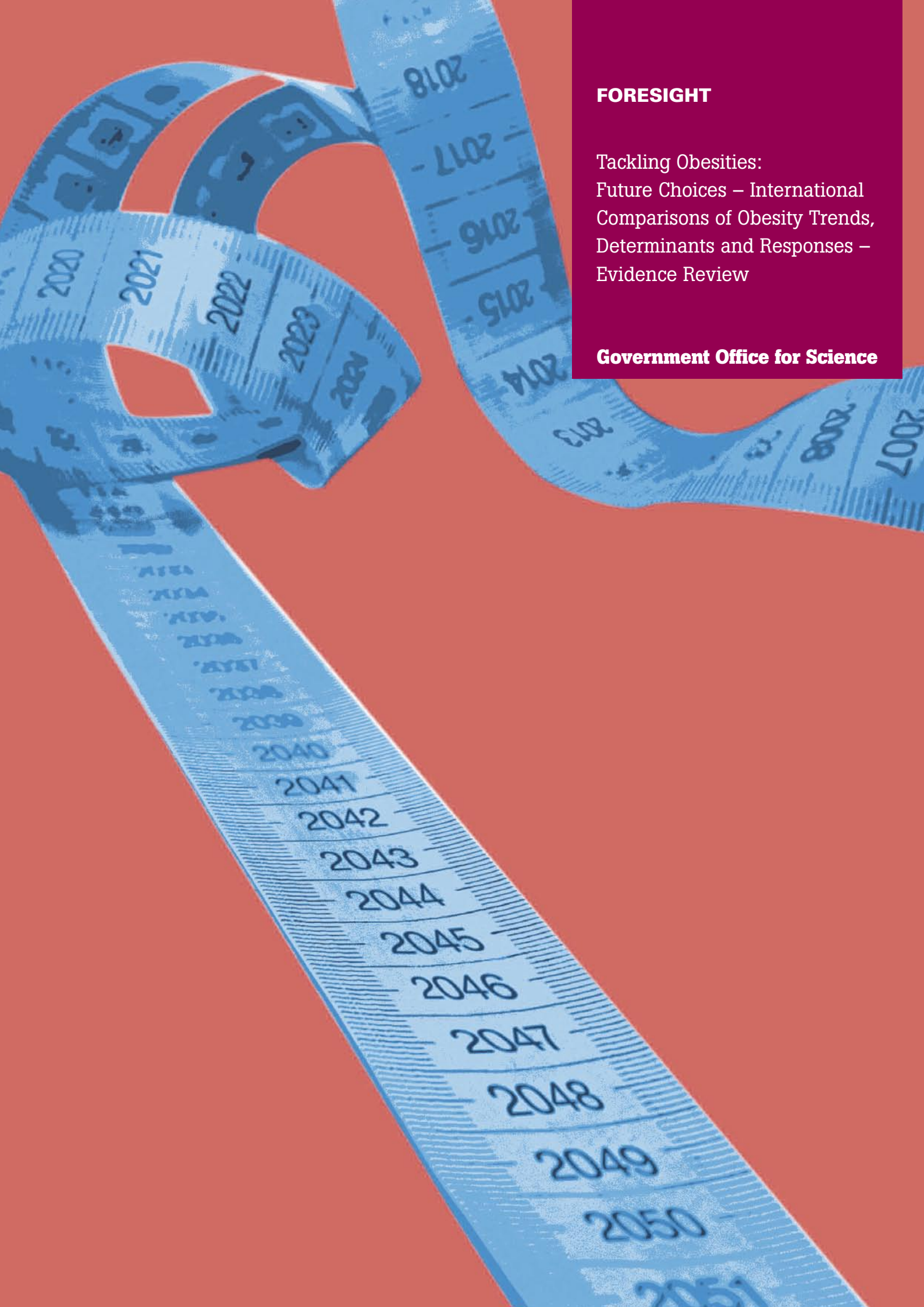

FORESIGHT

Tackling Obesities: Future Choices – International Comparisons of Obesity Trends, Determinants and Responses – Evidence Review

Government Office for Science

Fore*sight*

Tackling Obesities: Future Choices – International Comparisons of Obesity Trends, Determinants and Responses – evidence review

3 Appendices

This report has been produced by the UK Government's Foresight Programme. Foresight is run by the Government Office for Science under the direction of the Chief Scientific Adviser to HM Government. Foresight creates challenging visions of the future to ensure effective strategies now.

Details of all the reports and papers produced within this Foresight project can be obtained from the Foresight website (www.foresight.gov.uk). Any queries may also be directed through this website.

This report was commissioned by the Foresight programme of the Government Office for Science to support its project on Tackling Obesities: Future Choices. The views are not the official point of view of any organisation or individual, are independent of Government and do not constitute Government policy.

URN 07/926A3

Contents

Appendix 1
Methods for measuring body composition

Description	Comments
Underwater weighing (hydro-densitometry)	
Fat has a lower density than lean tissue. By measuring the density of the whole body, the relative proportions of each component can be determined. If total body density and the specific densities of fat and fat-free mass are known, an equation can be generated for converting total body density to percentage body fat.[1]	Requires a person to hold their breath underwater, and is unsuitable for use in young children or in older subjects who lack water confidence. There are theoretical concerns about the assumptions used to translate density measurements into estimates of fat mass and fat-free mass, among both normal children and the obese.
Air-displacement plethysmography	
A subject's volume is determined indirectly by measuring the volume of air the subject displaces when sitting inside an enclosed chamber. Adjustment for thoracic gas volume is made. Once body volume and mass are known, the principles of densitometry are applied to estimate the percentage of body fat.	Air-displacement plethysmography measurements are comfortable, relatively quick, non-invasive and can accommodate a wide range of body types. Subjects should be reasonably co-operative (for accurate measurement, the subject should breathe through a tube and wear a nose clip) and so the technique may be unsuitable for younger children. Again, there are theoretical concerns about the assumptions used to calculate body fat.[6]
Magnetic Resonance Imaging (MRI)	
MRI provides a visual image of adipose tissue and non-fat tissue. Total body-fat volume, total fat mass and percentage fat mass can be estimated.	MRI can accurately and reliably distinguish intra-abdominal from subcutaneous fat. MRI is expensive, time-consuming and must be performed in a major medical facility. The procedure takes approximately 20 minutes, and requires the subject to lie still, enclosed in a scanner, and may be unsuitable for young children.
Computerised tomography (CT)	
CT scans produce high-resolution X-ray-derived images and can identify small deposits of adipose tissue. Total and regional body fat can be calculated, as well as the percentage of body fat.	The procedure allows intra-abdominal and subcutaneous fat to be quantified with a high degree of accuracy and reliability. The equipment is expensive and must be operated by a skilled technician. The procedure involves significant radiation exposure, takes 20 minutes and requires the subject to lie still within the scanner, so it is unsuitable for routine use in children unless clinically indicated.

Description	Comments
Dual-energy X-ray absorp-tiometry (DEXA)	
DEXA is based on the principle that transmitted X-rays at two energy levels are differentially attenuated by bone mineral tissue and soft tissue, and the soft tissue component is subdivided into fat and lean tissue by using experimentally derived calibration equations.[2]	DEXA cannot distinguish between intra-abdominal and subcutaneous fat. It has a high correlation with CT scan data in determining total fat mass.[3] The procedure delivers lower radiation exposure than CT and is thus more suitable for use in children and adolescents. However, the test must be performed in a major medical facility with the DEXA equipment, the equipment is expensive and must be operated by a skilled technician, and the procedure can take up to 20 minutes and requires a very co-operative subject, making it unsuitable for children aged less than six years. DEXA has not been fully evaluated in healthy child or adolescent populations or in very obese people.
Bioelectrical impedance analysis (BIA)	
BIA is not strictly a direct measure of body composition, being based on the relation between the volume of a conductor (the body), the conductor's length (height) and its electrical impedance.[4] BIA assumes fat mass is anhydrous and that conductivity reflects fat-free mass. Prediction equations estimate the fat-free mass from the measured impedance and, by subtraction, the fat mass.	BIA measurements can be taken quickly and inexpensively, it is relatively non-invasive and has high inter- and intra-observer reliability. However, it requires equations specific to the instrument used and for the population under investigation, and the measurement may vary with hydration status and ethnic status (see Wabitsch et al.[5]). Though gaining acceptance in a range of settings, the limitations of BIA are sometimes overlooked.

Description	Validation	Comments
Weight and weight-for-height		
Total body weight can be recorded and compared with reference standards based on a child's age. Low weight-for-age is a widely used marker of malnutrition for younger children. However, weight is correlated with height, and reference standards based on weight-for-height provide a more accurate measure of under- or overweight, and takes account of possible confounding from inadequate linear growth (stunting) when assessing nutritional status.	Growth charts are based on standard reference populations (usually the US National Center for Health Statistics reference population, although these may under-represent the growth patterns of breast-fed children[7,8] and may need to be revised.[9] Weight-for-height charts are inaccurate beyond the age of around 10–11 years and the measure is not useful in older children and adolescents.[10]	Weight and height (or length) measurements are relatively easy to obtain, although they tend to me more accurate if taken by a trained person. Weight should be taken with the child wearing light, indoor clothing.

Description	Validation	Comments
Body mass index (BMI)		
BMI is defined as weight (kg) divided by height squared (m^2) and is widely used as an index of relative adiposity among children, adolescents and adults. Among adults, the World Health Organisation recommends that a person with a BMI of 25kg/m^2 or above is classified as overweight, while someone with a BMI of 30kg/m^2 or above is classified as obese,[11] although revisions of these guidelines are being proposed for certain populations.[12] For children, various cut-off criteria have been proposed based on reference populations and different statistical approaches (see discussion below).	BMI has been compared with DEXA (see above) in children and adolescents aged 4—20 years.[13] BMI had a true positive rate of 0.67, and a false positive rate of 0.06 for predicting a high percentage of total body fat. Sardinha[14] reported a true positive rate of 0.83 for 10–11-year-olds, 0.67 for 12–13-year-olds and 0.77 for 14–15-year-olds, while the false positive rate ranged from 0.03 in 12–13-year-olds to 0.13 in 10–11-year-olds. Therefore, although some overweight children would be wrongly classified as being of normal weight when using BMI as a screening test, few children would be classified as overweight if they were not. Correlation coefficients between BMI and DEXA range from 0.50 in a study of 7–17-year-old white males to 0.83 in a study of 7–17-year-old girls.[15] A study of 198 white boys and girls aged 5–19 years found a correlation of 0.85 between BMI and total body fat measured with DEXA.[16] (See also the discussion of 'other measures' below.)	BMI is more accurate when height and weight are measured by a trained person than when self-reported. Measurement of height and weight has a high subject acceptance, which is particularly important for adolescents who may be reluctant to undress (measures are normally taken with the subject wearing light clothing, without shoes). There is low observer error, low measurement error and good reliability and validity. However, BMI may not be a sensitive measure of body fatness in people who are particularly short, tall or have an unusual body fat distribution, and may misclassify people with highly developed muscles. Therefore two people with the same amount of body fat can have quite different BMIs.[14] There may also be racial differences in the relationship between the true proportion of body fat and BMI.[17]
Waist circumference and waist-to-hip ratio (WHR)		
Waist circumference is an indirect measure of central adiposity. Central adiposity is strongly correlated with risk for cardiovascular disease in adults[18] and an adverse lipid profile and hyperinsulinaemia in children.[19] Waist circumference is measured at the minimum circumference between the iliac crest and the rib cage using an anthropometric tape.		

Description	Validation	Comments
WHR has been used among adults to identify people with high central adiposity. Waist circumference is measured as above and hip circumference is measured at the maximum protuberance of the buttocks. The ratio is then calculated.	In young people aged 3–19, the correlation between waist circumference and DEXA of trunk fat were 0.83 for girls and 0.84 for boys. In addition, children's waist circumference correlates well with CT scan as a measure of subcutaneous abdominal adipose tissue (r = 0.93), and fairly well with intra-abdominal adipose tissue (r = 0.84). WHRs are less well correlated with trunk-fat measures using DEXA.[20]	Waist and hip circumferences are easy to measure with simple, low-cost equipment, they have low observer error, offer good reliability, validity and low measurement error. However, there are no accepted cut-off values for the classification of overweight and obesity based on these measures, and there have been few studies of the relationship between central adiposity and the metabolic disturbances associated with excess visceral fat among children and adolescents. Waist circumference and hip circumference are highly age-dependent, and it is not recommended to use the ratio between them without first considering each measure separately.[21]
Skinfold thickness		
Skinfold thickness can be measured at different sites on the body (e.g. triceps, subscapular) using skinfold callipers. Prediction equations can then be used to estimate fat mass and the percentage of fat from the skinfold measurements. New methods for measuring skin fold using portable echography equipment are under development.	Children's abdominal skinfold thickness correlates well (r = 0.88) with visceral adipose tissue as measured by CT scan or MRI.[22] Triceps skinfold thickness shows a sensitivity of 0.79 in 10–11-year-olds, 0.78 in 12–13-year-olds and 0.87 in 14–15-year-olds when compared with DEXA in measuring obesity (≥30% body fat).[14] The corresponding false positive rates were 0, 0.03 and 0.07. However, triceps measures may be less indicative of central obesity among children in developing countries[23] compared with a US-based population.	Skinfold thickness uses simple equipment and offers only a moderate respondent burden, and has the potential to determine total body fat and regional fat distribution. However, skinfold thickness varies with age, sex, and race, and the equations relating skinfold thickness at several sites to total body fat need to be validated for each population. Measurement requires training, and intra- and inter-observer reliability is poor.[4] In very obese individuals, the measurement of triceps skinfold or other skinfold thicknesses may not be possible. The relationship with metabolic problems is unclear.

Description	Validation	Comments
Other anthropometric measures		
Various alternatives to the weight-to-height ratio have been developed examining different powers of N in the formula weight/height^N, such as the ponderal index (w/h^3). 'N' is sometimes referred to as the Benn index. Another measure, the conicity index, is defined as waist circumference/(0.109 x square root of weight/height).	Both BMI and the ponderal index are intended to remove the height element from the estimation of relative weight but, in studies of child populations, there is evidence that both measures show some residual association with height. An analysis of the Benn index, which is least related to height at various stages in childhood, showed that N lay just below 3.0 for children aged 6 years, rising to 3.5 for children aged around 10, and falling to around 2.0 by age 18.[24] So the use of BMI (w/h^2) tends to give to taller children a greater BMI than that given to shorter children when their true relative weights are equal.	As with BMI, height and weight are more accurate when measured by a trained person rather than when self-reported. Such measures have high subject acceptance and there is low observer error, low measurement error and good reliability and validity. However, none of these indices is widely used at present.

Source: Lobstein, T., Baur, L. and Uauy, R. 2004. Obesity in Children and Young People: A Crisis in Public Health. *Obesity Reviews*, 5(Suppl 1):4–95.

