Obesity in Scotland
An update from the experts: Professor Mike Lean, Division of Developmental Medicine, University of Glasgow, incorporating comments from Professor Naveed Sattar, Dr Catherine Hankey and Hazel Ross.

There are several international authorities on obesity in Scotland, engaged on a variety of research programmes, and all willing to offer expertise and guidance to initiatives aimed at reducing obesity and its health consequences. This commentary represents a view from "the experts", several having contributed with rapid comments.

The Background – slow progress

This new report from ScotPHO is important for several reasons. Scotland led the world in proposing an integrated approach to treatment and prevention of obesity (SIGN, 1996). The idea of integrating these two aspects of management was new, but necessary, as both clinical services and public health had hitherto ignored one of the biggest and most costly diseases of all time. An epidemic is a disease which can no longer be contained by medical services in clinical settings. It certainly requires the best possible **medical management for those affected** but, as prevalence exceeds the WHO "critical threshold for intervention" of 15%, obesity also demands **effective political action for prevention** (WHO 1995). Obesity prevalence in adults, defined for epidemiological purposes as BMI > 30 kg/m^2, is now about 25% (SHS 2003), and rising rapidly. Its cost to healthcare services and also personally and socially, is colossal.

Treatment

Political action has to include coping with the treatment demands of a failure to implement effective preventive intervention when it rose above 15%. To save some of the colossal and rising rapidly costs of obesity, a lot more investment is needed for treatment. Scotland has taken a prominent lead in developing an evidence-based programme for weight management in routine NHS primary care, the Counterweight Programme (www.counterweight.org), and establishing a special interest group for Dieticians which evolved into the national DOM UK (www.domuk.org). Both are direct developments from the 1996 SIGN guideline on obesity (Lean 2006). A Scottish Health Department report in 2005 (Review of Bariatric Surgical Services in Scotland) concluded that more bariatric surgery* is needed for patients at very high risk of disability whose obesity cannot be sufficiently controlled by diet, lifestyle and pharmaceutical treatments. The "medical model" of obesity management cannot solve all our problems, but we do now have effective, and cost-effective, interventions for better primary and secondary care. The level of investment by NHS for treatment is extremely low, such that these services are not yet having impact at a national level. Much more investment is needed in treatment.

Prevention

* Bariatric surgery involves an operation to increase the feeling of fullness after meals, for example by reducing the size of the stomach

The main activity of Public Health, in relation to obesity, has been to improve descriptive methods to document the rising prevalence – mainly by the Scottish Health Survey, and socio-demographic associations of rising BMI and waist circumferences. The new ScotPHO report adds new dimensions, and provides a solid framework for monitoring overweight and obesity, to evaluate our efforts at prevention. The need is for effective and cost-effective prevention – specifically prevention of fat accumulation in adult life. No country has achieved this and some have ducked the main problem by focussing on children. Childhood obesity is an important reflection of a global epidemic, and brings a raft of new medical problems – physical, mental and social for affected children, but virtually all the healthcare costs of obesity are met in adulthood, most over the age of 40. Furthermore, most of the fat is put on in adulthood. It is possible that better behaviour patterns instilled in childhood may influence later adult behaviours to reduce obesity, but direct evidence is lacking. Patently, the education-based approaches of the past 20 years have failed, so a specific, coordinated approach is needed addressing the "Hosts" and "Vectors" of the epidemic, and the policy environment which currently rewards the promotion, for commercial reasons, of inactivity and over-eating (Swinburn & Egger 2002). A real problem for research, and interventions on obesity prevention, is that effects and evaluation need to be made on a generational timescale. If it is the will of the people to prevent obesity, then funding and programmes need to break away from the stifling limitation imposed by a political election cycle of five years. Another huge problem is that while obesity presents massive personal, social and healthcare costs, the commercial development which conspires to make us over-consume and under-exercise has been highly profitable. To change this will demand funding way beyond conventional public health or health promotion budgets.

The ScotPHO report is "an epidemiology briefing", presenting a view of obesity in Scotland for the public health community from a government agency which does not include specific expertise, or agendas in relation to obesity. It is therefore interesting for "obesity experts" to consider how the report has been orientated, and to offer comment, particularly since ScotPHO has prioritised obesity as the first in its series of reports on key public health issues for Scotland.

The report draws on new data, but the conclusions are depressingly familiar to dozens of previous recent reports, that obesity is a very major drain on health and vitality in Scotland, a disastrous drain on tax-payers for extra health care, and is increasing rapidly, particularly in adults and the elderly.

