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Disparities in vegetable and fruit consumption: European cases from the north to the south

Gun Roos[1,*], Lars Johansson[2], Anu Kasmel[3], Jurate Klumbiené[4] and Ritva Prättälä[5]
[1]National Institute for Consumer Research, Norway: [2]National Council on Nutrition and Physical Activity, Norway: [3]Centre for Health Education and Promotion, Estonia: [4]Kaunas University of Medicine, Lithuania: [5]National Public Health Institute, Finland

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Abstract

Objective: To present disparities in consumption of vegetables and fruits in Europe and to discuss how educational level, region and level of consumption influence the variation.
Design: A review of selected studies from 1985 to 1997.
Setting/subjects: 33 studies (13 dietary surveys, nine household budget surveys and 11 health behaviour surveys) representing 15 European countries were selected based on criteria developed as part of the study. Association between educational level and consumption of vegetables and fruits was registered for each study and common conclusions were identified.
Results: In the majority of the studies, with the exception of a few in southern and eastern Europe, consumption of vegetables and fruits was more common among those with higher education. The results suggest that in regions where consumption of vegetables and fruits is more common, the lower social classes tend to consume more of these than the higher social classes.
Conclusions: The differences in the patterns of disparities in vegetable and fruit consumption between regions, as well as within populations, need to be considered when efforts to improve nutrition and health are planned.

Keywords
Vegetables
Fruits
Disparities
Socio-economic factors
Europe
Review

Health inequalities have been well documented in European countries[1–3]. Earlier studies have shown that those who are poorer, have lower educational levels and lower status jobs are also disadvantaged in health and life expectancy[4,5]. In some countries, including the United Kingdom, differences in mortality have shown a tendency to increase since the 1980s[1]. A recent international comparison showed that relative socio-economic differences in morbidity and mortality were larger in Scandinavian countries and the Netherlands than in Germany, Switzerland and Spain[6,7]. Variations in health inequalities between different countries have often been explained by differences in welfare policies and living standards[8]. However, other explanations may also be relevant. The international comparison on variations in education-related inequalities in self-reported morbidity showed unexpectedly that inequalities were not smaller in the northern countries despite their more egalitarian social policies[6].

Reasons for health inequalities are less well understood because they are complex phenomena affected by economic, cultural and personal factors. The level of inequality in material resources within a society has often been presented as a major cause of health inequality[1,9–11]. It is argued that the living and working conditions of those belonging to lower social groups expose them to greater health hazards. In addition to the structural explanations, inequalities have been attributed to cultural, behavioural and psychosocial factors[9–14]. The Black report divided possible explanations for health inequalities into four main groups: artefact of measurement; theories of natural and social selection; materialist/structural explanations; and cultural/behavioural explanations[12]. Those belonging to disadvantaged social groups have been said to have riskier behaviour and less interest in their future health than those belonging to more advantaged social groups. In order to distinguish themselves, social groups may behave according to their own conceptions of what is suitable and appropriate for their group[15].

The roles played by food behaviour and lifestyle in developing health inequality is not yet well understood[1]. Studies have shown that people from higher social classes in general have more health-conscious behaviours than those from lower social classes[2,9–11,16,17]. Cross-sectional studies in some European countries have shown that

*Corresponding author: Email gun.roos@sifo.no

those belonging to higher social class groups tend to have healthier diets and consume more fruits and vegetables, but differences are not as clear at the nutrient level[3,13,16,18–20]. A few studies have suggested that the differences have been caused by different energy needs, cultural and social factors[1,16,21]. Davey Smith and Brunner[1] have presented micronutrient and antioxidant intakes as most likely nutritional influences on health inequalities. Fruits and vegetables, which are important sources of these nutrients, are central in the prevention of non-communicable diseases, such as cardiovascular diseases and cancer[22,23]. These food groups have also been the focus of more detailed analyses[24,25] and intervention campaigns such as 'five a day' in the United States[26] and '6 a day' in Denmark[27].

