

Food poverty and health among schoolchildren in Ireland: findings from the Health Behaviour in School-aged Children (HBSC) study

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Abstract

Objectives: To investigate the relationships between food poverty and food consumption, health and life satisfaction among schoolchildren.

Design: Analysis of the 2002 Health Behaviour in School-aged Children (HBSC) study, a cross-sectional survey that employs a self-completion questionnaire in a nationally representative random sample of school classrooms in the Republic of Ireland.

Subjects: A total of 8424 schoolchildren (aged 10–17 years) from 176 schools, with an 83% response rate from children.

Results: Food poverty was found to be similarly distributed among the three social classes (15.3% in the lower social classes, 15.9% in the middle social classes and 14.8% in the higher social classes). It was also found that schoolchildren reporting food poverty are less likely to eat fruits, vegetables and brown bread, odds ratio (OR) from 0.66 (95% confidence interval (CI) 0.45–0.87) to 0.81 (95% CI 0.63–0.99); more likely to eat crisps, fried potatoes and hamburgers, OR from 1.20 (95% CI 1.00–1.40) to 1.62 (95% CI 1.39–1.85); and more likely to miss breakfast on weekdays, OR from 1.29 (95% CI 0.33–1.59) to 1.72 (95% CI 1.50–1.95). The risk of somatic and mental symptoms is also increased, OR from 1.48 (95% CI 1.18–1.78) to 2.57 (95% CI 2.33–2.81); as are negative health perceptions, OR from 0.63 (95% CI 0.43–0.83) to 0.52 (95% CI 0.28–0.76) and measures of life dissatisfaction, OR from 1.88 (95% CI 1.64–2.12) to 2.25 (95% CI 2.05–2.45). Similar results were found for life dissatisfaction in an international comparison of 32 countries. All analyses were adjusted for age and social class.

Conclusions: Food poverty in schoolchildren is not restricted to those from lower social class families, is associated with a substantial risk to physical and mental health and well-being, and requires the increased attention of policy makers and practitioners.

Keywords
Adolescent health
Food poverty
Life satisfaction

Adolescence is a time when the physiological need for nutrients increases and the consumption of a diet of high nutritional quality is particularly important¹. A balanced and appropriate diet during childhood and adolescence is likely to reduce the risk of both immediate and long-term health problems^{2–5}. Poorer quality diet is consistently observed among the more socially disadvantaged groups in societies^{6–9}. Social gradients in nutritional intake have been proposed as a possible explanation for the social inequalities observed in a variety of nutrition-related health outcomes among adults^{10,11}.

Food poverty may be defined as the inability to access a nutritionally adequate diet and the related impact on health, culture and social participation^{12,13}. Experiencing food poverty during adolescence has been associated with

poor diet and may therefore expose young people to various health risks^{14,15}. Previous studies suggested that among children in the USA, household food insecurity, defined as limited or uncertain availability of nutritionally adequate and safe foods, is associated with poor health-related outcomes^{16,17}.

The topic of food poverty, food insecurity and food deserts has received some attention in the recent past^{18,19}. Within the general population, there is agreement that food poverty is associated with poverty and lower social class status. For example, the UK Food Poverty (Eradication) Bill was passed in 2001 aimed at taking government and local action to eradicate food poverty²⁰. However, despite increased understanding of the parameters of the problem, such policy responses are not widespread¹².

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Moreover, there appears to be a paucity of work investigating the extent of food poverty among adolescents and its associations with social class, food consumption, health and well-being. The present report aims to describe reported food poverty among school-aged children, to investigate the associations between food intake and the experience of food poverty, and to assess the risks of self-reported health and well-being associated with food poverty.

Methods

Sample

This study utilised data from the 2002 Irish Health Behaviour in School-aged Children study, a part of the World Health Organization International collaborative study (WHO-HBSC), carried out among 162 305 schoolchildren in 35 countries. Research teams in all participating countries must follow the same research protocol²¹ in order to facilitate entry into the international database and subsequent international analyses. Following this protocol²¹, the sampling unit for this study was the classroom. A nationally representative sample of schools (stratified by geographical region) was randomly selected, and individual classrooms within these schools were subsequently randomly selected for inclusion. All mainstream schools, both public and private, were included in the sample frame. Data were collected using a self-completion questionnaire, in April–June and September–October 2002, from 8424 schoolchildren. The response rate in this study was 83% of schoolchildren.

