

Annex D: Food Security

Table D-1: Nutrients in 100g Edible Portion of Food^a

Food (waste %) ^b	Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vitamin A (mcg)	Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Folate (mcg)	Vitamin C (mg)	
<i>Cereals</i>												
Barley	350	8.2	1	16	2	0	0.12	0.05	3.1	20	0	
Maize flour-whole	353	9.3	3.8	10	2.5	0	0.3	0.1	1.8	U	0	
Maize flour-refined	368	9.4	1	3	1.3	50 ^c	0.26	0.08	1	U	0	
Millet-bulrush	341	10.4	4	22	3	0	0.3	0.22	1.7	U	0	
Rice-polished	361	6.5	1	4	0.5	0	0.08	0.02	1.5	10	0	
Rice-parboiled	364	6.7	1	7	1.2	0	0.2	0.08	2.6	11	0	
Sorghum	345	10.7	3.2	26	4.5	0	0.34	0.15	3.3	U	0	
Wheat-whole	323	12.6	1.8	36	4	U	0.3	0.07	5	51	0	
Wheat flour-white	341	9.4	1.3	15	1.5	0	0.1	0.03	0.7	22	0	
Bread -white	261	7.7	2	37	1.7	0	0.16	0.06	1	17	0	
Pasta	342	12	1.8	25	2.1	0	0.22	0.03	3.1	34	0	
<i>Cereal products (food aid items)</i>												
Bulgur wheat	354	11.2	1.5	23	7.8	0	0.3	0.1	5.5	38	0	
Soy-fortified bulgur wheat	350	17.3	2	54	4.7	0	0.25	0.13	4.2	74	0	
Commeal-yellow-degermed	364	7.9	1.2	25	1.1	132	0.14	0.05	1	U	0	
Soy-fortified commeal	392	13	1.5	178	4.8	228	0.7	0.3	3.1	U	0	
Rolled oats	363	13	7	70	4	0	0.6	0.2	1.3	24	0	
Soy-fortified sorghum grits	360	16	1	40	2	—	0.2	0.1	1.7	50	0	
Soy-fortified rolled oats	380	20	6	81	5.3	0	0.74	0.14	4	U	0	
Wheat flour (medium extraction)	350	11.5	1.5	29	3.7	0	0.28	0.14	4.5	U	0	
Soy-fortified wheat flour, 6% soy	355	14	1.2	0	U	0	U	U	U	U	0	
11–12% soy	355	16.5	1.4	211	4.8	265	0.66	0.36	4.6	U	0	

(Table continues on the following page.)

Table D-1 (continued)

Food (waste %) ^b	Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vita- min A (mcg)	Thia- mine (mg)	Ribo- flavin (mg)	Nia- cin (mg)	Folate (mcg)	Vita- min C (mg)
<i>Blended foods and biscuits</i>											
Corn soy milk and wheat soy milk	380	20	6	1,000	18	510	0.8	0.8	8	200	40
Instant corn soy milk	380	20	6	1,000	18	510	0.8	0.8	8	200	40
Corn soy blend	380	18	6	513	18.5	500	0.65	0.5	6.8	U	40
Wheat soy blend	360	20	6	750	20.8	498	1.5	0.6	9.1	U	40
Australian high protein biscuits	450	20	20	1,125	25	0	2.75	4.08	27.5	U	63
Danish high protein biscuits	480	20	19	179	7.2	0	0.25	U	1	U	1
<i>Starchy roots and fruits</i>											
Cassava—fresh (26)	149	1.2	0.2	68	1.9	15	0.04	0.05	0.6	24	31
Cassava—flour	344	1.6	0.5	66	3.6	0	0.06	0.05	0.9	U	0
Plantain (34)	135	1.2	0.3	8	1.3	390	0.08	0.04	0.6	16	20
Potato—Irish (20)	79	2.1	0.1	7	0.8	0	0.09	0.04	1.5	13	20
Potato—sweet (yellow) (19)	105	1.7	0.3	22	0.6	(2,000) ^d	0.07	0.04	0.7	52	23
Yam—fresh (dioscorea) (16)	118	1.5	0.2	17	0.5	0	0.11	0.03	0.8	23	17
<i>Pulses</i>											
Beans—kidney—dry	333	23.6	0.8	143	8.2	0	0.5	0.22	2.1	180	5
Mungbeans—dry	347	23.9	1.1	132	6.7	11	0.6	0.23	2.3	120	5
Lentils—dry	338	28.1	1	51	9	4	0.5	0.25	2.6	U	6
Pigeon pea—dry	343	21.7	1.5	130	5.2	3	0.6	0.19	3	100	0
Groundnuts—dry	567	25.8	49.2	92	4.6	0	0.6	0.14	12.1	110	0
Soybeans—dry	416	36.5	20	277	15.7	2	0.9	0.25	1.6	210	0
Sunflower seeds	605	22.5	49	98	6.3	0	1.9	0.14	4.1	U	0
Coconut flesh (27)	376	3.9	36.5	20	2.3	0	0.6	0.8	0.4	U	0