Food balance sheet data and dietary studies show that the consumption of fruits and vegetables is at a higher level in southern European countries compared with other regions[28,29]. The lowest levels are found in eastern European countries, followed by northern countries. Fruit and vegetable consumption is usually higher among women than men[30–32] and among older people compared with younger[24,29,31,33]. Persons of low social status tend to have the lowest intakes[2,16,25,29,33,34].

The data for this paper were collected as part of a EU Concerted Action project 'Compatibility of the household and individual nutrition surveys in Europe and disparities in food habits' with participants from Belgium, Denmark, Estonia, Finland, Germany, Greece, Lithuania, Norway, Spain, Sweden and the United Kingdom[35]. In this review we present the disparities in consumption of vegetables and fruits we identified and discuss how educational level, region and level of consumption influence the variation. We pose the question whether those with higher education across Europe have healthier food habits, i.e. eat more fruit and vegetables.

Methods

Identification of studies

The methods have been described in detail elsewhere[35]. Relevant studies were identified by consulting researchers and performing literature searches through various electronic databases (including Medline, Social Science Citation Index and the 'Documentation Centre Socio-Economic Inequalities in Health' at Erasmus University in Rotterdam). This resulted in a bibliography with 165 references on disparities in food habits published 1987–97. To narrow the scope and enable a meaningful comparison of various European studies we developed a definition for disparities in food habits and criteria for study selection.

Disparities in food habits are defined as the difference in food consumption based on education and/or occupation among adult men and women. For a study to be included it had to fulfil the following criteria.

- The period of data collection had to be 1985–97.
- The subjects had to be adults (18–65 years).
- Obligatory variables were: education and/or occupation, age, gender, food groups/items. Education and occupation preferably reported as at least three groups. Focus on five food groups: fruits, vegetables, fats and oils (added lipids), meat and dairy.

The food groupings were largely based on the system used in comparative food availability studies[36,37]. The fruit group was defined as fresh and processed (e.g. dried, frozen, canned, preserved, fruit juices) fruits and berries. The vegetable group contained fresh and processed (e.g. frozen, canned, olives, pickles) vegetables (excluding potatoes) and pulses. However, we were somewhat flexible with these criteria because we relied on such a variety of studies (exceptions are indicated in the results). For example, health behaviour studies usually present the proportion of those with daily intake or low/high use. In addition, since the majority of the studies were published regrouping was not always possible. Education was selected to be the main measure of socio-economic status because it has some advantages compared to occupation and income; education forms an ordinal scale and undergoes minor changes over adult life[38]. Education could be reported as number of school years or educational levels. Occupation or income was used if information on education was missing. Studies that could provide information on food habits for at least three different educational/occupational groups were accepted.

Forty-seven potential studies were identified based on the bibliography and information from researchers. The number of studies to be included in the review decreased to 33 because results for consecutive years for some repeated studies were combined and one qualitative study was left out. Because the method used affects the results, the studies were grouped into three groups based on their types of methods and data: 13 dietary surveys, nine household budget surveys, and 11 health behaviour surveys (Table 1). The studies covered 15 countries representing all four regions of Europe: north, west, east and south. The majority of the studies included information on food consumption based on education, but two studies only gave results based on occupation and one based on social class. Most of the studies were based on random national samples, but it was not a criterion for choosing the studies. Therefore, one German dietary survey was limited to men in one smaller region and for Spain, dietary surveys from three regions were included. Among the included health behaviour surveys, one of the Lithuanian studies and two Danish studies were also limited to specific regions.

Systematic analysis

In the systematic analysis each study was taken at face value and for each of these the association between high education (or occupation/social class if education was not

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Table 1 Characteristics of studies ($N = 33$) included in the review of disparities in vegetable and fruit consumption

