pods, dried	3	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
43 Cowpea, young green pods, raw	-	8	0	0	8	8	-	-	-	-	-	8	-	-	8	0	8
44 Lentil, dried	3	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
45 Mungbean, green, dried	-	2	0	0	2	2	-	-	-	-	-	2	6	6	2	0	2
46 Mungbean, black, dried	-	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
47 Pea, dried	3	2	0	0	2	2	6	6	6	6	6	2	6	6	2	21	2
48 Pigeon pea, dried	3	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
49 Soya bean, dried	-	2	0	0	2	2	9	9	9	9	9	2	9	9	2	21	2
50 Velvet bean, dried	-	2	0	0	2	2	-	-	-	-	-	2	10	10	2	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A β	carot. other	Vit B1	Vit B2	Vit B6	Vit B12	Nia-cin	Folic acid	Vit C
35 Yam, fresh	2	2	2	8	8	21	20	20	2	2	-	6	2	-	2
36 Yam, flour	2	2	2	-	-	21	2	-	2	2			2		2
Grain legumes & legume products															
37 Beans/peas, fresh, shelled	5	5	5	7	7	21	20	20	5	5	7	8	5	8	19
38 Beans, dried	2	2	2	7	7	21	20	-	2	2	7	8	2	8	2
39 Beans, green in pod, raw	2	2	2	2	2	21	20	20	2	2	6	6	2	6	2
40 Bonavist/Hyacinth bean, dried	2	2	2	-	-	21	20	20	2	2	8	8	2	8	2
41 Chickpea, whole seeds, raw, dried	2	2	2	5	5	21	20	20	2	2	-	6	2	6	5
42 Cowpea, mature pods, dried	7	7	7	7	7	21	20	-	7	7	7	8	7	8	7
43 Cowpea, young green pods, raw	8	8	8	8	8	21	20	20	8	8	-	-	8	-	8
44 Lentil, dried	2	2	2	5	5	21	20	20	2	2	6	6	2	6	6
45 Mungbean, green, dried	2	8	2	5	5	21	20	-	2	2	8	8	2	8	6
46 Mungbean, black, dried	2	2	2	-	-	21	20	20	2	2	-	-	2	-	2
47 Pea, dried	2	2	2	6	6	21	20	20	2	2	6	6	2	6	2
48 Pigeon pea, dried	2	7	2	7	7	21	20	20	2	2	7	-	2	6	2
49 Soya bean, dried	2	2	2	9	9	21	20	20	2	2	8	8	2	8	8
50 Velvet bean, dried	2	-	2	-	-	21	20	20	2	2	-	-	2	-	2

4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
Nuts & seeds																	
51 Bambara groundnut, fresh	2	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
52 Cashew nut, dried	21	2	0	0	2	2	8	8	8	8	-	2	-	-	2	21	2
53 Coconut, immature kernel, fresh	0	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
54 Coconut, mature kernel, fresh	2	2	0	0	2	2	6	6	6	6	-	2	6	6	2	21	2
55 Groundnut, dry	3	2	0	0	2	2	6	6	6	6	-	2	-	-	2	21	2
56 Melon seeds, without coat	3	2	0	2	2	2	-	-	-	-	-	2	-	-	2	21	2
57 Pumpkin seeds, without coat	3	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
58 Sunflower seeds, without coat	9	5	0	0	5	5	21	21	21	21	9	5	21	21	5	21	5
Vegetables & vegetable products																	
59 Amaranth, leaves, raw	2	2	0	0	2	2	2	2	2	2	2	2	0	0	2	21	2
60 Amaranth, leaves, cooked	0	2	0	0	0	0	-	-	-	-	-	21	0	0	21	21	21
61 Bamboo shoots, raw	8	8	0	0	8	8	-	-	-	-	-	8	-	-	8	21	8
62 Baobab, leaves, raw	1	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
63 Bean sprouts, raw	8	8	0	0	8	8	-	-	-	-	-	8	-	-	8	21	8
64 Carrots, raw	2	2	0	0	2	2	2	2	2	2	2	2	6	6	2	21	2
65 Cassava, leaves, raw	1	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
66 Cauliflower, raw	-	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	other	Vit B$_1$	Vit B$_2$	Vit B$_6$	Vit B$_{12}$	Nia-cin	Folic acid	Vit C
Nuts & seeds															
51 Bambara groundnut, fresh	2	2	2	-	-	21	20	-	2	2	-	-	2	-	2
52 Cashew nut, dried	2	2	2	8	8	21	20	20	2	2	-	8	2	-	2
53 Coconut, immature kernel, fresh	5	5	5	6	6	21	3	-	5	5	6	3	5	6	3
54 Coconut, mature kernel, fresh	2	2	2	6	6	21	20	-	2	2	8	8	2	6	2
55 Groundnut, dry	2	2	2	6	6	21	20	20	2	2	6	6	2	6	2
56 Melon seeds, without coat	2	2	5	-	-	21	3	-	2	2	-	-	2	-	-
57 Pumpkin seeds, without coat	2	2	2	-	-	21	20	20	2	5	-	-	2	-	2
58 Sunflower seeds, without coat	5	5	5	-	-	21	20	-	5	5	-	-	5	-	-
Vegetables & vegetable products															
59 Amaranth, leaves, raw	2	2	2	8	8	21	20	-	2	2	-	8	2	8	14
60 Amaranth, leaves, cooked	0	0	0	-	-	21	20	-	-	-	-	-	-	-	14
61 Bamboo shoots, raw	8	8	8	8	8	21	20	20	8	8	8	8	8	8	8
62 Baobab, leaves, raw	2	16	2	-	-	-	-	-	-	-	-	-	-	-	2
63 Bean sprouts, raw	8	8	8	-	-	21	20	20	8	8	-	-	8	-	8
64 Carrots, raw	2	2	2	5	5	21	20	20	2	2	8	8	2	8	2
65 Cassava, leaves, raw	2	2	2	8	8	21	20	-	2	2	-	-	2	-	2
66 Cauliflower, raw	2	2	2	5	5	21	20	20	2	2	8	8	2	8	2

