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Symposium on 'Influence of social and cultural variations on diet'

Effect of social variation on the Irish diet

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Both jurisdictions of Ireland have high rates of chronic degenerative diseases, particularly of the cardiovascular system, and Irish migrants have worse health profiles, often lasting at least two generations. The influence of socio-demographic variation over the life course, and what role diet plays, has not been well researched in epidemiological terms. There is a long history of an unusual Irish diet. Estimated dietary fat intake (% total energy intake) in 1863 was only 9, but had reached 30 in 1948 and 34 in 1999. Conversely, carbohydrate intake has fallen steadily over 150 years. From 1948 onwards household budget survey data illustrate patterns of increasing urbanisation and socio-economic gradients in food availability. The National Survey of Lifestyles, Attitudes and Nutrition, (*n* 6539, 62·2 % response rate) provides clear evidence of inverse social-class gradients in intake of fruit and vegetables and dairy products and in reported patterns of healthy eating. Median carbohydrate and vitamin C levels are higher among social classes 1–2 and mean saturated fat intake is lower. International comparisons indicate a continuing, if narrowing, north–south gradient across Europe. Data from the Boston-Ireland study suggest a crossover in both dietary intake patterns and risk of heart disease in Ireland and the USA in the 1970s. Contemporary comparative data of middle-aged Irish and American women demonstrate patterns of diet intake and inactivity consistent with the modern epidemic of obesity and non-insulin-dependent diabetes. Thus, dietary variations within and between countries and over time are consistent with chronic disease patterns in contemporary Ireland.

Social class: Time trends: Saturated fatty acids: Fat intake: Carbohydrate intake

It is well established that social variations in health status exist both within and between countries, and the explanations for this factor must take account of lifestyle and socio-economic circumstances across the life course (Kuh & Ben Shlomo, 1998). In the Republic of Ireland overall life expectancy continues to be relatively low by European standards, rates of heart disease and some cancers are relatively high and there is now clear evidence of social variation in health expectancy (Kelleher, 1998, 1999; Department of Health and Children, 1999, 2001; Kelleher *et al*. 2002*b*). A defining characteristic of social variation in Ireland and elsewhere is the graduated pattern seen in risk-factor profiles and outcome morbidity and mortality patterns, from richest to poorest (O'Shea & Kelleher, 2001), suggesting the importance of factors such as income distribution and relative disadvantage (Marmot & Wilkinson, 2001). The epidemiological threshold is a conceptual explanation for the fact that in situations of extreme material disadvantage there is a powerful relationship between *per capita* income and life expectancy, but in more affluent countries, particularly in the modern Western world, the relationship is less clear-cut, and factors influencing relative social position gain more in importance (Wilkinson, 1996). There is consistent evidence now that such effects have an impact across the life course. Competing explanations for these early-life influences include the latent impact on adult

Abbreviation: SLAN, National Survey of Lifestyles, Attitudes and Nutrition.
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health of biological programming *in utero* (Barker, 1994), cumulative influences over time or trajectory experiences at crucial life points (Hertzman *et al*. 2001).

Whichever the explanation, the role of diet is central. In situations of extreme poverty an adequate energy supply is essential, but in more affluent environments the relative quality of the diet assumes more importance. From a basic biological or mechanistic perspective, maternal diet is critical to early-life growth and development (McCance, 1962*a,b*), and prospective epidemiological studies show that dietary intake at different life points is influential in almost every important common medical condition (Kushi *et al*. 1985; Riboli & Kaaks, 1997; Power *et al*. 1998; Hu *et al*. 2000; Hertzman *et al*. 2001; Willett, 2001). However, diet is also an important social indicator, in that it is associated with financial means, educational status and social position. Food patterns are strongly influenced by cultural context, including peer influences (Nic Gabhainn *et al*. 2002). Furthermore, food distribution and supply is heavily influenced by macro-economic conditions and by public policy (Milio, 1986). There are, therefore, a number of pathways mediating the influence of diet on health status, and estimates of its relative importance are considerable from both epidemiological and health promotion perspectives.