Country	Year	Study name	*N*	References
A. Dietary surveys ($N = 13$)				
Norway	1993–94	NORKOST	3144	39, unpublished data*
Finland, 4 regions	1992	Dietary Survey of Finnish Adults	1861	39,40
Sweden	1989	Swedish National Dietary Survey (HULK)	1525	41
Denmark	1985	Dietary Habits in Denmark	2242	42
Denmark	1995	Dietary Habits in Denmark	1409	Unpublished data*
UK	1986–87	National Diet and Nutrition Survey (NDNS)	2197	43
Germany, West	1985–89	German National Food Intake Survey	23209	Unpublished data*
Germany, Augsburg	1984–85	MONICA Augsburg	899	44
Netherlands	1987–88	Dutch Nutrition Surveillance System	2203	16
Netherlands	1992	Dutch Nutrition Surveillance System	2475	Unpublished data*
Spain, Basque C.	1990	Food Habits in Basque Country	2348	Unpublished data*
Spain, Catalonia	1992–93	Assess. of Nutr. Status of Catalonia's Population	2757	Unpublished data*
Spain, Navarra	1989–90	Food Habits in Navarra's Population	704	Unpublished data*
B. Household budget surveys ($N = 9$)				
Poland	1988	DAFNE I	29664	36
Poland	1996	Polish Household Budget Survey	31907	Unpublished data*
UK†	1985–89	National Food Survey	28532	45
Belgium, 3 regions	1987–88	DAFNE I	3235	36
Hungary	1991	DAFNE I	11813	36
Spain‡	1990–91	DAFNE II	21155	37
Spain‡	1990–91	Spanish Household Budget Survey	21155	Unpublished data*
Greece, 9 regions	1987–88	DAFNE I	6489	36
Greece	1993–94	DAFNE II	6756	37
C. Health behaviour surveys ($N = 11$)				
Finland†	1986–89	Health Behaviour among Finnish Adult Pop.	~3900	46, unpublished data*
Finland†	1990–93	Health Behaviour among Finnish Adult Pop.	~3700	47, unpublished data*
Finland†	1994–97	Health Behaviour among Finnish Adult Pop.	~3500	48, unpublished data*
Estonia†	1990, 92	Health Behaviour among Estonian Adult Pop.	~1000	49, unpublished data*
Estonia†	1994, 96	Health Behaviour among Estonian Adult Pop.	~1300	50, unpublished data*
Lithuania†	1994, 96	Health Beh. among Lithuanian Adult Pop.	~1900	51, unpublished data*
Lithuania, 5 regions	1993	CINDI Programme Screening 1993	1558	Unpublished data*
Denmark, Copenhagen	1986	DAN-MONICA II 1986	1462	52, unpublished data§
Denmark, Copenhagen	1993	DAN-MONICA II 1993	1555	53, unpublished data§
Netherlands	1989	Dutch Health Interview Survey 1989	6468	54
Switzerland	1992–93	Ernährung in der Schweiz	15288	55

* Unpublished data provided by researchers in the FAIR-97-3096 Disparities Group.
† Results from 2 or more years combined.
‡ These studies are based on the same data, but differences in results derive from different food classification schemes.
§ Unpublished data from Copenhagen County Center for Preventive Medicine.

available) and consumption of fruits and vegetables was registered. The strength of the association was determined based on the reported information on statistical significance (P values <0.05, <0.01 or <0.001 were considered statistically significant) and if the data showed a successive increase or decrease from low to high education, i.e. 'systematic trend'. The association between high education and consumption was classified as strong positive association (statistically significant and systematic trend), positive association (systematic trend or statistically significant difference), NS (no association), negative association (systematic trend or statistically significant difference) or strong negative association (statistically significant and systematic trend). The results are summarised in maps presenting the relationships between high education and consumption of vegetables and fruits. In the maps 'strong association' stands for a statistically significant difference and 'systematic trend' for both men and women. 'Association' is indicated when this difference is found for only one gender group or when there is either a 'systematic trend' or statistically significant difference.

Results

In the majority of the studies, with the exception of a few in southern and eastern Europe, consumption of both vegetables and fruits was more common among those with higher education (Table 2).

For vegetables there was a strong positive association in studies from Finland, Sweden, Lithuania, Denmark, Germany, the Netherlands, Switzerland and Spain (Fig. 1). Positive association was in addition found in studies in Estonia, the United Kingdom, Germany, and Poland. Negative association (i.e. those with lower education consume more vegetables) was found in a few studies in Hungary, Spain and Greece. Some of the studies in Norway, Lithuania, Denmark, the Netherlands, Poland, Belgium and Spain showed no clear association.