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Appendix 2
Summary of self-report vs measured BMI

Table 1: Survey findings

Sample size	Age range (years)	Area	Main findings	Reference
1,528 men 1,514 women	18+	ATTICA region of Greece	Women were 9 times more likely to under-report weight than men. Men were 7.5 times more likely to over-report height.	1
7,772 men 8,801 women	20+	National Health and Nutrition Examination Survey (NHANES), USA	Statistically significant differences were found for the mean error (measured-self-report values) for height and BMI. These were notably larger in older adults. In adults over the age of 70, BMI was 1 unit lower in self-report than in measured. The study concluded that self-report could be used for younger adults but that self-report in older adults aged ≥60 resulted in misclassification.	2
4,808	35–76	Oxford, UK	22.4% men and 18% of women were misclassified with self-reported height and weight. The authors noted that if you develop predicative equations from a small representative sample, these equations can be used to improve the accuracy of self-reported estimates. In this case, misclassification was reduced to 15.2% in men and 13.8% in women.	3
5,445 men 1,905 women	40–50, men 35–50, women	Workplace cohort in France	13% men and 17% of women were misclassified using self-report data. They identified five factors that were associated with the bias: overweight, end digit preference, age, educational level and occupation.	4
3,208 adults	18–84	Stockholm region, Sweden	19% men and 12% women were misclassified according to self-reported weight and height.	5
865 men 971 women	25–64	Glasgow, Scotland	The author found that this population was fairly unique as they under-reported height and weight. As a result, underestimates of BMI was only found in 55–64-year-old women.	6
262 men 310 women		Leon, Spain	Prevalence of obesity based on measured weight and height was 1.8 times that of self-reported data in men and 2.5 times for women. The authors also found that the difference between measured and self-report increases with age.	7

Table 1: Survey findings (*continued*)

Sample size	Age range (years)	Area	Main findings	Reference
4,253 men 1,148 women	35–64	Workplace, Japan	Prevalence of obesity was 23.6% using self-report and 24.9% using measured data in men. Obesity prevalence was 11.5% using self-report and 12.4% using measured data in women. The authors also found that those with higher measured BMI significantly underestimated weight compared with those with lower BMI. Presence of diabetes was also noted as a factor.	8
1,140 adults	18–78	Adelaide, Australia	Inclusion of waist circumferences increased the validity of self-reported BMI.	9
15,025 adults	20+	NHANES, USA	All women and Mexican American men underestimated true obesity prevalence. Ethnicity introduced a significant difference that could not be explained by sociodemographic, smoking or other health variables.	10
820 adults, telephone interview 1,318 adults, physical examination		Vaud, Switzerland	It must be noted that the surveys were based on different population samples. However, the author noted that this difference is unlikely to explain the systematic bias observed between self-report and measured values. Prevalence of obesity in the measured survey was double that of the self-reported survey.	11
1,622 adults	18–64	Wales	The prevalence of overweight and obesity was underestimated by 4.5% in men and 6.7% in women. The authors also noted that reporting was more biased in older and overweight groups. (Although not mentioned in the paper, it is likely that the extent of the underestimate of obesity rather than combined overweight would be higher).	12
836 males 871 females		Mexico	Self-report height and weight is an acceptable method but its precision decreases with age.	13
4,619 adolescents	9th–12th Grade (approx 14–17)	USA	BMIs based on self-reported height and weight underestimated the prevalence of overweight in adolescent populations.	14
376 children	1st and 4th Grade	Japan	The results indicated that data reported by parents provided a reliable assessment of childhood obesity. Error in estimating obesity was between –1.2% and 1%.	15
3,400 adults			Reliance on self-reported data results in considerable underestimation of the prevalence of obesity. In this instance, only 55% of obese women and 60% obese men were classified as such, according to the measured values.	16

Table 1: Survey findings (*continued*)

Sample size	Age range (years)	Area	Main findings	Reference
7,455 adults			The author suggests that substantial misclassification can occur when self-reported data is used to define BMI categories.	17
15,483 baseline adolescents 11,495 follow-up adolescents	7th–12th Grade (approx 12–17)	USA	The author found that parental reporting is a better indicator than adolescent reporting. However, using self-reported BMI correctly classified 96% in the obese category.	18
2,860 children/ adolescents	9–21	Jeddah City, Saudi Arabia	The author found high levels of inaccuracy using self-reported height and weight in classifying obesity by BMI. Approximately 60% of children were unaware of their weight and/or height and could therefore not be classified.	19
3,244 adolescents	15–18	Madrid, Spain	The author reported that the analysis of BMI as a categorical variable involved a considerable underestimate of high BMI. In this instance, high BMI was underestimated by 34%.	20
418 adolescents	Year 11 (15/16)	Wales	The author suggested that self-report bias had significant consequences for the accuracy of overweight and obese classification. Actual and perceived body size each contributed to underreporting of body weight; 25% of overweight students were misclassified and >30% of obese students were misclassified when using self-reported data.	21
143	Teenagers	Siena, Italy	The author identified overestimation of height and underestimation of weight in both genders. They suggested using conversion factors to correct the reported BMI.	22
	Teenagers	London, UK	Self-reported height and weights resulted in underestimation of overweight. Self-assessment of body fatness was influential on the height and weight reporting of females. The author suggested that self-reported data from teenagers should only be used with caution.	23
294	56–78	UK	The author suggested that overweight individuals tended to under-report and the short and underweight tended to over-report. Studies investigating associations of disease with height and weight using self-reported measures will underestimate effects.	24

Table 1: Survey findings (*continued*)

Sample size	Age range (years)	Area	Main findings	Reference
11,284	20–74	NHANES, USA	The author suggested that, on average, errors in self-report measured were small. However, these were directly related to the individuals' weight status – the more overweight, the greater the error. Race, age and end digit preference were also factors.	25
1,381	60–79	UK	Generally well correlated but, again, suggesting obese individuals were more likely to underestimate their weight.	26
2,046 men 2,393 women		USA	Underreporting was significantly related to weight, height and participation in a current weight reduction programme. However, generally self-reported weight correlated well with actual weight across the range of the population.	27
1,932	12–16	NHANES, USA	The author found that the influence of gender and race bias was small. Self-reported heights and weights were extremely reliable for predicting obesity-related morbidities and behaviours.	28
683	11–18	Australia	The author suggested that students with high BMI and high weight values were more likely to underreport weight. Younger, early pubertal and pre-menarcheal students were more likely to underestimate height and older, post-menarcheal (>3yrs) more likely to overestimate height. They also found that the more exercise the students took, the greater the accuracy of height estimate.	29
Review of literature			Twenty-six studies were examined reviewing self-reported height. Twenty-one of these found that women overestimate height. Thirty-four studies were found reviewing self-reported weight and all 34 studies found that women underestimate weight. The author did note that, although the mean variation of error was small, a significant percentage of the women in the groups had very large errors resulting in misclassification	30

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Appendix 3
Prevalence of adult obesity

Table 1: Data for 146 countries on the prevalence of adult obesity

Country	Year of data collection	Population	Age category	Males		Females		Combined	
				Overweight	Obesity	Overweight	Obesity	Overweight	Obesity
				Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+
Albania (urban)	2001	1,120	25+	56.5	22.8	42.2	35.6		
Armenia	2000	1,088	15–49			23.3	7.3		
Austria	1999	841	25–64	40.0	10.0	27.0	14.0		
Australia	2000	11,067	25+	48.2	19.3	29.9	22.2	39.0	20.8
Argentina (urban)	2003	1,100	18–65	24.6	19.5	10.8	17.5	17.4	18.5
Bahamas	1988–89	1,771	15–64	29.1	13.9	25.6	28.0	27.3	21.3
Bahrain	1998–99	2,301	19+	36.7	23.3	28.3	34.1		
Bangladesh	1999/2000	4,496	15–49			3.7	0.7		
Barbados	1991–94	811	25+		14.3		40.2		29.7
Belgium	1994–97	21,356	35–59	49.0	14.0	28.0	13.0		
Benin	2001	2,874	15–49			11.2	4.8		
Bolivia	1998	3,857	15–49			35.2	11.2		
Brazil	1997	n/a	20+	31.0	6.9	26.5	12.5	28.6	9.9
Brunei Darussalam	1997–99	n/a	Adults	44.0	12.9	45.0	13.9		
Bulgaria (urban)	1994	1,996	25–74		15.3		20.9		
Burkina Faso	1998/99	3,277	15–49			4.8	0.9		
Cambodia	2000	2,358	15–49			5.3	0.5		
Cameroon (urban)	2000	3,669	15+		5.1		13.8		9.9
Canada (self-report)	2000/01	50,801	20–64	40.0	16.0	25.0	14.0	33.0	15.0
Central African Republic	1994/95	2,025	15–49			5.5	1.1		
Chad	1996/97	3,549	15–49			4.3	0.9		
Chile (urban)	n/a	3,120	25–64		15.7		23.0		19.7
China	2002	140,022	18+					18.9	2.9
Colombia	2000	3,070	15–49			30.3	10.5		
Comoros	1996	773	15–49			15.9	4.4		
Congo (urban)	1996	3,529	15+		2.3		5.8		
Cook Island	1998	n/a	n/a	36.0	40.6				
Cote d'Ivoire	1998/99	1,299	15–49			13.5	4.5		
Croatia	1995/97	5,840	18–65	48.1	31.1	34.7	15.2	41.3	23.1
Cuba	1998	4,197	20–64	25.1	7.1	26.7	10.2		
Cyprus	1999–2000	1,019	25–64	46.0	26.6	34.3	23.7		
Czech Republic	1997/98	3,068	25+	48.5	24.7	31.4	26.2		
Denmark	2003	n/a	n/a		13.0		15.0		
Dominican R	1996–98	6,178	18–74		16.4		18.3		16.4
Egypt	2000	6,751	15–49			38.8	32.4		
England	2004	5,579	16+	43.9	22.7	34.7	23.8		
Eritrea*	2004	2,352	15–64					13.7	3.3
Estonia (self-report)	2004	3,033	16–64	32.0	13.7	25.7	14.9	28.4	14.4
Ethiopia	2000	6,493	15–49			2.1	0.2		
Fiji	1993	2,573	18+		7.3		20.5		14.1
Finland	2000	n/a	30+		20.0		25.0		

Table 1: Data for 146 countries on the prevalence of adult obesity *(continued)*

Country	Year of data collection	Population	Age category	Males		Females		Combined	
				Overweight	Obesity	Overweight	Obesity	Overweight	Obesity
				Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+
Former Yugoslav Republic of Macedonia	Pub 2001	838	20–65	47.9	14.4	35.1	19.3		
France (self-report)	2003	25,770	15+	37.4	11.4	23.7	11.3	30.3	11.3
French Polynesia	1995	1,273	16+	38.9	36.3	28.2	44.3		
Gabon	2000	2,190	15–49			21.3	8.2		
Gambia	1996–97	5,389	15+		0.6		4.4		
Germany	2002	3,807	25+	52.9	22.5	35.6	23.3		
Ghana	1997	4,731	25+	17.1	4.6	26.9	20.2	23.1	14.0
Greece (ATTICA)	2001–2002	3,042	20–89	53.0	20.0	31.0	15.0		
Guatemala	1998/99	2,318	18–49			33.4	14.0		
Guinea	1999	3,152	15–49			9.6	2.5		
Guyana	2000	1,315	20+	26.0	14.3	30.7	26.9	29.0	22.4
Haiti	1994/95	1,896	15–49			8.9	2.6		
Honduras	1996	885	15–49			23.8	7.8		
Hungary	1992–94	2,559	18+	41.9	21.0	27.9	21.2	34.3	21.1
Iceland	1991–96	6,178	18+	47.3	17.0	35.2	18.3		
India	1998	177,841	18+	4.4	0.3	4.3	0.6	4.4	0.5
Indonesia	2001	12,910	15+	7.3	1.1	14.2	3.6	11.0	2.4
Israel	1999–2001	2,782	25–64	45.8	19.9	33.1	25.7		
Iran	2000	10,145	20+	42.0	10.0	45.0	30.0		
Ireland	1997–99	1,379	18–64	46.3	20.1	32.5	15.9	39.0	18.0
Italy	2003	n/a	18+	42.1	9.3	25.8	8.7	33.6	9.0
Jamaica	1999	1,935	15+	24.7	7.6	30.3	23.9		
Japan	2000	8,305	20+	23.9	2.9	17.4	3.3	20.3	3.1
Jordan (Urban)	1994–96	2,836	25+		32.7		59.8		49.7
Kazakstan	1999	510	15–49			14.4	8.4		
Kenya	1998	3,103	15–49			12.1	2.7		
Korea (South)	1998	8,816	15–79	22.0	1.6	23.4	3.0		
Kuwait	1998–2000	9,755	n/a	38.3	27.5	32.8	29.9		
Kyrgyzstan	1997	1,238	15–49			16.4	4.4		
Latvia	1997	2,292	19–64	41.0	9.5	33.0	17.4		
Lebanon	1998–2002	2,846	25–64		36.3		38.3		37.9
Lithuania (self-report)	2002	n/a	20–64	41.2	16.2	26.6	15.8	33.1	16.0
Luxembourg	n/a	5,206	16+	45.6	15.3	30.7	13.9	37.9	14.7
Madagascar (urban)	1996	773	[3]15	4.8	1.2	7.2	3.3	6.0	2.4
Malawi	2000	6,489	15–49			9.5	1.5		
Malaysia	1996	30,165	18+	20.1	4.0	21.4	7.6		
Mali	1996	4,327	15–49			7.2	1.2		
Malta	1984	n/a	25–64	46.0	22.0	32.0	35.0		
Marshall Islands	Published 2003	1,582	18+	29.0	21.0	29.0	31.0		
Mauritiana	2000/2001	2,806	15–49			23.5	19.2		
Mauritius	1998	6,291	25–74	33.0	8.0	34.0	20.0	33.8	14.4
Mexico	2000	41,188	20–69	41.3	19.4	36.2	29.0		
Mongolia	1999	2,449	n/a	30.5	13.8	32.0	24.6	31.4	20.1
Morocco	2000	1,797	20+	25.5	8.2	29.8	21.7		

Table 1: Data for 146 countries on the prevalence of adult obesity *(continued)*

Country	Year of data collection	Population	Age category	Males		Females		Combined	
				Overweight	Obesity	Overweight	Obesity	Overweight	Obesity
				Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+
Mozambique	1997	3,091	15–49			7.8	1.7		
Namibia	1992	2,205	15–49			13.8	7.1		
Nauru	1994	1,444	25+		79.3		77.9		
Nepal	2001	4,078	15–49			3.2	0.5		
Netherlands	1998–2002	3,691	20–59	43.5	10.4	28.5	10.1		
New Zealand	1997	4,420	15+		14.7		19.2		17.0
Nicaragua	1997/98	4,793	15–49			28.6	11.6		
Niger	1998	3,324	15–49			6.0	1.6		
Nigeria	1999	2,046	15–49			15.8	7.1		
Niue	1987	740	20+	34.0	15.0	38.0	46.0		
Norway (limited area)	1995–97	66,140	n/a	53.2	15.5	40.0	21.0		
Oman	2000	6,400	20+	32.1	16.7	27.3	23.8		
Pakistan	n/a	1,471	18+	18.3	4.5	21.4	5.9		
Palestine	n/a	936	30–65		23.9		42.5		
Panama	2000	875	15–93	30.9	27.9	33.4	36.1	32.7	34.7
Papua New Guinea	1991	750	25+	74.8		79.5			
Paraguay	1991–92	1,606	20–74	41.6	22.9	36.1	35.7		
Peru (urban)	1998–2000	2,337	18–60	44.0	16.0	40.0	23.0		
Philippines	1998	9,299	20+	14.9	2.1	18.9	4.4	16.9	3.3
Poland	2000	n/a	18–94	41.0	15.7	28.7	19.9		
Portugal	2003–2005	5,123	18–64	44.1	14.5	31.9	14.6	37.1	14.5
Qatar	2003	1,208	25–65	34.3	34.6	33.0	45.3		
Rwanda	2000	4,096	15–49			11.8	1.4		
Romania*	1997	7,547	25+		10.8		22.4		
Russia	2000	9,006	19–55	30.7	10.3	27.4	21.6	28.9	16.0
Samoa	1995	588	29+		32.9		63.0		
Saudi Arabia	1995–2000	17,223	30+	42.4	26.4	31.8	44.0	36.9	35.6
Scotland	2003	6,675	16+	43.0	22.4	33.8	26.0	38.2	24.2
Senegal	1992/93	2,895	15–49			12.0	3.7		
Seychelles	1994	1,059	25–64	29.8	8.5	31.6	28.2	30.7	18.9
Sierra Leone	Published 1997	501	16+					15.0	5.0
Singapore	2004	4,168	18–69	28.6	6.4	22.6	7.3	25.6	6.9
Slovakia (CINDI Bankska Bystrica)	1998	n/a	15–64	57.0	16.0	51.0	18.0		
Slovakia CINDI (Trebisov)	1998	n/a	15–64	57.0	22.0	56.0	28.0		
Slovenia (self-report)	2001	9,034	25–64	50.0	16.5	30.9	13.8	39.6	15.0
South Africa	1998	13,585	15+	21.1	10.1	25.9	27.9		
Spain	1990–2000	9,885	25–60	45.0	13.4	32.2	15.8		
St Lucia	1991–94	1,084	25–74		8.4		28.7		19.5
Sweden (Goteborg)	2002	1,032	25–64	43.5	14.8	26.6	11.0		
Switzerland (urban)	2000–2001	2,482	35–74	45.9	14.1	27.6	10.4		12.3
Taiwan	1993–96	3,046	20+					21.1	4.0
Tanzania (urban)	1998	9,313	25–64		4.5		10.0		
Thailand	1997	3,220	20–59	15.7	3.5	25.1	8.8	22.0	21.5
Togo	1998	3,029	15–49			9.0	2.4		

Table 1: Data for 146 countries on the prevalence of adult obesity *(continued)*

Country	Year of data collection	Population	Age category	Males		Females		Combined	
				Overweight	Obesity	Overweight	Obesity	Overweight	Obesity
				Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+	Percentage with BMI 25–29.9	Percentage with BMI 30+
Tonga*	1998–2000	1,024	15–85	37.4	46.6	22.7	70.3	60.3	
Trinidad and Tobago	1999	803	20+	29.6	10.7	32.6	21.1	31.4	16.8
Tunisia	1997	2,760	20–60	23.3	6.7	28.2	22.7	27.4	14.4
Turkey (Urban)	2001–2002	5,016	20+	46.5	16.5	28.6	29.4	36.8	23.5
Turkmenistan	2000	2,117	15–49			16.0	7.8		
UAE	2000	1,286	20–79	36.7	17.1	28.4	31.4		
Uganda	2000/2001	3,322	15–49			9.5	1.7		
Uruguay (Urban) Self-Report	1998	900	18+	40.0	17.0	30.0	18.0	34.0	17.0
USA	2003–2004	n/a	20+	39.7	31.1	28.6	33.2	34.1	32.2
Uzbekistan *	1996/97	1,956	35+		9.9		18.9		
Vanuatu	1998	1,614	20+	33.6	12.2	32.2	19.6		
Venezuela (urban)	1997	30+	669.0						21.2
Vietnam (urban)	2001	1,200	25+					13.9	1.1
Wales n(self-report)	2003	7,800	16+	44.0	17.0	30.0	18.0	37.0	17.0
Yemen	1997	5,479	15–49			11.1	4.0		
Zambia	2001/2002	3,629	15–49			7.9	2.4		
Zimbabwe	1999	2,286	15–49			19.0	6.9		
*IOTF estimate									

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Iran	Tehran Lipid and Glucose Study, 2004. Endocrine Research Centre. http://www.erc.ac.ir/tlgs/ (accessed May 2007).
Ireland	Irish Universities Nutrition Alliance. 2001. North/South Ireland Food Consumption Survey 2000. http://www.safefoodonline.com/Uploads/North%20South%20Ireland%20Food%20Consumption%20Survey.pdf
Italy	www.istat.it/dati/catalogo/20051118_00/inf0525stili_di_vita_condizioni_salute03.pdf
Jamaica	Ichinohe, M., Mita, R., Saito, K. et al. 2005. The Prevalence of Obesity and its Relationship with Lifestyle Factors in Jamaica. *Tohoku Journal of Experimental Medicine,* 207:21–32.
Japan	World Health Organisation infobase. Dr Furuhata. Ministry of Health, Labour and Welfare of Japan, Health Service Bureau, Chronic Disease.
Jordan	Ajlouni, K., Jaddou, H. and Batieha, A. 1998. Obesity in Jordan. *International Journal of Obesity*, 22:624–628.
Kazakstan	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Kenya	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Korea (South)	Soon Park, H., Sook Yun, Y., Yuul Park, J. et al. 2003. Obesity, Abdominal Obesity, and Clustering of Cardiovascular Risk Factors in South Korea. *Asia–Pacific Journal of Clinical Nutrition*, 12(4):411–418.