The present paper is concerned with the effect of social variation on the Irish diet. First, we will examine how dietary patterns have changed in recent history, both in Ireland itself and among Irish migrants, as a means of estimating the influence on contemporary disease-specific patterns and trends. Then, we will examine contemporary dietary patterns, based particularly on the large-scale National Survey of Lifestyles, Attitudes and Nutrition (SLAN), conducted in 1998 (Friel *et al*. 1999). Finally, we will briefly discuss interventions related to dietary practice in estimating effective interventions in an Irish context.

Explaining present health status with evidence from the past

One of the paradoxes of public health policy in Ireland is that despite the poor profiles of health status in this country, there has been little epidemiological evidence to explain why, until relatively recently. However, two lines of enquiry are important in helping to illuminate this picture. First, the socio-cultural and historical literature has adequately documented the social circumstances of the Irish population leading up to, and in the aftermath of, the famine (Doyle, 1975; Crawford, 1984; Kelly, 1986). There is a long history of an unusual Irish diet. At the National Nutrition Surveillance Centre we have documented this pattern in some detail (Newell *et al*. 1993; Friel & Nolan, 1995). It is clear, for instance, that the Irish peasantry enjoyed a nutritionally more than adequate, but exceedingly monotonous, diet of large amounts of potatoes and buttermilk, which was unusual by European standards of the time. Estimated dietary fat intake (% total energy intake) in 1863 was only 9, but had reached 30 in 1948 and 36 in 1990. Conversely, carbohydrate intake has fallen steadily over 150 years (Newell *et al*. 1993). Cremin & Morrissey (1976) also documented the gradual change in diet in more recent decades, as meat and dairy product consumption rose over time. Although such surveys did not differentiate the type of fat, the source was mainly from dairy and meat products and therefore saturated in type.

The meticulous survey of diet in 1948 provides valuable evidence of the patterns of social variation in diet in this country that might be relevant to the health status of the Irish population today (Department of Health, 1951). The survey, which involved 2500 households and was devised to reflect both urban and rural social circumstances at all levels of affluence, clearly showed major differences according to socio-economic circumstances, with the potato continuing as a crucial staple among the rural poor, and class differences in the increasingly urbanised areas. Fruit and vegetable consumption was highest among suburban middle-class households (Table 1). There is also evidence in household budget survey data on food availability over the subsequent half century that there are continuing class gradients (Friel *et al*. 2002*b*). As just one example, it can be noted that the percentage of total household expenditure on food is greatest for the least affluent (Table 2), with the predictable expectation that such families must shop economically and for quantity rather than quality. If we assume that childhood nutrition is important to health in later life, then these patterns would suggest a gradient in

Table 1. Fruit and vegetables expenditure and consumption in 1948 (Department of Health, 1951)

	Potatoes		Vegetables		Fruit and products	
	% total food expenditure	Amounts of food consumed daily in 1948 (g)	% total food expenditure	Amounts of food consumed daily in 1948 (g)	% total food expenditure	Amounts of food consumed daily in 1948 (g)
Slum	7	341·3	4	80·7	2	18·6
Artisan	7	334·8	5	109·9	3	30·8
Middle class	4	325·1	5	163·0	8	85·5
Large town	7	431·7	4	114·7	3	29·6
Small town	9	454·0	3	100·9	3	28·0
Farming	9	659·5	3	153·6	2	26·3
Farmer workers	11	542·4	3	91·6	2	16·6
Congested district: Autumn	12	851·7*	2	55·5*	1	8·5*
Spring	14		2		1	

*Not specific to autumn or spring.

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Table 2. Household food purchasing patterns (% total expenditure) based on household budget survey data (Central Statistics Office, 1954, 1969, 1977, 1982, 1989, 1997)

	1951	1965	1973	1980	1987	1994
Professional, employer, manager	32·2	24	24	21	19	18
Salaried employees	32	30	27	24	23	20
Other non-manual	40	33	32	29	26	24
Skilled manual	44·5	33	30	26	26	23
Semi-skilled manual	42·9	38	34	31	30	26
Farming	39	36	33	30	26	26

contemporary heart disease rates related to socio-economic circumstances, and indeed this is now known to be the case (O'Shea & Kelleher, 2001; Kelleher *et al*. 2002). The patterns of deprivation in Ireland in the past were not, however, typical of other countries. Indeed, there is only a weak relationship between infant mortality rate in the past and contemporary rates of cardiovascular disease, by contrast with other countries (Pringle, 1998). This finding suggests that it was the process of urbanisation that was important, associated with a deterioration in diet quality.