<i>Vegetables</i>											
Carrots (19)	43	1	0.2	27	0.5	2813	0.1	0.06	0.9	14	9
Eggplant (17)	26	1.1	0.1	36	0.6	7	0.09	0.02	0.6	18	2
Leaves-dark green (spinach) (15)	22	2.9	0.4	99	2.7	672	0.08	0.19	0.7	194	28
<i>Leaves-medium (Chinese cabbage) (15)</i>											
Leaves-light (lettuce) (32)	16	1.2	0.2	77	0.3	120	0.04	0.05	0.4	79	27
Onion (8)	13	1	0.2	19	0.5	33	0.05	0.03	0.2	56	4
Peppers (23)-green	34	1.2	0.3	25	0.4	0	0.06	0.1	0.1	20	8
Peppers (23)-red	25	0.9	0.5	6	1.3	53	0.09	0.05	0.6	17	128
Pumpkin (30)	25	0.9	0.5	6	1.3	530	0.09	0.05	0.6	17	128
Tomato – ripe	26	1	0.1	21	0.8	160	0.05	0.11	0.6	8	9
Leaves-sweet potato	19	0.9	0.2	7	0.5	113	0.06	0.05	0.6	9	18
Amaranth	35	4	0.3	37	1	130	0.16	0.35	1.1	U	11
Beans-fresh	26	2.5	0.3	215	2.3	292	0.03	0.16	0.7	85	43
Maize-fresh	36	2.5	0.2	43	1.4	375	0.08	0.12	0.5	U	27
	165	5	2.1	2	0.5	28	0.2	0.06	1.7	46	7
<i>Fruits</i>											
Avocado (50)	161	2	15.3	11	1.02	61	0.11	0.12	1.9	22	8
Banana (33)	92	1	0.5	6	0.3	20	0.05	0.1	0.5	19	9
Orange (28)	47	0.9	0.1	40	0.1	120	0.09	0.04	0.3	30	53
Lime (36)	30	0.7	0.2	33	0.6	1	0.03	0.02	0.2	8	29
Lemon (36)	29	0.6	0.3	26	0.6	3	0.04	0.02	0.1	11	53
Guava (11)	51	0.8	0.6	20	0.3	79	0.05	0.05	1.2	7	184
Mango (31)	65	0.5	0.3	10	0.1	389	0.06	0.06	0.6	7	28
Papaw (28)	39	0.6	0.1	24	0.1	201	0.03	0.03	0.3	1	62
Pineapple (46)	49	0.4	0.4	7	0.4	2	0.09	0.04	0.4	11	15
Water-melon (56)	32	0.6	0.4	8	0.2	37	0.08	0.02	0.2	2	10
Baobab (72)	290	2.2	0.8	284	7.4	70	0.37	0.06	2.1	U	270

(Table continues on the following page.)

Table D-1 (continued)