Kuwait	Jackson, R.T., Al-Mousa, Z., Al-Raqua, M. et al. 2001. Prevalence of Coronary Risk Factors in Health Adult Kuwaitis. *International Journal of Food Sciences and Nutrition*, 52:301–311.
Kyrgyzstan	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Latvia	Pomerleau, J., Pudule, I., Grinberga, D. et al. 2000. Patterns of Body Weight in the Baltic Republics. *Public Health Nutrition*, 3:3–10.
Lebanon	World Health Organisation infobase. Dr M Khogali, Department of Family Medicine, American University of Beirut.
Lithuania	Grabauskas, V., Petkeviciene, J., Klumbiene, J. and Vaisvalavicius, V. 2003. The Prevalence of Overweight and Obesity in Relation to Social and Behavioural Factors (Lithuanian Health Behaviour Monitoring). *Medicina*, 39:1223–1230.
Luxembourg	Robertson, Dr A. World Health Organisation Europe. Personal communication. Data originally provided by Dr Yolande Weigall for the Global Burden of Disease Study.
Madagascar	Mauny, F., Viel, J.F., Roubaux, F. et al. Blood Pressure, Body Mass Index and Socioeconimic Status in the Urban Population of Antananarivo (Madagascar). *Annals of Tropical Medicine and Parasitology*, 97:645–654. Author personally provided obesity figures.
Malawi	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Malaysia	Ismail, M.N., Chee, S.S., Nawawi, H. et al. 2002. Obesity in Malaysia. *Obesity Reviews*, 3:203–208.
Mali	Martorell, R., Khan, L.K., Hughes, M.L. and Grummer Strawn, L.M. 2000. Obesity in Women from Developing Countries. *European Journal of Clinical Nutrition*, 54:247–252.
Malta	Personal communication, Dr A, Robertson, World Health Organisation Europe. MONICA data originally provided by Health Promotion Department, 1 Crucifix Hill, Floriana, Malta.
Marshall Islands	Gittelsohn, J., Haberle, H., Vastine, A.E. et al. 2003. Symposium: Beliefs, Power and the State of Nutrition: Integrating Social Science Perspectives in Nutrition Interventions. Macro and Microlevel Processes Affect Food Choice and Nutritional Status in the Republic of the Marshall Islands. *Journal of Nutrition*, 133:S310–S313.
Mauritiana	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Mauritius	World Health Organisation infobase. stefan.soderberg@medicin.umu.se, International Diabetes Institute.

Mexico	Personal communication, Dr C. Sanchez Castillio: Body Mass Index Cut-Off Points for Type 2 Diabetes Melliuts and Hypertension in the Mexican National Health Survey 2000.
Mongolia	Suvd, J., Gerel, B., Otgooloi, H. et al. 2002. Glucose Intolerance and Associated Factors in Mongolia: Results of a National Survey. *Diabetic Medicine*, 19(6):502–508.
Morocco	Personal communication, Morocco Minister of Health: national survey carried out in 2000.
Mozambique	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Namibia	Martorell, R., Khan, L.K., Hughes, M.L. and Grummer Strawn, L.M. 2000. Obesity in Women from Developing Countries. *European Journal of Clinical Nutrition*, 54:247–252.
Nauru	World Health Organisation infobase. Unpublished data. Data obtained from personal communication with the International Diabetes Institute.
Nepal	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Netherlands	Visscher, T.L., Viet, A.L., Kroesbergen, I.H. and Seidell, J.C. 2006. Underreporting of BMI in Adults and its Effect on Obesity Prevalence Estimations in the Period 1998 to 2001. *Obesity* (*Silver Spring*), Nov, 14(11):2054–2063.
New Zealand	World Health Organisation infobase. Ministry of Health, PO Box 5013 Wellington, New Zealand. http://www.moh.govt.nz
Nicaragua	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Niger	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Nigeria	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Niue	Mitikulena, M., Mitikulena, A., Talagi, S. et al. 1993. The 1987 National Nutrition and Dietary Survey of Niue. Technical Paper No. 202. Noumea, New Caledonia: SPC.
Norway (Nord-Trondelag)	Midthjell, K., Kruger, O., Holmen, J. et al. 1999. Rapid Changes in the Prevalence of Obesity and Known Diabetes in an Adult Norwegian Population. The Nord-Trondelag Health Surveys: 1984–1986 and 1995–1997. *Diabetes Care*, 22:1813–1820.
Oman	Al-Lawati, J.A. and Jousilahti, P.J. 2004. Prevalence and 10-Year Secular Trend of Obesity in Oman. *Saudi Medical Journal*, 25:346–351.

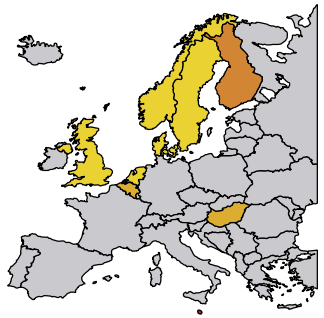
Pakistan	Data supplied by Dr R. Hakeem, Pakistan, re-analysed by IOTF.
Palestine	Abdul-Rahim, H.F., Holmboe-Ottesen, G., Stene, L.C.M. et al. 2003. Obesity in a Rural and an Urban Palestinian West Bank Population. *International Journal of Obesity*, 27:140–146.
Panama	Diaz, Q.M.E., De Leon, P., De Arango, L. and Mascarin, F. 2000. Estudio Multicentrico de Prevalencia de Obesidad en la Poblacion Aseturada de la Caja de Social de la Republica de Panama.
Papua New Guinea	World Health Organisation infobase. Dr A. Hodge. International Diabetes Institute, Melbourne, Victoria, Australia.
Paraguay	Personal communication, Professor Rafael Figueredo Grijalba.
Peru	Jacoby, E., Goldstein, J., Lopez, A. et al. 2003. Social Class, Family, and Lifestyle Factors Associated with Overweight and Obesity among Adults in Peruvian Cities. *Preventive Medicine*, 37:396–405.
Philippines	Data provided by the Philippean Department of Health, Dr C. Barbu, data re-analysed by Dr Charmaine Duante.
Poland	Szponar, L., Sekuła, W. and Rychlik, E. 2003. Badania indywidualnego spożycia żywności i stanu odżywienia w gospodarstwach domowych (*Survey of Individual Consumption of Food and Nutritional Status at Households*) Warszawa, IŻŻ.
Portugal	Personal communication, Isabel do Carmo, July 2005.
Qatar	Bener, A., Al-Suwaidi, J., Al-Jaber, K. et al. 2004. The Prevalence of Hypertension and its Associated Risk Factors in a Newly Developed Country. *Saudi Medical Journal*, 25(7):918–922.
Rwanda	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Romania	World Health Organisation infobase. Official report from national government office/ministry. Mr Aurel Camara. President, National Institute for Statistics.
Russia	Jahns, L., Baturin, A. and Popkin, B.M. 2003. Obesity, Diet, and Poverty: Trends in the Russian Transition to Market Economy. *European Journal of Clinical Nutrition*, 57:1295–1302.
Samoa	World Health Organisation infobase. Stephen T. McGarvey, Brown University Medical School, International Health Institute, Brown University, Box G-B497, Providence, RI 02912, USA.
Saudi Arabia	World Health Organisation infobase. Dr Mansour Al-Nozha, MD, FRCP, FACC. Professor of Medicine and Consultant Cardiologist; Director, King Fahd Cardiac Centre, Riyadh Saudi Arabia.
Scotland	Scottish Health Survey. http://www.scotland.gov.uk/Publications/2005/11/25145024/50251
Senegal	Martorell, R., Khan, L.K., Hughes, M.L. and Grummer Strawn, L.M. 2000. Obesity in Women from Developing Countries. *European Journal of Clinical Nutrition*, 54:247–252.
Seychelles	The Seychelles Heart Study II.

Sierra Leone	Ceesay, M.M., Morgan, M.W., Kamanda, M.O. et al. 1997. Prevalence of Diabetes in Rural and Urban Populations in Southern Sierra Leone: A Preliminary Survey. *Tropical Medicine and International Health*, 2:272–277.
Singapore	World Health Organisation infobase. Data from Ministry of Health Singapore, National Health Survey 2004.
Slovakia (Trebisov)	World Health Organisation Country Profile: Slovakia.
Slovenia	Zaletel-Kragelj, L., Erzen, I. and Fras, Z. 2004. Interregional Differences in Health in Slovenia. 1. Estimated Prevalence of Selected Cardiovascular and Related Diseases. *Croatian Medical Journal*, 45(5):637–643. Overweight data supplied by personal communication from author.
South Africa	Personal communication based on the 1998 Demographic Health Survey.
Spain	Aranceta, J., Perez Rodrigo, C., Serra Majem, L. 2003. Grupo Colaborativo para el Estudio de la Obesidad en Espana. Prevalence of Obesity in Spain: Results of the SEEDO 2000 study. *Medicina Clinica* (Barcelona), 120(16):608–612.
St Lucia	World Health Organisation infobase. Richard Cooper, Department of Preventive Medicine, Loyola University Medical School, 2160 S. First Ave, Maywood, IL 60153.
Sweden (Goteburg)	Berg, C., Rosengren, A., Aires, N. et al. 2005. Trends in Overweight and Obesity from 1985 to 2002 in Goteborg, West Sweden. *International Journal of Obesity*, 8:916–924.
Switzerland	World Health Organisation infobase. Alfredo Morabia, Hopitaux Universitaires de Genève.
Taiwan	Lin, Y.C., Yen, L.L., Chen, S.Y. et al. 2003. Prevalence of Overweight and Obesity and its Associated Factors: Findings from National Nutrition and Health Survey in Taiwan 1993–96. *Preventive Medicine*, 37:233–241.
Tanzania	World Health Organisation infobase. Data provided by Pascal Bovet, University Institute of Social and Preventive Medicine, Bugnon 17, 1005 Lausanne, Switzerland.
Thailand	Aekplakorn, W., Chaiyapong, Y., Neal, B. et al. 2004. Prevalence and Determinants of Overweight and Obesity in Thai Adults: Results of the Second National Health Examination Survey. *Journal of the Medical Association of Thailand*, 87(6):685–693.
Togo	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Tonga	Colagiur, S., Colagiuri, R., Na'ati, S. et al. 2005. The Prevalence of Diabetes in the Kingdom of Tonga. *Diabetes Care*, 25:1378–1383.

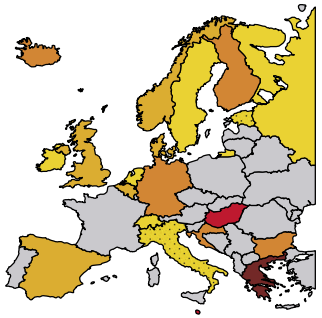
Trinidad and Tobago	Physical Activity Study. Unpublished CFNI. Food and Agriculture Organisation Country Profile: ftp://ftp.fao.org/es/esn/nutrition/ncp/trimap.pdf.
Tunisia	Mokhtar, N., Elati, J., Chabir, R. et al. 2001. Diet Culture and Obesity in Northern Africa. *Journal of Nutrition*, 131:887S–892S.
Turkey	Erem, C., Arslan, C., Hacihasanoglu, A. et al. 2004. Prevalence of Obesity and Associated Risk Factors in a Turkish Population (Trabzon City, Turkey). *Obesity Research*, 12:1117–1127.
Turkmenistan	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
United Arab Emirates	Measuring the Health of the Nation. United Arab Emirates Health and Lifestyle Survey 2000. UAEHALS 2000. United Arab Emirates University 2002.
Uganda	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Uruguay	Personal communication, Lucia Perez and Dr R. Pisaborro: Raul, P., Irrazabal, E. and Recalde, A. 2000. Overweight- and Obesity-Related Comorbidities in Uruguay. *Revista Medica del Uruguay Año*.
USA	NHANES. http:// www.cdc.gov
Uzbekistan	World Health Organisation infobase. Dr Hillary King: kingh@who.int
Vanuatu	Carlot-Tary, M., Hughes, R.G. and Hughes, M.C. 1999. *1998 Vanuatu Non-Communicable Diseases Survey Report*. Technical Paper No. 217. Noumea, New Caledonia: SPC.
Venezuela	Food and Agriculture Organisation Country Profile. Perfiles Nutricionales por Paises – Venezuela. December 2000.
Wales	http://www.wales.gov.uk/keypubstatisticsforwalesheadline/content/health/2004/hdw20041118-e.htm
Yemen	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Zambia	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.
Zimbabwe	United Nations Standing Committee on Nutrition. 2004. *Nutrition for Improved Development Outcomes.* 5th Report on the World Nutrition Situation. Appendix 11.

Appendix 4

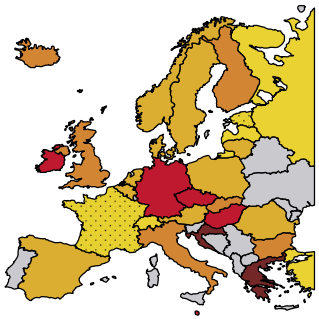
Trends in obesity in European adults, 1985–2005



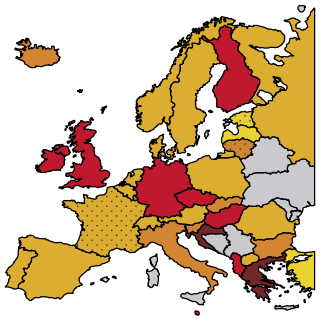
1985–1989



1990–1994



1995–1999



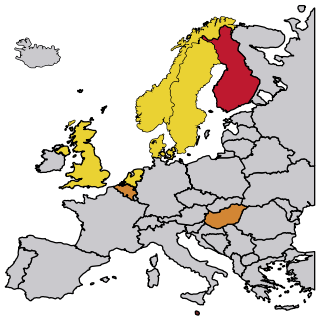
2000–2005

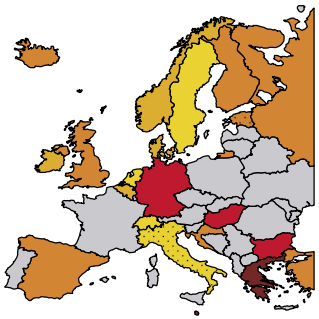
% Obesity
<5%
5–9.9%
10–14.9%
15–19.9%
20–24.9%