A second source of instructive evidence is the health experience of Irish migrants and how that experience might relate to diet, lifestyle and socio-economic circumstances. There is now convincing evidence that migrants to the UK have adverse health profiles, particularly from cardiovascular diseases and some cancers, for at least two generations, partially but not fully explained by socio-economic and traditional risk factors (Harding & Balarjan, 1996, 2001; Abbotts *et al*. 1997). We do not know the precise nature of their dietary patterns: however, food practices of migrants have been meticulously documented in the USA. The Irish migrants into the USA were quick to abandon the traditional high-energy carbohydrate diet and adopt the prevailing fare, in contrast with Italian and Jewish migrants, who continued with versions of the cuisine of their country of origin (Diner, 2001). There is also good evidence that the Irish had particularly adverse health patterns in the USA, lasting at least two generations (Winslow & Wang, 1931; Calabresi, 1945; Stamler *et al*. 1960; Trulson *et al*. 1964; Rosenwaike & Hempstead, 1989; CC Kelleher, S Harper and JW Lynch, unpublished results). In this respect we may compare the diet of the Boston brothers at home and in the USA, as reported in the Boston–Ireland Heart Health Study, between 1964 and 1985. The results showed that the migrants rapidly adopted a lifestyle typical of the American way of life, but their brothers also began to exhibit changes in dietary patterns, with increasing fat intake, in keeping with the secular trends of CHD (Trulson *et al*. 1964; Kushi *et al*. 1985; CC Kelleher, S Harper and JW Lynch, unpublished results).

The contemporary Irish diet

Ireland is one of twelve countries participating in the international Data Food Networking project. The household budget survey is employed as a means of measuring food availability in this study (Friel *et al*. 2001; Trichopoulou, 2001). It is clear that the north-south gradient in diet persists across Europe, despite increasing congruence, with high rates of consumption of meat and meat products and lower rates of fruit and vegetable intake in the northern countries. Ireland has particularly high rates of consumption of milk and lipids of animal origin.

There have been three nationally representative dietary surveys in Ireland over the last decade. In 1990 the National Nutrition Survey (Lee & Cunningham, 1990) provided important information that influenced subsequent public policy. The report indicated some evidence of demographic variation: for instance, high levels of Fe-deficiency anaemia among women of childbearing age and relatively high fat intakes among younger men. There was also evidence that rural respondents, still adhering to a more traditional diet, were consumers of items such as potatoes and had in fact a lower fat intake than urban respondents. The findings formed the basis of the Nutrition Advisory Group's (1995) recommendations for a national nutrition policy and the Department of Health and Children's Framework for Action programme that dictated public nutrition education campaigns throughout the last decade (Kelleher & Friel, 1996; Friel *et al*. 1997). Throughout the 1990s public nutrition educational campaigns focused on a balanced diet. A version of the Food Guide Pyramid (US Department of Agriculture, 1992) was used as a public educational tool, with a series of national- and settings-based campaigns in schools, workplaces and in communities with high levels of disadvantage. The pyramid recommendations suggest six or more daily servings of cereals, bread and potatoes, four or more servings of fruit and vegetables, three servings of milk, cheese and yogurt, two servings of meat, fish or poultry and three or less of top-shelf-treat items (Friel *et al*. 1997).

The North/South Ireland Food Consumption Survey, conducted through the Irish Universities Nutrition Alliance in both jurisdictions of Ireland in 1998, was a methodologically rigorous survey of 1379 adults employing a 7 d food diary method that also included detail on exercise patterns and intake of additives and other substances (Harrington *et al*. 2001*a,b*; Livingstone *et al*. 2001; McCarthy *et al*. 2001). This survey confirmed escalating rises in obesity, particularly related to physical inactivity. However, neither this survey nor the previous survey was sufficiently large in sample-size terms to differentiate food and nutrient intake patterns according to socio-economic circumstances and region.

