

## Patterns of food and nutrient intakes of Dutch adults according to intakes of total fat, saturated fatty acids, dietary fibre, and of fruit and vegetables

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Dietary intake characteristics were studied among 3833 adults of the second Dutch National Food Consumption Survey held in 1992. The subjects were classified into three groups based on their intake of total fat (% energy), saturated fatty acids (% energy), dietary fibre (g/MJ), and fruit and vegetables (g/d). All the classifications resulted in differences in energy intake. Except for dietary fibre, the mean energy intake was higher in the higher-intake tertiles. For the classification based on total fat, saturated fatty acids and dietary fibre the more prudent diets were accompanied with a lower energy-intake. As to the consumption of food groups, differences existed in both the proportion of consumers and in the mean consumption among users. It is concluded that the trends observed are probably more important than the actual figures.

### Dietary intake: The Netherlands

Nutritional standards for the Netherlands originate from two categories, namely the Recommended Dietary Allowances (RDA) with a long-standing tradition (Netherlands Food and Nutrition Council, 1992), and the Guidelines for a Healthy Diet, formulated in 1986 (Netherlands Food and Nutrition Council, 1986). In 1991 a reassessment of the goals related to fat consumption was carried out, and at this moment the Guidelines for a Healthy Diet are being updated. All the nutritional standards for the Netherlands are formulated by the Netherlands Food and Nutrition Council, an independent scientific advisory board for the Ministries of Health, Welfare and Sports and of Agriculture, Nature Management and Fisheries.

The Guidelines for a Healthy Diet can be summarized as follows: introduce variety into the diet; restrict the consumption of fat, notably saturated fat, and eat enough polyunsaturated fat; restrict the consumption of cholesterol; eat plenty of complex carbohydrates (starch) and fibre and avoid over-frequent and excessive consumption of sugar (both the monosaccharides and disaccharides); restrict alcohol consumption; and restrict the use of salt. In addition to observing these general rules, it is of course essential to achieve or maintain a normal body weight. These guidelines apply to the population as a whole; specific adjustments will be required for persons already on a diet.

In view of the population's current dietary habits, the Council recommends several changes in the nutritional composition of the diet. These changes apply to fat intake, vegetable/animal protein, cholesterol, (complex) carbohydrates, mono- and disaccharides, dietary fibre, alcohol and salt. For instance, the consumption of salt per individual should be such that it does not exceed the current daily average of 9 g.

The relatively high fat intake observed for the Dutch population (Löwik *et al.* 1994), especially the intake of saturated fatty acids (SFA), is given the strongest emphasis in several policy statements because the scientific evidence of its relationship to health is strongest and the likely impact of a change in fat on public health is greatest (Van Wechem *et al.* 1998). Fat intake should be reduced from an average of 40% to 30–35% of daily energy intake. This reduction should be brought about by limiting the amount of saturated fat consumed. In 1991 it was stated that total fat intake should be reduced to 30–35% energy and that the intake of saturated fat should be reduced to 10% energy.

The data presented hereafter should be interpreted from the perspective of the above-mentioned standards.

### Methods

In 1987–8, the first Dutch National Food Consumption Survey (DNFCS) was conducted (Löwik *et al.* 1994); the second DNFCS was carried out in 1992 (Löwik *et al.* 1998), whereas the data collection of the third survey was completed in March 1998. The first results of the third DNFCS are expected at the end of 1998. All surveys are conducted within the framework of the Dutch Nutrition Surveillance System (Löwik *et al.* 1996). Data were obtained from a probability sample of non-institutionalized subjects. Information on food consumption was collected with 2 d dietary records. In the dietary record method, respondents recorded their actual consumption of foods and beverages at the time of consumption. The amounts of the food products consumed were assessed by estimation of the weight of the food. In each household the person principally responsible

