

Dietary guidelines and patterns of food and nutrient intake in Sweden

Wulf Becker

National Food Administration, PO Box 622, S-751 26 Uppsala, Sweden

The Nordic and Swedish Nutrition Recommendations emphasize the balance between macronutrients in the diet. The amount of saturated and total fat should be limited to c. 10 %energy and 30 %energy, respectively, and the amount of total carbohydrates should be 55–60 %energy. Data from the first Swedish national dietary survey in 1989 show that the average diet is too high in fat, especially saturated fat (36–37 %energy and 16 %energy, respectively) while the content of total carbohydrates and dietary fibre is too low. However, parts of the population consume a diet that meets the recommendation for a particular macronutrient. A comparison of subjects with a low or high intake of total fat and saturated fat, dietary fibre or fruit and vegetables show some common trends with respect to the characteristics of a dietary pattern equal or close to the recommendations, e.g. more frequent consumption of fruit and vegetables and a lower consumption of some fat-rich foods, such as spreads, cheese and sausages.

Dietary guidelines: Dietary pattern: Sweden

The Nordic countries have for several decades collaborated in setting guidelines for dietary composition and recommended intakes of nutrients. The similarities in dietary habits as well as in the prevalence of diet-related diseases – such as coronary heart disease, obesity and diabetes – warranted a focus on the gross composition of the diet, i.e. the intake of fat, carbohydrates and protein as percentage of total energy intake. The third edition of Nordic Nutrition Recommendations (NNR) was published in 1996 (Sandström *et al.* 1996). Parts of the recommendations are given in Table 1.

In Sweden, the NNR have been adopted as the national recommendations with some minor additions. The recommendations have served as the basis for development of various dietary guidelines – guidelines for meal services for schools, children's day-care centres, hospitals, etc. – food standards, as well as for health-directed campaigns at a national or regional level. They are also the basis for the national plan of action that was developed, and formally approved by the Government in 1995, after the World Food Conference in Rome 1992.

An example of a food-based dietary guideline is the so-called 'Plate model'. The idea of the model is to illustrate the proportions between the components of a meal. The plate is divided into three sections, by an inverted 'Y', representing the contribution from: a, vegetables and fruit; b, potatoes, rice, pasta and bread; and c, meat, fish, eggs or pulses. It should be noted that the model describes the proportions of different foods in a meal and not only what is actually on the plate. Other widely used dietary guidelines are the 'Basic

seven' food circle, including the concept of 'basic' and 'supplementary' foods, and the food pyramid. An example of how nutrient recommendations could be implemented into food standards is the 'keyhole' labelling symbol. The symbol can be printed on packages of foods rich in fibre or low in fat within certain specified food groups. Within each food group, foods having a fat or fibre content below or above a certain level can be labelled with the symbol. Labelling is voluntary. Food groups presently included are spreads, cheese, milk, ice-cream, bread and cereals. Also ready-to-eat dishes and meals served in restaurants (menu labelling) can be labelled, but labelling here only refers to the fat content.

Methods

In Sweden, information on the dietary habits of the population as a whole can be obtained from the first national survey (the 'HULK survey') carried out in 1989 (Becker, 1994). The survey was a combined household and dietary survey of the Swedish population and was carried out by Statistics Sweden in collaboration with the National Food Administration (NFA). Each household was asked to record all the foods it purchased over a 4-week period. For food eaten outside the home only expenditures were recorded. Food intake for one household member was measured using a simplified 7 d record with precoded alternatives (expressed in household measures) for food consumed. Using a portion-guide with photographs, sizes of cooked food portions eaten at main meals and fat spreads used on sandwiches could be

estimated. Around 2000 persons, 1–74 years old, completed the study with a participation rate of 70%.