Measurement

The questionnaire was designed by researchers from all 35 participating countries (see Acknowledgements)²¹. Food poverty was defined as those schoolchildren who responded always, often or sometimes to the question ‘Some young people go to school or to bed hungry because there is not enough food at home. How often does this happen to you?’ This question has been validated within the HBSC²² and in studies in the USA^{14,17}, and its relevance and applicability has also been demonstrated elsewhere^{23,24}. Children were also asked to report on their father’s occupation from which a three-category social class scale was created (social classes 1–2, social classes 3–4 and social classes 5–6). Data on paternal occupation were available for 83% of respondents. Food consumption was measured by a set of questions regarding the frequency of the consumption of a variety of foodstuffs. The various foodstuffs were chosen to capture the relative intake of fibre and calcium, and the consumption foods high in fat, sugar and sodium. The validity and the reliability of this set of questions have been validated among schoolchildren in various countries in Europe and the USA^{25–27}. These variables were dichotomised at daily consumption or less of the foodstuffs.

The questionnaire also included a question on the frequency of having breakfast, a behaviour associated with nutritional status^{28,29} and which can be reliably assessed with this age group²⁵. Breakfast eating was dichotomised at ever missing breakfast or not.

Self-rated health was assessed by the question ‘Would you say your health is?’, with the response options dichotomised at excellent vs. good, fair or poor. Self-rated health is employed as a proxy indicator of health status, with demonstrated applicability for both children and adults^{30,31}. Children were also asked to report the frequency, in the 6 months prior to the survey, that they experienced a variety of symptoms. These items were used for calculating two indices: those reporting emotional symptoms (feeling low, nervous, bad tempered, afraid, or tired and exhausted) at least once a week during the last 6 months; and those reporting physical symptoms (headache, stomach-ache, backache, dizzy, or neck and shoulder pain) at least once a week in the last 6 months. This symptom checklist represents a non-clinical measure of mental health^{32,33}. Based on Huebner’s (1991)³⁴ students’ life satisfaction scale, children were asked six questions concerning feelings about their life: ‘I like the way things are going for me’, ‘I feel that my life is going well’, ‘I would like to change many things in my life’, ‘I wish I had a different life’, ‘I feel I have a good life’ and ‘I feel good about what is happening to me’. For these six questions, the response options were dichotomised at never and sometimes vs. always and often. Self-reported happiness was measured by the question ‘How do you feel about your life in general?’ and the responses were dichotomised at very happy vs. quite happy, not very happy and not happy at all. Finally, children were asked to rank themselves from 0 to 10 on a life satisfaction ladder³⁵. This scale was used to identify those with low life satisfaction (response <6). The appropriateness of these well-being items have been previously tested and reported elsewhere^{36,37}.

Statistical analyses

Associations between reported food poverty and likelihood of the various outcome measures described above are expressed in odds ratios (ORs) from logistic regression models in SPSS, version 12.0. All analyses were adjusted for age and social class (according to the father’s occupation), and were conducted independently for girls and boys. Each table represents a separate logistic regression model. Employing the classroom as the sampling unit, but the individual as the unit of analysis, has the potential to mask clustering effects; nevertheless, previous literature has shown that a cluster effect is less likely in the variables under investigation³⁸.

Results

Compared with 14.6% of schoolchildren in Europe who reported food poverty (ranging from 5.1% in Portugal to

Table 1 Associations between food poverty and daily consumption or less of various foodstuffs, by gender