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The SLAN survey was devised to provide just such a national profile. The methods utilised have been described in detail previously (Kelleher *et al.* 1999; Friel *et al.* 2002*c*; S Friel, CC Kelleher, G Nolan and J Harrington, unpublished results). In brief, a self-administered postal questionnaire was circulated to a randomly-selected sample of adults in district electoral divisions across the Republic of Ireland. There were 6539 respondents with 62·2 % response rate, which was highly acceptable for a postal questionnaire. A semi-quantitative food-frequency instrument, developed and validated for use in the European Prospective Investigation of Cancer and Nutrition (EPIC) international survey, was employed (Goldberg *et al.* 1991; Black *et al.* 1996; Bingham *et al.* 1997; Riboli & Kaaks, 1997; Willett, 2001). The procedure had also been piloted and validated in an Irish context, using food diaries and *p*-aminobenzoic acid as a urinary biomarker, to assess variations in completion according to gender and social class (Harrington, 1997). The 95 % CI for energy intake were used to identify under-, normal and over-reporters, leaving a final sample of 6465 respondents.

The recommended macronutrient intakes at the time of the survey were (% energy): 10 as protein; ≤ 35 as total fat; 55 as carbohydrate. Although employing quite different methodologies, and therefore not directly comparable, it is still instructive for policy purposes to examine how well, or not, the two surveys (SLAN and the North/South Ireland Food Consumption Survey) agree on present population intake rates (Table 3). The mean estimates (as % energy) from both surveys are notably close, with a higher estimate of protein intake in the SLAN survey, as might be expected, as items like meat tend to be overestimated by this method and alcohol intake tends to be underestimated. The estimates for total fat intake are almost identical, with only a 0·3 % difference, suggesting that this estimate is a realistic assessment of the present intake in the population.

Findings from the National Survey of Lifestyles, Attitudes and Nutrition

Men and women differ in their dietary patterns, and these differences have been reported in detail previously (Friel *et al.* 2002*c*; S Friel, CC Kelleher, G Nolan and J Harrington, unpublished results). In examining compliance with the recommended Food Pyramid guidelines first, men consume more energy, starchy foods and meat, but less fruit and vegetables and top-shelf treats. They also consume more butter, lard and fried foods than women and less low-fat products. At a macronutrient intake level, men have higher absolute levels of protein and total and saturated fat intakes than women. There are again gender differences in general dietary patterns. Women are much more likely to be conscious of healthy eating, to be on a weight-reducing diet or to take folate and vitamin substitutes. The urban–rural differences highlighted in the 1990 survey persist, with traditional staples like potatoes, milk and cheese being consumed more among the rural respondents. There is an age gradient too, with younger and middle-aged respondents consuming a healthier diet. Similarly, there seems to be a cohort or generational effect; for example, young respondents are more likely to be vegetarian. Low-cholesterol diets are more common among older respondents and those living in urban areas.

The patterns according to social class are summarised in Table 4. Median carbohydrate, alcohol and folate intakes are all higher in social classes 1–2. The evidence is also strongly suggestive that vitamin C intake is higher than expected among the higher social classes. Fruit and vegetable intakes show a graduated positive pattern and there are strong inverse patterns in relation to the type of milk consumed. Cooking methods also show a class gradient. Those respondents in lower social classes are more likely to boil from cold water and less likely to sauté and steam

Table 3. Macronutrient intake estimates (% total energy) from North/South Ireland Food Consumption Survey (1997–9; NSIFCS); Harrington *et al.* (2001*a*) and National Survey of Lifestyles, Attitudes and Nutrition (1998; SLAN); Kelleher *et al.* (1999)
(Mean values and standard deviations)