Scotland's position in a fat world

The report was widely interpreted as suggesting that Scotland was the second fattest country in the world – after the USA. In fact, things are much worse. Scotland is nowhere near the fattest if all other countries are considered: ahead of us (c 25%) lie not only US (c 30%), but also countries like Greece, Malta, Kuwait and the Gulf States (c 40%) and the Pacific Islands such as Tonga, Samoa, Nauru (70-80%) and figures are still increasing in all these countries. Our concern should focus on the gulf developing between these countries and others such as Norway, Italy, France and the Netherlands, where obesity remains below 15% (figure 1). What are they doing right in Norway, Italy, Sweden,

Netherlands and France? A love, pride and respect for food quality is coupled with much lower reliance on imported foods: it is worth reflecting that foods eaten on the most obese island states all has to be imported and so easily transported, high-fat foods and high profit foods dominate menus. Physical activity patterns are not radically different from Scotland in these less-obese countries, nor are the levels of general education higher. Indeed, striking analyses from US indicates that level of education has had no effect at all on the rising obesity levels of the last 30 years (Figure 2 - Sturm R 2004).

Social and regional variations

The regional data from SHS (Scottish Health Survey) 2003 included in this ScotPHO report show essentially no difference in obesity prevalence which can be related to social, educational or geographical factors. These data are presented as graphs with ranked points, joined by lines, and this implies some relationship, which is not the case. There is some suggestion of a social class gradient in children (Chart 6.4) but this graph, presented by SIMD as a continuous variable is hard to interpret. As SHS unfolds since its first survey in 1995, the increasing prevalence of obesity is seen in all age groups – but most strikingly, by far, in older ages (over 55 years) in both men and women (Section 5.3). This point probably deserves greater emphasis. It is further evidence that the main problem lies in adults (childhood obesity has changed much less – and not at all in girls). This is also a pointer to massive future clinical burdens from obesity as the population ages. Indeed, recent data suggest a substantial rise in UK diabetes levels.

Consequences for Healthcare in Scotland

The data on medical consequence of obesity in this ScotPHO report are largely taken from the 2001 Audit Office report – so based on rather old data which perhaps do not paint the full picture of the escalating healthcare burden with increasing age. A word of caution should be appended to the section on mortality: obesity has its greatest impacts on morbidity, not mortality. Of course it does increase mortality, perhaps a 2-fold, on a life-long basis, but the impact on mortality is lost if only older people are considered. The data quoted by ScotPHO from Adams et al 2006 show a small increase in mortality at BMI > 35 kg/m^2, but also below BMI 20 kg/m^2. This “U-shaped” curve for non-smokers is only applicable to older people. When all ages are included, mortality rises steadily with BMI > 25 kg/m^2 (Figure 3 –Manson et al 1995).

More recent detailed analyses of the overall impact of overweight and obesity on health and healthcare costs have come from the Counterweight audit, which has major Scottish input, showing the influences of obesity on several extra fields not conventionally linked with obesity (Counterweight Project Team 2005) which future SHS analyses might explore. There are also several recent secondary analyses of SHS data with important information for the public health community in Scotland. For example, the extent to which obesity, while itself not strongly related to social disadvantage adds to health inequalities because of its co-existence and interaction with factors which do relate closely to social disadvantage, smoking, inactivity and poor diet quality. It is the

intervention that is important. The “smoking trap” for the young overweight is already the topic of an Scottish FSA-funded project, to help smokers stop but avoid the usual weight gain – a particular problem for young smokers in Scotland who are now heavier than non-smokers (Akbartabartoori et al 2005). SHS data have shown how smoking clusters with the features of Metabolic Syndrome (high waist, high glucose, high BP, raised TG and low HDL), thus accelerating CHD and diabetes in more disadvantaged populations sectors in Scotland (Akbartabartoori et al 2006). SHS includes limited dietary information, using a “Dietary Targets Monitors” questionnaire designed to monitor progress towards Scotland’s carefully developed Dietary Targets (Lean et al 2003). It is vitally important that this questionnaire is not altered in successive surveys, as is currently being threatened, since this would invalidate longitudinal analyses. There is certainly scope to extend the information gathered in SHS – especially for diet and physical activity, recalling that the SDAP (Scottish Diet Action Plan 1996) was written in 1996 under political instruction at the time *not* to address obesity. SHS data indicate that greater physical activity does improve health, at any level of BMI, but it cannot overcome the adverse effects of obesity. The “fat and fit” may or may not exist elsewhere, but fat Scots delude themselves, if they think they are fit (Akbartabartoori et al 2007).

