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Reduction in fat intake in The Netherlands: the influence of food composition data

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In 1987–1988, the first Dutch National Food Consumption Survey (DNFCS) was conducted among 5898 subjects, aged 1–85 years. In 1992, the second survey was carried out among 6218 subjects, aged 1–92 years. Data of the first DNFCS were converted into energy and nutrients with the 1986–1987 version of The Netherlands nutrient databank (NEVO). The latest update of the 1993 NEVO Table was used to convert the 1992 food consumption data. This update reflected real changes in food availability but also artefactual changes due to improvements in the quality of the data. Compared with the results of the first DNFCS, in 1992 a substantially lower fat intake was observed (105 vs 92 g/day). Roughly half of the difference could be ascribed to changes in food choices, and the remaining half to changes in nutrient databanks. After correction for artefacts in nutrient databases the real difference in fat intake between the first and the second DNFCS was assessed to be 11 g/day. In conclusion, changes in food consumption data over time should be interpreted with care, and it is important to separate facts from artefacts. Copyright © 1996 Elsevier Science Ltd

INTRODUCTION

According to The Netherlands Food and Nutrition Council (1987) the Dutch National Food Consumption Survey (DNFCS) should provide information on mean food consumption and nutrient intake and their distribution among various categories of the non-institutionalized population. To get insight into the intake of energy and nutrients data of the DNFCS need to be converted with the aid of The Netherlands Nutrient Databank (NEVO).

In 1987–1988, the first DNFCS was carried out within the framework of the Dutch Nutrition Surveillance System (Löwik & Hermus, 1988; Hulshof & Van Staveren, 1991; Löwik *et al.*, 1994). A similar survey was carried out in 1992 (Anonymous, 1993*a*). One of the advantages of repeated surveys is that differences in time can be studied. Ideally, any differences in measurement procedures should be minimized. The goal to replicate measurement procedures, however, conflicts with the goal of improving the quality of the new survey. Hence, some modifications were made for the 1992 survey. This paper provides insight into changes in the Dutch diet and into the origin of the changes between 1987–1988 and 1992, special attention being paid to total fat intake.

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SUBJECTS AND METHODS

Dutch national food consumption surveys

The first DNFCS comprised 2203 households selected from a stratified probability sample among non-institutionalized households in The Netherlands. Actually, 5898 people living in the selected households, aged 1–85 years, participated (response rate 81%). Information on food consumption was obtained using a 2-day dietary record. The methods and procedures used in dietary data collection are described in detail elsewhere (Hulshof & Van Staveren, 1991). Briefly, in each household, the subject principally responsible for domestic affairs (hereinafter called the housekeeper) was the most important informant. The housekeeper carefully recorded in the household diary all food supplied (by her/him) to the members of the household. Precise description of methods of cooking, recipes and ingredients was requested. In addition, a diary was kept by each respondent to note food eaten outdoors. The food consumption data were coded with the aid of a coding manual (Westenbrink *et al.*, 1987) and converted into intake figures for energy and 28 nutrients with the NEVO Table, version 1986–1987.

In 1992, 2475 households agreed to participate, comprising 6218 subjects aged 1–92 years. Although the design of the survey was in line with the first survey new