Food (waste %) ^b	Energy (kcal)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)	Vita- min A (mcg)	Thia- mine (mg)	Ribo- flavin (mg)	Nia- cin (mg)	Folate (mcg)	Vita- min C (mg)
<i>Fruits and sugar</i>											
Dried apricots	238	3.7	0.5	45	4.7	724	0.01	0.15	3	10	2
Raisins	300	3.2	0.5	49	2.1	1	0.16	0.09	0.8	3	3
Dates-dry (10)	275	2	0.5	32	1.2	5	0.09	0.1	2.2	13	0
Marmalade	243	0.4	0	32	2	—	—	—	—	—	4
Jam	234	0.4	0	10	2	—	0.1	0.1	0.3	—	9
Sugar	400	0	0	0	0	0	0	0	0	0	0
<i>Meat</i>											
Mutton flesh	122	20.4	3.4	12	1.8	U	0.18	0.25	5.8	3	0
Beef flesh	115	22	1.9	4	1.9	20	0.23	0.26	7.5	15	0
Beef fat	900	1.5	94	0	0	0	0	0	0	0	0
Beef blood	80	17.8	0.13	6	44	21	0.9	0.3	1	0	0
Cattle liver beef	123	19.7	3.1	7	7.1	1,500	0.3	2.88	14.7	22	30
Pork flesh	114	22	1.9	3	1	6	0.9	0.23	5	6	2
Goat meat (with fat)	161	19.5	7.9	10	2	36	0.15	0.28	4.9	U	0
Corned beef	225	25.3	12	14	4.1	0	0.2	0.23	3.2	2	0
Canned pork	536	11	51.3	U	U	0	0.6	0.16	2.5	U	0
Poultry (33)	139	19	7	15	1.5	0	0.1	0.15	9	U	0
<i>Fish</i>											
Cod (25)	82	17.7	0.4	24	0.4	10	0.6	0.46	2.3	12	2
Perch (60)	89	18.4	0.8	20	1	7	0.8	0.12	1.7	U	0
Fish-dried-salted	225	47	7.5	343	2.8	0	0.07	0.11	8.6	U	0
<i>Dairy products</i>											
Breast milk	70	1	4.4	32	0.05	64	0.01	0.04	0.18	5	5
Cow's milk-whole	61	3.3	3.3	119	0.05	31	0.04	0.16	0.1	5	1
Dried whole milk	496	26.3	26.7	912	0.5	280	0.28	1.21	0.6	37	9
Dried skimmed milk	362	36.2	0.8	1,257	1	1,500 ^e	0.42	1.55	1	50	7
Condensed milk-sweetened	321	7.9	8.7	284	0.2	81	0.09	0.42	0.21	11	3
Evaporated milk	134	6.8	7.6	261	0.2	54	0.05	0.32	0.2	8	2

Canned cheese (average)	355	22.5	28	630	0.2	120	0.03	0.45	0.2	U	0
Danish new cheese	275	19	21	480	0.6	1,000	0.02	0.14	4.4	38	0
Milk bars	475	23.5	23	U	U	U	U	U	U	U	U
Milk tablets	540	27	27	U	U	U	U	U	U	U	U
Eggs-fresh(12%)	158	12.1	11.2	56	2.1	156	0.09	0.3	0.3	65	0
Eggs-dirted	594	45.8	41.8	212	7.9	586	0.31	1.17	6.4	184	0
<i>Fats and oils</i>											
Animal fat-lard	900	0	100	0	0	0	0	0	0	0	0
Butter	717	0.9	81	24	0.2	754	—	0.04	—	3	0
Butter oil, ghee	876	0.3	99.5	0	0	925	0	0	0	0	0
Margarine	719	0.9	80.5	30	0	9935	0.01	0.04	—	1	0
Palm oil	884	0	100	0	0	5,000 ^f	0	0	0	0	0
Vegetable oil (maize)	884	0	100	0	0	0	0	0	0	0	0
<i>Cooked Food</i>											
Boiled rice polished	123	2.2	0.3	U	0.2	0	0.01	0.01	0.3	3	0
Kidney beans-boiled	127	8.7	0.5	U	2.9	0	U	U	0.6	129	1
Lentils-boiled	116	9	0.4	U	3.3	1	U	U	1.1	180	2
Groundnuts-boiled	318	13.5	22	U	1	0	U	U	5.3	75	0
Groundnuts-dry roasted	585	23.7	49.7	U	2.3	0	U	U	13.5	145	0
Potatoes boiled-no skin	86	1.7	0.1	U	0.3	0	0.1	U	1.3	9	7
Spinach-boiled-drained	23	3	0.3	U	3.4	819	U	U	0.5	145	10

a. All values are for raw food, except in the final section.

b. Where there is no figure, the food contains no waste.

c. Yellow maize (FAO, 1982).

d. Deep yellow varieties only.

e. If fortified.

f. Fresh unbleached oil.
(FAO, 1993a)

Table D-2: Comparative Energy and Nutrient Values of Raw and Processed Foods/100 g^a