	Boys			Girls		
	% among those reporting food poverty	% among those not reporting food poverty	OR* (95% CI)	% among those reporting food poverty	% among those not reporting food poverty	OR* (95% CI)
Number	671	2925		676	4100	
Fruits	23.4	31.5	0.66 (0.45–0.87)	34.6	39.6	0.81 (0.63–0.99)
Vegetables	28.9	38.3	0.68 (0.49–0.87)	38.8	46.9	0.72 (0.54–0.90)
Sweets	51.9	48.2	1.16 (0.98–1.34)	52.9	52.7	1.03 (0.85–1.20)
Coke or soft drinks	45.9	42.3	1.18 (1.00–1.36)	36.3	32.5	1.25 (1.07–1.43)
Any alcoholic drink	2.5	1.8	1.25 (0.62–1.88)	1.5	1.2	1.11 (0.35–1.87)
Diet coke or diet soft drinks	11.5	11.9	0.93 (0.65–1.21)	15.5	14.2	1.15 (0.91–1.39)
Low-fat milk	12.1	14.9	0.76 (0.49–1.03)	17.4	18.2	0.94 (0.71–1.17)
Whole-fat milk	42.7	50.4	0.72 (0.54–0.90)	37.7	43.6	0.82 (0.64–1.00)
Cheese	16.1	18.5	0.86 (0.62–1.10)	14.7	16.7	0.92 (0.68–1.16)
Other milk products	26.8	28.5	0.91 (0.71–1.11)	28.4	33.6	0.76 (0.57–0.95)
Cereals	54.9	59.2	0.84 (0.49–1.02)	39.1	46.8	0.74 (0.56–0.92)
White bread	54.9	63.5	0.70 (0.52–0.88)	52.8	59.8	0.76 (0.59–0.93)
Brown bread	15.9	22.2	0.66 (0.42–0.90)	17.8	19.2	0.91 (0.68–1.14)
Crisps	28.3	25.6	1.20 (1.00–1.40)	30.1	26.2	1.23 (1.04–1.42)
Cakes or pastries	10.5	8.3	1.22 (0.91–1.53)	7.1	6.6	1.08 (0.74–1.42)
Chips/fried potatoes	19.9	13.4	1.62 (1.39–1.85)	11.7	8.7	1.33 (1.05–1.61)
Hamburgers, hot dogs, sausages	14.1	10.0	1.32 (1.04–1.60)	6.0	4.4	1.31 (0.93–1.69)

OR – odds ratio; CI – confidence interval.

* Adjusted for age and paternal social class.

26.8% in Italy), 16.1% of the Irish pupils reported experiencing food poverty (18.7% of boys, 14.2% of girls). This ranged from 15.3% of children from families of lower social classes (SC5–6), to 15.9% from middle social classes (SC3–4) families and to 14.8% of children from higher social classes (SC1–2) ($P = 0.50$). Small and statistically non-significant differences were also found between the three age groups, with 16.5% of 10- to 11-year-old children, 16.4% of 12- to 14-year-old children and 15.3% of 15- to 17-year-old children reporting food poverty ($P = 0.41$).

Experiencing food poverty was significantly associated with a poorer diet (less fruit, vegetables and brown bread, and more crisps among girls and fried potatoes and hamburgers among boys) (Table 1). Children reporting food poverty were more likely to miss breakfast on weekdays, with adjusted ORs of 1.29 (95% confidence interval (CI) 0.99–1.59) for boys and 1.72 (95% CI 1.50–1.95) for girls.

Reported food poverty was also found to be significantly associated with frequent mental and somatic symptoms, poor health (Table 2) and low life satisfaction (Table 3). ORs of ≥ 2 were found among boys experiencing food poverty, indicating an increased likelihood of reporting stomach-ache, feeling low and dizziness. Similarly, among girls experiencing food poverty ORs of > 2 were found, indicating an increased likelihood of reporting dizziness, feeling afraid, and feeling tired and exhausted. Both boys and girls experiencing food poverty were significantly less likely to report excellent health. On all measures of life satisfaction, children reporting food poverty were

significantly more likely to feel dissatisfied with their life, and were less likely to report that they feel happy. A comparison of the 32 HBSC countries that asked these questions (Fig. 1) confirms this as an international pattern, though showing some variability in the strength of the association, with Ireland ranking about mid-way.

Discussion

These data indicate a substantial level of food poverty among Irish schoolchildren. They also show that experiencing food poverty is significantly associated with poorer diet, frequent mental and somatic symptoms and low life satisfaction, but not with paternal social class. The current study is based on a large nationally representative sample of schoolchildren and the questionnaire in use was piloted and validated in Ireland as well as in other countries that took part in the international HBSC study in 2001/02^{21,39}.