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for domestic affairs (main housekeeper) was the most important and was visited on two occasions by a specially trained dietitian. During the first visit the household diary was explained: in this diary all the food supplied by the main housekeeper to the household members as well as information on cooking methods, recipes and ingredients were recorded. The number of persons (including visitors) attending the different meals and the amounts of foods used by them, as well as amounts of leftovers and food given to pets, was noted. Household members (except children under 13) recorded food eaten outdoors in separate diaries. During the second visit the interviewers checked the diaries. Common household measures and food regularly used (i.e., slices of bread, amount of fat spread on bread, amounts of sugar added to tea and/or coffee) were weighed. All the information was used for the conversion of household data into intake figures on an individual level. To convert the food consumption data into dietary intake figures the Netherlands Food Composition Table was used. For this, the 1986–1987 version of the food composition table was used in the first DNFCs, and the 1993 version was used in the second DNFCs.

For the purpose of this country report, 3833 subjects 18–60 years of age (women had to be non-pregnant) of the second DNFCs, held in 1992, were selected. These subjects were classified into three groups (tertiles), whereby the classification was based on the subject's intake relative to the intake levels of the other subjects. This was carried out for total fat (%energy), SFA (%energy), dietary fibre (g/MJ), and fruit and vegetables (g/d). After this classification the mean intake of energy and nutrients and the average consumption of food groups was calculated for the separate tertiles. As to food groups, the proportion of users and the mean consumption among users was calculated.

### Results and discussion

In Tables 1–5 the dietary intake figures for the various tertiles are presented. The results regarding the intake of dietary fibre should be interpreted with care, since the amount of dietary fibre refers mainly to insoluble fibre only. Mostly dietary fibre is defined as the combination of soluble and insoluble fibre.

In general, the characteristics of the diet were more in line with the guidelines for a healthy diet for the tertiles with a relatively low intake of total fat and of SFA and with a relatively high intake of dietary fibre and of fruit and vegetable consumption. As a matter of course, this is partly the result of the classification criteria in that the results are intentionally created in the direction of one of the goals of the guidelines.

All the classifications resulted in differences in energy intake. Except for dietary fibre, the mean energy intake was higher in the higher-intake tertiles. For the classification based on total fat, saturated fat and dietary fibre the 'better' diets were accompanied with a lower energy-intake. This may be (partly) the result of (selective) under-reporting, especially since it is known that under-reporting exists in the survey used for the calculations presented here. In that case, the 'better' diets are artificial in the sense that these diets are

not realized in reality by the particular subjects. Therefore, the absolute level of the figures presented should be used with care. On the other hand, it should be realized that we used a large sample that was classified into tertiles, whereby large subgroups were created. Furthermore, mostly a clear trend or gradient was observed among the tertiles with the intermediate tertile having values between the lowest and the highest tertile. Therefore, it is most likely that the trend in the data is a valid observation, whereas the quantification of these trends may be biased by (selective) under-reporting. As to fruit and vegetables, an opposite trend regarding the intake of energy is observed. The mean energy intake was higher at a higher consumption level of fruit and vegetables. This is probably the result of the more general phenomenon that a higher consumption of a particular food group, in this case fruit and vegetables, is more likely to be realized by subjects with a higher energy requirement. For instance, the subjects with the highest fruit and vegetable consumption also had a higher mean consumption of meat and meat products and of cheese.

As to the consumption of food groups, differences existed both in the proportion of consumers and in the mean consumption among users. For the basic food groups, which are mostly used daily, the differences in the proportion of users were small if they existed at all. For these groups, with a proportion of users approaching 100%, a more detailed classification is needed in order to come up with useable information. An extra argument for doing this is that nutritional advice often is to realize the guidelines by a substitution within product categories: for instance, choosing leaner varieties. The results of the first and second DNFCs show that the lowering of fat intake was indeed partly the result of the more frequent usage of leaner varieties (Hulshof *et al.* 1996).