Food/100g	Energy (kcal)	Protein (g)	Vita-min C (mg)	Iron (mg)	Comments
<i>Potatoes</i>					
Raw	87	2.1	8–20	0.5	—
Boiled	80	1.4	4–14	0.3	Water absorbed
Roasted	157	2.8	5–16	0.7	Fat gain, water loss
Crisps	533	6.3	17	2.1	
<i>Wheat</i>					
Flour	337	11.3	0	1.5	—
Bread	233	7.8	0	1.1	Water absorbed
Chapatti	202	7.3	0	2.1	Water absorbed
Pasta–raw	370	13.7	0	1.4	—
Pasta-cooked	117	4.3	0	0.5	Water absorbed
<i>Rice</i>					
Raw	363	7.0	0	1.7	—
Boiled/steamed	123	2.2	0	0.2	Water absorbed
<i>Millet</i>					
Porridge with unmalted flour	25	0.4	—	0.3	—
Malted flour	83	1.3	—	1.0	Increased amount of flour used
<i>Lentils</i>					
Raw	339	24.0	Trace	7.0	—
Boiled	98	7.6	Trace	2.4	Water absorbed
<i>Soy Bean</i>					
Raw, dry	355	31.3	0	7.3	—
Unpressed curd	33	3.1	0	0.8	Water absorbed
Fermented (Tempeth)	149	18.3	0	10.0	Constituent changes
Sprouts, raw	62	7.7	10	1.1	Constituent changes
Sprouts, cooked	34	4.8	2	0.8	Water absorbed; vitamin C lost
<i>Spinach type leaves</i>					
Raw	28	2.0	50	2.5	—
Boiled	49	3.5	25	4.4	Water loss; vitamin loss

a. These are representative figures. Individual or local cooking methods would show some variations. (Cameron & Hofvander, 1983)

Table D-3: Standard Measures with Some Equivalent Weights for Volumes

Abbreviations Used for Standard Units of Measure

Microgram	μg (or mcg)
Milligram	mg
Gram	g
Kilogram	kg
Milliliter	ml
Deciliter	dl
Litre	l
Ounce	oz
Fluid ounce	fl oz
Pound	lb
Pint	pt
Quart	qt
Gallon	gal

Equivalent Weights and Volumes

1 mg = 1000 μg
1 g = 1000 mg
1 kg = 1000 g
1 l = 1000 ml
1 dl = 100 ml
1 gal = 4 qt
= 8 pt
1 pt (Imp) = 20 fl oz
1 pt (US) = 16 fl oz

Approximate Equivalent Weights and Volumes for Practical Use

1 standard teaspoon (tspn) = 5 ml
1 standard tablespoon (tbspn) = 15 ml
30 g = 1 oz
1 fl oz = 30 ml
450g = 1 lb
1 kg = 2.2 lb
1/2 pt (Imp) = 10 fl oz = 300 ml
1/2 pt (US) = 8 fl oz = 240 ml

(Cameron & Hofvander, 1983)

Table D-4: The Volumes and Equivalent Weights of Some Raw Foods^a

Food	Volumes			Local Utensil	
	500 ml (5 dl)	200 ml (2 dl)	100 ml (1 dl)		
	Approximate weight			Type	Weight
	(g)	(g)	(g)	(ml)	(g)
				Example:	
				Milk can	
<i>Staples</i>					
Rice	450	180	90	200	180
Wheat noodles (small)	450	180	90		
Rolled oats	200	80	40		
Flour-whole grain	275	110	55		
Flour-refined	300	125	65		
Cassava flour (gari)	350	150	75		
<i>Legumes/oil seeds</i>					
Large, e.g., kidney beans, cow peas		150	75		
Small, e.g., mungbeans, chickpeas		175	90		
Split, no skin, e.g., lentils		175	90		
Flour, e.g., bean		170	85		
Groundnuts, whole		145	75		
Sesame seeds		140	70		
<i>Other foods</i>					
Vegetable oils		200	100		
Sugar		200	100		
Milk, liquid		200	100		
Dried skimmed milk-powder		90	45		
Dried skimmed milk-granules		70	35		
1 level tablespoon (15 ml)					
		g			
Oil		15 (1 tspn = 5 g)			
Sugar		15 (1 tspn = 5 g)			
Bean flour		12			
Sesame seeds		10			
Milk		15			
Evaporated, no sugar		15			
Skimmed powder		8			
Skimmed granules		4			
Full cream powder		9			

a. Example: for practical use 100 ml rice weighs 90 g.
(Cameron & Hofvander, 1983)