It is important to note that this study is cross-sectional in design and thus casual interpretations cannot be made. The response rate in this study is very high; nevertheless, there could be a bias due to non-response, because those absent from school might be particularly different from attendees. In addition, there is a relatively high level of missing data on socio-economic status, which must be considered when interpreting the lack of social class differences in reported food poverty. All data employed here are based on self-reports from children. Although the items employed have been extensively piloted and tested, it is important to bear in mind that there will inevitably be error within these data. Nevertheless, the patterns

Table 2 Associations between food poverty and measures of health perception, by gender

	Boys			Girls		
	% among those reporting food poverty	% among those not reporting food poverty	OR* (95% CI)	% among those reporting food poverty	% among those not reporting food poverty	OR* (95% CI)
Number	671	2925		676	4100	
Headaches weekly or more	15.5	8.7	1.74 (1.47–2.01)	19.9	16.3	1.31 (1.09–1.53)
Stomach-aches weekly or more	9.1	3.6	2.42 (2.06–2.78)	12.6	7.6	1.67 (1.40–1.94)
Backaches weekly or more	11.8	7.8	1.48 (1.18–1.78)	11.9	6.8	1.73 (1.45–2.01)
Feeling low weekly or more	21.2	9.3	2.57 (2.33–2.81)	25.3	15.2	1.73 (1.52–1.94)
Irritable or bad tempered weekly or more	30.3	22.0	1.49 (1.29–1.69)	33.7	22.0	1.85 (1.66–2.04)
Nervous weekly or more	22.0	13.0	1.85 (1.62–2.08)	23.6	15.9	1.57 (1.36–1.78)
Difficulties in sleeping weekly or more	21.9	14.2	1.68 (1.45–1.91)	26.8	17.3	1.76 (1.56–1.96)
Dizzy weekly or more	14.8	6.6	2.44 (2.15–2.73)	15.2	8.2	2.00 (1.75–2.25)
Neck and shoulder pain weekly or more	13.6	7.5	1.79 (1.50–2.08)	13.3	9.2	1.55 (1.29–1.81)
Afraid weekly or more	9.9	4.4	2.20 (1.85–2.55)	13.6	6.8	2.19 (1.92–2.46)
Tired and exhausted weekly or more	38.4	28.1	1.57 (1.38–1.76)	48.1	32.2	2.02 (1.84–2.20)
Emotional symptoms weekly or more	57.2	42.4	1.67 (1.47–1.23)	63.3	45.8	1.96 (1.77–2.15)
Physical symptoms weekly or more	35.8	21.5	1.86 (1.66–2.06)	39.9	28.5	1.67 (1.49–1.85)
Report excellent health	24.1	33.5	0.63 (0.43–0.83)	15.7	26.3	0.52 (0.28–0.76)

OR – odds ratio; CI – confidence interval.
* Adjusted for age and paternal social class.

Table 3 Associations between food poverty and measures of reported life satisfaction, by gender

	Boys			Girls		
	% among those reporting food poverty	% among those not reporting food poverty	OR* (95% CI)	% among those reporting food poverty	% among those not reporting food poverty	OR* (95% CI)
Number	671	2925		676	4100	
Never or sometimes feel they like the way things are going for them	41.7	24.9	2.17 (1.98–2.36)	47.9	32.0	1.98 (1.80–2.16)
Never or sometimes feel that their life is going well	34.4	19.7	2.15 (1.95–2.35)	40.8	26.5	1.87 (1.69–2.05)
Always or often feel that they like to change many things in their life	40.3	25.1	2.00 (1.81–2.19)	46.9	28.6	2.20 (2.02–2.38)
Always or often they wish they had a different life	21.1	12.2	1.88 (1.64–2.12)	29.6	15.0	2.30 (2.10–2.50)
Never or sometimes feel they have a good life	28.2	16.9	1.90 (1.68–2.12)	36.5	22.2	2.02 (1.83–2.21)
Never or sometimes feel good about what is happening to them	40.0	25.1	2.00 (1.81–2.19)	46.9	32.3	1.88 (1.70–2.06)
Low life satisfaction	20.8	10.2	2.19 (1.95–2.43)	28.8	15.0	2.25 (2.05–2.45)
Feel happy about life	15.5	7.2	0.46 (0.18–0.74)	22.1	9.9	0.37 (0.15–0.59)

OR – odds ratio; CI – confidence interval.
* Adjusted for age and paternal social class.

reported here are both substantial and internally consistent, and thus deserve further consideration.