In cases where an energy-providing nutrient is used to classify subjects into tertiles, in this case fat, the %energy of the other macronutrients will increase when the energy obtained from fat decreases. The results show that fat is mainly 'substituted' by carbohydrates. Much smaller changes were observed for protein and for alcohol, probably partly as a consequence of the smaller amount of energy that is provided by these nutrients in general. Furthermore, for protein it is known that the %energy is relatively stable, even in a cross-cultural setting.

A lower total fat intake (%energy) is associated with a somewhat higher consumption of milk and milk products, whereas these products are among the major sources of fat. The reason for this apparent contradiction is that a lot of milk products have a %energy below the mean %energy observed for the population, whereby these products contribute to lowering the fat content of the diet as a whole. An opposite association was observed for SFA, in that a positive association was observed between the consumption of milk and milk products and the energy obtained from SFA.

In summary, the classification into tertiles regarding the intake of fat, SFA and to a lesser extent dietary fibre (due to methodological problems) and the consumption of fruit and vegetables provided relevant information. The trends observed are probably more important than the actual figures.

**Table 1.** Mean daily intakes of energy and selected nutrients among the total sample of 18–60-year-old Dutch subjects in 1992 according to tertiles of the consumption of total fat, SFA, dietary fibre, and fruit and vegetables

	Total fat (%energy)			SFA (%energy)			Dietary fibre (g/MJ)			Fruit & vegetables (g/d)		
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
	(cut-off < 34.7)	(cut-off > 40.3)	(cut-off > 15.5)	(cut-off < 12.9)	(cut-off > 15.5)	(cut-off > 1.9)	(cut-off < 1.4)	(cut-off > 1.9)	(cut-off > 295)	(cut-off < 157)	(cut-off > 295)	
Energy (MJ)	9.1	9.7	10.2	9.4	9.8	9.8	10.5	10.0	8.5	9.5	9.7	9.8
%energy of:												
Protein	16.2	15.2	14.6	15.7	15.3	15.1	14.3	15.0	16.8	14.5	15.3	16.2
Total fat	30.1	37.5	44.9	31.5	37.9	43.1	38.3	38.4	35.7	38.5	37.8	36.2
SFA	11.6	14.5	17.0	10.9	14.2	17.9	14.8	14.6	13.5	14.5	14.6	13.9
MUFA	11.0	13.9	17.0	11.9	14.1	15.9	14.3	14.4	13.2	14.6	14.1	13.3
PUFA	5.4	6.9	8.5	6.6	7.2	7.0	6.9	7.1	6.7	7.1	6.9	6.8
Carbohydrates	48.4	44.0	38.4	47.5	43.9	39.4	42.4	43.4	45.0	42.6	43.5	44.7
Mono- and disaccharides	23.7	20.3	16.6	22.5	20.2	17.9	20.6	20.0	20.0	18.8	20.2	21.6
Alcohol	5.4	3.3	2.2	5.3	3.1	2.5	5.0	3.3	2.5	4.4	3.5	3.0
Cholesterol (mg/MJ)	26	27	30	25	27	31	29	28	26	28	28	27
Dietary fibre (g)	16	17	16	17	17	15	12	7	21	14	16	19
Dietary fibre (g/MJ)	1.9	1.7	1.6	1.9	1.7	1.6	1.1	1.1	2.5	1.5	1.7	2.1
Vitamin A (mg)	0.68	0.75	0.82	0.69	0.75	0.81	0.76	0.77	0.73	0.65	0.75	0.84
Vitamin B <sub>6</sub> (µg/g protein)	20	19	19	21	19	18	18	20	21	19	19	21
Vitamin C (mg)	80	75	65	79	73	69	56	73	91	44	70	107

SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

**Table 2.** Daily consumption (g/d) of food groups (consumers only and all subjects) among 18–60-year-old Dutch subjects in 1992 according to the consumption of total fat