Data from this survey has been used for analysing the food-intake pattern in relation to high or low consumers of total fat, saturated fat, dietary fibre and fruit and vegetables (Becker, 1995). Subjects aged 15–74 years were included in the analyses. Details of the grouping of subjects into 'low' or 'high' consumers are given in the tables. For total fat, the subjects were grouped into fixed categories of 5% units of energy. The reason for this was to obtain characteristics of subjects eating a diet that was below the current recommendation of 30% energy compared to those eating a high-fat diet (> 40% energy). This approach could not be applied to saturated fat, since the number of subjects eating a diet with less than 10% energy from saturated fat was very small. For saturated fat, dietary fibre, and fruit and vegetables, subjects were divided into more evenly distributed categories of intake. Data are shown for women only.

Results

In Table 1, the intakes of energy and macronutrients among males and females are given and compared to the current recommendations. The proportion of fat, and especially saturated fat, is higher than the recommended level, while the %energy from carbohydrates and the dietary fibre content is lower. The energy intake levels recorded are low, indicating under-reporting of food intake. Adjusting for obvious under-reporting increased fat content by 1–2% units (see Becker *et al.* 1999).

A comparison of the food intake of women classified as consuming a diet with a low or high content of total fat showed that a low-fat diet was associated with a lower consumption of spreads, cheese, sausage and buns, whereas the intake of fruit and vegetables was substantially higher, compared to a high-fat diet (Table 2). For spreads, and to some extent for cheese, the lower consumption among low-fat eaters was primarily due to smaller portions but also associated with fewer eating occasions. The lower mean

intake of sausage among low-fat eaters was mainly due to a lower proportion of consumers. A similar pattern was seen when the subjects were classified according to the content of saturated fat (Table 3).

Women consuming a diet low in dietary fibre ate less spreads and sausages but more fruit and vegetables, and the fat content was lower than among those consuming a high-fibre diet (Table 4). The lower mean intake of sausage among high-fibre eaters was mainly due to a lower proportion of consumers.

Women with a low intake of fruit and vegetables had a higher intake of total and saturated fat (expressed as %energy), but a lower intake of carbohydrates and dietary fibre than those eating a lot of fruit and vegetables (Table 5).

Discussion

The HULK survey shows that the average Swedish diet is too high in fat, especially saturated fat, while the content of complex carbohydrates is too low. However, parts of the population consume a diet that meets the recommendation for a particular macronutrient.

A problem in this type of analysis is that the energy intake often is different between subjects consuming low and high amounts of the various nutrients or foods in question. Subjects consuming a diet high in total and saturated fat had a higher energy intake than those consuming a low-fat diet, while the opposite was seen for fibre intake. One reason for this could be a general and/or selective under-reporting of certain foods.

In the Swedish survey subjects with a reported energy intake that indicated a probable under-reporting ($EI_{est}/BMR < 1.1$) recorded smaller portions of spreads than those with acceptable $EI_{est}/BMR (> 1.35)$. For low-energy reporters, both the frequency of intake among consumers and proportion of subjects recording spread intake was somewhat smaller. For fruit and vegetables, the differences in frequency of intake among consumers and the proportion of subjects reporting intake was smaller between low and acceptable energy reporters, than for spreads, and the actual portion

Table 1. Diet composition in the Swedish national dietary survey 1989 among men and women 15–74 years old

	Women <i>n</i> = 842		Men <i>n</i> = 809		NNR* 1996
	Mean	SD	Mean	SD	
EI: BMR _{est} ratio	1.33	0.38	1.35	0.38	1.6
Energy (MJ/d)	7.6	0.1	9.9	0.2	—
Fat (%energy)	36	0.3	37	0.4	30
SFA (%energy)	16	0.2	16.5	0.2	10
MUFA (%energy)	12	0.1	12.5	0.1	10–15
PUFA (%energy)	5.1	0.1	5.4	0.1	5–10
Carbohydrate, total (%energy)	47	0.4	45	0.4	55–60
Protein (%energy)	15	0.2	15	0.1	10–15
Alcohol (%energy)	1.7	0.2	3.1	0.3	<5
Dietary fibre (g/d)	15	0.3	18	0.4	25–35
Dietary fibre (g/MJ)	2.0	0.5	1.8	0.5	3
Fruit and vegetables (g/d)	290	175	240	180	increase

* Nordic Nutrition Recommendations.