The association between socio-economic status, diet and health is well established among adults^{12,13,15} and young children^{14,17}, but not among adolescents. These findings concur with previous literature on the associations between social class and health in adolescence. Whereas strong evidence exists with respect to the importance of socio-economic inequalities in health

among adults and young children^{40,41}, the patterns among adolescents are rarely so clear. Contradictory findings abound in the literature, and vary by measure of socio-economic status, health behaviour or outcome, as well as country^{42–44}. Thus adolescence is perceived as a period of relative healthfulness and equality. Although parental occupation is still considered a reliable measure in this age group^{42,45,46}, other possible measures of socio-economic status among adolescents is an important

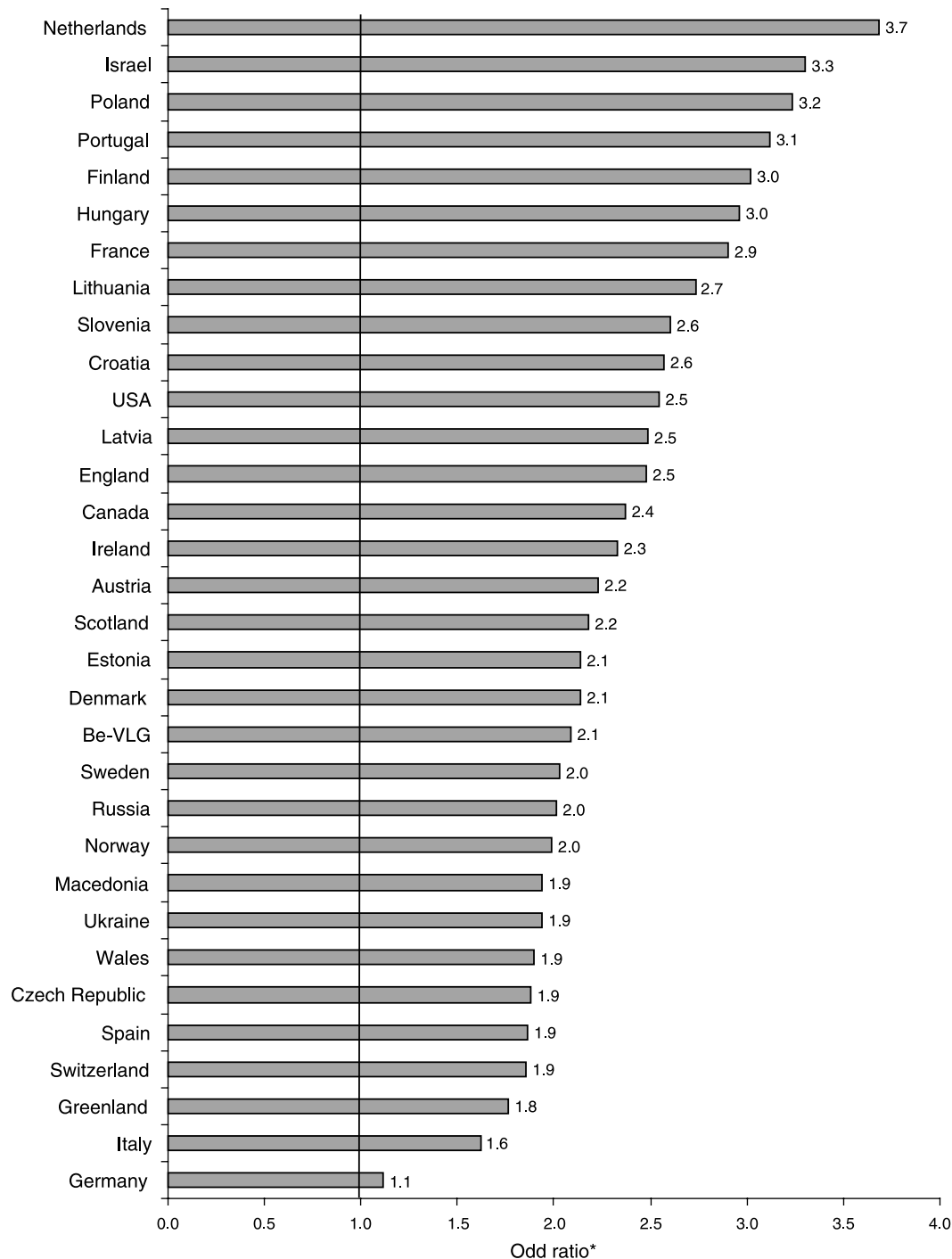


Fig. 1 Associations between food poverty and low life satisfaction, by country. *Adjusted for age and paternal social class. Germany, Italy and Russia are represented by regional rather than national samples; Be-VLG – Belgium, Flanders