Table D-5: Calculation of Approximate Weights from Known Volumes of Raw Foods

Foods (raw)	Volume (ml)	x Factor	= Weight (g)
<i>Staples</i>			
Rice		0.9	
Noodles (small)		0.9	
Cassava flour (gari)		0.75	
Refined flours		0.65	
Whole-grain flours		0.55	
Rolled oats		0.4	
<i>Legumes/oilseeds</i>			
Larger e.g., kidney beans, cow peas		0.75	
Smaller, e.g., mungbeans, chickpeas		0.9	
Split, no skins, e.g., lentils		0.9	
Flour e.g., bean		0.85	
Groundnuts		0.75	
Sesame seeds		0.65	
<i>Other foods</i>			
Sugar		1	
Oil		1	
Milk			
Liquid		1	
Powder		0.45	
Granules		0.35	

Note: The factors are derived from Table D-4. The *volume* (ml) x the given factor = weight (g).

Examples: 200 ml rice x 0.9 = 180 g; 100 ml cow peas x 0.75 = 75g. The *weight* (g) ÷ the given factor = volume (ml). Example: 75g cowpeas ÷ 0.75 = 100ml.

(Cameron & Hofvander, 1983)

Table D-6: Effect of Cooking on the Weights and Volumes of Foods Due to the Absorption or Loss of Water^a

Food	Weights		Volumes		Approximate Changes on Cooking
	Raw (g)	Cooked (g)	Raw (ml)	Cooked (ml)	
Rice	100	230–250	100	300	Volume increases by 3
Noodles-small	100	200–250	100	250	Volume increases by 2 1/2
Maize flour	100	500–600 (gruel)	100	440–460	Volume increases by 4 1/2
Rolled oats	100	600–700 (gruel)			
Potato	100	100–105	100	300–350	Volume increases by 3
Beans					
Whole	100	230–250	—	—	Weight, little change
Split, no skin	100	250–300			
Green leaves			100	240–260	Volume increases by 2 1/2
Spinach type	100	60–70	100	250–300	Volume increases by 2 1/2 –3
Cabbage type	100	80	Boiled, drained, and chopped		
			100 g–1 dl		
			10 g–1 tbspn		Weight reduced by 1/3
			10 g–1 tbspn		Weight reduced by 1/5

Miscellaneous

1 average chapatti (flat bread 40g) is equivalent to 25g wheat flour

100g wholemeal or white bread is equivalent to 70g flour

1 average tortilla is made from 60g corn dough

a. The amount of water used and the length of cooking time affects the amount of water absorbed or lost from the food. These changes shown in the table are *examples only*. They should be checked locally.

(Cameron & Hofvander, 1983)

Table D-7: Extraction Rates and Equivalent Amounts of Flour and Whole Grains

Cereal	Extraction Rate (percentage)	Yield of Milled Products from 100 kg Whole Grain	Amount of Grain Needed to Yield 100 kg Milled Product
Wheat	72–90	72–90 kg flour	140–110 kg grain
Maize	80–95	80–95 kg flour/meal	125–105 kg grain
Sorghum	80	80 kg flour	125 kg grain
Rice-paddy	60–70	60–70 kg polished rice	170–140 mg paddy

(FAO, 1993a)

Table D-8: Equivalent Amounts of Foods

Amounts Giving Equivalent Amounts of Energy	
100g cereal flour	<ul style="list-style-type: none"> • 100g any other cereal flour • 150g bread • 300g roots
100g roots	<ul style="list-style-type: none"> • 35g cereal flour • 46g bread
100g sugar	<ul style="list-style-type: none"> • 50g oil or fat • 150g dried fruit
100g any oil	<ul style="list-style-type: none"> • 100g any fat • 200g oil-seed or high-fat pulse • 200g sugar
Amounts Giving Equivalent Amounts of Protein	
100g dry pulses	<ul style="list-style-type: none"> • 100g dried whole milk • 66g dried skimmed milk • 120g canned meat or fish in oil • 35g fish flour • 120g cheese • 120g blended cereal • 200g fresh egg • 350g evaporated milk • 700g fresh milk
100g dried skimmed milk	<ul style="list-style-type: none"> • 150g pulses • 140g dried whole milk • 180g canned meat or fish in oil • 50g fish flour • 180g cheese • 180g blended cereal • 300g fresh egg • 500g evaporated milk • 1,000g fresh milk
100g canned meat, fish in oil blended cereal or cheese	<ul style="list-style-type: none"> • 80g pulses • 55g dried skimmed milk • 80g dried whole milk • 30g fish flour • 166g fresh egg

