The Summer Meeting of the Nutrition Society was held at the University of Surrey, Guildford on 30 June–2 July 2009

Conference on 'Over- and undernutrition: challenges and approaches'

Symposium 1: Overnutrition: consequences and solutions
Foresight Report: the obesity challenge ahead

Peter Kopelman
St George's, University of London, Cranmer Terrace, London SW17 0RE, UK

Successfully tackling obesity is a long-term commitment. Current levels of obesity in the population have been ≥ 30 years in the making. Not only will this position take time to reverse but there will be a considerable time lag before health and economic benefits are achieved through reductions in the morbidity from obesity-related diseases. There is clear evidence that policies aimed only at individuals will be inadequate and that increasing small-scale interventions will not suffice. Major action to prevent excess weight gain at a population level is required. The Foresight Report has confirmed that a 'whole system' approach is critical. This approach will require a broad portfolio of integrated policy responses including both national and local measures. This strategy requires action by government, both central and local, industry and communities and by families and the societies in which they live.

Foresight Report: Obesity: Strategies for prevention and treatment: Whole-system approach

The concerns

Overweight and obesity cause or exacerbate a large number of health problems, both independently and in association with other diseases, and are among the most important contributors to ill health. Unfortunately, many of the health risks associated with increasing body weight begin their manifestation in children and young adults; of great current concern is the increasing prevalence of type 2 diabetes and associated medical complications in young overweight adults. The intra-abdominal visceral deposition of adipose tissue, which is characterised by fat around the waist, is a major contributor to the development of high blood pressure (hypertension), raised blood glucose levels (type 2 diabetes) and abnormal blood fat concentrations (hyperlipidaemia)[1]. The concept of a combination of these problems in an individual is termed the metabolic syndrome, which refers to the phenomenon of clustering of risk factors for heart disease. It is worrying that overweight and obese youngsters may show the blood changes associated in older life with heart disease and, additionally, have fat deposited in their livers. Furthermore, it can be anticipated that excessive weight carried by young adults

will lead to osteoarthritis of the back, knee and hip in the future[1]. Most of the medical complications will not present to a medical practitioner until 20–30 years have passed; hence, it is difficult to discern immediate benefits to younger generations from modest reductions in body weight. In prevention terms the symptomatic benefit to an individual may be relatively quick but the overall benefit to society will take years[2].

This lag in perceived benefit will have contributed to the lack of success of previous attempts to curb the obesity epidemic.

Foresight

To some individuals being overweight has become a normal condition with an acceptance that the UK is becoming an obese society; this transition has been at least three decades in the making and it will take several decades to reverse the factors that are driving this trend. The UK Government's Foresight programme, in the Government Office for Science, was asked to consider how society might deliver a sustainable response to obesity in the UK

Corresponding author: Professor Peter Kopelman, fax + 44 208 672 6940, email pkopelman@sgul.ac.uk

over the next 40 years. Foresight works across government departments to analyse complex cross-cutting issues. Its projects entail the rigorous use of science to inform future thinking in Government. The Tackling Obesities: Future Choices project has involved >300 experts and stakeholders, and has extensively reviewed the evidence base and used a variety of horizon-scanning techniques to help identify possible solutions[3].

The Foresight project's objectives were to:

1. use the scientific evidence base from across a wide range of disciplines in order to identify the broad range of factors that influence obesity and look beyond the obvious;
2. create an understanding of the relationships between key factors influencing levels of obesity and their relative importance;
3. build on this evidence to identify effective interventions, analyse how future levels of obesity might change and identify the most effective future responses.

The analysis of published evidence, commissioned by Foresight, has revealed that the causes of obesity are embedded in an extremely complex biological system, set within an equally complex societal framework. Furthermore, the scale of the challenge to prevent obesity is substantially increased by the complex nature of the condition. The many causes of obesity argues against depending on a number of unconnected solutions to address the issue, and against a focus on single aspects (on one population group, for example) because this approach is unlikely to bring about the scale of change required.

A long-term comprehensive strategy needs to incorporate a range of policies that act in at least three dimensions:

1. systemic change focusing on initiatives to change behaviours and the cues for such behaviours relating to food, physical activity and physiological and psychosocial factors;
2. interventions designed to change a single factor conducted at many levels of governance, i.e. at individual, local, national and global levels;
3. different interventions targeting the same process of behaviour change applicable across a lifespan.

