



Energy Requirements Working Group

Agenda item: 3

Background Paper

The attached paper summarises the rationale for the Energy Requirements Working Group and provides data from the National Diet and Nutrition Surveys carried out between 1992 and 2001 on the energy intakes and body weight of the British population.

Energy Requirements Working Group

Background Paper

1. The National Diet and Nutrition Survey (NDNS) series consistently show average energy intakes below Estimated Average Requirement (EAR). NDNS and other surveys, however, also show that the number of people classified as overweight or obese is increasing (data from NDNS series is given in Appendix 1). The comparisons carried out within this paper have not taken into account variations in physical activity. It is planned that further analysis of the data be carried out to allow comparison between tertiles of physical activity.
2. This data indicates that on average habitual energy intake is in fact above energy need. Although it is recognised that under-reporting of food intake is responsible for at least some of the discrepancy between measured energy intake and EAR values, these observations have led the Agency to question the robustness of the COMA Dietary Reference Values (DRV) for energy, which were last reviewed in 1991.
3. DRV for food energy is used to provide guidance to consumers about how much energy they should consume to meet their needs, and as a benchmark to judge the adequacy of the food energy intake of the population. They are also used in clinical settings, by caterers and on food labels (as a basis for Guideline Daily Amounts). Population targets for fat and sugar intakes are also expressed as a percentage of DRV for food energy. Any changes to DRV for food energy would therefore have implications for the delivery of policy, for example, in relation to consumer guidance in relation to energy and other macronutrients, fat and sugar targets, labelling and catering.
4. FAO/WHO/UNU have recently published updated recommendations for energy intake and expenditure in the report Consultation on Human Energy Requirements. This Working Group has been established to review that FAO/WHO/UNU Energy Consultation, the evidence used in the report and implications for UK energy recommendation. The group is expected to report in 2006.

Appendix 1

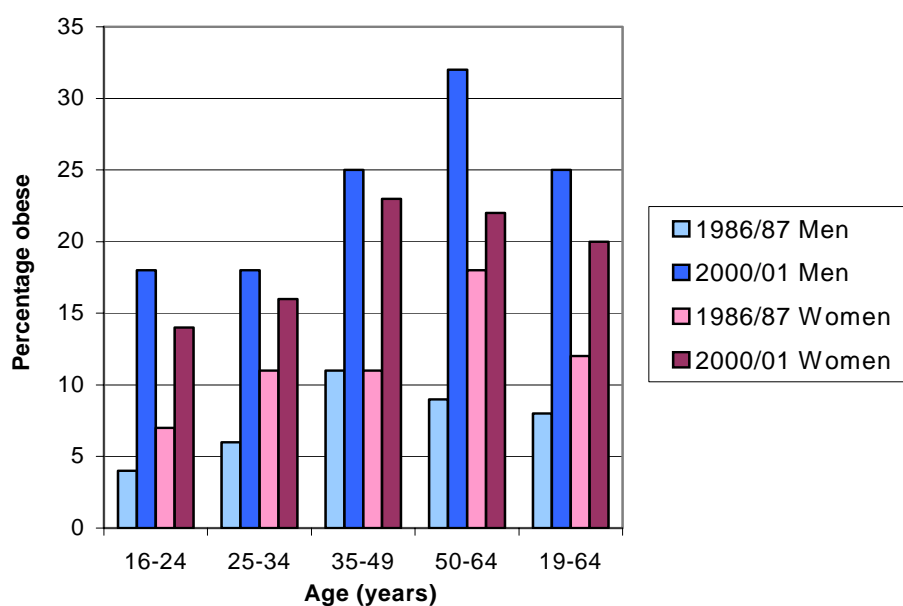
Information from NDNS surveys on energy intakes and body weight

Adults 19-64 years

Energy intake and body weight (Table 1)

- 1) Mean energy intakes for adults in 2000/01 fell below Estimated Average Requirements (EARs) for men and women in all age groups, and were 82-94% of EAR. However, the increasing prevalence of obesity suggests that energy intakes are generally in excess of requirements rather than inadequate.
- 2) Data from the two surveys of adults in 1986/87 and 2000/01 showed that the prevalence of obesity or overweight had increased from 45% of men and 36% of women who were obese or overweight in 1986/87 to 66% of men and 53% of women in 2000/01. This trend is confirmed by data from the Health Survey for England. Mean energy intakes in the 1986/87 survey were also below EARs. Comparing the 1986/87 and 2000/01 surveys, mean energy intake had fallen slightly in men but was unchanged in women.