(FAO, 1993a)

Table D-9: Basal Metabolic Rate in Adult Men and Women in Relation to Height and Median Acceptable Weight for Height (values given in kcal with MJ in parentheses)

Height (m)	Weight ^a (kg)	18–30 Years		30–60 Years		> 60 Years	
		Per kg per Day	Per Day	Per kg per Day	Per Day	Per kg per Day	Per Day
<i>Men</i>							
1.5	49.5	29.0 (121)	1440 (6.03)	29.4 (123)	1450 (6.07)	23.3 (98)	1150 (4.81)
1.6	56.5	27.4 (115)	1540 (6.44)	27.2 (114)	1530 (6.40)	22.2 (93)	1250 (5.23)
1.7	63.5	26.0 (109)	1650 (6.90)	25.4 (106)	1620 (6.78)	21.2 (89)	1350 (5.65)
1.8	71.5	24.8 (104)	1770 (7.41)	23.9 (99)	1710 (7.15)	20.3 (85)	1450 (6.07)
1.9	79.5	23.9 (100)	1890 (7.91)	22.7 (95)	1800 (7.53)	19.6 (82)	1560 (6.53)
2	88	23.0 (96)	2030 (8.49)	21.6 (90)	1900 (7.95)	19.0 (80)	1670 (6.99)
<i>Women</i>							
1.4	41	26.7 (112)	1100 (4.60)	28.8 (120)	1190 (4.98)	25.0 (105)	1030 (4.31)
1.5	47	25.2 (105)	1190 (4.98)	26.3 (110)	1240 (5.19)	23.1 (97)	1090 (4.56)
1.6	54	23.9 (100)	1290 (5.40)	24.1 (101)	1300 (5.44)	21.6 (90)	1160 (4.85)
1.7	61	22.9 (96)	1390 (5.82)	22.4 (94)	1360 (5.69)	20.3 (85)	1230 (5.15)
1.8	68	22.0 (92)	1500 (6.28)	20.9 (87)	1420 (5.94)	19.3 (81)	1310 (5.48)

a. Weight taken as median acceptable weight for height; body mass index (Wt/Ht²) = 22 in men, 21 in women. (FAO/WHO/UNU, 1985)

Table D-10: Physical Activity Levels (PALs) Based on Doubly-Labeled Water (DLW) Studies

Life Style and Level of Activity	PAL
Chair-bound or bed-bound	1.2
Seated work with no option of moving around and little or no strenuous leisure activity	1.4–1.5
Seated work with discretion and requirement to move around but little or no strenuous leisure activity	1.6–1.7
Standing work (e.g., housework, shop assistant)	1.8–1.9
Significant amounts of sport or strenuous leisure activity (30–60 minutes four to five times per week)	+0.3 (increment)
Strenuous work or highly active leisure	2.0–2.4

(Shetty, et al, 1996)

Table D-11: Alternative PAL Based on FAO/WHO/UNU 1985 Expert Consultation Recommendations

	Light	Moderate	Heavy
Men	1.55	1.78	2.10
Women	1.56	1.64	1.82

(Shetty, et al., 1996)

Table D-12: Calculation of Mean per Capita Estimated Energy Requirement (EMPCER), by Age Group^a

Age Group	Males				Females				Weighted Average Energy Req. of Age Group (kcal/d)		TER ^b (kcal/d)
	% of Pop.	BMR (kcal/d)	PAL	Total (kcal/d)	% of Pop.	BMR (kcal/d)	PAL	Total (kcal/d)	Total (kcal/d)	% of Pop.	
0.0-0.9	1.2			800	1.3			800	800	2.5	2,000
1.0-3.9	3.7			1,400	3.8			1,300	1,349	7.5	10,120
4.0-6.9	3.5	1,522	1.55	1,800	3.5	1,317	1.56	1,600	1,700	7	11,900
7.0-9.9	3.3	1,647	1.55	2,100	3.4	1,240	1.56	1,800	1,948	6.7	13,050
10.0-17.9	8.5	1,405	1.55	2,359	8.5	1,145	1.56	2,055	2,207	17	37,516
18.0-59.9	26.2			2,553	21.8			1,934	2,272	48	109,055
≥ 60	3.4			2,178	3.5			1,786	1,979	6.9	13,656
Pregnant									2,219	1.9	4,217
Lactating									2,434	2.5	6,086
EMPCER											2,076