The obesity epidemic

The Foresight Report was published in October 2007[3]. It confirms that the appetite control system is less responsive to diminished body energy needs, the consequence of low physical activity; this asymmetry of appetite regulation favours over-consumption because of a strong and rapid response to hunger cues and an incomplete response to satiety or 'fullness'. Over time, minor extents of positive energy balance result in overweight and obesity.

The obesity systems map (Fig. 1) identifies at its centre (or 'core') problems of appetite regulation and sedentary existence. By applying scientific and other evidence, the map demonstrates that energy balance (or imbalance) is determined by a complex multi-faceted system of

determinants (causes) in which no individual influence dominates[4]. The systems map can be divided into seven subsystems to illustrate the inter-play between causative factors: individual biology; individual activity; environmental activity; individual psychology; societal influences; food consumption; food production. Any intervention aimed at one segment will necessarily have an influence elsewhere on the map; the purpose of the map is to enable policy makers to anticipate the likely impact of preventive policies across several segments of the systems map. Altering this complex system to tackle obesity is far from straightforward, particularly as current evidence for effective preventative measures is not strong. There are few international examples of success on which the UK can draw[5], although a growing number of demonstrator projects offer promise.

Any one intervention will depend on a multiplicity of factors. Furthermore, the map demonstrates that single interventions are likely to have limited benefit; there needs to be a series of interventions at several levels.

This information led Foresight to an approach that links focused initiatives to 'enablers' and 'amplifiers'. An example is the strategy to provide healthier school meals (focused initiative). An 'enabler' is the linked policy to improve knowledge and education around food and activity in young adults. An 'amplifier' will be the control of advertising high-fat and -salt and sugary foods to children. One level of change will have limited benefit; three levels are likely, with time, to lead to greater benefit[3]. Nevertheless, the implementation of such strategies may have limited impact on the current generation of adults but lead to long-term benefit in younger generations. The impact across future generations will inevitably rise provided that the approach is sustained and combined with additional options (Fig. 2). The range of options will increase with time as the custom and values around food and activity shifts; future generations seeing benefit as a consequence of sustained strategies. Benefits from integrated and sustained strategies will lead to a progressive decline in obesity prevalence across all generations and an accompanying reduction in obesity-related diseases[2].

Looking to the future: Foresight tackling obesities

The Foresight quantitative scenario modelling predicts a rise in the prevalence of obesity to approximately 60% of the adult male population by 2050[1]. The predictions for children are equally stark, approximately 70% of girls will be overweight or obese and 55% of boys. Foresight has additionally modelled in the current generation of children the impact of reductions in obesity on the likelihood of diabetes, heart disease and the other commonly-associated medical complications of obesity (Fig. 3). The model demonstrates major benefit to future generations of adults but indicates that this benefit will be most evident in 20–30 years[1].