Figure 1: Comparison of prevalence of obesity (BMI greater than 30) in adults in 1986/87 and 2000/01



There is evidence of low energy intakes in some younger women. In the 19-24 age group 10% had energy intakes below 4MJ/day (EAR is 8.1MJ/day for this group).

Older adults 65 years and over

Energy intake and body weight (Table 1)

- 3) Mean energy intakes were below EARs. In the free-living group mean energy intake was 85% of EAR in men and 76% in women and for men was lowest in the 85+ age group.
- 4) In the institution group mean intake was over 90% of the EAR.

Children & young people 4 – 18 years

Energy intake and body weight (Table 1)

- 5) Mean energy intakes were below the EARs at 80-90% of the EAR. In girls aged 15-18 years mean energy intake was 77% of the EAR.

Overview of energy and macronutrient intakes

- 6) Mean energy intakes fell below EARs in all age/sex groups. The difference between reported energy intakes and EARs is likely to arise from a combination of factors. Mis-reporting of food consumption is known to be a problem in NDNS as in dietary surveys worldwide. This can cause biased low estimates of intake as respondents under-report their actual intake or modify their diet during the recording period. Falling physical activity levels in recent years mean that energy requirements may be overestimated.
- 7) Fat intakes were generally just above the DRV and met the DRV for women aged 19-64 and women aged 65 and over living in an institution. Saturated fat intakes exceeded the DRV in all groups. Milk, cereals and meat were the major sources of fat and saturated fat, the contribution of milk decreasing with age, and that of meat increasing.
- 8) The percentage of food energy derived from carbohydrate met or was close to meeting the DRV of 50% in all age groups. Intakes in children and older people are above the DRV although this is largely due to the high consumption of non-milk extrinsic sugars (NMES) in these age groups. NMES intake exceeded the DRV in all age groups and was highest in children, especially boys, and older people in institutions. Soft drinks were the major source of NMES in children and young adults but in older adults this was table sugar.
- 9) All groups had mean protein intakes above the Reference Nutrient Intake levels. Intake of non-starch polysaccharides was low overall and no groups met the DRV for adults.

Table 1: Average daily total energy intake (MJ) as a percentage of the estimated average requirement (EAR) by sex and age of respondent*

Gender and age of respondent	Mean energy intake (MJ)	Intake as % EAR**	Number of subjects
Males and females aged 1.5-2.5 years***	4.39	90%	576
Males and females aged 2.5-3.5 years	4.88	84%	606
Male aged (years)			
3.5-4.5***	5.36	82%	250
4 - 6	6.39	89%	184
7 - 10	7.47	91%	256
11 - 14	8.28	89%	237
15 -18	9.60	83%	179
19-64	9.72	92%	833
65+ <i>Free-living</i>	8.02	85%	540
65+ <i>Living in an institution</i>	8.14	91%	93
Female aged (years)			
3.5-4.5***	4.98	82%	243
4 - 6	5.87	91%	171
7 - 10	6.72	92%	226
11 - 14	7.03	89%	238
15 -18	6.82	77%	210
19-64	6.87	85%	891
65+ <i>Free-living</i>	5.98	76%	735
65+ <i>Living in an institution</i>	6.94	90%	319

* Department of Health. Report on Health and Social Subjects: 41. *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom*. HMSO (London, 1991).