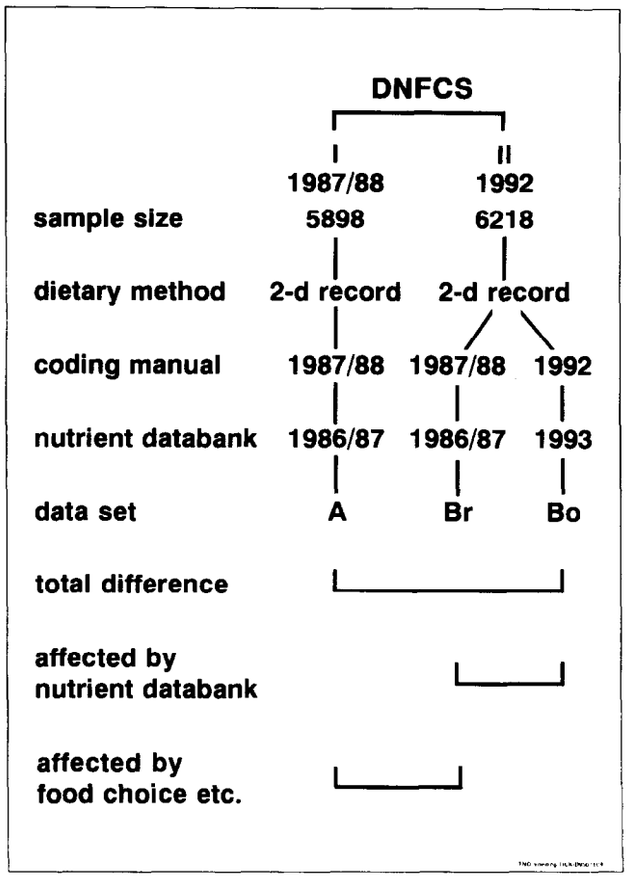

Fig. 1. Scheme of the comparisons between two surveys.

information, changes in supply and new products have led to some modifications. The food code manual was updated between the two surveys (Hulshof *et al.*, 1992) and calculations for the second DNFCS were based on the 1993 NEVO version.

The Netherlands nutrient databank (NEVO)

Food composition tables will never be complete; there will always be new foods to be added while others are deleted. Furthermore, changes in production methods may alter the nutrient content of foodstuffs. Methods of analysis are constantly being developed and adapted. The update of the 1993 NEVO version reflected real changes in foods available (for instance products with a lower fat content) and also artefactual changes due to improvements [resulting, for instance, from the usage of better analytical methods (including lower detection limits) and substitution of missing values for real figures] and more analytical data for many foods. In the 1993 version (NEVO Table, 1993) about 375 new foods have been added. After the last update (1990) about 10 000 new nutrient analyses became available and about 50 000 mutations were carried out. Differences between the procedures and nutrient databases used in the 1987–1988 DNFCS and those used in the 1992 survey could have affected estimated nutrient intakes. To study this, data of the second DNFCS were also converted with the procedures used in 1987–1988 (manual 1987) and the NEVO Table, 1986–1987. Corrected changes in the amounts of foodstuffs can be obtained by comparing the revised 1992 data set (B_r) with the 1987–1988 data set (A). Insight into differences attributable to the two different nutrient databanks can be obtained by comparing the original 1992 data set (B_o) with B_r, whereas changes mainly due to food choices can be obtained by comparing data set B_r with A (Fig. 1). In this paper special attention will be given to this topic regarding changes in fat intake.

RESULTS AND DISCUSSION

Fat intake

In 1992 the intake of energy and of most energy-providing nutrients was lower than in 1987–1988 (Table 1). One of the most striking differences was observed for the intake of fat. In 1987–1988, mean fat intake was 105 g/day, varying among age–gender groups from 52 g (girls aged 1–4 years) to 137 g (men aged 16–19 years). In

Table 1. Mean daily intake of energy and macronutrients estimated in the DNFCS*

	A(n=5898)	B_r(n=6218)	B_o(n=6218)
Energy (kJ)	9746	9437	9278
Protein (g)	76	76	81
Fat total (g)	105	98	92
Fat saturated (g)	43	40	35
Carbohydrates (g)	252	249	248
Alcohol (g)	10	10	10
As % of total energy intake			
Protein	13.3	13.8	15.0
Fat total	40.0	38.7	36.9
Saturated fat	16.5	15.8	14.1
Carbohydrates	43.8	44.7	45.3
Alcohol	2.8	2.7	2.8

*A = DNFCS 1987–1988;
B_r = DNFCS 1992, revised version (coded with 1987–1988 procedures and converted with the 1986–1987 NEVO Table);
B_o = DNFCS 1992, original version (coded with 1992 procedures and converted with 1993 NEVO Table).

Table 2. Average consumption (g/day) of important fat sources in the DNFCS*

	A($n=5898$)	B_r($n=6218$)
Fats and oils	48	43
Meat and meat products	116	111
Milk and milk products	367	381
Cheese	28	29
Savoury snacks	23	25
Biscuits and pastry	42	41

*A = DNFCS 1987–1988;
B_r = DNFCS 1992, revised version (coded with 1987–1988 procedures).

1992, mean daily intake was significantly lower than in 1987–1988 ($P<0.001$), namely 92 g, varying among age–gender groups from 45 g (boys aged 1–4 years) to 118 g (men aged 19–22 years). Table 1 also shows that for the total population about half of the difference in total fat intake came from changes in the nutrient databank (B_r 6 g/day higher than B_o). The other half could mainly be explained by differences in food choice (A 7 g/day higher than B_r). For the various age–gender groups these changes ranged from −2 to −9 g/day (databanks) and from 0 to −14 g/day (food choice).