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Table 2 Consumption of vegetables and fruits in low and high educational groups and association between high education and consumption (▲▲▲, strong positive association (statistically significant and systematic trend); ▲▲, positive association (systematic trend); ▲, positive association (statistically significant difference); ▼▼▼, strong negative association (statistically significant and systematic trend); ▼▼, negative association (systematic trend); ▼, negative association (statistically significant difference); NS, no association)

			Vegetables (g/day)*				Fruits (g/day)*				Vegetables association		Fruits association	
			Male		Female		Male		Female					
Country	Year	Study	Low	High	Low	High	Low	High	Low	High	Male	Female	Male	Female
A. Dietary surveys														
Norway	1993–94	NORKOST	133	130	138	136	202	220	202	237	NS	NS	▲▲▲	▲▲▲
Finland	1992	Dietary Survey of Finnish Adults	113	142	121	151	270	312	284	360	▲▲▲	▲▲▲	▲▲▲	▲▲▲
Sweden	1989	Swedish National Dietary Survey (HULK)	65	91	78	98	108†	126†	132†	149†	▲▲▲	▲▲▲	NS	NS
Denmark	1985	Dietary Habits in Denmark	92*	133*	147*	161*	40*	65*	109*	112*	▲▲▲	▲	▲▲▲	NS
Denmark	1995	Dietary Habits in Denmark	96	121	105	165	119†	198†	170†	183†	▲	▲▲▲	▲▲▲	NS
UK	1986–87	National Diet and Nutrition Survey (NDNS)	137	166	106	142	45†	791	46†	93†	▲▲	▲▲	▲▲	▲▲
Germany	1985–89	German National Food Intake Survey	108†	119†	105†	121†	78†	98†	96†	108†	▲▲	▲▲	▲▲	▲▲
Germany	1984–85	MONICA Augsburg	164	214	-	-	70	126	-	-	▲▲▲		▲▲▲	
Netherlands	1987–88	Dutch Nutrition Surveillance System	158	171	147	159	119	131	124	152	NS	NS	▲	▲
Netherlands	1992	Dutch Nutrition Surveillance System	121*	146*	173*	185*	88*	115*	139*	215*	▲	▲	▲	▲
Spain	1990	Food Habits in Basque Country	163	184	139	180	385	326	411	276	NS	▲▲	▼	▼▼▼
Spain	1992–93	Assessment of Nutritional Status of Catalonia's Population	207§	188§			266§	272§			▼▼§		NS§	
Spain	1989–90	Food Habits in Navarra's Population	142	155	136	141	77	94	110	121	▲▲	▲▲	▲▲	NS
B. Household budget surveys§														
UK	1988	DAFNE I	170§	188§			75§	179§			▲▲§		▲▲§	
Poland	1996	Polish Household Budget Survey	264§	198§			107§	130§			▲▲§		NS§	
Poland	1985–89	National Food Survey	210§	197§			105§	200§			NS§		▲▲§	
Belgium	1987–88	DAFNE I	176§	173§			283§	219§			NS§		NS§	
Hungary	1991	DAFNE I	246§	175§			171§	193§			▼▼§		NS§	
Spain	1990–91	DAFNE II	191§	174§			332§	301§			NS§		▼▼§	
Spain	1990–91	Spanish Household Budget Survey‡	378‡§	265‡§			319‡§	297‡§			▲▲▲§		NS§	
Greece	1987–88	DAFNE I	290§	255§			344§	403§			▼§		NS§	
Greece	1993–94	DAFNE II	263§	229§			263§	315§			▼▼§		▲▲§	
C. Health behaviour surveys														
Finland	1986–89	Health Behaviour among Finnish Adult Pop.	57‖	27‖	43‖	17‖	48‖	30‖	31‖	20‖	▲▲▲	▲▲▲	▲▲▲	▲▲▲
Finland	1990–93	Health Behaviour among Finnish Adult Pop.	53‖	24‖	37‖	17‖	50‖	36‖	31‖	20‖	▲▲▲	▲▲▲	▲▲▲	▲▲▲
Finland	1994–97	Health Behaviour among Finnish Adult Pop.	54‖	26‖	36‖	17‖	49‖	37‖	31‖	22‖	▲▲▲	▲▲▲	▲▲▲	▲▲▲
Estonia	1990, 92	Health Behaviour among Estonian Adult Pop.	82‖	71‖	73‖	66‖	92‖	91‖	84‖	90‖	▲	▲▲	NS	▲▲▲
Estonia	1994, 96	Health Behaviour among Estonian Adult Pop.	73‖	61‖	67‖	54‖	85‖	69‖	79‖	58‖	▲	▲	▲▲▲	▲▲▲
Lithuania	1994, 96	Health Behaviour among Lith. Adult Pop.	10‖	4‖	9‖	3‖	45‖	24‖	42‖	19‖	▲▲	▲▲	▲▲	▲▲
Lithuania	1993	CINDI Programme Screening 1993	9¶	6¶	8¶	1¶	8¶	4¶	5¶	0¶	NS	▲▲▲	NS	▲▲▲
			48**	37**	45**	32**	55**	41**	52**	43**	▲▲	▲▲▲	▲▲▲	NS
Denmark	1986	DAN-MONICA II 1986	11††	13††	22††	27††	36§§	33§§	53§§	61§§	NS	NS	NS	▲▲
			19‡‡	17‡‡	38‡‡	47‡‡					NS	▲▲		
Denmark	1993	DAN-MONICA II 1993	18††	16††	20††	22††	27§§	33§§	51§§	63§§	NS	NS	NS	NS
			21‡‡	24‡‡	27‡‡	47‡‡					NS	▲▲		
Netherlands	1989	Dutch Health Interview Survey 1989	47‖‖	62‖‖			63¶¶	69¶¶			▲▲▲§		▲▲	
													▲§	
Switzerland	1992–93	Ernährung in der Schweiz	72§§	84§§	84§§	91§§	58§§	63§§	78§§	81§§	▲▲▲	▲▲▲	▲▲▲	▲▲▲