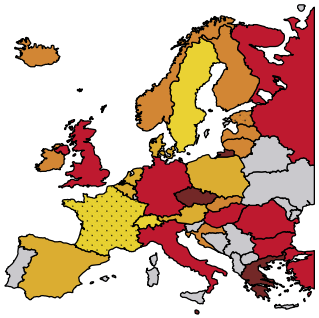
Males

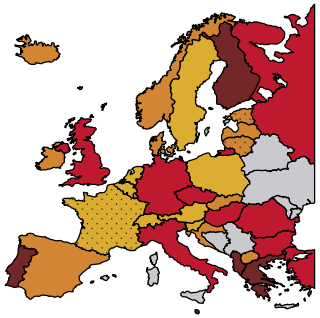
Adult Obesity trends in Europe

Females



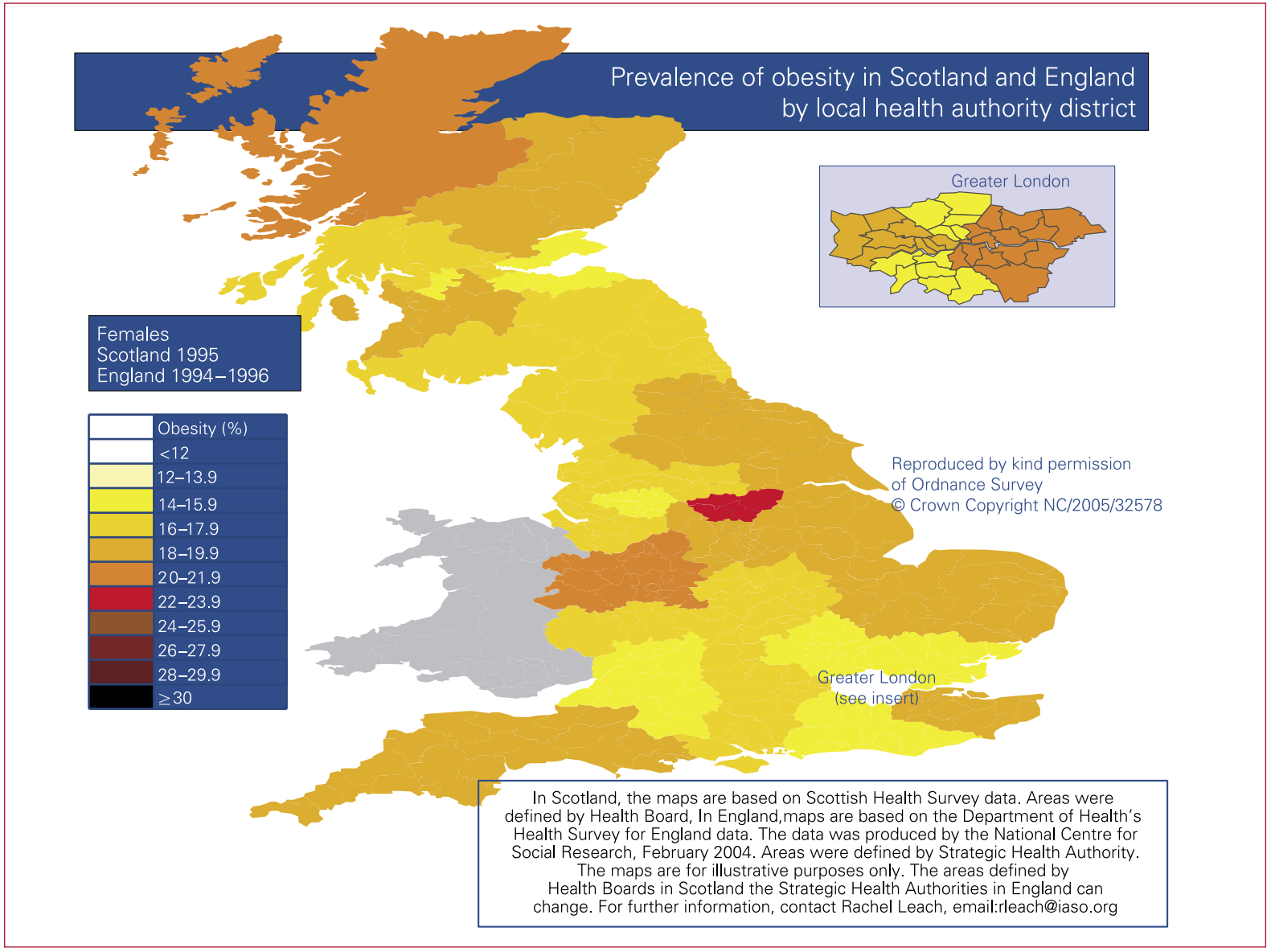






Appendix 5

Trends in the prevalence of obesity in Scotland and England by local health authority district


Prevalence of obesity in Scotland and England
by local health authority district
Greater London
Females
Scotland 1995
England 1994–1996
Obesity (%)
<12
12–13.9
14–15.9
16–17.9
18–19.9
20–21.9
22–23.9
24–25.9
26–27.9
28–29.9
≥30
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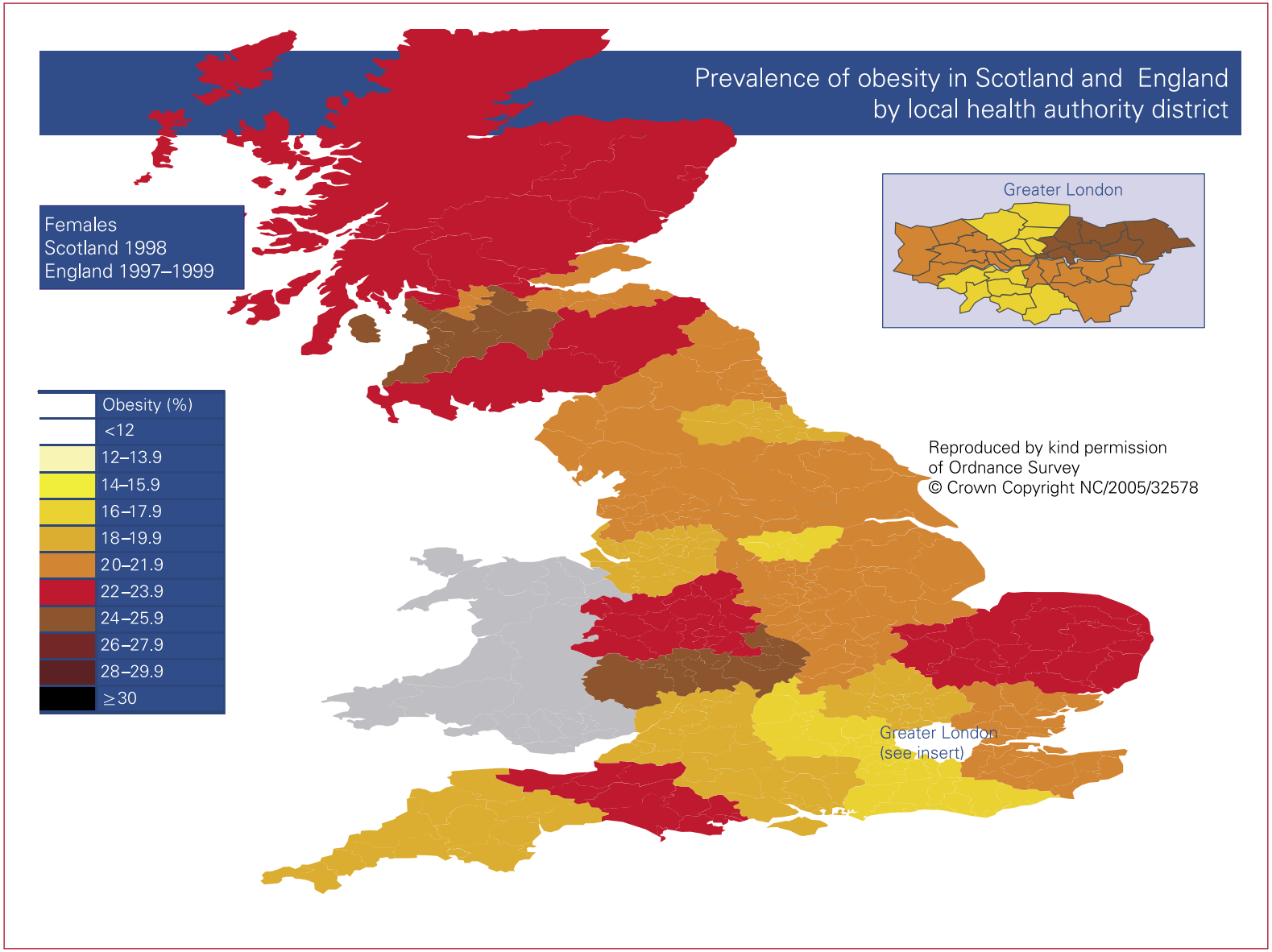
© Crown Copyright NC/2005/32578
Greater London
(see insert)
In Scotland, the maps are based on Scottish Health Survey data. Areas were defined by Health Board, In England,maps are based on the Department of Health's Health Survey for England data. The data was produced by the National Centre for Social Research, February 2004. Areas were defined by Strategic Health Authority. The maps are for illustrative purposes only. The areas defined by Health Boards in Scotland the Strategic Health Authorities in England can change. For further information, contact Rachel Leach, email:rleach@iaso.org


Prevalence of obesity in Scotland and England
by local health authority district
Females
Scotland 1998
England 1997–1999
Obesity (%)
<12
12–13.9
14–15.9
16–17.9
18–19.9
20–21.9
22–23.9
24–25.9
26–27.9
28–29.9
≥30
Greater London
Greater London
(see insert)
Reproduced by kind permission
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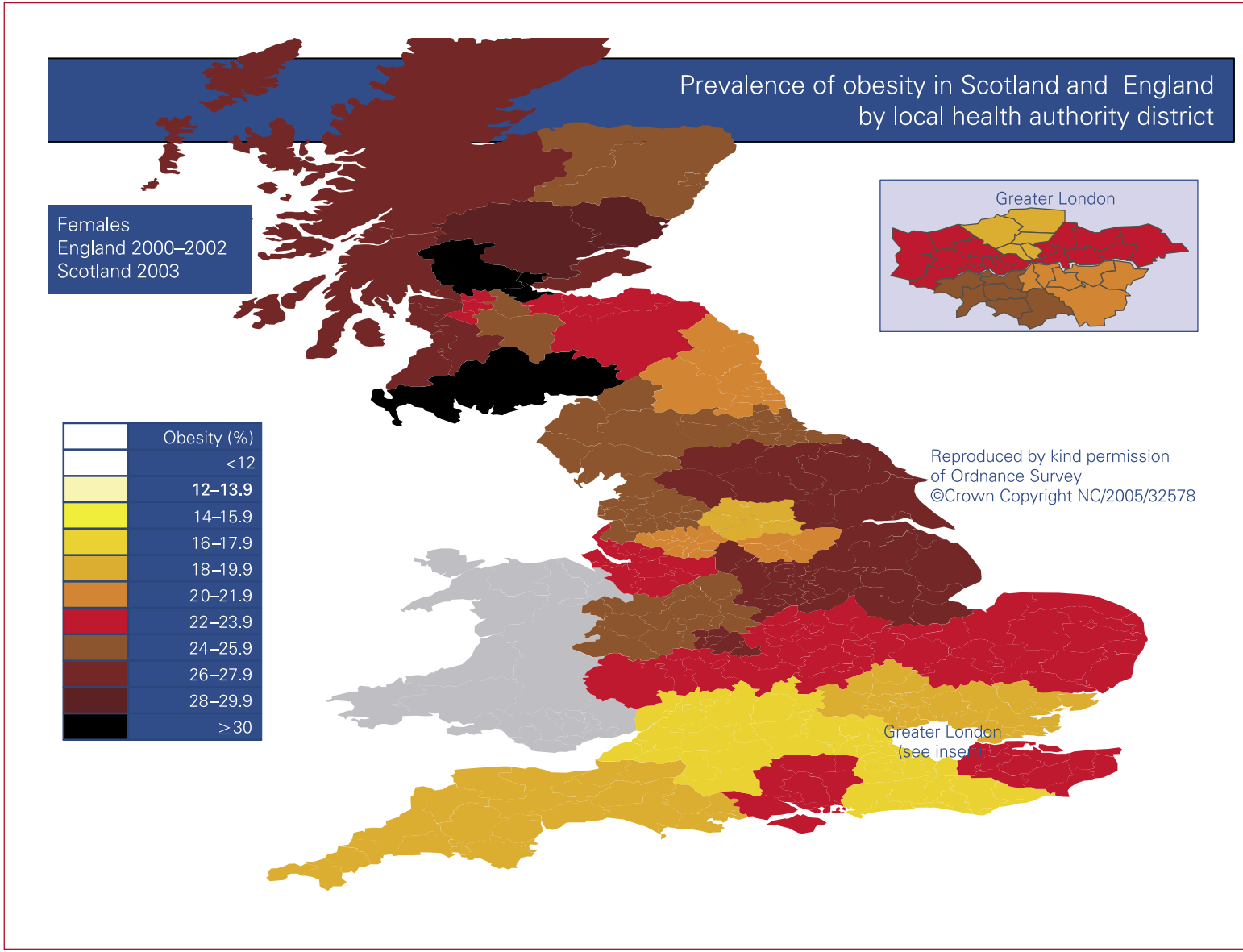
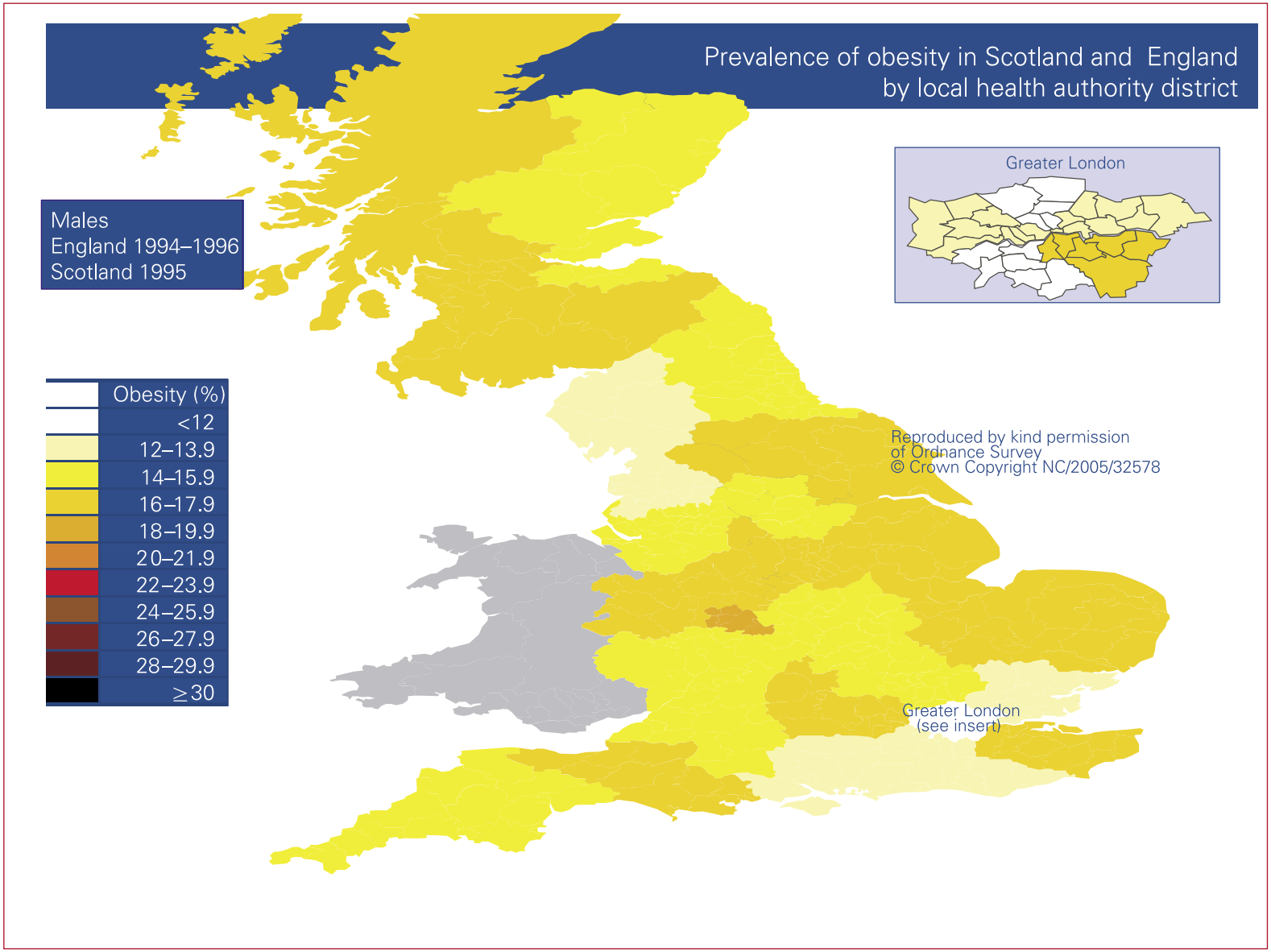

Prevalence of obesity in Scotland and England by local health authority district
Females
England 2000–2002
Scotland 2003
Greater London
Obesity (%)
<12
12–13.9
14–15.9
16–17.9
18–19.9
20–21.9
22–23.9
24–25.9
26–27.9
28–29.9
≥30
Reproduced by kind permission of Ordnance Survey ©Crown Copyright NC/2005/32578
Greater London (see inset)