EI: BMR_{est} ratio = Energy Intake: estimated Basal Metabolic Rate; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

Table 2. Energy, macronutrient and food intake in Swedish women aged 15–74 years classified as low and high fat eaters

	Low fat < 30%energy (n=81)			High fat > 40%energy (n=169)		
	Mean	SD	% consumers	Mean	SD	% consumers
EI : BMR ratio	1.14	0.35		1.46	0.36	
Energy (MJ/d)	6.7	1.9		8.2	1.9	
Fat, total (%energy)	27	2.7		43	2.6	
SFA (%energy)	12	1.7		19	2.2	
MUFA (%energy)	9	1.2		14	1.1	
PUFA (%energy)	3.8	0.7		6.5	1.6	
Carbohydrate, total (%energy)	56	5.7		42	3.4	
Protein (%energy)	15	3.3		14	2.0	
Alcohol (%energy)	2.4	3.8		1.4	1.9	
Dietary fibre (g/d)	17	6		14	4	
Dietary fibre (g/MJ)	2.6	0.7		1.7	0.3	
Food intake (g/d)						
Spreads	8	6	84	25	17	94
Cheese	30	23	91	41	25	98
Milk	350	240	91	320	210	95
Bread	79	31	100	85	31	100
Potatoes	101	68	98	106	56	98
Vegetables	117	93	98	82	52	94
Fruit	210	149	98	92	81	93
Juice	96	150	56	44	64	51
Meat	68	42	95	78	35	94
Sausage	9	11	56	23	17	91
Buns, pastries, etc.	29	26	81	49	34	96

EI : BMR ratio = Energy Intake : Basal Metabolic Rate; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

Table 3. Energy, macronutrient and food intake in Swedish women aged 15–74 years classified as low and high saturated fat eaters

	Low SFA < 13%energy (n=103)			High SFA > 18%energy (n=168)		
	Mean	SD	% consumers	Mean	SD	% consumers
EI : BMR ratio	1.16	0.35		1.48	0.37	
Energy (MJ/d)	6.7	1.9		8.3	2.0	
Fat (%energy)	29	3.7		42	3.5	
SFA (%energy)	12	1.3		20	1.6	
MUFA (%energy)	10	1.5		13	1.4	
PUFA (%energy)	4.5	1.3		5.4	1.5	
Carbohydrate, total (%energy)	56	5.7		42	3.4	
Protein (%energy)	15	3.3		14	2.0	
Alcohol (%energy)	2.3	3.5		1.4	2.0	
Dietary fibre (g/d)	17	5		14	4	
Dietary fibre (g/MJ)	2.6	0.7		1.7	0.3	
Food intake (g/d)						
Spreads	9	8	85	25	17	98
Cheese	26	20	90	46	25	99
Milk	341	237	92	368	234	98
Bread	77	30	100	85	28	100
Potatoes	107	70	98	109	59	98
Vegetables	123	87	99	80	47	99
Fruit	188	128	97	97	79	94
Juice	90	139	59	44	72	48
Meat	70	42	95	73	35	99
Sausage	12	13	64	21	16	86
Buns, pastries, etc.	32	28	84	50	36	95

EI : BMR ratio = Energy Intake : Basal Metabolic Rate; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

Table 4. Energy, macronutrient and food intake in Swedish women aged 15–74 years classified as low and high fibre eaters

	Low fibre < 1.5 g/MJ (n = 109)			High fibre > 2.5 g/MJ (n = 128)		
	Mean	SD	% Consumers	Mean	SD	% Consumers
EI : BMR ratio	1.39	0.40		1.15	0.36	
Energy (MJ/d)	7.9	2.2		6.6	1.9	
Fat (%energy)	40	5.1		31	4.1	
SFA (%energy)	18	2.9		14	2.4	
MUFA (%energy)	13	1.7		10	1.6	
PUFA (%energy)	5.6	1.7		4.4	1.1	
Carbohydrate, total (%energy)	45	5.8		52	5.4	
Protein (%energy)	15	2.4		16	2.8	
Alcohol (%energy)	1.9	3.3		1.3	1.9	
Dietary fibre (g/d)	11	3.3		19	5.6	
Dietary fibre (g/MJ)	1.4	0.1		2.9	0.4	
Food intake (g/d)						
Spreads	20	15	99	11	8	91
Cheese	35	23	94	39	26	96
Milk	430	260	95	295	195	93
Bread	75	34	100	83	34	100
Potatoes	116	66	98	95	65	97
Vegetables	56	39	97	127	82	99
Fruit	48	48	87	224	130	99
Juice	67	110	52	60	93	48
Meat	75	32	100	69	47	95
Sausage	23	18	90	12	14	66
Buns, pastries, etc.	37	33	92	32	28	83