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4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
67 Cucumber, raw	2	2	0	0	2	2	2	2	2	-	-	2	6	6	2	21	2
68 Cowpea leaves, raw, fresh	2	2	0	0	2	2	-	-	-	-	-	2	19	19	2	21	2
69 Cowpea leaves, raw, dried	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70 Egg plant, raw	2	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
71 Hare's lettuce, raw	1	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
72 Leaves, pale green, fresh	2	2	0	0	2	2	-	-	-	-	-	2	7	7	2	21	2
73 Leaves, medium green, fresh	2	5	0	0	5	5	-	-	-	-	-	5	-	-	5	21	5
74 Leaves, dark green, fresh	3	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
75 Lettuce, raw	3	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
76 Mushrooms, fresh	3	2	0	0	2	2	9	9	9	9	9	2	9	9	2	21	2
77 Okra, pods, raw	2	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
78 Okra, leaves, raw	17	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
79 Onion, shalot, raw	2	2	0	0	2	2	-	-	-	-	-	2	7	7	2	21	2
80 Pepper, capsules, sweet green, raw	6	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
81 Pepper, capsules, sweet red, raw	6	2	0	0	2	2	-	-	-	-	-	2	6	6	2	21	2
82 Pepper, leaves, raw	3	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
83 Pumpkin, squash, raw	2	2	0	0	2	2	21	21	21	21	21	2	7	7	2	21	2
84 Pumpkin, leaves, raw	-	2	0	0	2	2	-	-	-	-	-	2	7	7	2	21	2
85 Sweet potato, leaves, raw	2	2	-	0	2	2	-	-	-	-	-	2	-	-	2	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	other	Vit B$_1$	Vit B$_2$	Vit B$_6$	Vit B$_{12}$	Nia-cin	Folic acid	Vit C
67 Cucumber, raw	2	2	2	6	6	21	2	-	2	2	6	8	2	8	2
68 Cowpea leaves, raw, fresh	2	2	2	8	8	21	20	-	2	2	8	8	2	8	2
69 Cowpea leaves, raw, dried	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70 Egg plant, raw	2	2	2	6	6	21	20	20	2	2	6	6	2	6	2
71 Hare's lettuce, raw	2	2	2	-	-	21	2	-	-	2	-	-	2	-	2
72 Leaves, pale green, fresh	2	2	2	7	7	21	20	20	2	2	7	7	2	8	2
73 Leaves, medium green, fresh	5	5	5	5	-	21	20	-	5	5	8	8	5	8	5
74 Leaves, dark green, fresh	2	2	2	8	8	21	20	-	2	2	-	8	2	8	2
75 Lettuce, raw	2	2	2	5	5	21	19	-	5	5	8	8	5	8	2
76 Mushrooms, fresh	2	2	2	6	6	0	6	-	6	6	6	6	6	6	6
77 Okra, pods, raw	2	2	2	5	5	21	2	-	2	2	8	8	2	8	2
78 Okra, leaves, raw	2	2	2	-	-	21	20	-	2	2	-	-	2	-	2
79 Onion, shalot, raw	2	2	2	7	7	21	2	-	2	2	19	0	2	6	2
80 Pepper, capsules, sweet green, raw	2	2	2	5	5	21	20	20	2	2	6	-	2	6	2
81 Pepper, capsules, sweet red, raw	2	2	2	5	5	21	20	20	2	2	6	-	2	6	2
82 Pepper, leaves, raw	2	18	2	-	-	21	20	20	-	-	-	-	-	-	5
83 Pumpkin, squash, raw	2	2	2	7	7	21	0	20	2	2	8	8	2	8	2
84 Pumpkin, leaves, raw	2	2	2	7	7	21	20	-	2	2	-	-	2	-	2
85 Sweet potato, leaves, raw	2	2	2	5	5	21	20	20	2	2	-	-	2	-	-

4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat						Carbohydrates				Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin	Chol	total	mono	poly	fibre		
86 Taro, leaves, raw	-	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
87 Tomato, raw	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
88 Turnip, leaves, raw	8	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
Fruit																	
89 Avocado, raw	2	2	0	0	2	2	9	9	9	9	9	2	9	9	2	21	2
90 Baobab, ripe, raw	2	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
91 Banana, ripe, raw	8	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
92 Citrus, orange/tangerine, raw	6	2	0	0	2	2	15	15	15	15	15	2	7	7	2	21	2
93 Citrus, grapefruit/pomelo, raw	2	2	0	0	2	2	15	15	15	15	15	2	7	7	2	21	2
94 Citrus, lemon/lime, raw	2	2	0	0	2	2	15	15	15	15	15	2	7	7	2	21	2
95 Dates, dried	3	2	0	0	2	2	-	-	-		15	2	9	9	2	21	2
96 Groundcherry/Cape gooseberry, raw	3	5	0	0	5	5	-	-	-		15	5	-	-	5	21	5
97 Guava, raw	2	2	0	0	2	2	15	15	15	15	15	2	-	-	2	21	2
98 Mango, ripe, raw, without skin	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
99 Mango, unripe, raw, without skin	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
100 Papaya, raw	2	2	0	0	2	2	15	15	15	15	15	2	7	7	2	21	2
101 Pineapple, fresh	2	2	0	0	2	2	15	15	15	15	15	2	6	6	2	21	2
102 Pomegranate, fresh	2	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
86 Taro, leaves, raw	2	2	2	-	-	21	20	20	2	2	-	-	2	-	2
87 Tomato, raw	2	2	2	7	7	21	20	20	2	2	7	6	2	6	2
88 Turnip, leaves, raw	2	2	2	8	8	21	20	20	2	2	-	-	8	-	8
Fruit															
89 Avocado, raw	2	2	2	8	8	21	20	20	2	2	6	15	2	8	2
90 Baobab, ripe, raw	2	2	2	-	-	21	20	20	2	2	-	-	2	-	2
91 Banana, ripe, raw	2	2	2	7	7	21	20	20	2	2	7	15	2	6	2
92 Citrus, orange/tangerine, raw	2	2	2	7	7	21	20	-	2	2	7	15	2	6	2
93 Citrus, grapefruit/pomelo, raw	2	2	2	5	5	21	2	-	2	2	6	15	2	6	2
94 Citrus, lemon/lime, raw	2	2	2	7	7	21	20	20	2	2	1	15	2	-	2
95 Dates, dried	2	2	2	5	5	21	2	20	2	2	15	15	2	6	2
96 Groundcherry/Cape gooseberry, raw	5	8	5	6	6	21	20	20	8	8	6	15	8	-	8
97 Guava, raw	2	2	2	7	7	21	20	20	2	2	7	8	2	8	2
98 Mango, ripe, raw, without skin	2	2	2	7	7	21	20	-	2	2	7	8	2	8	2
99 Mango, unripe, raw, without skin	2	19	2	7	7	21	20	-	7	7	21	-	7	8	2
100 Papaya, raw	2	2	2	7	7	21	20	20	2	2	8	8	2	8	2
101 Pineapple, fresh	2	2	2	5	5	21	20	20	2	2	6	15	2	6	2
102 Pomegranate, fresh	2	2	2	5	5	21	20	20	5	5	15	15	5	-	5