Prevalence of obesity in Scotland and England
by local health authority district
Greater London
Males
England 1994–1996
Scotland 1995
Obesity (%)
<12
12–13.9
14–15.9
16–17.9
18–19.9
20–21.9
22–23.9
24–25.9
26–27.9
28–29.9
≥30
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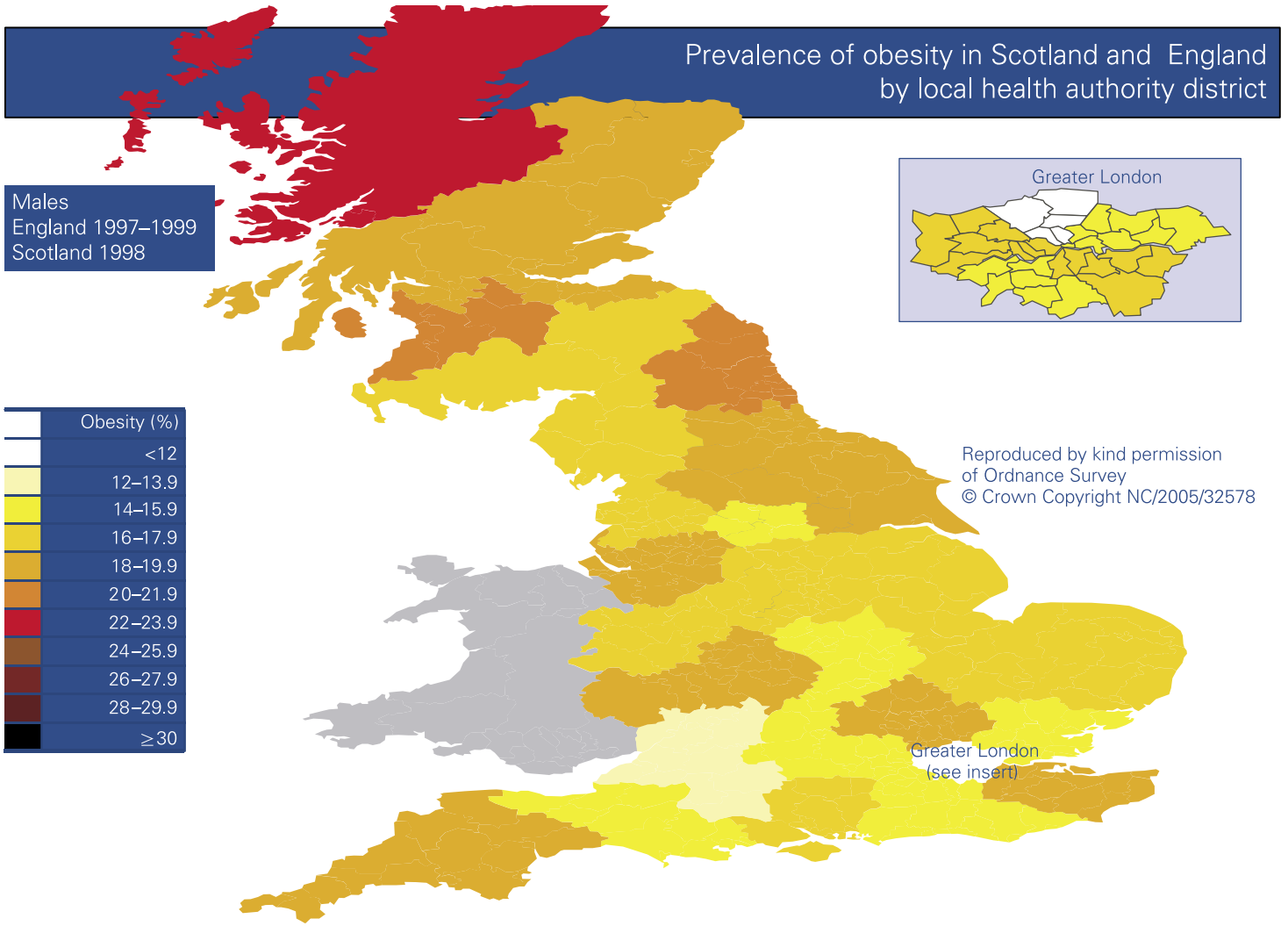
Greater London
(see insert)


Prevalence of obesity in Scotland and England by local health authority district
Males
England 1997–1999
Scotland 1998
Greater London
Obesity (%)
<12
12–13.9
14–15.9
16–17.9
18–19.9
20–21.9
22–23.9
24–25.9
26–27.9
28–29.9
≥30
Reproduced by kind permission of Ordnance Survey
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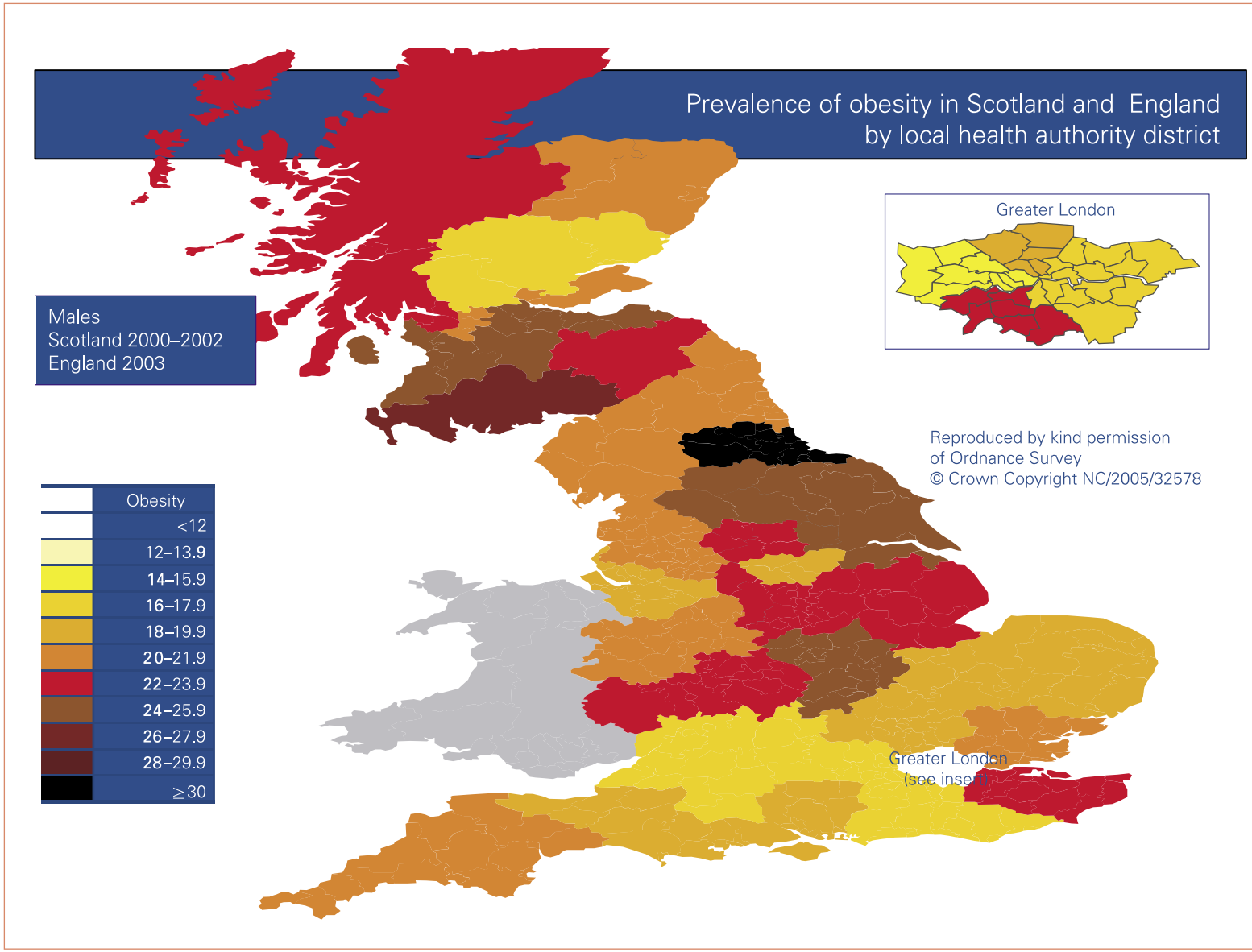
Greater London (see insert)


Prevalence of obesity in Scotland and England by local health authority district
Greater London
Males
Scotland 2000–2002
England 2003
Obesity
<12
12–13.9
14–15.9
16–17.9
18–19.9
20–21.9
22–23.9
24–25.9
26–27.9
28–29.9
≥30
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Greater London (see inset)

Appendix 6
Summary of recent reviews

The table below gives examples of recent reviews, most of them systematic and some conforming to the Cochrane protocols, identified in a search of English-language papers in January 2006. The notes are a brief indication of the findings or recommendations of the reviews. Section 7 includes a selection of reviews of interventions for other public health purposes that could have a bearing on obesity prevention strategies.

Review	Notes
1 Prevention of overweight or obesity	
Flynn, M.A., McNeil, D.A., Maloff, B. et al. 2006. Reducing Obesity and Related Chronic Disease Risk in Children and Youth: A Synthesis of Evidence with 'Best Practice' Recommendations. *Obesity Reviews*, 7(Suppl 1):7–66.	• There is a lack of programmes to address the particular needs of the subgroups of children and youth. Although immigrants new to developed countries may be more vulnerable to the obesogenic environment, no programmes were identified that specifically targeted their potentially specialised needs. • Also, there is under-representation of programmes for children aged 0–6 years and males. • There is only a limited number of interventions in home and community settings, and a serious lack of upstream population-based interventions. • Current programmes lead to short-term improvements in outcomes relating to obesity and chronic disease prevention, with no adverse effects noted. • Engagement in physical activity is a critical intervention in obesity prevention and reduction programmes. • Programmes require sustained long-term resources to facilitate comprehensive evaluation that will ascertain if long-term impact such as sustained normal weight is maintained. • There is a critical need for the development of consistent indicators to ensure that comparisons of programme outcomes can be made to better inform best practice.

Review	Notes
Doak, C.M., Visscher, T.L.S., Renders, C.M. and Seidell, J.C. 2006. The Prevention of Overweight and Obesity in Children and Adolescents: A Review of Interventions and Programmes. *Obesity Reviews*, 7:111–136.	*Industry sponsored:* This review was limited to school-based studies with a quantitative evaluation using anthropometric outcomes, and that intervene on diet- or activity-related behaviours. Seventeen of the 25 interventions were 'effective' based on a statistically significant reduction in BMI or skin folds for the intervention group. Four interventions were effective by BMI as well as skinfold measures. Of these, two targeted reductions in television viewing. The remaining two studies combined a physical education programme with nutrition education. One intervention was effective in reducing childhood overweight but was also associated with an increase in underweight prevalence. The review recommends giving more attention to preventing adverse outcomes such as underweight.
Summerbell, C.D., Waters, E., Edmunds, L. *et al. 2005. Interventions for Preventing Obesity in Children. Cochrane Library.*	*Cochrane Review:* The majority of studies were short-term. Studies that focused on combining dietary and physical activity approaches did not significantly improve BMI, although nearly all studies resulted in some improvement in diet or physical activity. There is not enough evidence from trials to prove that any one particular programme can prevent obesity in children, although comprehensive strategies to address dietary and physical activity change, together with psycho-social support and environmental change may help. There was a trend for recent interventions to involve their respective communities and to include evaluations. Future research might usefully assess changes made on behalf of entire populations, such as improvements in the types of foods available at schools and in the availability of safe places to run and play, and should assess health effects and costs over several years. The programmes in this review used different strategies to prevent obesity, so direct comparisons were difficult. Also, the duration of the studies ranged from 12 weeks to three years, but most lasted less than a year.
Katz, D.L., O'Connell, M., Yeh, M.C. et al. 2005. *Public Health Strategies for Preventing and Controlling Overweight and Obesity in School and Worksite Settings: A Report on Recommendations of the Task Force on Community Preventive Services.* MMWR Recomm Rep. 7;54(RR-10):1–12.	The Task Force recommends multi-component interventions that include nutrition and physical activity (including strategies such as providing nutrition education or dietary prescription, physical activity prescription or group activity, and behavioural skills development and training) to control overweight and obesity among adults in worksite settings. The Task Force determined that insufficient evidence existed to establish the effectiveness of combination nutrition and physical activity interventions to prevent or reduce overweight and obesity in school settings because of the limited number of qualifying studies reporting non-comparable outcomes.

Review	Notes
Wareham, N.J., van Sluijs, E.M. and Ekelund, U. 2005. Physical Activity and Obesity Prevention: A Review of the Current Evidence. *Proceedings of the Nutrition Society*, 64(2):229–47.	The majority of studies suggest that low levels of activity are only weakly associated with future weight gain. Observational studies leave uncertainties about the direction of causality, as individuals who are overweight are less likely to stay active. The updated review found six trials published since 2000 in adults and eleven in children, and, for various methodological reasons, they are uncertain in their conclusions about whether increasing activity will be effective in preventing obesity. However, it is wise, in the meantime, to stick to the consensus public health advice of advocating 45–60 minutes of moderate-intensity activity daily to prevent obesity.
Clemmens, D. and Hayman, L.L. 2004. Increasing Activity to Reduce Obesity in Adolescent Girls: A Research Review. *Journal of Obstetrics and Gynaecology: Neonatal Nursing*, 33(6):801–8.	This review of physical activity intervention research conducted with adolescent girls found that, although the results were not consistent across studies, they suggest that school-based, multi-component interventions that were also designed to decrease sedentary behaviour, were effective in increasing physical activity in adolescent girls. Future research should focus on determinants of long-term adherence and the duration and intensity of interventions necessary to prevent obesity in adolescent girls.
Carrel, A.L. and Bernhardt, D.T. 2004. Exercise Prescription for the Prevention of Obesity in Adolescents. *Current Sports Medicine Reports*, 3(6):330–336.	School personnel report lack of training in intervention, and health providers report ineffective office-based (clinic-based) intervention strategies. With co-ordination of interventions in the school and office, prevention and treatment of childhood obesity can be improved. The evidence base is insufficient to provide specific guidelines for assessment and treatment, although general recommendations can be made.
Casey, L. and Crumley, E. 2004. *Addressing Childhood Obesity: The Evidence for Action*. Ottawa: Canadian Association of Paediatric Health Centres. http://www.cihr-irsc.gc.ca/e/documents/ChildhoodObesityReport_e.pdf (accessed May 2007).	A review of systematic reviews, their nature and quality, which identified the following: • Long-term follow-up is critical to determine the relationship between physical activity interventions and lifelong patterns of activity, and should be included as a measure of efficacy of the intervention. • Interventions to increase physical activity in schools should include measures of both in-school and out-of-school physical activity to determine the effect of these interventions on total activity levels. • Comparative studies on dietary interventions should be conducted specifically in populations of overweight children to determine the characteristics associated with improved dietary habits. • Age at intervention should be evaluated to assist in targeting available resources to achieve maximum impact. • Research should be systematically reviewed to determine appropriate strategies for minority populations.

Review	Notes
Reilly, J.J. and McDowell, Z.C. 2003. Physical Activity Interventions in the Prevention and Treatment of Paediatric Obesity: Systematic Review and Critical Appraisal. *Proceedings of the Nutrition Society*, 62(3):611–619.	The evidence on childhood obesity prevention is not encouraging, although promising targets for prevention are now clear, notably reduction in sedentary behaviour. There is stronger evidence that targeting activity and/or inactivity might be effective in paediatric obesity treatment, but doubts as to the generalisability of existing interventions, and the clinical relevance of the interventions, is unclear.
Muller, M.J., Mast, M., Asbeck, I. et al. 2003. Prevention of Obesity: Is It Possible? *Obesity Reviews*, 2:15–28.	Although effective with respect to reduction in cardiovascular risk factors, programmes did not affect mean BMI of the target populations. Selective prevention directed at high-risk individuals (e.g. at children with obese parents) exhibited various degrees of effectiveness. Targeted prevention produced promising results in obese children when compared to no treatment. As well as health promotion and counselling, better school education and social support appear to be promising strategies for future interventions.
Mulvihill, C. and Quigley, R. 2003. *The Management of Obesity and Overweight: An Analysis of Reviews of Diet, Physical Activity and Behavioural Approaches. Evidence Briefing* (1st edition), October. London: Health Development Agency.	Children: There is evidence to support the use of multi-faceted school-based interventions to reduce obesity and overweight in school children, particularly girls. These interventions included: nutrition education, physical activity promotion, reduction in sedentary behaviour, behavioural therapy, teacher training, curricular material, and modification of school meals and tuck shops. Currently, there is limited evidence: • to support school-based health promotion (classroom curriculum to reduce television, videotape and video game use) for the prevention of obesity and overweight in children • that family-based behaviour modification programmes (family therapy in addition to diet education, regular visits to a paediatrician and encouragement to exercise) impede weight gain in obese children. Currently, there is a lack of evidence: • for school-based physical activity programmes led by specialist staff or classroom teachers for the prevention of obesity and overweight in children • that family-based health promotion interventions impact on obesity and overweight. These interventions focused on dietary and general health education and increased activity, with sustained contact with children and parents. Adults: The evidence is mixed and inconclusive in terms of effectiveness. There is inconclusive evidence regarding the effectiveness of community-based interventions (for example, seminars, mailed educational packages and mass-media participation) for the prevention of obesity and overweight in adults.