		Protein		Fat		Carbohydrate		Alcohol	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
SLAN:	*n* 6539 45·4% males	17·0	5·0	34·5	7·6	46·5	9·4	2·7	3·6
NSIFCS:	*n* 1379 48% males	15·5	2·7	34·8	5·7	43·5	6·4	5·9	7·2
Males									
SLAN:	18–34 years	17·1	6·2	36·1	6·2	44·8	9·3	1·6	3·1
NSIFCS:	18–35 years	14·8	2·6	35·0	5·5	42·7	6·1	7·2	7·8
SLAN:	35–54 years	17·4	3·6	33·2	7·3	45·2	7·3	1·8	3·6
NSIFCS:	36–50 years	15·9	2·6	35·5	5·7	43·3	6·3	5·1	6·2
SLAN:	55+ years	18·5	6·1	32·2	8·2	46·1	12·3	1·9	4·1
NSIFCS:	51–64 years	16·2	2·7	33·3	5·9	45·1	6·8	5·1	7·2
Females									
SLAN:	18–34 years	16·4	3·4	34·4	6·9	46·5	6·9	1·5	2·8
NSIFCS:	18–35 years	14·7	3·0	36·1	5·4	44·4	5·7	4·8	5·3
SLAN:	35–54 years	17·2	3·8	33·6	7·5	47·8	7·5	1·4	2·3
NSIFCS:	36–50 years	15·9	2·6	35·7	5·8	44·7	6·1	3·3	4·2
SLAN:	55+ years	18·6	6·7	32·0	8·9	47·8	11·1	0·9	2·0
NSIFCS:	51–64 years	16·7	2·8	34·7	6·5	46·8	6·4	1·5	2·9

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Table 4. Selected food and nutrient consumption and food preparation patterns according to the Irish social class scale in the National Survey of Lifestyles, Attitudes and Nutrition SLAN; (1999); (Kelleher *et al.* 1999)

Social class. . .	1–2	3–4	5–6
n	1796	1761	938
Median daily macronutrient intake (g)			
Protein	91·04	92·04	92·38
Fat	79·52	80·88	82·87
Carbohydrate	273·2**	258·0	257·7
Alcohol	5·91**	4·49	4·06
MUFA	24·88	25·18	25·90
PUFA	10·68	10·83	10·55
SFA	28·84	30·04	31·44
Median daily vitamin intake			
Vitamin A (μg)	547·4	571·6	588·4
Vitamin B_6 (mg)	2·61	2·59	2·55
Vitamin B_{12} (μg)	4·79	5·17	5·18**
Folate (μg)	293·7**	284·5	279·4
Vitamin C (mg)	104·6	91·5	80·48
Vitamin D (μg)	2·86	2·88	2·87
Vitamin E (μg)	6·19	6·04	5·70
Added fats every or most days (%)			
Butter or hard margarine	50·9	58·3	63·1**
Low-fat or polyunsaturated spread	55·9	54·9	53·4
Vegetable oil	19·0**	15·4	14·8
Lard or dripping	2·7	5·3	8·2**
Fried foods	8·2	12·4	17·6**
Milk consumption patterns; type used most frequently (%)			
Full-fat	56·4	64·1	67·0**
Low-fat	25·7	21·7	19·9**
Skimmed	5·3	4·2	3·1**
Dried	0·1	0·1	0·2**
Respondents' cooking methods (%)			
Boiled from cold water	45·6	54·3	61·8**
Grilled	3·2	4·7	2·9**
Fried	1·4	1·3	1·1
Microwaved	4·4	2·4	1·5**
Steamed	11·2	7·4	5·8**
Sautéed then casseroled	0·9	0·3	0·3
Respondents' dieting patterns (%)			
Eat healthier	81·1**	77·1	74·5
Vegetarian	4·5**	2·8	2·1
Diabetic	1·2	1·7	1·9
Weight reducing	12·9	14·7	11·4
Gluten free	1·2*	0·5	0·6
Vitamins, minerals, food supplements	58·2**	48·2	40·9
Folic acid	18·3**	14·6	11·8
Achieving recommended pyramid servings:			
Cereals, breads and potatoes	39·8	41·7	43·5
Fruit and vegetables	73·2**	65·6	57·3
Milk, cheese and other dairy products	25·2*	24·1	21·0
Meat, fish and poultry	39·1	40·1	41·4
Top shelf	13·6	14·8	12·9

MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; SFA, saturated fatty acids.
Social class variation was significant (three-way group comparison; ANOVA): *$P<0·05$, **$P<0·01$.

food. Gluten-free diets are also more common in social classes 1–2, as is reported folate intake.