4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat						Carbohydrates				Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin	Chol	total	mono	poly	fibre		
103 Tamarind, dried	2	2	0	0	2	2	15	15	15	15	15	2	9	9	2	21	2
104 Tomato, tree, raw	2	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
105 Watermelon	2	2	0	0	2	2	-	-	-	-	15	2	6	6	2	21	2
Sugars & syrups																	
106 Soft drinks, commercial	7	7	0	0	7	7	7	7	7	7	7	7	7	7	7	21	7
107 Sugar cane	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
108 Sugar	0	0	0	0	0	0	0	0	0	0	0	7	7	0	0	21	0
Meat, poultry & eggs																	
109 Bacon, fat, whole side	2	2	0	0	2	2	6	6	6	6	-	2	-	-	0	21	2
110 Beef, moderately fat	3	2	0	0	2	2	7	7	7	7	7	7	7	7	7	21	2
111 Egg, hen	3	2	0	0	2	2	7	7	7	7	7	2	-	-	2	21	2
112 Goat, moderately fat	3	5	-	0	5	5	-	-	-	-	-	5	21	21	0	21	5
113 Heart, beef	-	2	0	0	2	2	-	-	-	-	-	2	-	-	21	-	2
114 Kidney, beef	-	5	0	0	5	5	8	8	8	8	-	5	-	-	-	-	5
115 Liver, beef	-	2	0	0	2	2	7	7	7	6	7	2	7	7	21	21	2
116 Mutton, moderately fat	3	2	0	0	2	2	8	8	8	8	-	0	-	-	0	21	2
117 Pork, moderately fat	3	2	0	0	2	2	-	-	-	-	-	21	21	21	21	21	2

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. ß	other	Vit B₁	Vit B₂	Vit B₆	Vit B₁₂	Nia-cin	Folic acid	Vit C
103 Tamarind, dried	2	2	2	9	9	21	20	20	2	2	15	15	2	-	2
104 Tomato, tree, raw	2	2	2	-	-	21	2	20	3	3	-	-	3	-	3
105 Watermelon	2	2	2	5	5	21	20	20	2	2	15	15	2	6	2
Sugars & syrups															
106 Soft drinks, commercial	7	-	-	-	7	-	-	-	-	-	-	-	-	-	-
107 Sugar cane	2	2	2	-	-	-	-	-	2	2	-	-	2	-	2
108 Sugar	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0
Meat, poultry & eggs															
109 Bacon, fat, whole side	2	2	2	6	6	3	0	-	3	3	8	8	3	8	3
110 Beef, moderately fat	2	2	2	7	7	5	5	-	7	7	7	8	7	8	7
111 Egg, hen	2	19	2	7	7	2	2	-	7	7	7	6	2	6	7
112 Goat, moderately fat	5	5	5	-	-	3	-	-	5	5	-	-	5	-	-
113 Heart, beef	2	2	2	-	-	8	8	-	5	5	8	8	2	8	8
114 Kidney, beef	5	5	5	6	8	17	-	-	5	5	8	8	2	8	8
115 Liver, beef	2	7	2	7	7	2	2	-	7	7	7	8	7	8	2
116 Mutton, moderately fat	2	2	2	5	8	2	2	-	5	5	8	8	2	-	-
117 Pork, moderately fat	2	2	2	-	-	0	-	-	8	8	0	8	8	8	-