**The Estimated Average Requirements (EARs) for energy are:

Men:

0 – 3 months: 2.28MJ/d
 4 – 6 months: 2.89MJ/d
 7 – 9 months: 3.44 MJ/d
 10 – 12 months: 3.85MJ/d
 1 – 3 years: 5.15MJ/d
 4 – 7 years: 7.16MJ/d
 7 – 10 years: 8.24MJ/d
 11 – 14 years: 9.27MJ/d
 15 – 18 years: 11.51MJ/d
 19 to 50 years: 10.60MJ/d
 51 to 59 years: 10.60MJ/d
 60 to 64 years: 9.93MJ/d

Women:

0 – 3 months: 2.16MJ/d
 4 – 6 months: 2.69MJ/d
 7 – 9 months: 3.20MJ/d
 10 – 12 months: 3.61MJ/d
 1 – 3 years: 4.86MJ/d
 4 – 7 years: 6.46MJ/d
 7 – 10 years: 7.28MJ/d
 11 – 14 years: 7.72MJ/d
 15 – 18 years: 8.83MJ/d
 19 to 50 years: 8.10MJ/d
 51 to 59 years: 8.00MJ/d
 60 to 64 years: 7.99MJ/d

Energy intake as a percentage of EAR was calculated for each respondent using the EAR appropriate for sex and age.

***Energy intakes per kilogram body weight was used to calculate 'Intake as % of EAR'.

Excludes children not weighed or where weight measurement was invalid.

Table 2: Comparison of macronutrient intakes by adults in two surveys: 1986/87 Adults survey* and 2000/01 NDNS Adults**

Macronutrient	1986/87 Adults survey 16-64 years	2000/01 NDNS Adults 19-64 years	DRV***
Men			
Mean daily total energy intake (kcal)	2450	2313	2550 (19-59yrs) 2380 (60-64yrs)
% food energy from total carbohydrate	44.7	47.7	50
<i>of which:</i>			
% food energy from non-milk extrinsic sugars	n/a	13.6	11
% food energy from protein	15.2	16.5	n/a
% food energy from total fat	40.4	35.8	35
<i>of which:</i>			
% food energy from saturated fats	16.5	13.4	11
% food energy from trans unsaturated fats	2.2	1.2	2
% food energy from monounsaturated fats	12.4	12.1	13
% food energy from n-3 polyunsaturated fats	0.8	1	
% food energy from n-6 polyunsaturated fats	5.4	5.4	
Women			
Mean daily total energy intake (kcal)	1680	1632	1940 (19-50yrs) 1900 (51-64yrs)
% food energy from total carbohydrate	44.2	48.5	50
<i>of which:</i>			
% food energy from non-milk extrinsic sugars	n/a	11.9	11
% food energy from protein	15.6	16.6	N/a
% food energy from total fat	40.3	34.9	35
<i>of which:</i>			
% food energy from saturated fats	17	13.2	11
% food energy from trans unsaturated fats	2.2	1.2	2
% food energy from monounsaturated fats	12.2	11.5	13
% food energy from n-3 polyunsaturated fats	0.8	1	
% food energy from n-6 polyunsaturated fats	5.3	5.3	
n/a data not available			

* Gregory JR et al. *The Dietary and Nutritional Survey of British Adults*. HMSO (London, 1990).

** Henderson L et al. *The National Diet & Nutrition Survey: adults aged 19-64 years. Volume 2: Energy, protein, carbohydrate, fat and alcohol intake*. TSO (London, 2003)

*** Department of Health. *Report on Health and Social Subjects: 41. Dietary Reference Values for Food Energy and Nutrients for the United Kingdom*. HMSO (London, 1991).

Table 3: Percentage of food energy from total carbohydrate, non-milk extrinsic sugars (NMES), protein, total fat, saturated fatty acids and trans fatty acids and comparison with COMA Dietary Reference Values (DRVs)