avenue of investigation^{43,47}. However the role of other sources of social inequality also requires consideration.

According to the findings presented here, the association of food poverty with poor diet, negative health and poor life satisfaction among children is over and above measures of social class and is generally stronger among boys than girls. Casey and colleagues previously reported similar gender effects¹⁶, which suggest, together with the international comparison presented here, that the associations between food poverty and low life satisfaction are not unique to Ireland and may exhibit considerable cultural variability. Thus, the necessity of considering the different pathways of association between food poverty and health within specific population subgroups is highlighted.

The unequal distribution of the material, social and cultural resources in society results in social inequalities in food, and often in food poverty among some population groups^{12,48}. Research in the UK and Ireland has clearly identified material and structural issues of access to and availability of healthy foods as the two main determinants of food poverty⁴⁹. It appears from this study that the risk of being hungry due to lack of food at home can exist across all social classes. This suggests a more complex aetiology of food poverty among children, including matters of material circumstance, psychosocial support, work–life balance of parents, family (dis)organisation, as well as personal and family nutrition knowledge and beliefs, many of which could operate independently of occupational or socio-economic status⁵⁰.

Access to a safe and varied healthy diet is a fundamental human right. Yet, up until recently, food poverty *per se* has not received much attention at a policy level in Ireland. However, the recognition of the need for equal access to food for all members of society is embedded within Ireland's new National Nutritional Policy, launched in Summer 2006. One of the key strategic objectives is to help reduce food poverty⁵¹. No single approach to tackling food poverty is believed to address all the relevant issues. However, with regard to food poverty among children and adolescents, schools are a powerful, potentially supportive setting, in a position to provide much of the structural and skills development necessary for healthy living. The provision of school meals is a proven beneficial support measure for schoolchildren^{52,53}. Ongoing dietary programmes in schools are to be commended, but need to be developed and supported nationwide as part of a long-term strategic approach to ensure provision of nutritionally balanced meals for all children.

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References

- 1 Dwyer JT. Childhood, youth and old age. In: Garrow JS, James WPT, eds. *Human Nutrition and Dietetics*. Edinburgh: Churchill-Livingstone, 1993; 394–408.
- 2 Joint WHO/FAO Expert Consultation. *Diet, Nutrition and the Prevention of Chronic Disease*. Geneva: World Health Organisation, 2003. (WHO Technical Report Series, No. 916).
- 3 Pollitt E, Mathews R. Breakfast and cognition: an integrative summary. *American Journal of Clinical Nutrition* 1998; **67**: 804S–13S.
- 4 Weinreb L, Wehler C, Perloff J, Scott R, Hosmer D, Sagor L, et al. Hunger: its impact on children's health and mental health. *Pediatrics* 2002; **110**: 41.
- 5 Gordon N. Some influences on cognition in early life: a short review of recent opinions. *European Journal of Paediatric Neurology* 1998; **2**(1): 1–5.
- 6 Roos G, Johansson L, Kasmel A, Klumbiene J, Prattala R. Disparities in vegetable and fruit consumption: European cases from the north to the south. *Public Health Nutrition* 2001; **4**: 35–44.
- 7 Nelson M. Childhood nutrition and poverty. *Proceedings of the Nutrition Society* 2000; **59**: 307–15.
- 8 Friel S, Kelleher CC, Nolan G, Harrington J. Social diversity of Irish adults nutritional intake. *European Journal of Clinical Nutrition* 2003; **57**: 865–75.
- 9 Vincentian Partnership for Social Justice. *One Long Struggle – A Study of Low Income Families*. Dublin: Vincentian Partnership for Social Justice, 2001.
- 10 James WPT, Nelson M, Ralph A, Leather S. The contribution of nutrition to inequalities in health. *British Medical Journal* 1997; **314**: 1545–9.
- 11 Eurodiet. Nutrition and diet for healthy lifestyles in Europe: science and policy implications. *Public Health Nutrition* 2002; **4**(2A): 265–73.
- 12 Friel S, Conlon C. *Policy Response to Food Poverty in Ireland*. Dublin: Combat Poverty Agency, 2004.
- 13 Dowler EA. Food poverty and food policy. *IDS Bulletin* 1998; **29**: 58–65.
- 14 Alaimo K, Olson CM, Frongillo EA. Low family income and food insufficiency in relation to overweight in children: is