Terms, criteria and definitions

A limitation to SHS, perhaps related to its commissioning to an English Research Agency (Joint Health Surveys Unit of the National Centre for Social Research and the Department of Epidemiology and Public Health at University College London) is that it presented data on BMI, with only limited analysis by waist, and confusingly by WHR (waist: hip ratio). A result is that non-specialists have become confused about definitions and criteria for overweight and obesity.

This topic was addressed in the BMJ ABC series 2006-2007 (ABC on obesity 2007). At its simplest, obesity is the disease process of excess body fat accumulation, the result of a gene-environment interactions, with multiple organ-specific consequences. This is a clinical diagnosis. For epidemiological purposes, BMI 18.5 – 25 kg/m^2 is defined as normal by WHO, BMI 25 – 30 kg/m^2 as “overweight” and BMI > 30 kg/m^2 as “obese”. BMI adjusts weight for height, but it is not an ideal measure, as it is elevated by variation in muscle-mass as well as fat-mass. That is a particular problem in the range BMI 25 – 35, which includes over half the adult population. Rugby players commonly have BMI > 30 but body fat under 10% - so they could almost be considered underweight! Thus for BMI up to about 30, BMI does not discriminate strongly for health outcomes. Above this range, most extra weight is indeed fat, so for groups with very wide BMI ranges, BMI is a better guide. For population with BMI below 30 – 35, and so for our population in Scotland, waist circumference (WC) is a better indicator of total body fat content, and also a better indicator of health outcomes, although its measurement may be prone to more error. It is valuable to see in ScotPHO data analysed by waist circumference, which, if measured appropriately, is of greater relevance to health outcomes.

For groups of people with the same total body fat content, and the same BMI, there are still variations in health outcomes which relate to variations in fat distribution. Those with greater intra-abdominal fat mass, indicated by greater waist circumference, have poorer health.

There has been endless confusion about the relative value of BMI and WC for categorising obesity. A high WC indicates, firstly, high total body fat. Thus a WC > 102 cm (men) and > 88 cm (women) is a better guide to obesity than BMI > 30 in our Scottish population. WC is not a measure of "central obesity", or "apple-shaped obesity", any more than BMI is a measure of "pear-shaped obesity". Nor is WC a measure of intra-abdominal fat. They are both indicators of total body fat, and can be used in epidemiology to categorise overweight and obesity. There is no such thing as "central obesity". An increased intra-abdominal fat mass can occur with, or without, obesity, partly for genetic reasons, although it is exacerbated by high total body fat. Intra-abdominal fat mass can be measured with MRI or CT scanning (Han et al 1997), but it is difficult to identify otherwise. Raised WC reflects total body fat, and this will include increased intra-abdominal fat. For groups where total body fat is similar, variations in WC are more likely to reflect variation in intra-abdominal fat. During weight loss, obese people preferentially lose intra-abdominal fat so WC usually falls relatively quickly – about 1 cm for each 1 kg lost (Han et al 1997).

The SHS and ScotPHO include WHR as a "measure of obesity". This was a term used historically, and erroneously, to indicate fat distribution. WHR is not a measure of obesity. It does not usefully reflect body fat, or fat distribution (Han et al). Both waist and hip circumferences are directly influenced by changes in total body fat and the term WHR has no biological meaning. WHR does have relationships with some health indices, including CHD and type 2 DM – but only in cross-sectional studies (Yusuf et al 2004; Schneider et al 2007; Wang et al 2005; Meisinger et al 2006; The Diabetes Prevention Program Research Group 2006). Waist circumference alone is more powerful for predicting future health in longitudinal studies (Chan et al 1994). The reason for this is probably that raised WHR can result from small hips, with reduced gluteal muscle mass, caused by inactivity and / or disease (Seidell et al 1997). Any relationship between WHR and obesity or its consequences is explained by WC alone. Obesity experts learned from the mistakes made years ago that regression analyses should start by using the measurements actually made (e.g. WC, hips, height) before creating complex terms or ratios.

The future

This ScotPHO report concludes with yet another call for better data to try to explain why obesity is rising – whether by greater food-energy intake, or by lower physical activity. There is the need to have better information about social determinants, especially about the portion-sizes, composition, marketing and sales of foods, and particularly in the ready-meal and catering area, as determinants. But it is vital that we all recognise that self-reported food information is essentially useless. For the obesity expert whether high food intake or low physical activity is dominant is a sterile question. Health Economics analyses from US suggest that declining physical activity in the 1960s and 1970s

initiated the epidemic, but that more rapid escalation since 1980s has resulted from increased food provision and marketing, especially of high fat foods (Hill et al 2004). From first principles, overweight, obese, people have elevated metabolic rates, and so need to consume more calories to avoid weight loss. Obese people are already working harder to move their weights about, and find it difficult to exercise more. Moreover obtaining "true" information about their behaviour is impossible in surveys. Overweight people consistently, reliably, globally under-report their energy consumption and over-report physical activity. Even normal weight people deliberately mis-report food consumption (Lara et al 2004). So expanding the dietary questionnaire component of national surveys will not provide the answers.