Fibre intake is higher among the higher social classes (24·53 (SD 13·2) g), but so is sugar intake (130·0 (SD 69) g). The pattern of vegetarianism is also strongly related to social class, as is reported supplement intake. Unlike the survey of 1990, there is little convincing evidence of variations in Fe intake according to age, gender and social class (not shown). Of critical importance is not so much total fat intake, as type of fat intake, and these data are reported in Table 5. Monounsaturated, polyunsaturated and saturated fatty acid intakes are all higher among younger respondents, but this finding reflects an overall higher total fat intake according to age. Mean rates of saturated fatty acid intake do show a significant class gradient ($P<0·01$), and there is also a gender difference, with higher intakes among men.

These SLAN data clearly suggest two processes at work, the shift from the traditional diet, evidenced by urban–rural differences, which is to some considerable extent age related and, therefore, a reflection of secular trends. There are clearly established social-class gradients at food, nutrient and preparation levels. These patterns are in keeping with the epidemiological evidence, suggesting a trend more in keeping with other industrialised countries and emerging gradients according to social position within modern urban areas (Kelleher *et al*. 2002*a*). We have demonstrated in other analyses that other socio-demographic determinants, such as educational status, are important predictors of dietary patterns, and that men and women differ in the extent to which socio-economic and social support mechanisms are important, including educational status (Friel *et al*. 2002*c*). It is clear, however, that the once obvious differences between urban and rural populations are diminishing; in part because of considerations of retail and food supply, but also because individual level, rather than area level, influences on deprivation are relatively more important in contemporary Ireland outside the cities (Howell *et al.* 1993; Harrington & Friel, 2002; Kelleher *et al*. 2002*a,b*).

The Ireland – West Virginia Women's Study: lessons for health promotion policy

Another interesting source of contemporary evidence is the comparison of older Irish and American women, undertaken in the mid 1990s with the objective of identifying how diet and lifestyle practices might differ in countries with contrasting health promotion strategies. Obesity is now a global health problem, but trends have been particularly dramatic in the USA, where obesity rates among adults have risen from 12·8 % in 1960–2 to 22·6 % in 1988–94 (Centers for Disease Control and Prevention, Department of Health and Human Services, 2000) and diabetes rates have soared, so that 15·7 million people, about 6 % of the population, have the disease (Centers for Disease Control and Prevention, Department of Health and Human Services, 2001). Rates are particularly high in East Coast states like West Virginia. Rates are rising in Ireland too, with about 2 % of the respondents in SLAN reporting diagnosed diabetes (Kelleher *et al*. 2002*b*). Data for the Ireland–West Virginia study were collected collaboratively, by means of

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Table 5. Socio-demographic profile of fat intake data from the National Survey of Lifestyles, Attitudes and Nutrition 1998†
(Mean values, medians and standard deviations, excluding outliers; *n* 6465)

	Gender						Age-group (years)									Social class								
	Male			Female			18–34			35–54			55+			1–2			3–4			5–6		
n	2964			3381			2334			2331			1628			1785			1735			924		
	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median
MUFA (g)	28·32	16·2	25·14**	25·96	15·3	23·02	31·14	17·1	27·87**	26·89	14·7	24·08	21·34	13·1	19·15	28·00	15·3	24·88	28·58	15·3	25·18	29·21	16·8	25·90
PUFA (g)	11·95	8·1	10·13	11·97	8·1	9·99	13·26	8·0	11·42**	12·34	8·1	10·34	9·54	7·7	7·55	12·63	7·8	10·68	12·87	8·2	10·83	12·52	8·6	10·55
SFA (g)	35·12	20·4	30·82	30·47	18·1	26·58	37·22	20·7	33·42**	32·12	18·2	28·46	26·65	17·2	23·06	33·04	19·0	28·84	34·33	19·1	30·04	35·50**	20·6	31·44

MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; SFA, saturated fatty acids.
Variation within socio-demographic group was significant: $^{**}P < 0{\cdot}01$.
†Occupational data were not available for some women and older participants.

the same food-frequency questionnaire used in SLAN, among two groups of middle-aged women in similar voluntary organisations, the Irish Country Women's Association and the West Virginia Extension Homemakers Clubs. In each country 400 questionnaires were distributed. The overall response rate was 56 % (*n* 448), and 351 of these respondents were rural based. A total of 171 questionnaires were returned from the Irish Country Women's Association in twenty-three of the twenty-six Irish counties, and 180 questionnaires were returned in West Virginia. The respondents in West Virginia tended to be older, 77 % >50 years *v*. 48 % of the Irish sample.