	Fat intake (%energy)											
	Lowest tertile				Intermediate tertile				Highest tertile			
	Consumers only		All subjects		Consumers only		All subjects		Consumers only		All subjects	
	% consumers	mean	mean	% consumers	mean	% consumers	mean	% consumers	mean	% consumers	mean	
Potatoes	77	135	104	83	146	121	142	87	163	142	142	
Bread	99	145	143	99	150	149	140	99	141	140	140	
Alcoholic beverages	54	593	319	48	383	185	134	41	325	134	134	
Non-alcoholic beverages	100	1318	1318	100	1289	1289	1285	100	1286	1285	1285	
Eggs	43	32	14	48	32	15	18	53	34	18	18	
Fruit	79	170	133	73	145	107	90	68	133	90	90	
Biscuits/pastries	74	55	40	83	61	50	48	79	61	48	48	
Cereal products	64	91	58	66	75	50	30	53	57	30	30	
Vegetables	94	156	147	93	154	144	128	91	140	128	128	
Savoury sandwich spreads	16	15	2	20	16	3	3	18	17	3	3	
Cheese	77	35	27	81	42	34	38	83	46	38	38	
Milk (products)	95	373	355	96	363	348	319	94	341	319	319	
Nuts, seeds and snacks	46	44	20	62	46	28	42	66	64	42	42	
Pulses	8	107	8	7	97	7	7	7	102	7	7	
Mixed dishes	24	158	38	25	150	38	31	22	144	31	31	
Soup	41	209	85	40	200	79	68	37	187	68	68	
Soy products	10	12	1	9	11	1	1	6	14	1	1	
Sugar, sweets and preserves	87	52	46	92	48	44	34	86	39	34	34	
Fats and oils	97	42	41	99	50	50	62	99	63	62	62	
Fish	16	63	10	15	68	10	11	17	66	11	11	
Meat (products)	96	115	111	97	123	119	128	97	132	128	128	

**Table 3.** Daily consumption (g/d) of food groups (consumers only and all subjects) among 18–60-year-old Dutch subjects in 1992 according to the consumption of saturated fat

	Saturated fat intake (%energy)											
	Lowest tertile				Intermediate tertile				Highest tertile			
	Consumers only		All subjects		Consumers only		All subjects		Consumers only		All subjects	
	% consumers	mean	mean	mean	% consumers	mean	mean	mean	% consumers	mean	mean	
Potatoes	77	138	106	84	150	126	86	156	134			
Bread	99	151	149	99	149	148	99	136	135			
Alcoholic beverages	54	589	320	46	398	182	43	313	135			
Non-alcoholic beverages	100	1338	1338	100	1270	1270	100	1286	1265			
Eggs	45	35	16	32	49	16	51	31	16			
Fruit	76	169	129	74	142	105	70	138	96			
Biscuits/pastries	74	56	41	81	61	50	81	59	48			
Cereal products	64	90	58	63	76	48	57	57	33			
Vegetables	92	156	144	92	148	136	94	147	139			
Savoury sandwich spreads	23	16	4	19	16	3	12	16	2			
Cheese	72	29	21	80	39	31	88	52	45			
Milk (products)	94	347	326	95	359	342	96	371	354			
Nuts, seeds and snacks	54	56	30	62	49	30	58	52	30			
Pulses	8	104	8	6	99	6	7	102	7			
Mixed dishes	27	170	46	25	133	33	19	148	28			
Soup	41	206	84	40	210	84	36	180	65			
Soy products	11	14	2	9	11	1	5	10	1			
Sugar, sweets and preserves	87	50	44	91	49	44	87	41	35			
Fats and oils	97	46	44	99	54	53	99	56	55			
Fish	19	67	12	15	67	10	13	63	8			
Meat (products)	95	115	109	98	125	122	97	130	126			

**Table 4.** Daily consumption (g/d) of food groups (consumers only and all subjects) among 18–60-year-old Dutch subjects in 1992 according to the consumption of dietary fibre