* Units: g/10 MJ.
† Fresh.
‡ Includes potatoes.
§ Per person.
‖ Proportion of those with low use.
¶ Proportion of those with low use of fresh in summer and autumn.
** Proportion of those with low use of fresh in winter and spring.
†† Proportion of those with daily intake of raw.
‡‡ Proportion of those with daily intake of cooked.
§§ Proportion of those with daily intake.
‖‖ Proportion of persons eating raw or cooked vegetables every day.
¶¶ Proportion of persons eating >5 pieces of fruit a week.

Fig. 1 Association between vegetable consumption and high education in 33 European studies

Fruit consumption had a strong positive association with education in studies in Norway, Finland, Estonia, Lithuania, Denmark, Germany, the Netherlands and Switzerland (Fig. 2). In addition, positive association was found in studies in the United Kingdom, the Netherlands, Poland, Spain and Greece. Negative association was only found in two Spanish studies. Studies in Sweden, Estonia, Lithuania, Denmark, Poland, Belgium, Hungary, Spain and Greece showed no association.

The association varied between men and women in about a third of the studies which reported results separately for both genders (Table 2). There was no clear pattern in the variation.

Both Finnish dietary and health behaviour data showed strong positive association for both vegetables and fruits (Table 2). In Denmark, dietary surveys showed clearer association than the health behaviours survey data, whereas for the Netherlands, the health behaviour survey data showed a stronger positive association than the dietary survey data. The dietary survey data for different regions in Spain showed variation from positive to negative association. Also, household budget survey data from Spain showed variation. Information on statistical significance was not reported in most of the household budget survey data. Therefore, our results for the household budget surveys showed a weaker association between education and consumption compared with the other types of studies.