Review	Notes
NHS Centre for Reviews and Dissemination. 2002. The Prevention and Treatment of Childhood Obesity. *Effective Health Care*, 7(6).	• There is some evidence that school-based programmes that promote physical activity, the modification of dietary intake and the targeting of sedentary behaviours may help reduce obesity in children, particularly girls. • Family-based programmes that involve parents, increase physical activity, provide dietary education and target reductions in sedentary behaviour may help reduce childhood obesity. • Future research must be of good methodological quality, involve large numbers of participants, be carried out in appropriate settings and needs to be of longer duration and intensity.
Micucci, S., Thomas, H. and Vohra, J. 2002. *The Effectiveness of School-Based Strategies for the Primary Prevention of Obesity and for Promoting Physical Activity and Nutrition, the Major Modifiable Risk Factors for Type 2 Diabetes: Review of Reviews*. Education and Development Program. Hamilton, Canada: Public Health Research.	A 'review of reviews' on interventions to prevent chronic disease conducted by an inter-university team for the City of Hamilton, Ontario, Canada. The review concluded that the most effective interventions should be based on a 'whole school' approach, including cafeterias, physical education classes, lunch and recess activities, classroom teaching, and should include links to home and the community. The longer the intervention, the greater the change in outcome measures. Different age groups, ethnic groups and genders needed different approaches.
Reilly, J.J., Wilson, M.L., Summerbell, C.D. and Wilson, D.C. 2002. Obesity, Diagnosis, Prevention, and Treatment, Evidence-Based Answers to Common Questions. *Archives of Disease in Childhood*, 86(6):392–394.	'There is some doubt as to whether obesity is preventable in school-age children, using currently available intervention strategies … Further research is indicated, though more recent evidence, published after the present literature review had been completed, is not promising.'
Schmitz, K.H. and Jeffrey, R.W. 2002. Prevention of Obesity, in Wadden, T.A. and Stunkard, A.J. (eds). *Handbook of Obesity Treatment*. New York: Guilford Press. pp. 556–593.	• Interventions should take account of national changes in dietary trends that may be occurring during the period of intervention. A five-year school-based nutrition education programme showed significantly raised awareness of nutritional knowledge among intervention children compared with controls, but no difference in energy or macronutrient intake, while both intervention and control groups showed reduced consumption of French fries and an increased use of olive oil over the period. • Environmental changes, such as alterations in school physical education or monitoring television viewing time, are at least as important as classroom-based educational interventions. Studies conducted in less diverse settings were more likely to show significant obesity-related treatment effects. • The absence of long-term treatment effects makes it difficult to evaluate the efficacy of interventions on obesity prevalence. Most of the studies were able to show improvements in eating and/or exercise habits of children and the large trials indicate the feasibility of implementing school-wide changes for the purpose of obesity prevention. The effects of these interventions when the children become adults, in terms of their health-related behaviour or their health status, remain to be assessed. • Future studies will therefore need to evaluate the cost-effectiveness of school- and/or community-based obesity prevention interventions in youth, including long-term follow-up of obesity prevalence and incidence.

Review	Notes
Swedish Council on Technology Assessment in Health Care. 2002. *Obesity: Problems and Interventions*. Swedish Council on Technology Assessment in Health Care. Report No. 160. Stockholm, Sweden: Swedish Council on Technology Assessment in Health Care. http://www.sbu.se/Filer/Content0/publikationer/1/obesity_2002/obsesityslut.pdf (accessed April 2007).	Most population-based preventive programmes that have been scientifically assessed have not demonstrated any favourable effects on the prevalence of obesity. However, there are examples of successful programmes both for adults and children. New outreach strategies need to be developed and assessed. Concurrently, public policy initiatives are needed to reduce the incidence of obesity.
Dietz, W. and Gortmaker, S. 2001. Preventing Obesity in Children and Adolescents. *Annual Review of Public Health*, 22:337–353.	Families and schools represent the most important foci for preventive efforts in children and adolescents. One productive approach is to proceed from an examination of factors that affect energy balance to the identification of more proximal influences on those factors. For example, television viewing affects both energy intake and energy expenditure, and therefore represents a logical target for interventions. Guidance by paediatricians may help to change parental attitudes and practices regarding television viewing. School-based interventions can be directed at changes in food choices and sedentary behaviour.
Steinbeck, K. 2001. The Importance of Physical Activity in the Prevention of Overweight and Obesity in Childhood: A Review and an Opinion. *Obesity Reviews*, 2:117–130.	The role of physical activity in the prevention of obesity (primary and secondary prevention) is not clear. However, a number of recent school-based interventions directed at either increasing physical activity and/or decreasing sedentary behaviours, have shown encouraging results. On balance, increasing physical activity in children is an attractive and non-restrictive approach to obesity prevention. To adopt this approach requires the support and involvement of many community sectors other than health.
Hardeman, W, Griffin, S., Johnston, M. et al. 2000. Interventions to Prevent Weight Gain: A Systematic Review of Psychological Models and Behaviour Change Methods. *International Journal of Obesity and Related Metabolic Disorders*, 24(2):131–43.	Effects on weight were mixed, but follow-up was generally short. Smaller effects on weight gain were found among low-income participants, students and smokers. Study drop-out was higher among thinner and lower-income subjects. Interventions to prevent weight gain exhibited various degrees of effectiveness. Definite statements about the elements of the interventions that were associated with increased effect size cannot be made, as only one of the five studies that involved a randomised controlled trials design reported a significant effect on weight. This intervention involved a correspondence programme and a mix of behaviour change methods, including goal-setting, self-monitoring and contingencies.

Review	Notes
Story, M. 1999. School-Based Approaches for Preventing and Treating Obesity. *International Journal of Obesity and Related Metabolic Disorders*, 23(Suppl 2):S43–51.	School-based treatment showed positive, though modest, short-term results. Relatively few primary prevention studies have been conducted and therefore efficacy has not been established. Both primary and secondary obesity interventions have a role in schools. A model, building on the comprehensive school health programme model, consists of eight interacting components: health instruction; health services; school environment; food services; school-site health promotion for faculty and staff; social support services; physical education classes; and integrated and linked family and community health promotion efforts.
Goran, M., Reynolds, K.D., Lindquist, C.H. 1999. Role of Physical Activity in the Prevention of Obesity in Children. *International Journal of Obesity*, 23(Suppl 3): S18–S33.	The beneficial effect of physical activity in children is supported by controlled exercise intervention programmes. Several broad-based public health interventions designed to increase children's levels of physical activity have been implemented in schools, families and communities, with results suggesting promising strategies for the prevention of childhood obesity. It is likely that successful prevention of childhood obesity through physical activity promotion will involve theory-based, culturally appropriate school, family and community interventions. Through policy changes, environmental planning and educational efforts in schools and communities, increased opportunities and encouragement for physical activity can be provided.
The Prevention and Treatment of Obesity. 1997. *Effective Health Care*, 3(2). http://www.york.ac.uk/inst/crd/ehc32.htm (accessed April 2007).	Progression of obesity in high-risk children may be prevented by family therapy. Prevention of obesity in adults may be achieved by community-based education programmes linked with financial incentives. Interventions to reduce sedentary behaviour can reduce overweight in children.
2 Physical activity promotion	
Jackson, N. Air-displacement plethysmography measurements are comfortable, relatively quick, non-invasive and can accommodate a wide range of body types. Subjects should be reasonably co-operative (for accurate measurement, the subject should breathe through a tube and wear a nose clip) and so the technique may be unsuitable for younger children. Again, there are theoretical concerns about the assumptions used to calculate body fat.[6] Howes, F.S., Gupta, S. et al. 2005. *Interventions Implemented through Sporting Organisations for Increasing Participation in Sport. Cochrane Library.*	*Cochrane Review:* There is an absence of high-quality evidence to support interventions designed and delivered by sporting organisations to increase participation in sport. Interventions funded and conducted in this area must be linked to a rigorous evaluation strategy in order to examine overall effectiveness, sociodemographic differentials in participation and cost-effectiveness of these strategies.

Review	Notes
Jackson, N.W., Howes, F.S., Gupta, S. et al. 2005. *Policy Interventions Implemented through Sporting Organisations for Promoting Healthy Behaviour Change. Cochrane Library.*	*Cochrane Review:* Unable to find any controlled studies to guide the use of policy interventions used in sporting settings. The search process revealed a number of case studies with anecdotal reporting of outcomes. More rigorous evaluation techniques should be employed to evaluate outcomes and the contexts and processes that are likely to be effective.
LaMonte, M.J., Blair, S.N. and Church, T.S. 2005. Physical Activity and Diabetes Prevention. *Journal of Applied Physiology*, 99(3):1205–1213.	Hyperglycaemia is the hallmark clinical manifestation of diabetes and evolves through a multi-factorial etiology of genetic, environmental and behavioural enablers. The hypothesis is that the most proximal behavioural cause of insulin resistance is physical inactivity. Several streams of scientific research have demonstrated a role for physical activity in the etiology and prevention of diabetes and its related morbidity. The review examined associations between physical activity, cardio-respiratory fitness, and non-insulin-dependent diabetes.
Jago, R. and Baranowski, T. 2004. Non-Curricular Approaches for Increasing Physical Activity in Youth: A Review. *Preventive Medicine*, 39(1):157–163.	Time for school physical education has declined. Curricular interventions have had limited effects and alternative non-curriculum approaches need to be tested. The review found that children were active during school break periods, and inexpensive interventions further increased activity during these times. Active travel to school offered potential, but its effectiveness was impaired by traffic congestion and parental fears about child safety. Extracurricular, school-based interventions had problems with low attendance, which might be removed if delivered through existing community organisations. Summer day camps offered potential for increasing the activity of youth, but research is required to determine how best to convert camp activity into increased post-camp habitual activity.
Hillsdon, M., Foster, C. and Thorogood, M. 2004. *Interventions for promoting physical activity. Cochrane Library.*	*Cochrane Review:* Physical activity interventions have a moderate effect on self-reported physical activity and cardio-respiratory fitness, but not on achieving a predetermined level of physical activity. Professional advice and guidance with continued support can encourage people, 16 and older, to be more physically active. The majority of studies lasted no more than one year. There was no increase in exercise-related cardiac events or injuries among those who had become physically active, compared to those who remained sedentary.

Review	Notes
Hills, A.P. and Byrne, N.M. 2004. Physical Activity in the Management of Obesity. *Clinical Dermatology*, 22(4):315–318.	Exercise has a pivotal role in weight management, optimising body composition by minimising fat-free mass losses and maximising fat-mass loss, and enhancing metabolic fitness. The amount and type of exercise needed to obtain health-related benefits may differ from that recommended for fitness benefits. Public health messages about exercise have focused on improvements in general health and fitness rather than on weight loss, prevention of weight gain or weight regain. About 2.5 times more exercise than the US Surgeon General's recommendation is needed to maintain energy balance and thus maintain a certain weight. The challenge is to get the exercise prescription right at an individual level.
Armour, T., Norris, S., Brown, D. et al. 2007. Initiating and Maintaining Physical Activity for Type 2 Diabetes Mellitus. *Cochrane Database of Systematic Reviews,* 2. Abstract available http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD004656/frame.html (accessed May 2007).	*Cochrane Review: in process* Most of the evidence to date on physical activity and diabetes has focused either on the effects of exercise on various biological and physiological outcomes or on demonstrating the importance of exercise for managing the disease. These investigations do not indicate what interventions are effective in promoting physical activity in people with diabetes or identify the unique barriers this population may face when deciding to become more physically active.
Lytle, L.A., Jacobs, D.R., Perry, C.L. and Klepp, K.-I. 2002. Achieving Physiological Change in School-Based Intervention Trials: What Makes a Preventive Intervention Successful? *British Journal of Nutrition*, 88: 219–221.	This commentary on school-based interventions noted that only a few interventions have had significant effect on physiological measures. The authors suggest improved success rates may result from an adequate length of intervention and a reduction in drop out through greater participant involvement. Heterogeneity, i.e. the involvement of participants from diverse cultural backgrounds, is rarely catered for in the experimental designs where 'one size fits all', and this may compromise the ability to show significant effects.
Task Force on Community Preventive Services. 2002. Recommendations to Increase Physical Activity in Communities. *American Journal of Preventive Medicine*, 22(Suppl 4):67–72.	• School-based physical education: strongly recommended. • Classroom-based health education focused on information provision: insufficient evidence. • Classroom-based health education focused on reducing television viewing and video game playing: insufficient evidence. • Family-based social support: insufficient evidence. • Individually-adapted health behaviour change programmes: strongly recommended. • Enhanced access to places for physical activity plus informational outreach activities: strongly recommended.

Review	Notes
Kahn, E.B., Ramsey, L.T., Brownson, R.C. et al. 2002. The Effectiveness of Interventions to Increase Physical Activity: A Systematic Review. *American Journal of Preventive Medicine*, 22(Suppl 4):73–107.	Changes in physical activity behaviour and aerobic capacity were used to assess effectiveness. Two informational interventions ('point of decision' prompts to encourage stair use and community-wide campaigns) were effective, as were three behavioural and social interventions (school-based physical education, social support in community settings, and individually adapted health behaviour change) and one environmental and policy intervention (creation of or enhanced access to places for physical activity combined with informational outreach activities). Evidence is insufficient to assess classroom-based health education, family-based social support, mass-media campaigns, college-based health education and physical education or classroom-based health education focused on reducing television viewing and video game playing.
Dobbins, M., Lockett, D., Michel, I. et al. 2001. *The Effectiveness of School-Based Interventions in Promoting Physical Activity and Fitness among Children and Youth: A Systematic Review*. Final Report. Education and Development Program, Effective Public Health Practice Project, Hamilton, Ontario: Public Health Branch, Ministry of Health and Long-Term Care, Public Health Research. http://www.nhsru.com/documents/Physical-Activity-Review.pdf (accessed April 2007).	This review found moderate improvement in physical activity among children and among adolescent girls exposed to promotional campaigns, but with little measurable effect on blood pressure, BMI or heart rate. The most effective initiatives involved children through the whole school day, including lunch and recesses as well as class time and physical education lessons. Adults who had participated in school-based physical activities as children were more likely to be active in adulthood than those who had not. • Interventions should be multi-faceted including classroom instruction and changes in the school environment. • Interventions should be behaviourally focused. • Longer-lasting interventions and/or frequent booster sessions improve effectiveness. • Age, gender and ethnicity may affect outcomes and require further study.
Stone, E.J., McKenzie, T.L., Welk, G.J. and Booth, M.L. 1998. Effects of Physical Activity Interventions in Youth: Review and Synthesis. *American Journal of Preventive Medicine*, 15(4):298–315.	Studies showing the best results used randomised designs, valid and reliable measurements, and more extensive interventions. Some follow-up results showed physical activity was sustained after interventions ended. Special attention is needed for girls, middle schools, and community settings for all youth. More objective assessments are needed for measuring physical activity outside of school and in younger children, since they cannot provide reliable self-report.

Review	Notes
3 Non-medical treatment for overweight	
Norris, S.L., Zhang, X., Avenell, A. et al. 2005. *Long-Term Non-Pharmacological Weight Loss Interventions for Adults with Prediabetes. Cochrane Library.*	*Cochrane Review:* Overall, weight-loss strategies using dietary, physical activity, or behavioural interventions produced significant improvements in weight among those with pre-diabetes and a significant decrease in diabetes incidence. Modest, but not statistically significant, improvements were noted in the few studies that examined blood-sugar control, blood pressure, and lipid levels. No data on quality of life or mortality were found. Further work is needed on the long-term effects of these interventions on morbidity and mortality and on how to implement these interventions in diverse community settings.
Norris, S.L., Zhang, X., Avenell, A. et al. 2005. *Long-Term Non-Pharmacological Weight Loss Interventions for Adults with Type 2 Diabetes Mellitus. Cochrane Library.*	*Cochrane Review:* Weight-loss strategies using dietary, physical activity, or behavioural interventions produced small between-group improvements in weight. These results were minimized by weight loss in the comparison group, however, and examination of individual study arms revealed that multi-component interventions including very low calorie diets or low calorie diets may hold promise for achieving weight loss in adults with type 2 diabetes.
Shaw, K., O'Rourke, P., Del Mar, C. and Kenardy, J. 2005. *Psychological Interventions for Overweight or Obesity*. Cochrane Library.	*Cochrane Review:* People who are overweight or obese benefit from psychological interventions, particularly behavioural and cognitive-behavioural strategies, to enhance weight reduction. They are predominantly useful when combined with dietary and exercise strategies. The bulk of the evidence supports the use of behavioural and cognitive-behavioural strategies. Other psychological interventions are less rigorously evaluated for their efficacy as weight-loss treatments.
Whitlock, E.P., Williams, S.B., Gold, R. et al. 2005. Screening and Interventions for Childhood Overweight: A Summary of Evidence for the US Preventive Services Task Force. *Pediatrics*, 116(1):e125–144. US Preventive Services Task Force. 2005. Screening and Interventions for Overweight in Children and Adolescents: Recommendation Statement. *Pediatrics*, 116(1):205–209.	Interventions to treat overweight adolescents in clinical settings have not been shown to have clinically significant benefits, and they are not widely available. Screening to categorise overweight among children under age 12 or 13 who are not clearly overweight may not provide reliable risk categorisation for adult obesity. Screening in this age group is compromised by the fact that there is little generalisable evidence for primary care interventions: the US Preventive Services Task Force found insufficient evidence for the effectiveness of behavioural counselling or other preventive interventions with overweight children and adolescents that can be conducted in primary care settings. Research is needed to provide well-defined and effective approaches to medical and psychological screening in children, as well as effective clinical approaches for the prevention and treatment of overweight in children that can be implemented by primary care clinicians.