As seen in Table 6, smoking rates were well below expected rates, but in keeping with their age and socio-demographic profile. Overall, more West Virginian women had a self-reported weight problem, with significantly higher reported rates of overweight and obesity ($P<0{\cdot}01$). Significantly more of the West Virginian women had had their cholesterol level checked in the past 6 months ($P<0{\cdot}01$ for both age-groups). In both age-groups knowledge of ideal blood cholesterol was significantly higher amongst the West Virginian women ($P<0{\cdot}01$).

Reported attitudes to food and exercise were quite similar. In both age-groups, concern with a healthy diet was ranked first by Irish and American women, followed by concern with overweight or obesity, as reasons for modification of diet in the past year. This concern was significantly more prevalent for the older American women compared with their Irish counterparts ($P<0{\cdot}01$). In both countries the main reasons for engaging in exercise was to improve health or fitness, or as a means of weight control. The main barriers to exercise for the two groups were lack of time because of family commitments, followed by lack of interest. In the older age-group the perception of the principal cause of good health was good healthy food among both Irish (33 %) and American (54 %) women, although significantly more so amongst American respondents ($P<0{\cdot}01$). This perception differed slightly in those women <50 years of age. A healthy lifestyle and sufficient rest rated higher for the younger American women.

There are, therefore, important differences between these two groups of health-conscious women that arguably reflect the health promotion strategies in place. In the USA there has been a major emphasis on reduction of fat intake and measurement of serum cholesterol levels, practices confirmed here among the West Virginian women. However, their rates of inactivity and reported obesity are higher and their carbohydrate intakes higher, notwithstanding a lower average energy intake. While the determinants of overweight and obesity are overwhelmingly environmental, the nature of public health guidelines must play an important role. Willett (2001) maintains that the present Food Pyramid recommendations are problematic, because high intakes of refined carbohydrate, particularly in situations of inactivity, promote postprandial glycaemic load and are potentially diabetogenic. The combined effect, Willett (2001) contends, is to promote obesity, because there is not enough emphasis on energy balance and exercise, and there has been demonisation of potentially-beneficial mono- and polyunsaturated fats and promotion of refined carbohydrate consumption. He wants to see a

Table 6. Comparison of selected food and nutrient consumption and food preparation patterns among rural Irish and West Virginian women

	≤50 years				>50 years			
n. . .	Ireland 82		West Virginia 42		Ireland 89		West Virginia 138	
	n	(%)	*n*	(%)	*n*	(%)	*n*	(%)
Current smokers	10	12	5	12	5	6	5	4
BMI (kg/m^2):								
Normal weight (<25)	53	65	11	28**	45	51	40	30**
Overweight (25–30)	21	26	17	42**	36	40	54	40
Obese (>30)	8	10	12	30**	8	9	40	30**
Blood cholesterol measured in past 6 months	8	10	19	45**	18	20	79	57**
Knowledge of ideal blood cholesterol level	30	38	35	83**	37	44	86	64**
Consume low-fat milk	30	38	29	69**	24	28	79	57**
Consume fried food at home most days	27	33	4	10**	26	29	13	10**
Consume fried food away from home most days	9	11	2	5	3	3	5	4
Salt added in cooking	50	61	28	67	51	57	99	74**
Salt added at table	46	56	20	48	26	52	45	34**
Steamed or microwaved vegetables	38	54	32	76**	38	51	100	72**
Use of vitamin and/or mineral supplements	43	52	0	0	45	51	0	0
Energy (KJ)	2651		2550		2494		2334*	
Fat (g)	104·0		95·5		99·5		81·8**	
Protein (g)	121·8		113·8		111·1		94·0	
Carbohydrate (g)	321·0		324·4		302·4		324·2	
Folate (mg)	370·4		498·8**		369·4		485·7**	
Ca (mg)	791·7		1242**		743·3		1208**	
Fe (mg)	18·0		19·6		16·5		17·9	
% Energy from fat	35·3		33·7		35·9		31·5	
% Energy from protein	18·4		17·8		17·8		16·1	
% Energy from carbohydrate	48·4		50·9		48·5		55·6	
Exercise:								
Walking more than three times per week	53	65	22	52	55	62	74	54
Gardening more than three times per week	17	21	9	21	34	38	38	28
Dancing more than three times per week	3	4	2	5	–	–	3	2
Swimming more than three times per week	6	7	1	2	4	4	3	2
Reasons for modification of diet in past year:								
Concern with a healthy diet	36	50	11	30	37	47	57	43
Overweight or obesity	28	37	8	22	14	19	43	33
High blood cholesterol	1	2	5	14**	5	7	35	27**
High blood pressure	2	2	1	3	17	19	27	21
Bowel problems	10	14	5	14	5	7	15	11
Diabetes	2	3	–	–	1	2	16	12**
Other	7	8	5	12	14	16	27	20
Reasons for engaging in sport and exercise:								
Improved health and fitness	56	71	31	74	59	69	102	76
To control weight	46	60	26	63	41	50	75	56
Relaxation or stress reduction	44	57	27	64	34	45	69	52
Pleasure or fun	32	44	17	40	21	29	58	43**
Friendship or sociability	21	29	14	33	26	34	40	30
Sense of accomplishment	12	17	8	19	8	12	31	23**
Sense of being member of a team	1	1	2	5	4	6	12	10