Note: BMR: basal metabolic rate; PAL: Physical activity level.

a. Population distribution as per Jamison and Hobbs (1994) in Allen & Howson (1995) for developing countries. Body size for sub-Saharan Africa: males, 170cm; females, 155 cm. Body weight as expected for height according to U.S. data: males, 63.5 kg; females, 50 kg. BMR of adults and energy requirements of children as per FAO/WHO/UNU (1985). PAL, light, as per FAO/WHO/UNU (1985); males, 1.55, females, 1.56.

b. TER: Total energy requirements of age group per 100 persons in the population. Calculated as (weighted average energy requirement of age group) x (number of people in age group per 100 individuals in population). (Allen & Howson, 1995)

Table D-13: Energy Requirement for Infants 0–12 Months Estimated from Total Energy Expenditure and Energy Cost of Growth

Age (months)	All (kcal/d)	BF ^a (kcal/d)	FF ^b (kcal/d)	Energy Requirement		
				All (kcal/ kg/day)	BF ^a (kcal/ kg/day)	FF ^b (kcal/ kg/day)
<i>Boys</i>						
0–1	361	341	381	91	87	94
1–2	433	413	453	93	90	96
2–3	525	504	545	94	91	97
3–4	544	524	564	86	83	90
4–5	578	557	598	84	81	87
5–6	623	602	643	84	80	87
6–9	712	692	733	86	83	89
9–12	862	841	882	93	89	96
<i>Girls</i>						
0–1	343	322	363	88	84	90
1–2	408	388	428	90	86	92
2–3	477	457	497	90	87	93
3–4	510	490	530	85	82	89
4–5	557	537	578	85	82	88
5–6	608	588	629	86	82	89
6–9	692	671	712	86	83	89
9–12	841	820	861	93	89	96

a. BF = breastfed.

b. FF = formula fed.

(Adapted from Butte, 1996)

Table D-14: Estimates of Total Daily Energy Expenditure from the Physical Activity Levels Suggested in Table D-15 and Basal Metabolic Rates Calculated with Schofield's Equations

Age (years)	Weight ^a (kg)	Habitual physical activity					
		Light		Moderate		Heavy	
		(kcal/d)	(kcal/kg/d)	(kcal/d)	Kcal/kg/d)	(kcal/d)	(kcal/kg/d)
<i>Boys</i>							
1	10.4	854	82.1	942	90.6	—	—
2	12.3	1018	82.7	1123	91.3	—	—
3	14.6	1211	83	1337	91.6	—	—
4	16.7	1281	76.6	1413	84.6	—	—
5	18.7	1346	72	1486	79.4	—	—
6	20.7	1510	72.9	1704	82.3	1899	91.7
7	22.9	1587	69.3	1792	78.2	1996	87.2
8	25.3	1671	66.1	1887	74.6	2102	83.1
9	28.1	1770	63	1998	71.1	2227	79.2
10	31.4	1885	60	2126	67.7	2370	75.5
11	35.3	1988	56.3	2245	63.6	2501	70.9
12	39.8	2112	53.1	2384	59.9	2657	66.8
13	45	2254	50.1	2545	56.6	2836	63
14	50.8	2491	49	2803	55.2	3192	62.8
15	56.7	2659	46.9	2991	52.7	3406	60.1
16	62.1	2811	45.3	3163	50.9	3602	58
17	66.3	2930	44.2	3296	49.7	3755	56.6
18	68.9	3004	43.6	3379	49.1	3849	56.9
<i>Girls</i>							
1	9.8	783	79.9	865	88.2	—	—
2	11.8	953	80.7	1051	89.1	—	—
3	14.1	1120	79.4	1236	87.6	—	—
4	16	1176	73.5	1297	81.1	—	—
5	17.7	1226	69.3	1352	76.4	—	—
6	19.5	1323	67.8	1499	76.9	1676	85.9
7	21.8	1393	63.9	1579	72.4	1764	80.9
8	24.8	1484	59.8	1682	67.8	1880	75.8
9	28.5	1597	56	1810	63.5	2023	71
10	32.5	1706	52.5	1933	59.4	2160	66.5
11	37	1783	48.2	2021	54.6	2259	61
12	41.5	1874	45.1	2123	51.2	2373	57.2
13	46.1	1966	42.6	2228	48.3	2490	54
14	50.3	1982	39.4	2256	44.8	2529	50.3
15	53.7	2048	38.1	2331	43.4	2613	48.7
16	55.9	2091	37.4	2379	42.6	2668	47.7
17	56.7	2107	37.2	2397	42.3	2688	47
18	56.6	2105	37.2	2395	42.3	2685	47.4

a. Median weight for age, NCHS/WHO.
(Torun et al., 1996)