Why so long? This time period reflects how long it takes for the serious medical consequences associated with obesity to present; this inevitable delay must not diminish nor divert from a priority of tackling obesity now.
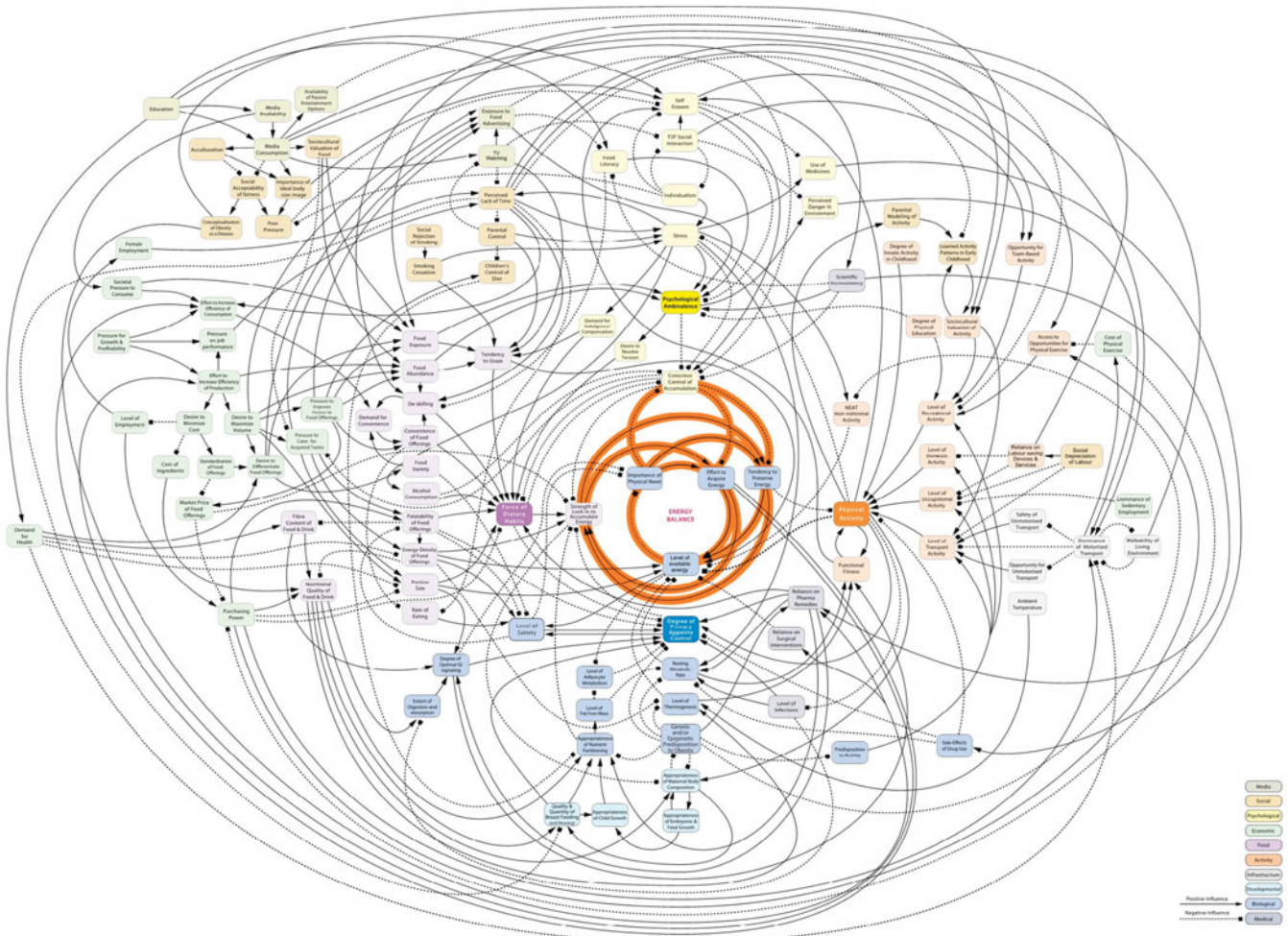
Fig. 1. Foresight obesity systems map demonstrating at its centre ('core') the imbalance between appetite regulation and sedentary existence. ⬜, Media; 🟧, social; 🟨, psychological; ⬜, economic; 🟪, food; 🟧, activity; ⬜, infrastructure; ⬜, developmental; 🟦, biological; 🟦, medical; ──▶, positive influence; - - -■, negative influence. (From Vandenbroeck *et al.*[4].)

Public health policies involving changes of lifestyle

A concept identified in the Foresight Report is passive obesity, which implies an insidious weight gain in many individuals that results from societal and cultural beliefs[3]. The concept of passive obesity raises important questions about how society responds to strategies directed at preventing obesity and where society perceives the responsibility for action lies. Individuals who are ambivalent about an issue may react to health-related messages in unexpected and counterintuitive ways. In addition, many individuals do not perceive obesity as an issue that affects them personally and consequently public demand for major action is relatively weak[6,7]. The Foresight Report emphasises the importance of designing options for healthy behaviour, or 'cues' for behavioural change, that become normal daily life and thereby influence those individuals not yet ready to make active choices. It is clear that efforts to reverse the rising trend and address the prospect of the increasing health burden and societal costs will be demanding and will necessitate major changes in behaviour, not only in individuals but also in families, communities, organisations and economic markets.