Values were significantly different from those for women within each age-group: *$P<0·05$, **$P<0·01$.

modification of the pyramid recommendations to include exercise and energy balance, take account of alcohol and allow discrimination of the type of fat and carbohydrates consumed.

Taken in an Irish context this approach is particularly interesting, since we have shifted in recent history from a high-carbohydrate diet to a more atherogenic saturated fat and high-protein diet, with falling energy levels. The paradox may be that if we seek to reverse this trend by undue focus on total fat intake, without attending to energy balance and types of fat and carbohydrate consumed, we too will see continuing changes in obesity and non-insulin-dependent diabetes patterns for the worse, as exemplified here in the comparison with the women in West Virginia. There is already evidence in SLAN of a rise in carbohydrate intake among the compliers with healthy-eating guidelines, which is not a problem as long as it is in the context of overall healthy lifestyle. There is clearly evidence from both SLAN (Friel *et al*. 1999) and the North/South Ireland Food Consumption Survey of trends in obesity, patterns of

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overweight and inactivity that must be checked at public policy level by facilitating supportive environments (Livingstone *et al*. 2001).

Strategies for prevention: targeted policy and settings approaches

The evidence is therefore persuasive that social variations in diet exist now, and have done so for some time, and that there is a temporal relationship with disease-specific variations in health status. A life-course approach is appropriate in interpreting this relationship, since the historical data indicate long-term effects related to past dietary patterns. Evidence from analyses such as the UK 1958 birth cohort contribute to our understanding of the interaction of biological and social processes (Power *et al*. 1998; Hertzman *et al*. 2001), and it is very likely that adult obesity, for instance, is a function of childhood development and socio-economic circumstances. Our best estimates are that the high rates of chronic disease in Ireland are a combination of secular or generational factors among older Irish adults, but that the widening social gradient in contemporary urban Ireland will mean that children born in adverse circumstances today will carry the influence of those childhood circumstances forward. This situation is the reason why newly-established cohort studies will be so important in the coming years in helping to influence policy. It is clear that estimates of life expectancy are exceeding all predictions (Department of Health and Children, 2001), giving a different likely health profile in the future, with disease related to long periods of unopposed oestrogen in women and diseases associated with obesity and inactivity being increasingly prevalent. Food policy is therefore crucial, particularly as it affects differentially the social spectrum. Policies that are excessively individualistic and lifestyle focused are merely going to perpetuate the class gradient, and food retail and supply is pivotal. The evidence we have collected in settings such as schools and workplaces (Friel *et al*. 1997, 2002*a*; Kelleher, 1998; Nic Gabhainn *et al*. 1999, 2002) is remarkably consistent with the international literature, showing that there are also class gradients in health promotion programmes, but that targeted supportive programmes can work if they are supported by conducive public policy. It is evident that such approaches must become the norm if we are to avoid epidemics of nutrition-related chronic disease and widening class differentials in the decades to come.

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