Table D-15: Physical Activity Levels Suggested to Estimate Total Daily Energy Expenditure from the Mean Basal Metabolic Rate of Children and Adolescents

Age (years)	Sex	Habitual Physical Activity		
		Light	Moderate	Heavy
1-5	M, F	1.44	1.61	
6-13	M	1.54	1.75	1.96
14-18	M	1.6	1.82	2.04
6-13	F	1.48	1.68	1.88
14-18	F	1.46	1.66	1.86

(Torun, et al., 1996)

Table D-16: Suggested Figures for Energy Requirements During Lactation^a

Period (month)	Milk volume ^b (g/d)	Energy Requirements (kcal/day) ^c	
		Full Costs	Allowing for Fat Loss ^d
<i>All women</i>			
0-1	680	568	413
1-2	780	652	497
2-3	820	686	530
<i>Full breast-feeders^e</i>			
3-6	820	686	530
6-12	650	543	543
12-24	600	502	502
<i>Partial breast-feeders^f</i>			
3-6	410	342	186
6-12	325	272	272
12-24	300	251	251

a. As the text emphasises, the values are increments to be added to the maternal requirements calculated using PAL x BMR (PAL may be slightly reduced if there is evidence of lower activity during lactation in the population being considered).

b. Derived from studies in Sweden (Sadurskis et al. 1988). England (Paul et al. 1988). USA (Heinig et al. 1993a.b) and the WHO Collaborative Study on Breast-Feeding (WHO, 1985). Values include a +4% adjustment to allow for insensible water losses from the baby during test-weighing.

c. Assumes energy density of breast-milk to be .67 kcal/g and dietary-milk energy conversion efficiency of 80%.

d. Assumed to be approx. 500 g/month up to 6 months post-partum and nothing thereafter.

e. Babies receive only limited complementary feeds after 3-4 months, and breastmilk is intended to provide the primary source of nourishment for 6 months or more.

f. Babies are fed breastmilk or almost exclusively until 3-4 months of age; weaning foods are then introduced progressively as part of an active weaning process.

(Prentice, et al., 1996)

Table D-17: Individual Coping Strategies and the Cumulative Food Security Index by Income Group

Income Group ^a	Round ^b	Eating	Limiting	Borrow-	Maternal	Skip-	Skip-	Cumulative Index ^d
		Less Preferred Foods (1 - 4) x 1 ^c	Portion Size (1 - 4) x 1 ^c	ing Food or Money (1 - 4) x 2 ^c	Buffering (1 - 4) x 2 ^c	ping Meals (1 - 4) x 2 ^c	ping Days (1 - 4) x 3 ^c	
VL	1	1.6	2.4	5.1	5.2	4.9	9.8	29.8
	2	2.4	3	6.2	6.6	5.6	11.2	35.6
L	1	2.5	3.1	6.4	6.3	6.5	11.4	36.3
	2	2.8	3.5	6.7	7	6.6	11.8	39.1
LM	1	2.6	3.3	6.7	7	7.3	11.8	38.7
	2	2.9	3.7	7.4	7.6	7.3	11.8	41.1
UM/H	1	3.3	3.6	7.3	6.9	7.9	12	41.1
	2	3.3	3.6	7.4	7.3	7.5	12	41.4
All Groups	1	2.5	3.1	6.2	6.3	6.5	11.3	35.9
	2	2.8	3.4	6.8	7.1	6.6	11.7	39

a. Income groups: VL: very low income; L: Low income; LM: Low-middle income; UMH: upper-mid income.

b. Round of survey: 1: rainy season (N = 328); 2: dry season (N = 304).

c. Frequency scoring: 4: never (zero times per week); 3: rarely (once or fewer times per week); 2: sometimes (2-5 times per week); 1: frequently (almost every day). Frequency scoring (in parenthesis) times seventy weighing based on ordinal ranking by focus group respondents gives range of possible means listed for each category.

d. Cumulative index is the sum of scores for the six individual coping strategies. (Maxwell, 1996)