4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat						Carbohydrates				Alco-hol	Ash
						total	SFA	MUFA	PUFA	Lin	Chol	total	mono	poly	fibre		
118 Poultry, for example chicken	3	2	0	0	2	2	7	7	7	7	7	7	7	7	7	21	2
119 Turtle	3	3	0	0	3	3	–	–	–	–	–	3	–	–	–	21	–
Fish & fish products																	
120 Crustaceans, crab, lobster, prawn	2	2	0	0	2	2	–	–	–	–	–	2	–	–	8	21	2
121 Fish, average fillet	–	1	0	0	1	1	–	–	–	–	–	–	–	–	–	–	–
122 Fish, dried	–	2	0	0	2	2	9	9	9	9	–	2	2	2	2	21	2
123 Small dried fish (Dagaa)	3	2	0	0	2	2	7	7	7	7	7	7	7	7	2	21	2
Milk & milk products																	
124 Milk, cow, whole	0	2	0	0	2	2	7	7	7	7	7	2	7	7	21	21	2
125 Milk, cow, skimme	21	2	0	0	2	2	7	7	7	7	7	2	7	7	21	21	2
126 Buttermilk	21	7	0	0	7	7	7	7	7	–	–	7	7	7	7	21	7
127 Milk powder, cow, whole	–	7	0	0	7	7	7	7	7	7	7	7	7	7	7	21	7
128 Milk powder, cow, skimmed (DSM), vitamin A enriched	–	–	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
129 Milk, goat	2	2	0	0	2	2	7	7	7	7	7	2	7	7	2	21	2
130 Milk powder, cow, special baby food, average	–	–	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot. β	carot. other	Vit B1	Vit B2	Vit B6	Vit B12	Nia-cin	Folic acid	Vit C
118 Poultry, for example chicken	2	2	2	7	7	5	5	-	7	7	7	8	7	-	21
119 Turtle	3	3	-	-	-	-	-	-	3	3	-	-	3	-	-
Fish & fish products															
120 Crustaceans, crab, lobster, prawn	2	2	2	8	8	20	8	-	3	3	8	8	3	8	3
121 Fish, average fillet	1	1	-	-	-	1	20	-	1	1	-	-	1	-	1
122 Fish, dried	2	2	2	-	-	2	20	-	2	2	-	-	2	-	2
123 Small dried fish (Dagaa)	2	2	2	7	7	2	-	-	2	2	7	-	2	-	2
Milk & milk products															
124 Milk, cow, whole	2	7	2	7	7	20	2	-	7	7	7	6	7	6	2
125 Milk, cow, skimmed	7	7	7	7	7	7	7	-	7	7	7	8	7	6	7
126 Buttermilk	7	7	7	7	7	7	-	-	7	7	7	-	7	-	7
127 Milk powder, cow, whole	7	7	7	7	7	2	2	-	7	7	7	-	7	-	7
128 Milk powder, cow, skimmed (DSM), vitamin A enriched	0	0	-	-	-	0	-	-	0	0	-	-	0	-	0
129 Milk, goat	7	7	7	7	7	7	-	-	7	7	7	8	7	-	7
130 Milk powder, cow, special baby food, average	0	0	-	-	-	0	-	-	0	0	-	-	0	-	0

4.3 Sources of individual values in the table (Section 2)

	Waste	Mois-ture	kJ	kcal	Pro-tein	Fat total	SFA	MUFA	PUFA	Lin	Chol	Carbohydrates total	mono	poly	fibre	Alco-hol	Ash
Oils & fats																	
131 Beef suet	7	7	0	0	7	7	7	7	7	7	7	7	7	7	7	21	-
132 Butter, from cow's milk	21	2	0	0	2	2	7	7	7	7	7	2	-	-	2	21	2
133 Coconut oil	0	0	0	0	8	8	8	8	8	8	-	21	21	21	21	21	8
134 Fish liver oil	21	21	0	0	5	5	5	5	5	5	-	21	21	21	21	21	21
135 Ghee, clarified butter	0	2	0	0	2	2	5	5	5	5	-	2	-	-	21	21	2
136 Lard/animal fats	0	6	0	0	6	6	6	6	6	6	-	0	21	21	21	21	21
137 Margarine, fortified	7	7	0	0	7	7	7	7	7	7	7	7	7	7	7	21	7
138 Red palm oil, fresh	0	2	0	0	2	2	6	6	6	6	6	2	-	-	2	21	2
139 Red palm oil, stale	0	2	0	0	2	2	6	6	6	6	6	2	-	-	2	21	2
140 Salad oil	0	7	0	0	7	7	7	7	7	7	7	7	0	0	7	21	7
141 Sunflower oil	0	10	0	0	10	10	10	10	10	10	-	10	10	10	10	10	10
Other																	
142 Beer, local	-	-	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
143 Caterpillars, dried	-	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
144 Coconut milk	0	8	8	0	8	8	-	-	-	-	-	8	8	0	8	21	8
145 Termites, fresh	-	2	0	0	2	2	-	-	-	-	-	2	-	-	2	21	2
146 Yeast, baker's, dry	-	6	0	0	6	6	-	-	-	-	-	6	6	6	6	21	6

4.3 Sources of individual values in the tables (Section 2)

	Ca	Fe	P	K	Na	Reti-nol	pro-vit A carot.		Vit B$_1$	Vit B$_2$	Vit B$_6$	Vit B$_{12}$	Nia-cin	Folic acid	Vit C
							β	other							
Oils & fats															
131 Beef suet	7	7	7	7	7	7	-	-	7	7	7	7	7	-	7
132 Butter, from cow's milk	7	7	7	7	7	2	2	-	5	5	7	-	5	-	6
133 Coconut oil	8	8	8	-	-	-	-	-	8	8	-	-	8	-	-
134 Fish liver oil	-	-	-	-	-	5	5	-	-	-	-	-	-	-	-
135 Ghee, clarified butter	5	3	5	-	-	5	5	-	-	5	-	-	-	-	-
136 Lard/animal fats	6	6	6	6	6	6	6	-	6	6	6	-	6	6	6
137 Margarine, fortified	7	7	7	7	7	7	7	-	7	7	7	-	7	-	7
138 Red palm oil, fresh	2	6	2	6	6	21	20	20	2	2	2	2	2	21	-
139 Red palm oil, stale	2	6	2	6	6	21	12	-	-	2	2	2	2	2	-
140 Salad oil	7	7	7	7	7	7	-	-	7	7	7	-	7	-	7
141 Sunflower oil	-	16	-	-	-	16	16	-	16	-	-	-	-	-	-
Other															
142 Beer, local	0	0	-	-	-	0	-	-	0	0	-	-	0	-	0
143 Caterpillars, dried	2	2	2	-	-	-	-	-	2	2	-	-	2	-	2
144 Coconut milk	8	8	8	8	8	8	8	-	8	8	8	8	8	-	8
145 Termites, fresh	2	17	-	-	-	21	-	-	-	-	-	-	-	-	-
146 Yeast, baker's, dry	6	6	6	6	6	6	-	-	6	6	6	-	6	-	6