EI : BMR = Energy Intake : Basal Metabolic Rate; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

Table 5. Energy, macronutrient and food intake in Swedish women aged 15–74 years classified as low and high fruit and vegetable eaters

	Fruit and vegetables (portions per day)					
	< 2 (n = 161)			> 5 (n = 141)		
	Mean	SD	% Consumers	Mean	SD	% Consumers
EI : BMR ratio	1.16	0.31		1.47	0.45	
Energy (MJ/d)	6.7	1.8		8.4	2.5	
Fat (%energy)	38	5		34	4	
SFA (%energy)	17	3		15	3	
MUFA (%energy)	13	1.7		11	1.8	
PUFA (%energy)	5.2	1.6		4.7	1.2	
Carbohydrate, total (%energy)	46	5.5		51	5.8	
Protein (%energy)	15	2.3		15	2.8	
Alcohol (%energy)	1.4	2.4		1.5	1.9	
Dietary fibre (g/d)	11	3		20	4	
Dietary fibre (g/MJ)	1.7	0.4		2.5	0.6	
Food intake (g/d)						
Spreads	16	12	98	16	14	96
Cheese	30	20	93	46	26	99
Milk	360	240	96	320	210	93
Bread	77	31	100	89	38	100
Potatoes	99	64	96	113	65	99
Vegetables	40	31	96	165	73	100
Fruit	42	45	78	237	116	100
Juice	29	55	35	110	154	66
Meat	67	34	99	77	49	95
Sausage	20	16	84	15	16	68
Buns, pastries, etc.	36	32	88	45	36	91

EI : BMR = Energy Intake : Basal Metabolic Rate; SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

sizes among consumers were similar. Thus both general and selective under-reporting among low-fat eaters can be suspected. On the other hand, a fat-rich diet usually contains more energy than a diet low in fat (Becker *et al.* 1999).

The results of the analyses show some common trends with respect to the characteristics of a dietary pattern equal or close to the recommendations, such as a higher consumption of fruit and vegetables, and a lower consumption of some fat-rich foods, e.g. spreads, cheese and sausages. However, high consumers of fruit and vegetables did eat more cheese than low consumers, but the content of total and saturated fat was still lower (Table 5).

The overall results of the national survey also show that the proportion of subjects meeting a specific recommendation varies depending on the nutrient. The recommendation for saturated fat is the most difficult to meet, followed by that for dietary fibre and total fat. Establishing a goal of five portions of fruit and vegetables per day would also be

difficult to meet as only 10–15% of the adult population meets this goal, according to the 1989 survey.

References

- Becker W (1994) *Dietary habits and nutrient intake in Sweden 1989* (in Swedish with English summary). National Food Administration, Uppsala.
- Becker W (1995) *Relation of dietary factors to food and nutrient intake* (in Swedish). SLV Report No. 11. National Food Administration, Uppsala.
- Becker W, Foley S, Shelley E & Gibney M (1999) Energy under-reporting in Swedish and Irish Dietary Surveys: Implications for Food-based Dietary Guidelines. *British Journal of Nutrition* **81** (suppl.), S127–S131.
- Sandström B, Lyhne N, Pedersen JI, Aro A, Thorsdóttir I & Becker W (1996) Nordic Nutrition Recommendations 1996. *Scandinavian Journal of Nutrition/Näringsforskning* **40**, 161–165.