The regional pattern for vegetable consumption indicates that high educational level is associated with higher vegetable consumption especially in the northern and western European countries (Fig. 1). It was only studies in Spain, Greece, Poland and Hungary that indicated that those with lower education consumed more vegetables. The regional pattern for fruits is fairly similar to that of

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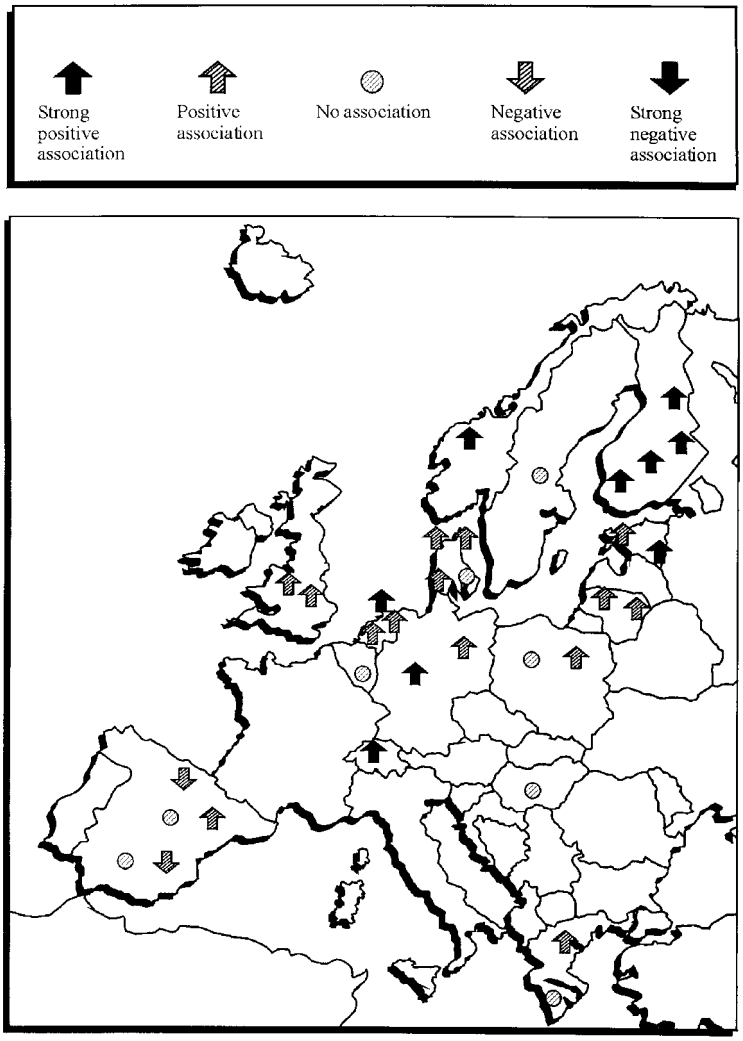

Fig. 2 Association between fruit consumption and high education in 33 European studies

vegetables (Fig. 2). In most countries there is a positive or no clear association between high education and fruit consumption. It was only two Spanish studies that showed a negative association, i.e. those with lower education consumed more fruits.

Discussion

In interpreting the results several types of limitations have to be taken into account. There are possible problems related to the identification of studies. Therefore, studies were identified with the help of both literature searches and by consulting experts. Because we mainly relied on published data, our ability to do secondary analyses on primary data was limited. In secondary analyses, validity, reliability and representativeness of primary studies are important. The potential problems include issues related to the sample, time, method and reporting. The methods used in the studies varied from questionnaires to dietary recalls and records. Since all methods are subject to different limitations the studies were grouped according to method. The dietary (group A) and health behaviour surveys (group C) fulfilled the predefined criteria of study inclusion better than the household budget surveys (group B), which did not provide age and gender specific estimates of fruit and vegetable consumption.

The number of identified studies was limited and may not be representative for the countries. However, most of the studies were large-scale, based on random samples and had acceptable response rates. To diminish the problems of the sample, age boundaries were set and only studies focusing on adults were included. Although the definition of disparities in food habits and the criteria for choosing the studies dealt with some of the problems, it was impossible

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to take all factors into account. For example, because education has a skewed distribution in the population, older adults are often over-represented in the groups with low education. Also, the various forms of reporting socio-economic status (education, occupation and social class) and variation in the number and size of classes (e.g. low/intermediate/high) may cause problems because results vary depending on the variable used. To diminish the problem related to the heterogeneity of the studies, we assessed the variation in consumption based on socio-economic status within each study and compared the patterns instead of comparing absolute differences.