In recent years one of the most successful public health measures has been a requirement to wear seat belts in motor vehicles. The legislation has resulted in a dramatic reduction in injuries and fatalities from road traffic accidents; an immediate, easily-recognised and persuasive benefit[8]. By contrast, it has taken 40 years to realise true benefit from smoking restriction. *Smoking and Health*, the seminal report on health consequences of smoking, was published by The Royal College of Physicians of London in 1962[9]. The forward-looking recommendations include curbs on the promotion of tobacco products (most particularly to young adults) and the sponsorship of sporting events by tobacco companies, together with recommendations for health warnings on cigarette packs, smoking cessation clinics in hospital practice and a restriction on smoking in public. This last recommendation was introduced in July 2007. Why did effective anti-smoking measures take so long to be introduced? At the outset concerns were expressed about the infringement of personal liberties, the 'choice agenda'; those with doubts were the most vocal. Moreover, there were compelling financial disincentives against action from the Treasury tax perspective and for the tobacco industry. The latter sought
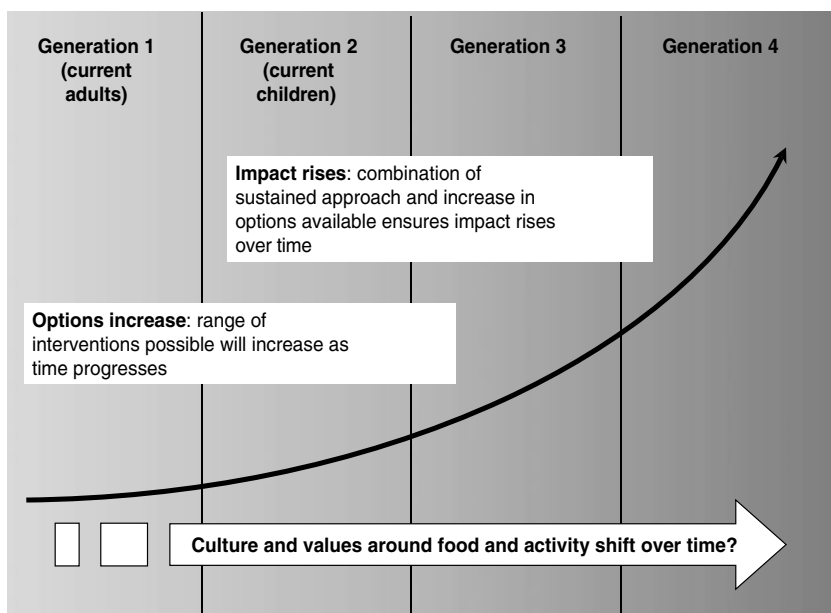
Fig. 2. The potential impact of preventive measures against overweight and obesity sustained over a prolonged period of time. →, The positive impact across generations. (From Government Office for Science[3]; reproduced with permission by Foresight, Government Office for Science.)

Decreasing levels of obesity-related disease will require more intervention

Significant time lag to seeing effect of intervention on BMI to impact on disease levels

Disease incidence: no intervention (——) *v*. preventing obesity in children 6–11 years (——)
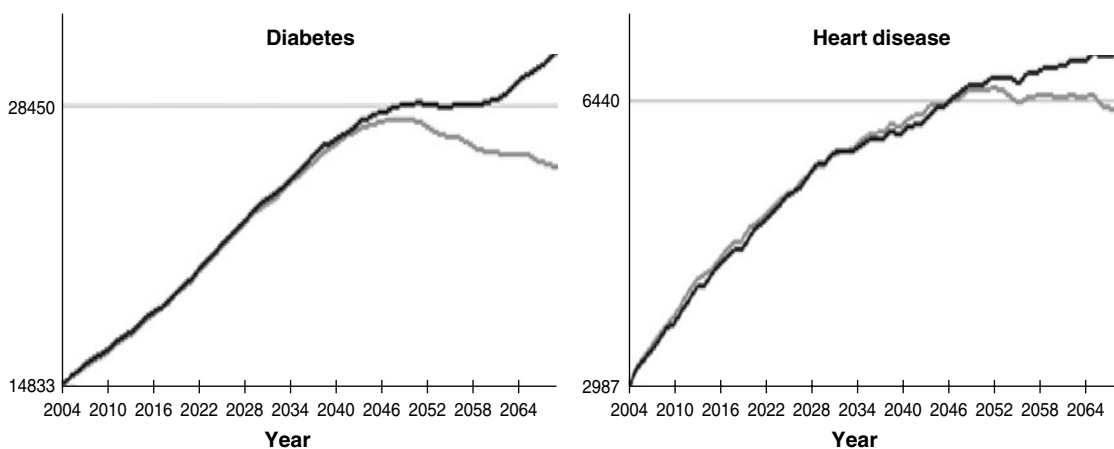