- there a paradox? *Archives of Pediatrics & Adolescent Medicine* 2001; **155**: 1161–7.
- 15 Giskes K, Turrel G, Patterson C, Newman B. Socioeconomic differences among Australian adults in consumption of vitamins A, C and folate. *Journal of Human Nutrition Dietetics* 2002; **15**: 375–85.
 - 16 Casey PH, Szeto KL, Robbins JM, Stuff JE, Connell C, Gossett JM, *et al.* Child health-related quality of life and household food security. *Archives of Paediatrics & Adolescent Medicine* 2005; **159**: 51–6.
 - 17 Alaimo K, Olson CM, Frongillo EA, Briefel RB. Food insufficiency, family income, and health in US preschool and school-aged children. *American Journal of Public Health* 2001; **108**: e44–53.
 - 18 Cummins S, Macintyre S. 'Food deserts' – evidence and assumption in health policy making. *British Medical Journal* 2001; **325**: 436–8.
 - 19 Dowler E. Food and poverty – insights from the 'North'. *Development Policy Review* 2003; **21**: 569–80.
 - 20 Food Poverty (Eradication) Bill. <http://www.joeshort.net/foodjustice/thebill.htm> (accessed 9 December 2005).
 - 21 Currie C, Samdal O, Boyce W, Smith R, eds. *Health Behaviour in School-aged Children: A World Health Organization Cross-national Study: Research Protocol for the 2001/02 Survey*. Edinburgh: University of Edinburgh, 2002.
 - 22 Mullan E, Currie C, Boyce W, Morgan A, Kalnins I, Holstein B. Social inequality. In: Currie C, Samdal O, Boyce W, Smith R, eds. *Health Behaviour in School-aged Children: A World Health Organization Cross-national Study: Research Protocol for the 2001/02 Survey*. Edinburgh: University of Edinburgh, 2002; 175–250.
 - 23 British Medical Journal, News Extra. More than 1% of Canadian population suffers hunger. *British Medical Journal* 2000; **321**: 1042.
 - 24 Riches G. Hunger, food security and welfare policies: issues and debates in first world societies. *Proceedings of the Nutrition Society* 1997; **56**: 63–74.
 - 25 Maes L, Vereecken C, Johnston M. Eating and dying. In: Currie C, Samdal O, Boyce W, Smith R, eds. *Health Behaviour in School-aged Children: A World Health Organization Cross-national Study: Research Protocol for the 2001/02 Survey*. Edinburgh: University of Edinburgh, 2002; 39–58.
 - 26 Vereecken C, Maes LA. A Belgian study on the reliability and relative validity of the Health Behaviour in School-Aged Children food frequency questionnaire. *Public Health Nutrition* 2003; **6**: 581–8.
 - 27 Vereecken CA, Inchley J, Subramanian SV, Hublet A, Maes L. The relative influence of individual and contextual socioeconomic status on consumption of fruit and soft drinks among adolescents in Europe. *European Journal of Public Health* 2005; **15**: 224–32.
 - 28 Resnicow K. The relationship between breakfast habits and plasma cholesterol levels in schoolchildren. *Journal of School Health* 1991; **61**: 81–5.
 - 29 Siega-Riz AM, Carson T, Popkin B. Three squares or mostly snack – what do teens really eat? A sociodemographic study of meal patterns. *Journal of Adolescence Health* 1998; **22**: 29–36.
 - 30 Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior* 1997; **38**: 21–37.
 - 31 Torsheim T, Currie C, Boyce W, Samdal O. Country material distribution and adolescents' perceived health: multilevel study of adolescents in twenty-seven countries. *Journal of Epidemiology and Community Health* 2006; **60**: 156–61.
 - 32 Haugland S, Wold B, Stevenson J, Aaro LE, Woynarowska B. Subjective health complaints in adolescence – a cross national comparison of prevalence and dimensionality. *European Journal of Public Health* 2001; **11**: 4–10.