Under-reporting of food intake has often been associated with lower social classes and lower levels of education, but there is also evidence that it can be linked to those belonging to higher social classes and with high levels of education[56–60]. Under-reporting by those with lower levels of education has been explained by their poor literacy skills, whereas misreporting of food by those with higher levels of education may be connected to the health image of foods and the wish to convey a socially desirable image[60]. Assuming that those belonging to lower social groups under-report consumption of vegetables and fruits, whereas those belonging to higher social groups over-report consumption of healthy vegetables and fruits, the disparities in consumption of vegetables and fruits might be smaller than reported. However, estimating the effects of possible under- and over-reporting is problematic and other factors such as a selective dropout may lead to the underestimation of the real differences in the population. Turrell and Najman[61] showed that sampling and data collection methods may understate the true range of socio-economic inequalities in food habits. They concluded that mailed survey questionnaires are inappropriate for use with respondents from very low socio-economic status backgrounds.

A major finding from this review of disparities in vegetable and fruit consumption in Europe was that, in particular in the north and west, those with a high educational level tend to consume more vegetables and fruits, i.e. have healthier food habits, than those with a low educational level. This result is in line with previous analyses[10,19] which have shown inequalities in more northern countries. In southern European countries the pattern shows a reverse tendency, in some studies those with high education tend to consume less than those with low education. It is important to relate this result to the information that the level of vegetable and fruit consumption varies in Europe. Consumption of these foods is much higher in the south than in the rest of Europe[28]. Although the consumption of fruits and vegetables has increased in the north, the level is much lower than in the south. Foods with an increasing consumption trend can be seen as 'modern'[34]. In Finland, fruits and vegetables belong to the modern foods that higher socio-economic groups consume more of than the lower socio-economic groups[34]. Fruits and vegetables also symbolise healthy foods; they have been the focus of dietary initiatives and are viewed by consumers as very important components of a healthy diet[62]. The role of fruits and vegetables is probably more traditional in the south. The results suggest that in regions where consumption of vegetables and fruits is more common the lower social classes tend to consume more of these than the higher social classes. Cavelaars[10] linked regional variation to structural characteristics such as availability of fresh vegetables. Those of lower socio-economic classes in the south may have better access to cheaper vegetables and fruits. In addition, people in the east and south are more likely to grow their own vegetables or acquire them through unofficial channels. The variation in the economic structure in Europe may also play a role. In the south and east increased wealth may lead to an increase in meat consumption, whereas in the north and west meat consumption has already levelled off and there may be more emphasis on health and consumption of other foods.

In addition to structural explanations, disparities in the consumption of fruits and vegetables can be explained by cultural, behavioural and psychosocial factors[9,10,13,14]. Food and eating are linked to identity and the way people think of themselves and others. For example, in French working class culture food is important for working capacity and the strength of the body[15]. Also other studies have shown that those on low incomes are more concerned with foods that 'fill you up' and provide energy than those that are healthy[63]. Fruits and vegetables are not that filling. In addition, it is more rewarding for mothers to serve foods that their families like and identify with. Therefore, lower social classes may consume less vegetables and fruits. However, in tackling inequality, structural and material issues are important. According to Stronks *et al.*[14] the contribution of structural factors to socio-economic inequalities in health is larger than that of behavioural factors.

This review indicates that the pattern of disparities in food consumption varies in Europe. To get a deeper understanding of the variation it would be useful to gather more comparable information from a few countries representing the different regions. To improve our understanding of reasons for health inequalities there are various alternatives for future research approaches. It would be important to obtain a better understanding of how diet contributes to the social differentials in health and whether socio-economic status modifies associations between diet and disease. A prerequisite for analysing the role of diet in inequalities of health is to have an understanding of the role of other health behaviours. Therefore, there is also a need for studies on socio-economic differences in food habits in relation to other health behaviours and lifestyle. The differences in the patterns of disparities between regions need to be considered when efforts to improve nutrition and health are planned. In northern Europe it could, for example, be effective to address the question of

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how to direct the increase in vegetable consumption more to those with low education. In the south, the traditional diet includes vegetables and it is therefore relevant to try to keep the traditional diet and prevent the low socio-economic groups from adopting 'northern' habits.

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