Fig. 3. Predictions of obesity associated disease rates (type 2 diabetes and CVD) during the next 49 years by successful intervention in children currently aged 6–11 years. (From Government Office for Science[3]; reproduced with permission by Foresight, Government Office for Science.)

commercial opportunities by introducing 'safer' cigarettes (filter-tipped) and arguing that there was no evidence to support stricter legislation. Both the fiscal and personal liberties arguments largely held sway until after the 1997 general election. The publicity and engagement of health professional advice and non-governmental organisations during the 40 years has unquestionably contributed to the progressive decline in smoking prevalence in adults, and

an associated reduction in smoking-related diseases throughout the four decades. Societal benefit has happened but over a sustained period of time.

Obesity has much in common with many of the other challenges faced in public health, and many of the wider determinants of health are the same.

The social, infrastructural and environmental factors that need to frame the planning and implementation of policies

Table 1. Core principles for tacking obesity

1	A system-wide approach, redefining the nation's health as a societal and economic issue
2	Higher priority for the prevention of health problems, with clearer leadership, accountability, strategy and management structures
3	Engagement of stakeholders within and outside government
4	Long-term sustained interventions
5	Ongoing evaluation and a focus on continuous improvement

for obesity reflect many other public health issues, including the management of several chronic diseases, for example:

1. implementing actions despite recognition that the extent of intervention required to achieve a major impact on obesity prevalence may create tensions with broader societal aspirations;
2. stimulating changes in approach when a sense of urgency or policy priority in the wider community is lacking;
3. providing strategic leadership and coordinating action when implementation is complex requires cross-government attention and responsibilities are dispersed;
4. making choices and policy trade-offs;
5. managing risks in the context of limited evidence;
6. managing the risk of unexpected consequences of policy measures[6,10].

The way forward: Foresight Report

The rate of increase in prevalence of obesity is susceptible to a number of external drivers of change that include lifestyle and societal factors[11]. Foresight has developed four scenarios based on differing attitudes to future challenge ('prepare' or 'mitigate') and whether responsibility is held by society to lie first and foremost at the national, community or individual level.

Analysis of the scenarios suggests that social values and the way society chooses to respond to long-term challenges will be the critical determinant of future scenarios postulated in the Foresight Report. From Foresight's perspective, the greatest opportunity to tackle obesity effectively was found in the scenario that is the most 'socially responsible and prevention focused'[3].

Any action to counter obesity must be aligned with other major policies to maximise the involvement of a broad range of stakeholders. Some policies can act indirectly to reduce the prevalence of obesity through actions motivated by other priorities.

Given the serious challenges identified, obesity can and must be tackled. Foresight has identified five core principles to developing a strategy framework for triggering, and achieving, sustained policy success (Table 1).

The challenge is to produce a range of solutions that are effective across different areas of government policy rather than within them and for such policies to be effective by working in a way that society finds acceptable. This strategy will undoubtedly require a greater amount of national debate.

System-wide and high-priority approaches

Although the major drive of the Foresight Report is towards prevention of obesity, it acknowledges the importance of effective treatment, particularly as weight once gained is difficult to lose. There are already substantial numbers of obese individuals requiring treatment and these numbers will rise regardless of the success of short-term measures. Treatments are of limited effectiveness but there have been some successes; modest weight loss (by 5–10 % of initial weight) reduces the risk of developing type 2 diabetes, improves blood pressure and reduces total cholesterol[1]. The evidence included in the report confirms that a substantial extent of intervention will be required to have any impact on the rising trend in obesity and a systemic, or even paradigm, shift is needed to achieve this outcome. Developing a mandate for such a shift is a formidable challenge. However, much progress could be made by creating a new framework for delivering an integrated strategy for prevention[12].

Engagement of stakeholders within and outside government

Progress will be accelerated by supporting multi-sector, multi-level action within and beyond the public health profession. Numerous organisations from the public sector, industry, patient and consumer groups and many others outside government are already engaged in the efforts to combat obesity. Action to build on this commitment and improve coordination would enable maximum benefit to be realised. The systems mapping work demonstrates that many levers of change lie outside the traditional health arena and governmental control.