In the first DNFCS total fat provided, on average, about 40% of daily energy intake. In 1992, this contribution had declined to about 37%. The contribution of saturated fat dropped from 16.6 to 14.1% of total energy intake.

Fat sources

In the Dutch diet 'fats and oils', 'meat and meat products', 'milk and milk products', 'cheese', 'savoury snacks' and 'biscuits and pastry' are the most important fat sources. Together these foodstuffs provided more than 80% of total fat intake. Thus, as to the changes in fat consumption it is expected that these have occurred in the consumption and/or composition of these food groups. Table 2 shows that between 1987–1988 and 1992 the mean consumption of 'fats and oils' as well as 'meat and meat products' declined by about 5 g/day. The mean consumption of 'dairy products' (including cheese) and 'savoury snacks' increased somewhat, whereas the mean consumption of 'biscuits and pastry' slightly decreased. Within the 'meat and meat products', 'milk and milk products' and 'fats and oils' groups a shift was observed from products with a relatively high fat content to leaner varieties (Table 3).

In 1987–1988, 21 g/day of fat was obtained from 'meat and meat products', 10 g/day from 'milk and milk products' and 34 g/day from 'fats and oils'. In 1992, these figures were 17, 8 and 26 g/day, respectively. In the 'meat and meat products' group about 55% of the difference could be ascribed to changes in the nutrient database. For the 'milk and milk products' and 'oils and fats' goups these proportions were 100 and 32%, respectively. Differences in daily amounts consumed and in type of food chosen accounted for the remaining change.

Table 3. Contribution (%) of subgroups to the consumption of important fat sources*

Food group	Subgroup	Data set A	Data set B_r
Meat and meat products	Lean	44	48
	Medium-fat	22	23
	Fat	34	20
Milk and milk products	Skimmed	24	27
	Low-fat	36	39
	Whole milk	41	33
Fats and oils	Margarine/butter	52	42
	Low-fat spreads	19	23
	Oils	15	16
	(Salad) sauces	15	19

*A = DNFCS 1987–1988;
B_r = DNFCS 1992, revised version (coded with 1987–1988 procedures).

Changes in food choice

Figures in Table 1 indicate that more than half of the total difference in estimated fat intake between 1987–1988 and 1992 could be attributable to changes in food choices. These changes might be (partly) an effect of the 'Fat Watch' campaign. This nationwide intervention programme, conducted for 1 month every year since 1991, is aimed at drawing attention to too high a (saturated) fat intake in The Netherlands and provides relevant facts regarding fat reduction. The primary target group of this campaign were consumers who are mainly responsible for household food purchases (Löwik *et al.*, 1993). Therefore, more awareness of the composition of foods regarding fat might have influenced food choices.

Other factors, such as socio-demographic changes, might also have influenced fat intake. Changes in the Dutch population are characterized by ageing, declining household size and higher education level. The relatively small impact of these factors, as well as their changes over a period of 4–5 years, imply that their effects are limited compared with those of food choice and of food composition (Löwik *et al.*, 1993).

Changes due to food composition

In The Netherlands the fat content of several products has been reduced in recent years. For instance, margarines, low-fat spreads and dressings with a lower fat content have been introduced and were available to subjects during the second DNFCS. Therefore, most of the change in fat obtained from 'fats and oils' reflected in changes in the nutrient databank can be considered as real. Within the 'milk and milk products' group the fat content of some desserts was also reduced. The 1993 figures represent the statutory values. In the 1993 NEVO version, for the first time, the fat content was expressed with to one decimal place. As a consequence, whole milk is now reported to contain 3.5 g fat per 100 g instead of 4 g in the 1986–1987 version, and low-fat milk 1.5 g instead of 2 g per 100 g. This means that the lower

intake of fat from this food group is mainly an artefact as a result of the more precise figures and to a smaller extent reflect real changes in fat content.