4.3 Sources of individual values in the tables (Section 3)

	N	Total	total	Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
Cereals & grain products																					
3 Maize, yellow, whole kernel, dried	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
8 Millet, finger, whole grain	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
10 Millet, bullrush, whole grain	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
12 Rice, lightly milled, parboiled	2	0	0	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
13 Rice, milled, polished	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
14 Sorghum, whole grain	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
16 Wheat, whole, parboiled	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
17 Wheat, flour, 85% extraction	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
18 Wheat, flour, 70% extraction	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
21 Breakfast cereals, corn flakes	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23 Macaroni, cooked, tender stage	-	-	-	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
25 Spaghetti, cooked, tender stage	-	-	-	6	1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Starchy roots, tubers & fruit																					
27 Cassava, bitter, fresh	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
28 Cassava, meal	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
30 Potato, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
31 Sweet potato, yellow, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
32 Sweet potato, pale, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

4.3 Sources of individual values in the tables (Section 3)

	N	Total N	total	Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
	g	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
35 Yam, fresh	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Grain legumes & legume products																					
38 Beans, dried	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-
42 Cowpea, mature pods, dried	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
44 Lentil, dried	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
45 Mungbean, green, dried	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
46 Mungbean, black, dried	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
47 Pea, dried	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
48 Pigeon pea, dried	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
49 Soya bean, dried	2	0	0	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Nuts & seeds																					
52 Cashew nut, dried	2	0	0	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
54 Coconut, mature kernel, fresh	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
55 Groundnut, dry	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Vegetables & vegetable products																					
59 Amaranth, leaves, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
60 Amaranth, leaves, cooked	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58

Essential amino acids

4.3 Sources of individual values in the tables (Section 3)

	N	Total	total						Essential amino acids												
				Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
62 Baobab, leaves, raw	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
64 Carrots, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
65 Cassava, leaves, raw	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
67 Cucumber, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
76 Mushrooms, fresh	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
77 Okra, pods, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
78 Okra, leaves, raw	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
79 Onion, shalot, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
80 Pepper, capsules, sweet green, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
81 Pepper, capsules, sweet red, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
84 Pumpkin, leaves, raw	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
87 Tomato, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
88 Turnip, leaves, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Fruit																					
89 Avocado, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
91 Banana, ripe, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
92 Citrus, orange/tangerine, raw	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

4.3 Sources of individual values in the tables (Section 3)

	N	Total		Essential amino acids																	
			total	Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
	g	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
93 Citrus, grapefruit/pomelo, raw	2	0	0	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
95 Dates, dried	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
98 Mango, ripe, raw, without skin	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
99 Mango, unripe, raw, without skin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 Papaya, raw	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
101 Pineapple, fresh	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
Meat, poultry & eggs																					
110 Beef, moderately fat	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
111 Egg, hen	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
116 Mutton, moderately fat	2	0	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
117 Pork, moderately fat	2	0	0	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
118 Poultry, for example chicken	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Fish & fish products																					
120 Crustaceans, crab, lobster, prawn	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
122 Fish, dried	2	0	0	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51

4.3 Sources of individual values in the tables (Section 3)

	N	Total	total	Cys	Ile	Leu	Lys	Met	Phe	Thr	Tyr	Trp	Val	Ala	Arg	Asp	Glu	Gly	His	Pro	Ser
Milk & milk products																					
124 Milk, cow, whole	2	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
126 Buttermilk	19	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
127 Milk powder, cow, whole	19	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58
129 Milk, goat	2	0	0	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58

MicroNap database access software 5

5.1 Introduction

Institutes and government departments in developing countries responsible for research have limited access to computer facilities. Machines are shared with other departments, often the Government Department of Statistics. Such arrangements seriously limit an institute's ability to develop and control modern procedures for handling information. Computerised techniques of data handling require software for specialised purposes.

One specialised purpose concerns the investigation of the nutritional status of the population. Part of the information used to describe the nutritional situation of the population consists of details of food consumption, which can provide a basis for public policy and its associated impact evaluation.

Hand calculation the nutrient content from such data requires nutrient analysis software that can be run on micro computers. The University of Manitoba has recently developed computer programs for the analysis of food consumption data from community nutrition surveys and clinical research studies. The programs, distributed under the name MicroNAP, can be used with local food composition tables.

5.2 Overview of the programs

The series of programs, available for micro computers such as the AppleII and the IBM PC, are designed to read the amounts of food eaten by individuals and calculate the nutrient content of these foods. The nutrients consumed can then be compared with amounts recommended to maintain good health. The calculations require both food composition data for the foods eaten and estimates of nutrient requirements. The programs are built to allow users without programming experience to change food composition and requirement data with simple procedures.

Users can change any or all of the food composition values in the database. The user can also change the recommended nutrient intake values used to estimate the adequacy of intakes for individuals. This feature makes the system suitable for use in countries where recommendations differ from the FAO/WHO figures.

The programs associate a time, place and day with each food item consumed by an individual. Hence the nutrient content of foods consumed at breakfast or on particular days can be calculated separately. The nutrient content of food consumed for any of the day, meal or location combinations can be calculated either as a total or as an average.

The results of the analysis can be shown in tables or stored on disk. The programs will copy information about individuals, other than food intake information, to the computer files stored on disk. These files can then be used by statistical programs to test relationships between nutrient intake and other individual information such as medical, educational or socio-economic data.

5.3 Program structure

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The MicroNap program calculates the nutrient content of food consumed separately for each individual. Processing for any number of individuals can start once all food consumption data and instructions for presentation of the results are entered. In this way the programs calculate the nutrient content of the dietary information from a large data file and produce a file of results. The datafile can be processed again with different instructions to produce a second file of results.

Entering data and instructions is prompted through a series of screens that show the options available to the user at each stage of the entry process. All functions are selected from menus or options listed on the screen.

The main menu provides choices of programs to manipulate the food composition database. The program is not supplied with a database unless requested by the user. Local food composition values will be needed to represent the nutrient content of foods reported by individuals and these values can be entered through the database management part of the program.