Importantly, ScotPHO has begun to make proposals for obesity prevention. The suggestion, in the final paragraph of this ScotPHO report, that pharmacists might take on management of obesity and collect data deserves comment. In principle pharmacists would probably be willing to do this – a variety of health professionals, and trained non-health-professionals have shown themselves able to obtain useful results (Truby et al 2006). However pharmacists expect to be paid, and to be paid through the NHS they need to be trained. At present, pharmacies across Scotland are filled with shelves – even whole cabinets – of non-evidence-based "quack" medicines, which make outrageous and unsubstantiated claims for health – including obesity (e.g. Boots and other pharmacists). Pharmacists need to show commitment to providing the evidence-based healthcare which the 21st century demands. There is still very widespread mis-information reaching the public, amongst whom large sectors are inclined to believe in magical health claims for obesity treatments, on the internet, in newspapers and magazines, in supermarket, pharmacies and even some doctors.

It is time for Government bodies to get together with consumer agencies and with the experts, and to make some tough, expensive policy decisions to protect the public and our children from an unwanted product of an unregulated market economy. The obesity epidemic is the result of external, environmental, commercially driven changes compounded by misinformation and corrupt marketing claims. If we are serious about checking or reversing this epidemic, that is where decisive, permanent action is needed. The ScotPHO has usefully accessed market research data from Mintel. In the future, we will need much more comprehensive information about the "Vectors" of obesity (high-fat, high-sugar meals and foods, energy-saving devices etc) and about the interplay of policy influences over the food environment and physical activity environment, as well as about us, the "Hosts" of the epidemic (Swinburn & Egger 2002).

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Examples of "quack" treatments for obesity in pharmacy websites

http://www.boots.com/shop/product_details.jsp?productid=1082796&classificationid=1040124

http://www.boots.com/shop/product_details.jsp?productid=1080279&classificationid=1045790

http://www.boots.com/guidedsearch/newsearch.jsp?searchArea=1&searchTerm=weight+loss&uri=%2Fonlineexperience%2Fflexible_template_2006_publish.jsp&classificationId=1043920&contentId=&articleId=&N=0&Ntk=all&Nty=1&Go.x=22&Go.y=12

http://www.lipotrim.demon.co.uk/

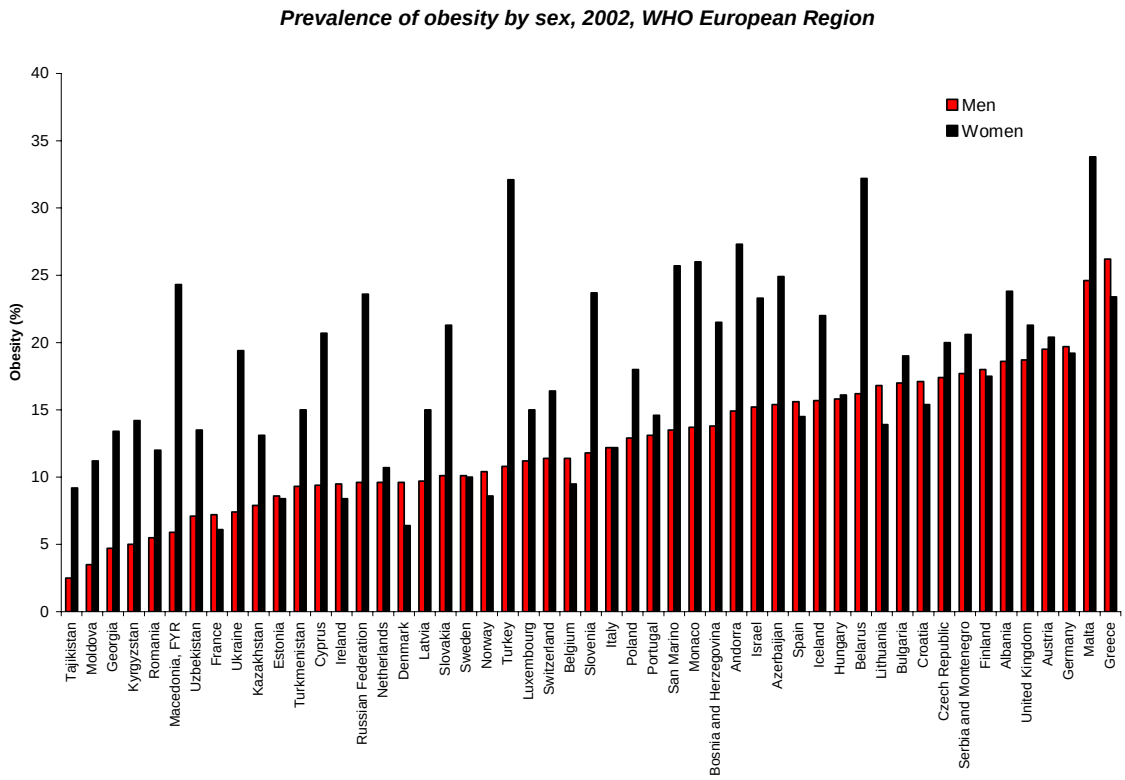
http://www.dooyoo.co.uk/services-misc/lipotrim/1048173/