Gender and age	Total carbohydrate	NMES	Protein	Total fat	Saturated fatty acids	Trans fatty acids	Base
Male aged (years)							
1.5-4.5	51.4	18.8	12.8	35.7	16.2	1.7	848
4-18	51.6	16.7	13.1	35.4	14.2	1.4	856
19-64	47.7	13.6	16.5	35.8	13.4	1.2	833
65+ <i>Free-living</i>	48.2	13.2	16.1	35.7	14.6	1.5	540
65+ <i>Living in an institution</i>	50.8	17.9	14.1	35.1	15.2	1.7	93
Female aged (years)							
1.5-4.5	50.8	18.6	13.1	36.1	16.2	1.7	827
4-18	51.1	16.4	13.1	35.9	14.3	1.3	845
19-64	48.5	11.9	16.6	34.9	13.2	1.2	891
65+ <i>Free-living</i>	47.5	11.5	16.5	36.1	15.3	1.6	735
65+ <i>Living in an institution</i>	51.3	18.5	14.0	34.8	15.4	1.8	319

Dietary reference values (DRVs) are:

Total carbohydrate should make up more than 50% of food energy intake

NMES should make up less than 11% of food energy intake

Total fat should make up less than 35% of food energy intake

Saturated fats should make up less than 11% of food energy intake

Trans fatty acids should make up less than 2% of food energy intake

Appendix 2

Comparison of FAO/WHO/UNU recommendations for energy intake with COMA DRV for energy (1991)

		FAO/WHO/UNU 2004			COMA 1991				
Age	Sex	Kg	PAL	MJ/d	Age	Sex	Kg	PAL	MJ/d
18 - 29.9 years	Male	70	1.6	11.7	19 - 29 years	Male	70	1.6	11.7
30 - 59.9 years	Male	70	1.6	11.2	30 - 59 years	Male	70	1.6	11.2
60 years plus	Male	70	1.6	9.4	60 - 64 years	Male	74	1.5	9.9
					65 - 74 years	Male	71	1.5	9.7
					75 years plus	Male	69	1.5	8.8
18 - 29.9 years	Female	60	1.6	9.2	19 - 29 years	Female	60	1.6	9.2
30 - 59.9 years	Female	60	1.6	8.9	30 - 59 years	Female	60	1.6	9.2
60 years plus	Female	60	1.6	8.1	60 - 64 years	Female	63.5	1.5	8
					65 - 74 years	Female	63	1.5	8.0
					75 years plus	Female	60	1.5	7.6

FAO/WHO/UNU 2004			COMA 1991		
Age	Daily Energy Requirement MJ/d		Age	EAR MJ/d	
	Male	Female		Male	Female
1 - 2 years	3.96	3.62	1 - 3 years	5.15	4.86
2 - 3 years	4.72	4.38	4 - 6 years	7.16	6.46
3 - 4 years	5.24	4.84	7 - 10 years	8.24	7.28
4 - 5 years	5.69	5.19	11 - 14 years	9.27	7.72
5 - 6 years	6.14	5.56	15 - 18 years	11.51	8.83
6 - 7 years	6.58	5.97			
7 - 8 years	7.08	6.50			
8 - 9 years	7.66	7.11			
9 - 10 years	8.28	7.76			
10 - 11 years	8.99	8.39			
11 - 12 years	9.80	8.99			
12 - 13 years	10.66	9.52			
13 - 14 years	11.59	9.95			
14 - 15 years	12.51	10.25			
15 - 16 years	13.30	10.42			
16 - 17 years	13.90	10.47			
17 - 18 years	14.27	10.47			

FAO/WHO/UNU 2004			COMA 1991		
Age	Daily Energy Requirement MJ/d		Age	EAR MJ/d	
	Male	Female		Male	Female
0 - 1 months	2.17	1.94	0 - 3 months	2.28	2.16
1 - 2 months	2.39	2.16			
2 - 3 months	2.49	2.30			
3 - 4 months	2.38	2.25	4 - 6 months	2.89	2.69
4 - 5 months	2.55	2.39			
5 - 6 months	2.67	2.51			
6 - 7 months	2.73	2.53	7 - 9 months	3.44	3.20
7 - 8 months	2.85	2.63			
8 - 9 months	2.94	2.73			
9 - 10 months	3.06	2.83	10 - 12 months	3.85	3.61
10 - 11 months	3.15	2.90			
11 - 12 months	3.24	2.98			