Users are expected to create their own nutrient database that will reflect the nutrient content of local foods. Those who wish to use existing nutrient information can make unlimited modifications not only to food names and nutrient amounts, but also nutrient names. The maximum size of the database is almost 9.999 foods, with a maximum of 90 nutrients and 10 portion factors for each food item. The speed of MicroNap remains the same regardless of the size of the database.

Once created, the database can be listed and printed either alphabetically by foodname, or numerically by foodcode. MicroNap can read more than one database created in this way, allowing institutes to share nutrient information and compare analyses. Comparison of nutrient intakes with recommended nutrient intakes can be carried out after the program has calculated nutrient intakes from the reported food consumption. In this process the program calculates the levels of recommended intakes for different nutrients. The calculations use the weight, age, gender and where approriate the energy consumption of the individuals. The requirement and minimum intake figures used in estimating the recommended intake of each nutrient can be changes by the user.

5.4 Data entry

Food items reported in the dietary record or recipe are identified by a unique four-digit food code. A print of the database in either alphabetical or numerical order will assist in coding the food consumption record. All food amounts are entered either in grams, or in units with conversion factors associated with common portion sizes. The conversion factor indicates the standard weight of the portion size identified, such as a slice of bread or one medium apple.

This information is entered via a series of screens, which prompts the individual for all information required. The foods eaten on one day, in one location, at one meal are all entered on one screen. Another screen appears for the foods eaten at the next meal or a different day.

Using foodcodes to identify food items can lead to errors, even if it allows greater flexibility in managing the database. The MicroNap program facilitates error checking by listing the foodnames associated with the codes entered from the dietary record, together with the recorded amounts. Comparing the list with the raw data makes for faster and more accurate error checking.

The program will also accept non-food information, such as the social or health characteristics of an individual. This information, entered in either words or numerical codes, is not used by the program, but simply echoed in the results. The results will then combine both non-food data and the calculated nutrient amounts, which can be read directly by standard statistical programs.

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5.5 Processing

MicroNap sorts all foods consumed by an individual according to the day, location and meal category registered for each food item at the time of data entry. The total nutrient content of the food items in the same categories is calculated before the nutrient contents of various categories are combined as requested by the user.

Any number of days, locations or meals can be coded during data entry and the nutrient content of any of the categories can be either summed or averaged for any combination of categories. For example, calculating the nutrient intake over several survey days can provide: the amount for breakfast on the 1st day and compare this to the intake on the 2nd and 3rd days, to detect the effect of data collection methods. Alternatively, if the user has coded the source of food eaten instead of the location, it will be possible to determine whether store bought food contributes a greater nutrient density to breakfasts than home produced food.

Another feature of MicroNap is the ability to group the separate food items consumed by individuals in groups defined by the user. In this way the nutrient contribution of a specified group of foods in the food consumption record can be identified, instead of the nutrient content of all foods in the record. Any combination of food items, or a single food, can be defined. The program will use only the foods specified and ignore the nutrient content of others that appear in the food consumption data being processed. Being able to ignore traditional food groups, which are based on major nutrient composition, is particularly useful for studies where the content of food components such as sugars or fats separate foods rather than major nutrients.

An important feature of the program are the warning messages it generates when nutrient data called for by the program is not present

in the database. Not all foods registered in the database will have content values for each of the nutrients and missing data may mean that nutrient intakes for the nutrient are underestimated. Results can therefore be checked for completeness and the user can judge the importance of the missing values in drawing conclusions from the results.

5.6 Presentation of results

The tables of results are intended for use by professionals. The format of the tables is defined by the instructions for processing. Storing the results on disk in a standard ASCII file allows the user to compare intakes with recommended values and to use statistical programs.

The program can compare the dietary nutrient amounts to recommended intakes for individuals. The program averages the results for any number of days of individual intake and can also be printed or saved on disc for further statistical analysis. The most recent Canadian recommendations for adequate nutrient intake are used in the program. A number of constants are used to calculate recommended intakes for 16 nutrients, applicable to all age and sex groups. These constants will differ between countries and all constants can be changed by the user. Not only does this make the process transferable between countries, but it also allows users to update the calculations as research leads to new conclusions on nutrient requirements.

Statistics have been left out of the MicroNap program because powerful software already exists to calculate either descriptive statistics, such as standard deviations and distributions, or probability tests. The output of MicroNap is therefore used directly in such programs as SAS, Statpro or SPSS. The output can be divided in two types: either printed tables which are defined by the way the user combined the dimensions, or unlabelled listings of nutrient amounts that provide the same information but that can be read by statistical programs.

5.7 Management of programs

The series of programs facilitate much of the work associated with processing and interpretation of food consumption surveys. Though easy to use, procedures involve a number of complex technical steps over which professionals need to maintain control. Hence there are two areas that need special attention when these programs are used in professional work.

Firstly, the management of the database will require a set of careful rules and guidelines. It is clear that the flexibility of the program to change the nutrient composition recorded in the database gives the advantage of using locally representative values in professional work and keeping such values up to date. The disadvantage is that any individual user can alter the values without knowledge of other users or change values on the basis of inconsistent and low quality source data. Such decisions would weaken the reliability of the nutrient data and subsequent dietary analyses would be inadequate.

Managing the database will therefore mean: defining the criteria for any changes; outlining the procedures whereby any changes are

made; identifying the staff position(s) who have the responsibility to control and implement changes; set up a mechanism (committee) through which to decide on the need for any changes and the reliability of technical information. Without adequate management the data in the compositional tables will become professionally useless.

Secondly, the procedures for coding dietary information need for be defined. Choices of foodcodes from the database vary between professional people and consistency is difficult to achieve. In addition, decisions on the amounts eaten will vary. To minimise the effect of these variations on the results of the analysis, professionals working with the same database in the same locality should use standard procedures. It may be possible to develop standardised coding criteria as part of data entry routines. Such data entry software will facilitate both the recording of dietary information and the entry of this data in computer storage. Procedures adopted by the majority of professionals will be very important for maintaining reliable results in clinical and community studies that require measurement of dietary factors.