In 1989, the meat sector noted that the fat content values for 'meat and meat products' used for calculations in the first DNFCS were too high. A comprehensive national study in 1990 working on the fat content of meat products (Van Wijk, 1991; Van Wijk *et al.*, 1991) came to the conclusion that the fat content of most products was indeed lower than the values reported in the NEVO Table, 1986–1987. In the 1993 version the new values were used. It is reasonable to expect that the reduction in fat content of meat is partly the result of selective breeding which might have been realized over the past decades instead of in a period of 4 years. This means that the lower fat content of meat is a real change, and that part of the change occurred before 1987–1988 so that the contribution of meat to fat intake was overestimated.

Only small differences in fat intake from the 'biscuits and pastry' and 'cheese' food groups were observed. In some types of cheese the fat content was reduced. In the 'biscuits and pastry' group the difference might not reflect part of the shift from visible to invisible fats noted in 1992 by the Commodity Board for Margarine, Fats and Oils (Anonymous, 1993*b*). It should be kept in mind that, due to a delay in registration inherent in a nutrient database, in the 1993 version of the NEVO Table these shifts could not be fully incorporated.

CONCLUSIONS

The results show that between 1987 and 1992 the mean fat intake in The Netherlands declined by 13 g/day and its contribution to energy intake by 3.1%. Roughly half of the difference could be ascribed to changes in food choices, and the remaining half to changes in nutrient databanks. After correction for artefacts in nutrient databases the real difference in fat intake between the first and the second DNFCS was assessed to be 11 g/day. If the complete change in fat content of 'meat and meat products' between 1987–1988 and 1992 is considered to be an artefact, the real difference is reduced to 8 g/day. Instead of 105 g/day (40% of total energy intake), daily fat intake in 1987–1988 would be 103 (40%) or 98 g (38.9%), respectively. It can be concluded that changes in food consumption data over time should be interpreted with care, and that it is important to separate facts from artefacts.

REFERENCES

Anonymous (1993*a*). Zo eet Nederland, 1992. Voorlichtingsbureau voor de Voeding, 's-Graven hage.

Anonymous (1993*b*). Nederlands vetgebruik daalt. *MVO-Magazine*, **23**, 1.

Hulshof, K. F. A. M., Van der Heijden, L. J. M. & Donders-Engelen, M. R. (1992). Maten, gewichten en codenummers 1992. TNO Report V92.003. TNO Nutrition and Food Research Institute, Zeist.

Hulshof, K. F. A. M. & Van Staveren, W. A. (1991). The Dutch national food consumption survey. Design, methods and first results. *Food Policy*, **16**, 257–260.

Löwik, M. R. H. & Hermus, R. J. J. (1988). The Dutch nutrition surveillance system. *Food Policy*, **13**, 359–365.

Löwik, M. R. H. Hulshof, K. F. A. M. & Kistemaker, C. (1993). Lagere vetconsumptie in de tweede voedselconsumptiepeiling. Hebben de Let op Vet campagnes effect?. *Voeding*, **59**, 27–29.

Löwik, M. R. H., Brussaard, J. H., Hulshof, K. F. A. M., Kistemaker, C., Schaafsma, G., Ockhuizen, T. & Hermus, R. J. J. (1994). Adequacy of the diet in the Netherlands in 1987–1988 (Dutch Nutrition Surveillance System). *Int. J. Food Sci. Nutr.*, **45**, Suppl. 1, S1–62.

NEVO Table (1986–1987). Nederlands Voedingsstoffenbestand 1986–1987. Voorlichtingsbureau voor de Voeding, 's-Gravenhage.

NEVO Table (1993). Nederlands Voedingsstoffenbestand 1993. Voorlichtingsbureau voor de Voeding, 's-Gravenhage.

The Netherlands Food and Nutrition Council (1987). Mogelijkheden tot het opzetten van een voedingspeilingssysteem in Nederland. *Voeding*, **48**, 35–43.

Van Wijk, Th. A. (1991). Bepaling van het vetgehalte in vleesprodukten. TNO Report T91.038. TNO Nutrition and Food Research Institute, Zeist.

Van Wijk, Th. A., Van Erp-Baart, A. M. J. & Roomans, H. H. S. (1991). Bepaling van het vet—en eiwitgehalte van bereid vlees. TNO Report T91.038. TNO Nutrition and Food Research Institute, Zeist.

Westenbrink, S., Brants, H. A. M., Hulshof, K. F. A. M. & Schneijder, P. (1987) Maten, gewichten en codenummers 1987. TNO Report V 87.342. TNO Nutrition and Food Research Institute, Zeist.