http://www.silverwellbeing.com/erol.html#1181X1189

http://www.hollandandbarrett.com/pages/Categories.asp?CID=71&afid=70&safid=Google&scid=4897

http://www.patient-pharmacy.co.uk/list.asp?level=2&ref=453634DI

Figure 1

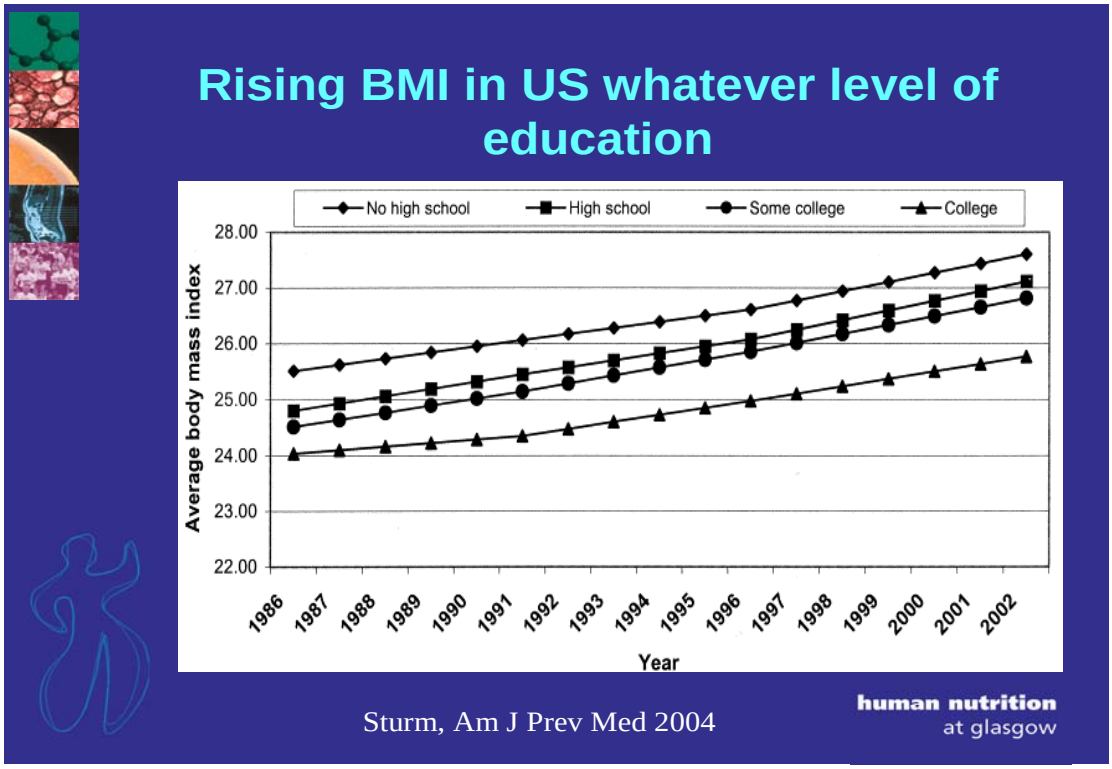


Notes: *Values are age-standardised to the WHO Standard Population.*
Overweight is defined as BMI ≥ 25kg/m2. Obese defined as BMI ≥ 30kg/m2.

Source: WHO (2005) The SuRF Report 2. Surveillance of chronic disease risk factors, WHO: Geneva.

www.heartstats.org

Figure 2


Rising BMI in US whatever level of education
No high school
High school
Some college
College
Average body mass index
28.00
27.00
26.00
25.00
24.00
23.00
22.00
1986
1987
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Year
Sturm, Am J Prev Med 2004
human nutrition
at glasgow

Figure 3 – Manson et al 1995 *NEJM*