5.8 Availability of MicroNap

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The program is available at the present time in a preliminary version, which is supplied with a 50 page manual. The Department of Nutrition, University of Manitoba can be contacted, attention

G.P. Sevenhuysen, to order copies. Current price: CN$ 800.—.

In the near future the marketing and distribution of the program will be carried out by MCALC, the Manitoba Computer Assisted Learning Centre. This company expects to start work on new versions of the program. Changes to the program will improve ease of use and update the manual information. As a result, the program will be of interest to member of the public as well as professionals.

In fact two versions may be available by October 88, one professional system similar to the current program in functions and flexibility, and another system for use by the public that is less complex. Prices have not yet been established for either system. The professional version of the program will be provided with support for the user and advice or data for the database.

None of the program versions will be sold with a nutrient database. Users are expected to enter their own data on foodcomposition. MCALC can provide datahbase information when requested, but this information is not sold. Hence, public data, such as the Canadian Nutrient File, can be provided free of charge. Copyrighted databases such as the Tanzanian database for use in East Africa, can only be provided to users who pay the developers of the database for the use of the information. The simpler version of the program will be provided with a short database with values from of the Canadian Nutrient File.

For further information of MicroNap software, contact:

MCALC
340 Education Blg.
University of Manitoba
Winnipeg R3T 2N2
CANADA
Tel.: (204) 474 6621

Index of foods with English, Kiswahili and scientific names 6

Product number	English name	Kiswahili name	Scientific name
Cereals and grain products			
1	Maize, yellow, immature on cob, fresh	Mahindi mabichi	Zea mays
2	Maize, white, whole kernel, dried	Mahindi	Zea mays
3	Maize, yellow, whole kernel, dried	Mahindi	Zea mays
4	Maize, white, on cob, toasted	Mahindi	Zea mays
5	Maize flour, white, 60-80% extraction	Sembe	Zea mays
6	Maize, yellow, meal	Unga wa mahindi	Zea mays
7	Maize, white, meal	Dona	Zea mays
8	Millet, finger, whole grain	Ulezi	Eleusine spp.
9	Millet, finger, flour	Unga wa ulezi	Eleusine spp.
10	Millet, bullrush, whole grain	Uwele	Pennisetum typhoides
11	Millet, bullrush, flour	Unga wa uwele	Pennisetum typhoides
12	Rice, lightly milled, parboiled	Mchele uliotokoswa	Oryza sativa
13	Rice, milled, polished	Mchele mweupe	Oryza sativa
14	Sorghum, whole grain	Mtama	Sorghum spp.
15	Sorghum, flour	Unga wa mtama	
16	Wheat, whole, parboiled	Ngano	Triticum vulgare
17	Wheat, flour, 85% extraction	Unga wa ngano	Triticum vulgare
18	Wheat, flour, 70% extraction	Unga wa ngano	Triticum vulgare
19	Bread, white	Mkate	
20	Bread, brown	Mkate	

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Product number	English name	Kiswahili name	Scientific name
Starchy roots, tubers and fruit			
26	Breadfruit, pulp, raw	Stafeli	Artocarpis communis
27	Cassava, bitter, fresh	Mhogo mbichi	Manihot esculenta
28	Cassava, meal	Unga wa mhogo	
29	Plantain, ripe, raw	Ndizi za kupika	Musa paradisiaca
30	Potato, raw	Viazi ulaya	Solanum tuberosum
31	Sweet potato, yellow, raw	Viazi vitamu	Ipomoea batatas
32	Sweet potato, pale, raw	Viazi vitamu	Ipomoea batatas
33	Taro/Cocoyam, raw	Magimbi	Colocasia spp
34	Turnip/Swede, root, raw	Figili	Brassica rapa
35	Yam, fresh	Viazi vikuu	Dioscora spp
36	Yam, flour	Unga wa viazi vikuu	
Grain legumes and legume products			
37	Beans/peas, fresh, shelled	Njegere	Phaseolus spp
		mbichi baada ya kumenywa	Vigna spp
38	Beans, dried	Maharagwe	Vigna spp
39	Beans, green in pod, raw	Maharagwe mabichi bila kumenywa	Vigna spp
40	Bonavist/Hyacinth bean, dried	Fiwi	Lablab niger
41	Chickpea, whole seeds, raw, dried	Dengu	Cicer arietinum
42	Cowpea, mature pods, dried	Kunde	Vigna spp

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Product number	English name	Kiswahili name	Scientific name
43	Cowpea, young green pods, raw	Kunde	Vigna spp
44	Lentil, dried	Adesi	Lens esculenta
45	Mung bean, green, dried	Choroko Vigna radiata	Phaseolus aureus
46	Mung bean, black, dried	Choroko nyeusi	Phaseolus mungo / Vigna mungo
47	Pea, dried	Njegere	Pisum sativum
48	Pigeon pea, dried	Mbaazi	Cajanus cajan
49	Soya bean, dried	Soya	Glycine max
50	Velvet bean, dried	Upupu	Stizolobium deeringianum
Nuts and seeds			
51	Bambara groundnut, fresh	Njugu mawe	Voandezia subterranea
52	Cashew nut, dried	Korosho	Anacardium occidentale
53	Coconut, immature kernel, fresh	Dafu	Cocos nucifera
54	Coconut, mature kernel, fresh	Nazi kavu	Cocos nucifera
55	Groundnut, dry	Karanga kavu	Arachis hypogaea
56	Melon seeds, without coat	Mbegu za tikiti	Citrullis vulgaris
57	Pumpkin seeds, without coat	Mbegu za mboga	Cucurbita spp / Telfairia spp
58	Sunflower seeds, without coat	Mbegu za alizeti	Helianthus annuus