	Dietary fibre intake (g/MJ)											
	Lowest tertile				Intermediate tertile				Highest tertile			
	Consumers only		All subjects		Consumers only		All subjects		Consumers only		All subjects	
	% consumers	mean	mean	mean	% consumers	mean	mean	mean	% consumers	mean	mean	
Potatoes	74	132	97	88	154	135	86	157	134			
Bread	99	139	136	100	147	146	99	151	149			
Alcoholic beverages	57	590	335	48	390	187	38	299	114			
Non-alcoholic beverages	100	1238	1238	100	1274	1273	100	1383	1383			
Eggs	52	36	19	51	32	16	41	29	12			
Fruit	61	113	69	76	140	106	83	187	155			
Biscuits/pastries	77	65	50	84	62	51	75	49	37			
Cereal products	59	87	52	64	76	48	60	64	38			
Vegetables	89	115	102	94	146	137	96	186	179			
Savoury sandwich spreads	17	16	3	18	16	3	19	16	3			
Cheese	79	44	34	80	41	33	81	38	31			
Milk (products)	96	359	343	96	365	351	93	352	328			
Nuts, seeds and snacks	62	57	36	61	52	32	50	46	23			
Pulses	2	67	2	5	91	4	14	112	15			
Mixed dishes	32	164	53	24	145	34	15	133	20			
Soup	38	185	71	39	199	77	40	213	85			
Soy products	8	7	1	8	9	1	8	21	2			
Sugar, sweets and preserves	90	52	47	90	49	44	85	38	32			
Fats and oils	99	57	57	99	54	53	97	44	43			
Fish	19	75	14	15	63	9	14	56	8			
Meat (products)	97	131	126	98	124	121	95	115	110			

**Table 5.** Daily consumption (g/d) of food groups (consumers only and all subjects) among 18–60-year-old Dutch subjects in 1992 according to the consumption of fruit and vegetables

	Fruit and vegetable consumption (g/d)											
	Lowest tertile				Intermediate tertile				Highest tertile			
	Consumers only		All subjects		Consumers only		All subjects		Consumers only		All subjects	
	% consumers	mean	% consumers	mean	% consumers	mean	% consumers	mean	% consumers	mean	% consumers	
Potatoes	75	135	101	147	86	147	126	161	87	161	140	
Bread	99	143	141	142	99	142	141	151	99	151	150	
Alcoholic beverages	50	543	274	425	47	425	202	356	45	356	161	
Non-alcoholic beverages	100	1250	1249	1275	100	1275	1275	1369	100	1369	1369	
Eggs	47	36	17	31	51	31	16	31	46	31	15	
Fruit	42	53	22	108	81	108	88	227	97	227	221	
Biscuits/pastries	74	57	42	58	83	58	48	61	80	61	49	
Cereal products	56	78	43	74	63	74	47	74	65	74	48	
Vegetables	83	77	64	144	97	144	139	219	98	219	215	
Savoury sandwich spreads	18	17	3	16	18	16	3	15	19	15	3	
Cheese	75	40	30	40	81	40	32	42	84	42	36	
Milk (products)	93	322	298	371	96	371	357	383	96	383	367	
Nuts, seeds and snacks	65	61	40	48	59	48	28	45	50	45	22	
Pulses	7	101	7	101	8	101	8	103	6	103	7	
Mixed dishes	33	168	56	139	22	139	31	132	16	132	21	
Soup	36	204	75	192	40	192	77	202	40	202	82	
Soy products	7	6	1	9	7	9	1	18	10	18	2	
Sugar, sweets and preserves	86	48	41	48	92	48	44	43	88	43	38	
Fats and oils	99	51	51	53	98	53	52	51	98	51	50	
Fish	14	67	9	64	16	64	11	66	17	66	11	
Meat (products)	96	110	106	127	98	127	125	133	96	133	127	

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