Review	Notes
Ni Mhurchu, C., Dunshea-Mooij, C., Bennett, D. and Rodgers, A. 2005. *Chitosan for Overweight or Obesity. Cochrane Library.*	*Cochrane Review:* There is some evidence that chitosan is more effective than placebo in the short-term treatment of overweight and obesity. However, many trials to date have been of poor quality and results have been variable. Results obtained from high-quality trials indicate that the effect of chitosan on body weight is minimal and unlikely to be of clinical significance.
Miller, Y.D. and Dunstan, D.W. 2004. The Effectiveness of Physical Activity Interventions for the Treatment of Overweight and Obesity and Type 2 Diabetes. *Journal of Science and Medicine in Sport*, 7(1 Suppl):52–59.	Among adults, strategies that combine diet and physical activity are more effective than physical activity strategies alone. Combined lifestyle strategies are most successful for maintained weight loss, although most programmes are unsuccessful in producing long-term changes. There is little evidence about compliance to prescribed behaviour changes or the factors that promote or hinder compliance to lifestyle changes. Limited evidence suggests that continued professional contact and self-help groups can help sustain weight loss.
McLean, N., Griffin, S., Toney, K. and Hardeman, W. 2003. Family Involvement in Weight Control, Weight Maintenance and Weight-Loss Interventions: A Systematic Review of Randomised Trials. *International Journal of Obesity and Related Metabolic Disorders*, 27(9):987–1005.	This review found that parental involvement is associated with weight loss in children and that use of a greater range of behaviour change techniques improves weight outcomes for both parents and children. There was a suggestion that spouse involvement increased effectiveness but that adolescents achieved greater weight loss when treated alone. Future interventions should pay attention to which family members are targeted and how they are involved in the intervention in terms of setting goals for behaviour change, providing support and training in behaviour change techniques.
Maziekas, M.T., LeMura, L.M., Stoddard, N.M. et al. 2003. Follow-Up Exercise Studies in Paediatric Obesity: Implications for Long-Term Effectiveness. *British Journal of Sports Medicine*, 37(5):425–429.	The studies reviewed indicate that exercise is efficacious for reducing percentage body fat in obese children and adolescents, and that exercise intervention may encourage long-term maintenance of the observed gains.
Summerbell, C.D., Waters, E., Edmunds, L. et al. 2003. *Interventions for Treating Obesity in Children. Cochrane Library.*	*Cochrane Review:* Although 18 research studies were found, most of these were very small studies drawn from homogeneous, motivated groups in hospital settings. There is limited data on the components of programmes to treat childhood obesity, and no direct conclusions can be drawn. Research is needed on the psychosocial determinants for behaviour change, strategies to improve clinician–family interaction, and cost-effective programmes for primary and community care.

Review	Notes
Swedish Council on Technology Assessment in Health Care. 2002. *Obesity: Problems and Interventions*. Swedish Council on Technology Assessment in Health Care. Report No. 160. Stockholm, Sweden: Swedish Council on Technology Assessment in Health Care. http://www.sbu.se/Filer/Content0/publikationer/1/obesity_2002/obsesityslut.pdf (accessed April 2007).	• Changes in dietary habits through counselling (mainly reduction of energy and fat intake) can lead to weight reduction, as a rule in the range of 3–10kg during the first year (or 10% of body weight in children). The long-term effects are uncertain. • Regular exercise contributes to weight reduction. • Behavioural therapy in conjunction with changes in diet and exercise can have further effects on weight if supportive interventions continue for a longer period. • Approximately one-fifth of those who undergo treatment based on the 'weight watcher' approach, and reach their goals, achieve a permanent weight loss of 10% or more of their original weight. • A very-low-calorie diet (VLCD, based on protein formulas) for 6-12 weeks yields a greater weight reduction than conventional low-energy diets. In VLCD studies, where the treatment was often periodic over 1–2 years, authors note a retained weight loss of a few kilograms more than in treatment using a balanced diet alone. • The scientific evidence for a wide range of 'alternative medicine' methods is too weak to draw any conclusions concerning the possible effects these methods have on obesity. • The risks of obesity can be reduced through weight reduction, regardless of the methods used. Intervening against other risk factors – even when weight reduction does not succeed – can help reduce the risks of obesity. Such interventions would include increased physical activity, smoking cessation, and improved control of diabetes, high blood pressure and elevated blood lipids.
Pirozzo, S., Summerbell, C., Cameron, C. And Glasziou, P. 2002. *Advice On Low-Fat Diets For Obesity. Cochrane Library.*	*Cochrane Review:* The review suggests that fat-restricted diets are no better than calorie-restricted diets in achieving long-term weight loss in overweight or obese people. Overall, participants lost slightly more weight on the control diets but this was not significantly different from the weight loss achieved through dietary fat restriction and was so small as to be clinically insignificant.
Shaw, K., Del Mar, C., O'Rourke, P. and Tito, F. 2007. *Exercise for Obesity*. Cochrane Library. http://www.cochrane.org/reviews/en/ab003817.html (accessed May 2007).	*Cochrane Review:* Studies show that maintenance of weight loss is enhanced if patients adhere to exercise programmes.[1,2] Exercise may also affect weight loss through psychological pathways: exercise enhances body image, boosts self-esteem and improves mood, and individuals may adhere more rigorously to their dietary regimen.[2] This enhanced dietary adherence may explain the link between exercise and weight control.

Review	Notes
Harvey, E.L., Glenny, A.-M., Kirk, S.F.L. and Summerbell, C.D. 2001. *Improving Health Professionals' Management and the Organisation of Care for Overweight and Obese People. Cochrane Library.*	*Cochrane Review:* At present, there are few solid leads about improving obesity management, although reminder systems, brief training interventions, shared care, in-patient care and dietician-led treatments may all be worth further investigation. In addition, decisions for the improvement of provision of services must be based on the existing evidence on interventions with patients and good clinical judgement. Further research is needed to identify cost-effective strategies for improving the management of obesity.
The Prevention and Treatment of Obesity. 1997. *Effective Health Care*, 3(2) http://www.york.ac.uk/inst/crd/ehc32.htm (accessed April 2007).	Behavioural, diet, exercise and drug treatments have all been shown to be effective, to some extent, in treating obesity in adults, particularly when two or more approaches are used in combination. Most people begin to regain weight a few months after treatment. Longer-term follow-up and use of maintenance interventions is necessary to sustain weight loss.
4 Medical treatment for obesity	
Colquitt, J., Clegg, A., Sidhu, M. and Royle, P. 2005. *Surgery for Morbid Obesity. Cochrane Library.*	*Cochrane Review:* The limited evidence suggests that surgery is more effective than conventional management for weight loss in morbid obesity. The comparative safety and effectiveness of different surgical procedures is unclear.
Norris, S.L., Zhang, X., Avenell, A. et al. 2005. *Pharmacotherapy for Weight Loss in Adults with Type 2 Diabetes Mellitus. Cochrane Library.*	*Cochrane Review:* Fluoxetine, orlistat and sibutramine can achieve statistically significant weight loss over 12–57 weeks. The magnitude of weight loss is modest, however, and the long-term health benefits remain unclear. The safety of sibutramine is uncertain. There is a paucity of data on other drugs for weight loss or control in people with type 2 diabetes.
Avenell, A., Broom, J., Brown, T.J. et al. 2004. Systematic Review of the Long-Term Effects and Economic Consequences of Treatments for Obesity and Implications for Health Improvement. *Health Technology Assessment*, 8(21):iii–iv:1–182.	Orlistat and sibutramine appear beneficial for the treatment of adults with obesity, and metformin for obese patients with type 2 diabetes. Exercise and/or behaviour therapy appear to improve weight loss when added to diet. Long-term weight loss in epidemiological studies was associated with reduced risk of type 2 diabetes, and may be beneficial for cardiovascular disease. Low-fat diets and exercise interventions in individuals at risk of obesity-related illness are of comparable cost to drug treatments.
Padwal, R., Li, S.K. and Lau, D.C.W. 2003. *Long-Term Pharmacotherapy for Obesity and Overweight. Cochrane Library.*	*Cochrane Review:* Studies evaluating the long-term efficacy of anti-obesity agents are limited to orlistat and sibutramine. Both drugs appear modestly effective in promoting weight loss. However, interpretation is limited by high attrition rates. Longer and more methodologically rigorous studies of anti-obesity drugs that are powered to examine endpoints such as mortality and cardiovascular morbidity are required to fully evaluate any potential benefit of such agents.

Review	Notes
Swedish Council on Technology Assessment in Health Care. 2002. *Obesity: Problems and Interventions*. Swedish Council on Technology Assessment in Health Care. Report No. 160. Stockholm, Sweden: Swedish Council on Technology Assessment in Health Care. http://www.sbu.se/Filer/Content0/publikationer/1/obesity_2002/obsesityslut.pdf (accessed April 2007).	• Pharmacological treatment using orlistat (Xenical®) or sibutramine (Reductil®) yields an average weight loss of 2–5kg beyond that which would be attained through diet and exercise alone. In clinical trials, a quarter to one-fifth of those who started pharmacological treatment lost at least 10% in weight, compared to half as many of those treated with placebo. The major problem is that weight loss is not usually permanent. Within a few years, most who had initially succeeded in losing weight had returned to their original weight. Therefore, it is particularly important to develop and assess long-term treatments that aim at permanent weight loss. • Surgical treatment, which is an option in severely obese patients, reduces weight, on average, by somewhat more than 25% (e.g. from 125kg to 90kg) up to five years after surgery. After ten years, a weight loss of approximately 16% remains, on average slightly over 20kg. This has substantial health and quality-of-life benefits for this patient group. The intervention, however, carries risks for complications.
The Prevention and Treatment of Obesity. 1997. *Effective Health Care*, 3(2) http://www.york.ac.uk/inst/crd/ehc32.htm (accessed April 2007).	Behavioural, diet, exercise and drug treatments have all been shown to be effective, to some extent, in treating obesity in adults, particularly when two or more approaches are used in combination. Most people begin to regain weight a few months after treatment. Longer-term follow-up and use of maintenance interventions is necessary to sustain weight loss. Surgery is the most effective and possibly most cost-effective approach for reducing weight in people with severe obesity.
5 Breast-feeding promotion and infant growth	
Merten, S., Dratva, J. and Ackermann-Liebrich, U. 2005. Do Baby-Friendly Hospitals Influence Breast-feeding Duration on a National Level? *Pediatrics*, 116(5):e702–708.	*Single studies:* Two studies have evaluated the Baby-Friendly Hospital programme from UNICEF in Europe. The most recent finds that children in Switzerland born in a baby-friendly health facility are more likely to be breast-fed for a longer time, and this is particularly marked in those hospitals showing the greatest compliance with the UNICEF Baby-Friendly Hospital guidelines. A second study, in Italy,[3] found that an increase in the number of baby-friendly staff practices was related to a large rise in breast-feeding initiation and duration.
Dyson, L., McCormick, F. and Renfrew, M.J. 2005. *Interventions for Promoting the Initiation of Breast-Feeding. Cochrane Library.*	*Cochrane Review:* Five trials involving women on low incomes in the USA showed breast-feeding education had a significant effect on increasing initiation rates compared to routine care – women were approximately 50% more likely to start breast-feeding following educational interventions.

Review	Notes
Protheroe, L., Dyson, L., Renfrew, M.J. et al. 2003. *The Effectiveness of Public Health Interventions to Promote the Initiation of Breastfeeding*: Evidence briefing. Health Development Agency. http://www.publichealth.nice.org.uk/download.aspx?o=502585 (accessed April 2007).	Breast-feeding literature alone is not effective in promoting breast-feeding among women of different income and ethnic groups in the UK, the Republic of Ireland and the USA. Group health education can be effective among women from different ethnic and low-income groups in westernised countries. One-to-one educational programmes were more effective for women who planned to bottle-feed, whereas group programmes were more effective for women who planned to breast-feed. This evidence is based on studies of low-income black Americans. Paying participants to attend classes increased participation rates for group classes. Advice, leaflets and routine health education plus intensive staff training had significant effects on initiation rates. Breast-feeding promotions delivered during both the ante- and post-natal periods were most likely to have a positive effect on breast-feeding. The interventions involved were intensive, involving multiple contacts with a professional promoter or peer counsellor. The confidence and commitment to breast-feed successfully are best achieved by exposure to breast-feeding rather than talking or reading about it. Five out of six effective multi-faceted interventions included a media campaign, in combination with health education programmes, training of health professionals and/or changes in government and hospital policies. Four out of six effective multi-faceted interventions included a peer support programme in combination with health education programmes, media programmes and/or legislative and structural changes to the healthcare sector. In Scandinavia, four types of intervention have contributed to the high level of breast-feeding: • problem-based information about breast-feeding, written mostly for and often by mothers, but read also by health workers. Consequently, more health workers also succeeded in their own breast-feeding • increased availability of mother-to-mother support groups, health workers with better management skills and sometimes personal experience, and the rise in collective breast-feeding experience as more women successfully breast-feed. • increased paid maternity leave, with guaranteed return to previous employment. • maternity ward practices changed substantially towards mother–infant contact and autonomy.

Review	Notes
Kramer, M.S. and Kakuma, R. 2001. Optimal Duration of Exclusive Breast-Feeding. Cochrane Library.	*Cochrane Review:* No deficits have been demonstrated in growth among infants from either developing or developed countries who are exclusively breast-fed for six months or longer, although infants should still be managed individually so that insufficient growth or other adverse outcomes are not ignored. Other foods are often introduced to breast-fed babies after three or four months, but exclusive breast-feeding for six months has advantages over mixed feeding after three to four months in both developed and developing countries. These include fewer gastrointestinal infections for the baby, and for the mother, weight loss and a delay in her return to fertility.
Henderson, G., Anthony, M.Y. and McGuire, W. 2001. *Formula Milk versus Term-Human Milk for Feeding Preterm or Low-Birth-Weight Infants. Cochrane Library.*	*Cochrane Review:* In pre-term and low-birth-weight infants, feeding with formula milk, compared with unfortified term-human milk, leads to a greater rate of growth in the short term. The limited data available do not allow definite conclusions on whether adverse outcomes occur in the longer term, and there are no data from randomised trials on the comparison of feeding with formula milk versus nutrient-fortified breast milk.
de Oliveira, M.I., Camacho, L.A. and Tedstone, A.E. 2001. Extending Breastfeeding Duration through Primary Care: A Systematic Review of Prenatal and Postnatal Interventions. *Journal of Human Lactation*, 17(4):326–343.	Interventions that were most effective in extending the duration of breast-feeding generally combined information, guidance and support and were long-term and intensive. During pre-natal care, group education was the only effective strategy reported. Home visits used to identify mothers' concerns with breast-feeding, assist with problem solving, and involve family members in breast-feeding support were effective during the post-natal period or both periods. Individual education sessions were also effective in these periods, as was the combination of two or three of these strategies in interventions involving both periods. Strategies that had no effect were characterised by no face-to-face interaction, practices contradicting messages, or small-scale interventions.

Review	Notes
Stockley, L. 2000. *Consolidation and Updating the Evidence Base for the Promotion of Breastfeeding.* Health of Wales Information Service. www.wales.nhs.uk/publications/bfeedingevidencebase.pdf (accessed April 2007).	• Interventions should be long-term, intensive, span both the ante-natal and post-natal periods, and involve multiple contacts. • Information provision alone is not effective, and may exacerbate inequalities. • Peer-support programmes are particularly promising. • Flexible and individualised approaches are more likely to be effective. In particular, there need to be different approaches for women whose original intention is to breast-feed and those who originally intended to bottle-feed. • Professionals need to be consistent in the advice and support they provide. • Hospital practices should reflect current knowledge. • There is a negative impact of returning to full-time work on duration of breast-feeding. • Fathers have an important role in the initiation and establishment of breast-feeding. This is more likely to be positive if they are included in breast-feeding education as early as possible during pregnancy. Ante-natal sessions should include opportunities and exercises to help couples communicate with one another about their feelings and attitudes toward breast-feeding. • Workplace initiatives can address the barriers that currently exist, including negative attitudes and lack of facilities. • More co-ordinated and consistent education about breast-feeding is needed in schools for both girls and boys. • Health professionals should be aware of the research on the negative impacts of smoking on breast-feeding. • Encouragement to consider breast-feeding is needed as early in pregnancy as possible (if not before pregnancy).
Sjostrom, M. and Stockley, L. 2000. *Toward Public Health Nutrition Strategies in the European Union to Implement Food Based Dietary Guidelines and to Enhance Healthier Lifestyles.* Working Party 3: Final report. University of Crete. 2000. http://eurodiet.med.uoc.gr/ (accessed April 2007).	There are wide variations in rates of breast-feeding initiation and continuation in the EU member states. Hospital practices and the support of community health services are important influences in this. Systematic reviews of the literature show that opportunities and barriers to good nutritional health in infancy are associated with the physical hospital environment and routines e.g. feeding at set times, separation of mother and baby, use of infant formula, but also, importantly, by the attitudes and expectations of the health professionals involved.