Product number	English name	Kiswahili name	Scientific name
Vegetables and vegetable products			
59	Amaranth, leaves, raw	Mchicha	Amaranthus spp
60	Amaranth, leaves, cooked	Mchicha	Amaranthus spp
61	Bamboo shoots, raw	Kilele cha mwanzi	Bambusa spp
62	Baobab, leaves, raw	Majani yambuya	Adansonia spp
63	Bean sprouts, raw	Maharage yaliootsehwa	Phaseolus/Vigna
64	Carrots, raw	Karoti	Daucus carota
65	Cassava, leaves, raw	Kisamvu	Manihot esculenta
66	Cauliflower, raw		Brassica oleracea
67	Cucumber, raw	Tango	Cucumis sativus
68	Cowpea, leaves, raw, fresh	Mkunde	Vigna unguiculata
69	Cowpea, leaves, raw, dried	Mkunde	Vigna unguiculata
70	Egg plant, raw	Biringanya	Solanum melongena
71	Hare's lettuce, raw	Mchunga	Sonchus spp
72	Leaves, pale green, fresh		
73	Leaves, medium green, fresh		
74	Leaves, dark green, fresh		
75	Lettuce, raw	Saladi	Lactuca sativa
76	Mushrooms, fresh	Uyoga	Agaricus spp
77	Okra, pods, raw	Bamia	Hibiscus esculentus
78	Okra, leaves, raw	Majani ya bamia	

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Product number	English name	Kiswahili name	Scientific name
79	Onion, shalot, raw	Vitunguu	Allium ascalonicum
80	Pepper, capsules, sweet green, raw	Pilipili mbichi na zilizoiva	Capsicum annuum
81	Pepper, capsules, sweet red, raw	Pilipili mbichi na zilizoiva	Capsicum annuum
82	Pepper, leaves, raw	Majani ya mpilipili	Piper nigrum
83	Pumpkin, squash, raw	Boga	Cucurbita spp
84	Pumpkin, leaves, raw	Majani ya Mboga	
85	Sweet potato, leaves, raw	Matembele mabichi	Ipomoea batatas
86	Taro, leaves, raw	Magimbi	Colocasia esculenta
87	Tomato, raw	Nyanya na maganda	Lycopersicom esc
88	Turnip, leaves, raw	Majani ya figiri	Brassica rapa
Fruit			
89	Avocado, raw	Parachichi	Persea americana
90	Baobab, ripe, raw	Mbuyu	Adansonia digitata
91	Banana, ripe, raw	Ndizi mbivu	Musa sapientum
92	Citrus, orange/tangerine, raw	Machungwa na chenza	Citrus sinensis / C. aurantium / C. reticulata
93	Citrus, grapefruit/pomelo, raw	Balungi	Citrus grandis / C. paradisi
94	Citrus, lemon/lime, raw	Limao	Citrus aurantifolia / C. limon
95	Dates, dried	Tende kavu	Phoenix dactylifera
96	Groundcherry/Cape gooseberry, raw	Zabibu mwitu	Physalis peruviana
97	Guava, raw	Mapera	Psidium guajava

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Product number	English name	Kiswahili name	Scientific name
98	Mango, ripe, raw, without skin	Embe	Magnifera indica
99	Mango, unripe, raw, without skin	Embe	
100	Papaya, raw	Papai	Carica papaya
101	Pineapple, fresh	Nanasi	Ananus comosus
102	Pomegranate, fresh	Komamanga	Punica granatum
103	Tamarind, dried	Ukwaju	Tamarindus indica
104	Tomato, tree, raw	Nyanya mshumaa	Cyphomandra betacea
105	Watermelon	Tikiti	Citrullus vulgaris

Sugars and syrups

Product number	English name	Kiswahili name	Scientific name
106	Soft drinks, commercial		
107	Sugar cane	Maji ya mwua	Saccharum officinarum
108	Sugar	Sukari nyeupe	

Meat, poultry and eggs

Product number	English name	Kiswahili name	Scientific name
109	Bacon, fat, whole side	Nyama ya nguruwe iliyonona	
110	Beef, moderately fat	Nyama ya ng'ombe ya kawaida iliyonona	
111	Egg, hen	Mayai ya kuku	
112	Goat, moderately fat	Nyama ya mbuzi	
113	Heart, beef	Moyo	
114	Kidney, beef	Mafigo	

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Product number	English name	Kiswahili name	Scientific name
115	Liver, beef	Maini	
116	Mutton, moderately fat	Nyama ya kondoo	
117	Pork, moderately fat	Nyama ya nguruwe	
118	Poultry, for example chicken	Nyama ya kuku	
119	Turtle	Kasa	
Fish and fish products			
120	Crustaceans, crab, lobster, prawn	Kaa wa pwani, kamba	
121	Fish, average filet	Samaki wa maji baridi mnofu	
122	Fish, dried	Samaki wakavu	
123	Small dried fish	Dagaa	
Milk and milk products			
124	Milk, cow, whole	Maziwa ya ng'ombe yaliyo na mafuta	
125	Milk, cow, skimmed	Maziwa ya ng'ombe yaliyoondolewa mafuta	
126	Buttermilk		
127	Milk powder, cow, whole	Maziwa ya ng'ombe ya unga	
128	Milk powder, cow, skimmed (DSM), vitamin A enriched		
129	Milk, goat	Maziwa ya mbuzi	
130	Milk powder, cow, special baby food, average		

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Product number	English name	Kiswahili name	Scientific name
Oils and fats			
131	Beef suet		
132	Butter, from cow's milk	Siagi	
133	Coconut oil		
134	Fish liver oil	Mafuta ya samaki	
135	Ghee, clarified butter	Samli	
136	Lard/animal fats	Mafuta na nguruwe na ya wanyama	
137	Margarine, fortified	Margarine	
138	Red palm oil, fresh	Mafuta ya mawese	Elaeis guineensis
139	Red palm oil, stale	Mafuta ya mawese	Elaeis guineensis
140	Salad oil		
141	Sunflower oil	Mafuta ya alizeti	
Other			
142	Beer, local	Pombe ya	
143	Caterpillars, dried	Viwazi	
144	Coconut milk	Tui la nazi	Cocos nucifera
145	Termites, fresh	Kumbikumbi	
146	Yeast, baker's, dry	Hamira	Saccharomyces cerevisiae