Long-term sustained interventions

The need for short-term action and impact must be balanced against the drive for longer-term sustainable change. Interventions will only be effective if they are designed to be sustainable. It will take considerable time to establish new habits and build new structures to support healthy diets and enhanced physical activity in individuals and across populations. This approach requires long-term strategies that span several generations and normal planning cycles.

Ongoing evaluation and a focus on continuous improvement

The introduction of interim targets and supporting measures will help evaluate progress. Seeing 'health impact' as a criterion for policy impact assessment, along with economic and environmental impacts, could help reinforce this approach.

Cross-government involvement

Reducing the prevalence of obesity requires concerted long-term action from numerous stakeholders across many levels. The lead, however, must come from government. It is argued that the infrastructure and environment to deliver

a comprehensive and sustainable obesity strategy and a wide array of specific policies has much in common with other policy goals as well as other public health issues. There are therefore wide-ranging implications for the strategic management and coordination of such complex issues within central government.

A higher priority for the prevention of health problems is needed, with clearer leadership, accountability, strategy, resource and management structures. Success in tackling obesity requires the health of the population to be seen as a priority both by government ministers and society at large.

Conclusion

The Foresight Report demonstrates real opportunities today for tackling obesity and related diseases in adults now and for the future by implementing integrated interventions focused most particularly at today's younger generations. The Department of Health for England has responded immediately to the key issues raised in the Foresight Report, publishing a cross-government strategy, 'Healthy weight, healthy lives' in January 2008[13]. This strategy develops the themes suggested by Foresight for the prevention and treatment of overweight and obesity. An implementation review after 12 months indicates good progress towards achieving many of the objectives[14]. There must be confidence that such a multi-faceted approach will bring substantial benefit to the nation's health and economy provided the strategies are sustained over a decade or more and not sidelined by electoral or commercial priorities. Cigarette smoking took 40 years; the nation cannot wait another 40 years to curb obesity.

Acknowledgements

References

1. Kopelman P (2007) Health risks associated with overweight and obesity. *Obes Rev* **8**, Suppl. 1, 13–17.
2. McPherson K, Marsh T & Brown M (2007) Foresight tackling obesities: future choices – modelling future trends in obesity and the impact on health. 2nd ed. http://www.foresight.gov.uk/obesity/14.pdf
3. Government Office for Science (2007) Foresight tackling obesities: future choices. http://www.foresight.gov.uk/Obesity/17.pdf
4. Vandenbroeck IP, Goossens J & Clemens M (2007) Foresight tackling obesities: future choices – obesity system atlas. http://www.foresight.gov.uk/Obesity/11.pdf
5. Lobstein T & Jackson Leach R (2007) Foresight tackling obesities: future choices – international comparisons of obesity trends determinants and responses. Evidence Review. http://www.foresight.gov.uk/Obesity/06%20page.pdf
6. Maio G, Manstead A, Verplanken B *et al.* (2007) Foresight Tackling Obesities: Future Choices – *Lifestyle Change*. *Evidence Review*. http://www.foresight.gov.uk/Obesity/05.pdf
7. Reilly J, Dorosty A & Emmett P (1999) Prevalence of overweight and obesity in British children: cohort study. *Br Med J* **319**, 1039.
8. The Royal Society for the Prevention of Accidents (2009) Seat belts: History. www.rospa.com/roadsafety/advice/motorvehicles/seatbelt_history.htm
9. Royal College of Physicians (1962) Smoking and Health. London: Royal College of Physicians.
10. Chiperfield T, O'Brien R, Bolderson T *et al.* (2007) Foresight tackling obesities: future choices – qualitative modelling of policy options. http://www.foresight.gov.uk/obesity/15.pdf.
11. Lang T & Rayner G (2007) Overcoming policy cacophony on obesity: an ecological public health framework for policy makers. *Obes Rev* **8**, Suppl. 1, 165–181.
12. Eggar G & Swinburn B (2002) Preventative strategies against weight gain and obesity. *Obes Rev* **3**, 28–301.
13. Cross-Government Obesity Unit (2008) Healthy weight healthy lives: a cross-government strategy for England. http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_084024.pdf
14. Cross-Government Obesity Unit (2009) Healthy weight healthy lives: one year on. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/DH_097523