 - 33 Ghandour RM, Overpeck MD, Huang ZJ, Kogan MD, Scheidt PC. Headache, stomachache, backache, and morning fatigue among adolescent girls in the United States: associations with behavioral, sociodemographic, and environmental factors. *Archives of Pediatrics & Adolescent Medicine* 2004; **158**: 797–803.
 - 34 Huebner ES. Initial development of the students life satisfaction scale. *School Psychology International* 1991; **12**: 231–40.
 - 35 Cantril H. *The Pattern of Human Concerns*. New Brunswick: Rutgers University Press, 1965.
 - 36 Hagquist C, Andrich D. Measuring subjective health among adolescents in Sweden. *Social Indicators Research* 2004; **68**: 201–20.
 - 37 Torsheim T, Ravens-Sieberer U, Hetland J, Välimaa R, Danielson M, Overpeck M. Cross-national variation of gender differences in adolescent subjective health in Europe and North America. *Social Science & Medicine* 2006; **62**: 815–27.
 - 38 Roberts C, Tynjala J, Currie D, King M. Methods. In: Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O, *et al.*, eds. *Young People's Health in Context*. Copenhagen: World Health Organization Regional Office for Europe, 2004; 217–28.
 - 39 Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samdal O, *et al.*, eds. *Young People's Health in Context*. Health Policy for Children and Adolescents No. 4. Copenhagen: World Health Organization Regional Office for Europe, 2004.
 - 40 Woodroffe C, Glickman M, Baker M, Power C. *Children, Teenagers and Health: The Key Data*. Buckingham: Open University Press, 1993.
 - 41 MacIntyre S. Socioeconomic variations in Scotland's health: a review. *Health Bulletin (Edinburgh)* 1994; **52**: 456–71.
 - 42 West P. Health inequalities in the early years: is there equalisation in youth? *Social Science & Medicine* 1997; **44**: 833–58.
 - 43 Currie CE, Elton RA, Todd J, Platt S. Indicators of socioeconomic status for adolescents: the WHO Health Behaviour in School-aged Children Survey. *Health Education Research* 1997; **13**: 385–97.
 - 44 Goodman E. The role of socioeconomic status gradients in explaining differences in US adolescents' health. *American Journal of Public Health* 1999; **89**: 1522–8.
 - 45 Abramson JH, Gofin R, Habib J, Pridan H, Gofin J. Indicators of social class: a comparative appraisal of measures for use in epidemiological studies. *Social Science & Medicine* 1982; **16**: 1739–46.
 - 46 Townsend P. Widening inequalities of health in Britain: a rejoinder to Rudolph Klein. *International Journal of Health Services* 1990; **20**: 363–72.
 - 47 Batista-Foguet JM, Fortiana J, Currie C, Villalbi JR. Socio-economic indexes in surveys for comparisons between countries. an applied comparison using the Family Affluence Scale. *Social Indicators Research* 2004; **67**: 315–32.
 - 48 Shaw M, Dorling D, Gordon D, Davey Smith G. *The Widening Gap: Health Inequalities and Policy in Britain*. Bristol: The Policy Press, 1999.
 - 49 Dowler EA, Dobson BM. Nutrition and poverty in Europe: an overview. *Proceedings of the Nutrition Society* 1997; **56**: 51–62.
 - 50 DeRose L, Messer E, Millman S. *Who's Hungry? and How Do We Know? Food Shortage, Poverty, and Deprivation*. New York: United Nations University Press, 1998.
 - 51 Take 5 steps... to a healthier you. <http://www.healthpromotion.ie/news/?id=46> (accessed 15 December 2005).
 - 52 Department of Health. *Healthy Start: Proposals for Reform of the Welfare Food Scheme*. London: Department of Health Publications, 2002.
 - 53 Department of Social and Family Affairs. *Review of Urban and Gaeltacht School Meals Schemes*. Dublin: Department of Social and Family Affairs, 2003.