Review	Notes
Fairbank, L., O'Meara, S., Renfrew, M.J. et al. 2000. A Systematic Review to Evaluate the Effectiveness of Interventions to Promote the Initiation of Breastfeeding. *Health Technology Assessment Programme*, 4(25).	• There is some evidence that breast-feeding literature alone among the general population is not effective in promoting breast-feeding among women of different income and ethnic groups. • Group health education can be effective among women from different ethnic and low-income groups • One-to-one educational programmes were more effective for women who planned to bottle-feed, whereas group programmes were more effective for women who planned to breast-feed. Paying participants to attend classes has been shown to be effective at increasing participation rates for group education. • The provision of additional health education from community staff through face-to-face and telephone contacts in the ante-natal and post-natal periods had no significant effect. • In Sweden, advice, leaflets and routine health education plus intensive staff training had significant effects on initiation rates.
Tedstone, A., Dunce, N., Aviles, M. et al. 1998. *Effectiveness of Interventions to Promote Healthy Feeding in Infants Under One Year of Age: A Review*. London: Health Education Authority.	• One-to-one educational sessions were more successful than group sessions when they were aimed at promoting initial breast-feeding with women who had already made a decision to bottle-feed. • Breast-feeding promotions delivered in the period both before and after birth were most likely to have a positive effect on breast-feeding. These interventions were intensive, involving multiple contacts with a professional promoter or peer counsellor. • The effectiveness of pre-natal educational sessions in initiating breast-feeding was enhanced by contact with peer counsellors. • Weaker evidence shows that including partners, providing incentives and changing the content of commercial hospital packs given to women on discharge from hospital may aid promotion. • The least successful interventions were those where breast-feeding promotion was only one part of the focus of multiple health promotion programmes and involved special visits to the hospital/clinic or took place by telephone.
6 Chronic disease prevention and dietary intervention	
Cockroft, J.E., Cade, J.E. and Durkin, M. *In process. Interventions for Increasing Fruit and Vegetable Consumption in Pre-School Children. Cochrane Library.*	*Cochrane Review: in process* There is currently no evidence-based guidance on effective methodologies for conducting 5-a-day-type programmes in pre-school children. This information is important particularly when resources including time and money are limited.

Review	Notes
Moore, H., Summerbell, C., Hooper, L. et al. *In process. Dietary Advice for the Prevention of Type 2 Diabetes Mellitus in Adults. Cochrane Library.*	*Cochrane Review: in process* There is now evidence that type 2 diabetes can be prevented or at least delayed by dietary effort. The United States Diabetes Prevention Program reported a reduction of 58% in the incidence of diabetes when participants were treated with the lifestyle intervention, compared with a 31% reduction of incidence of diabetes for the metformin-treated participants.[4]
Brunner, E.J., Thorogood, M., Rees, K. and Hewitt, G. 2005. *Dietary Advice for Reducing Cardiovascular Risk. Cochrane Library.*	*Cochrane Review:* Dietary advice appears to be effective in bringing about modest beneficial changes in diet and cardiovascular risk factors over approximately nine months, but longer-term effects are not known. The dietary improvements recommended to the people in the intervention groups centred largely on the reduction of salt and fat intake and an increase in the intake of fruits, vegetables and fibre. Advice was delivered in a variety of ways, including one-to-one contact, group sessions, and written materials. There was some evidence of greater effectiveness in people told that they were at risk of heart disease or cancer. Modest improvements were shown in cardiovascular risk factors, such as blood pressure and total and LDL-cholesterol levels. The trials did not last long enough to answer the question of whether the beneficial changes in cardiovascular risk factors resulted in a reduced incidence of heart disease, stroke or heart attack.
Amorim, A.R., Linne, Y.M. and Lourenco, P. M.C. *In process. Diet or Exercise, or Both, for Weight Reduction in Women after Childbirth? Cochrane Library.*	*Cochrane Review: in process* There is evidence suggesting that failure to lose weight gained during pregnancy contributes to female overweight and obesity. However, the effects of negative energy balance during the postpartum period, achieved by energy restriction intake, increased energy expenditure, or the combination of both, are still not fully understood. Since the growth rate of exclusively breast-fed infants depends on the energy provided by maternal breast milk, it is paramount to evaluate the impact of diet and exercise on lactation performance.
Schulze, M.B. and Hu, F.B. 2005. Primary Prevention of Diabetes: What Can be Done and How Much Can be Prevented? *Annual Review of Public Health*, 26:445–467.	There is increasing evidence that the quality of fat and carbohydrate plays a more important role than does the quantity, and thus, public health strategies should emphasise replacing saturated and trans-fats with unsaturated fats and replacing refined grain products with whole grains. Recent studies have also suggested a potential role for coffee, dairy products, nuts, magnesium and calcium in preventing diabetes. Overall, a healthy diet, together with regular physical activity, maintenance of a healthy weight, moderate alcohol consumption, and avoidance of sedentary behaviours and smoking, could nearly eliminate type 2 diabetes.

Review	Notes
Hayman, L.L., Williams, C.L., Daniels, S.R. et al. 2004. Cardiovascular Health Promotion in the Schools: A Statement for Health and Education Professionals and Child Health Advocates from the Committee on Atherosclerosis, Hypertension, and Obesity in Youth (AHOY) of the Council on Cardiovascular Disease in the Young, American Heart Association. *Circulation*, 110(15):2266–2275. http://circ.ahajournals.org/cgi/content/full/110/15/2266 (accessed April 2007).	Across well-controlled and well-conducted studies, differential results in physiological outcome indicators point to the need for researchers to pay more attention to developmental age, gender, culture and sociodemographic factors. The results indicate that the modification of risk factors for cardiovascular disease in 'real world' school settings must be reinforced and complemented at multiple levels of intervention. Towards that goal, from a population perspective, broader public health interventions as suggested in the American Heart Association's *Guide for Improving Cardiovascular Health at the Community Level*[5] are warranted. Partnerships between healthcare and educational professionals in collaboration with policy makers and community leaders will be required to actualise the school environment in promoting the cardiovascular health of all our children and youth and reducing the risk and public health burden of cardiovascular disease.
Pavlovich, W.D., Waters, H., Weller, W. and Bass, E.B. 2004. Systematic Review of Literature on the Cost-Effectiveness of Nutrition Services. *Journal of the American Dietetics Association*, 104(2):226–232.	Relatively consistent evidence exists to support the cost-effectiveness of nutrition services in the reduction of serum cholesterol levels (e.g. $20–1,268 per mmol/L decrease in serum low-density lipoprotein level), weight loss ($2.40–10 per pound lost), and blood glucose ($5 per mmol/L decrease), and for target populations with diabetes mellitus and hypercholesterolemia. However, the randomised controlled trials had important limitations and used different cost perspectives. Limited evidence of economic benefit exists to support coverage of outpatient nutrition services for selected indications. More randomised controlled trials of nutrition services should be conducted, taking into consideration all potential candidates for nutrition therapy and all potential costs to patients, providers, and payers.
Moore, H., Summerbell, C., Hooper, L. et al. 2004 *Dietary Advice for Treatment of Type 2 Diabetes Mellitus in Adults. Cochrane Library.*	*Cochrane Review:* No high-quality data on the efficacy of diet alone exists for treatment of type 2 diabetes mellitus. This systematic review assesses the effects of 18 studies that examined dietary advice, with or without the addition of exercise or behavioural approaches. No data were found on micro- or macrovascular diabetic complications, mortality or quality of life. The addition of exercise to dietary advice showed an improvement of metabolic control after six- and twelve-month follow-up.
Kelly, S., Frost, G., Whittaker, V. and Summerbell, C. 2004. *Low Glycaemic Index Diets for Coronary Heart Disease. Cochrane Library.*	*Cochrane Review:* The evidence from randomised controlled trials showing that low-glycaemic-index diets reduce coronary heart disease and its risk factors is weak. Many of the trials identified were short-term, of poor quality and conducted on small sample sizes. There is a need for well-designed, adequately powered, randomised controlled studies, of >12 weeks' duration to assess the effects of low-glycaemic-index diets for coronary heart disease.

Review	Notes
Thompson, R.L., Summerbell, C.D., Hooper, L. et al. 2003. *Dietary Advice Given by a Dietician versus other Health Professional or Self-Help Resources to Reduce Blood Cholesterol. Cochrane Library.*	*Cochrane Review:* Dieticians were better than doctors at lowering patients' blood cholesterol in the short to medium term, but there was no evidence that they were better than self-help resources. There was no evidence that dieticians provided better outcomes than nurses. The results should be interpreted with caution as the studies were not of good quality and the analysis was based on a limited number of trials.
Hooper, L., Bartlett, C., Davey Smith, G. and Ebrahim, S. 2004. *Advice to Reduce Dietary Salt for Prevention of Cardiovascular Disease. Cochrane Library.*	*Cochrane Review:* Intensive support and encouragement to reduce salt intake did lead to reduction in salt eaten. It also lowered blood pressure, but only by a small amount (about 1mmHg for systolic blood pressure, less for diastolic), after more than a year. This reduction was not enough to expect an important health benefit. It was also very hard to keep to a low salt diet.
Kramer, M.S. and Kakuma, R. 2003. Energy and Protein Intake in Pregnancy. Cochrane Library.	*Cochrane Review:* Providing pregnant women with a balanced supplement of energy and protein (a supplementation in which protein provides no more than 25% of the total energy content) modestly increases the growth of the foetus and improves foetal and neonatal survival. High-protein supplementation in pregnancy does not appear beneficial and may be harmful. Restriction of energy intake in pregnant women who are overweight or gain excessive weight does not help prevent pre-eclampsia and adversely affects foetal growth.
Cheng, J., Pan, T., Ye, G.H. and Liu, Q. 2003. *Calorie-Controlled Diet for Chronic Asthma. Cochrane Library.*	*Cochrane Review:* There is very limited evidence that asthma may improve with reducing calorie intake and more research is required. It is thought that high-calorie diets may contribute to the development of asthma. Theoretically, reducing the amount of calories consumed as part of a diet may help to alleviate the symptoms of asthma. No firm conclusions can be drawn regarding the effects of dietary manipulation, and more research is required.
French, S., Story, M. and Jeffery, R.W. 2001. Environmental Influences on Eating and Physical Activity. *Annual Review of Public Health*, 309–335.	Recent trends in food supply, eating out, physical activity and inactivity are reviewed, as are the effects of advertising, promotion and pricing on eating and physical activity. Public health interventions, opportunities and potential strategies to combat the obesity epidemic by promoting an environment that supports healthy eating and physical activity are recommended.
Meininger, J.C. 2000. School-Based Interventions for Primary Prevention of Cardiovascular Disease: Evidence of Effects for Minority Populations. *Annual Review of Nursing Research*, 18:219–244.	There were no consistent effects of school-based interventions on blood pressure, lipid profiles or measures of body mass and obesity. There was evidence that changes in knowledge and health behaviours occurred. Findings are interpreted within the context of population-wide approaches to prevention, and recommendations for future research directions are discussed.

Review	Notes
Resnicow, K. and Robinson, T.N. 1997. School-Based Cardiovascular Disease Prevention Studies: Review and Synthesis. *Annals of Epidemiology*, S7:S14–S31.	The majority of school-based studies reported statistically significant effects on health knowledge, attitudes and behavioural outcomes. The diet and physical activity changes reported in some studies were modest in magnitude, although from a population perspective, they could translate into potentially sizable reductions in population-attributable cardiovascular disease risk. The results of school-based intervention research showed only modest change in physiological indicators, including serum cholesterol, blood pressure and measures of adiposity.
	Recommendations for action at school and community level: • Policies: review policies that would be useful in supporting physical education and health education in schools • Environment: establish safe and pleasant environments and opportunities for physical activity • Physical education: promote development of knowledge, attitudes, skills and confidence to maintain physically active lifestyle • Health education: implement health education curricula to support healthy dietary choices • Extracurricular activities: provide activities to meet the needs/interests of all students • Parental involvement: include parents in instruction and encourage support of physical activity • Personnel training: introduce training for school and community personnel to promote lifelong physical activity • Health services: assess, counsel, refer and advocate for health-promoting physical activity. • Community: provide a range of sports and recreation programmes • Evaluation: of community and school physical activity programmes and facilities.
7 Examples of other public health interventions	
Macpherson, A. and Spinks, A. 2007. Bicycle Helmet Legislation for the Prevention of Head Injuries. Cochrane Library.	*Cochrane Review:* Barriers to the use of helmets include inhibitive costs, discomfort, lack of belief in their necessity and an unpopular image of helmets among young cyclists.[6,7] In order to overcome resistance to helmet usage, legislation has been enacted in various parts of the world, including Australia, New Zealand, the United States and Canada. Jurisdictions differ in the population range affected by legislation. In Australia, for example, bicycle riders of all ages must wear a helmet. In Canada, legislation applies to children and adolescents only. Evaluations have shown that legislation is successful in increasing helmet use.[8–13]

Review	Notes
Moher, M. Hey, K. and Lancaster, T. 2005. Workplace Interventions for Smoking Cessation. Cochrane Library.	*Cochrane Review:* The workplace can be an effective setting for people to stop smoking. Proven methods, like group therapy, individual counselling and nicotine replacement therapy, are equally effective when offered in the workplace. The evidence is less clear for self-help methods. Bans and restrictions can reduce smoking at work, although it is not clear whether they reduce overall smoking levels. Social and environmental support, competitions and incentives, and comprehensive programmes do not show a clear benefit in helping smokers to quit at work.
Lancaster, T. and Stead, L.F. 2005. Individual Behavioural Counselling for Smoking Cessation. Cochrane Library.	*Cochrane Review:* The review looked at trials of counselling by a trained therapist providing one or more face-to-face sessions, separate from medical care. All the trials involved sessions of more than 10 minutes, with most also including further telephone contact for support. The review found that individual counselling could help smokers quit, but there was not enough evidence about whether more intensive counselling was better.
Stead, L.F. and Lancaster, T. 2004. Interventions for Preventing Tobacco Sales to Minors. Cochrane Library.	*Cochrane Review:* Interventions can reduce the number of illegal sales, but young people may still be able to buy cigarettes. If young people are unable to purchase cigarettes, it may reduce the number who start to smoke. Various interventions, including warnings and fines, can reduce the proportion of retailers who sell tobacco to minors. However, it has been difficult to demonstrate a clear effect on young smokers' perceptions of how easily they can buy cigarettes, or on their smoking behaviour.
Bala, M., Strzeszynski, L. and Hey, K. *In process. Mass Media Interventions for Smoking Cessation in Adults. Cochrane Library.*	*Cochrane Review: in process* The US Federal Communications Commission enforced the Fairness Doctrine, obliging radio and television stations to broadcast one anti-smoking message for every three cigarette commercials (equivalent to a media value today of $300 million.[14] This policy lasted until 1970, when a ban on broadcast cigarette advertising came into effect. Cigarette consumption had declined by 37% during the campaign, but began to rise again after the advertising ban ended free access to broadcast time for anti-smoking messages.[15–17] Previous reviews of the literature lend some support to anti-smoking media campaigns as a component of a comprehensive tobacco control programme.[18,1melawren9] Much of the literature is focused on the effects of anti-smoking advertising on young people, but there are also a number of evaluations of campaigns targeting adult smokers, which show mixed results. Some national and state-wide interventions have been shown to be effective in reducing smoking rates, while the outcomes are less consistent for community and local campaigns.

Review	Notes
Lovato, C., Linn, G., Stead, L.F. and Best, A. 2003. *Impact of Tobacco Advertising and Promotion on Increasing Adolescent Smoking Behaviours. Cochrane Library.*	*Cochrane Review:* Tobacco advertising and promotion increases the likelihood that adolescents will start to smoke. Advertising is the use of media to create positive product imagery or associations. Promotion or marketing is the mix of activities designed to increase sales. There are no trials of the impact of tobacco advertising and promotional activities on people taking up smoking. However, there are studies following non-smokers and their exposure to advertising (such as the number of tobacco advertisements in the magazines they read). The review found that, in all these studies, non-smoking adolescents who were more aware of or receptive to tobacco advertising were more likely to become smokers later.
Stead, L.F., Lancaster, T. and Perera, R. 2002. *Telephone Counselling for Smoking Cessation. Cochrane Library.*	*Cochrane Review:* People trying to quit smoking can be helped with medication or through behavioural support such as specialist counselling and group therapy. Support, information and counselling are offered either face-to-face or by telephone. Counselling via telephone hotlines can be provided as part of a programme or separately and gives access to more people than face-to-face. The review of trials found telephone counselling is effective compared to a programme with no personal contact.
Sowden, A. and Stead, L. 2002. Community Interventions for Preventing Smoking in Young People. Cochrane Library.	*Cochrane Review:* The decision to start (or continue) smoking is made within a broad social context, affected by many factors. Community interventions use co-ordinated, widespread, multi-component programmes to try and influence people's behaviour. Programmes include age restrictions on tobacco purchase, programmes for the prevention of disease (like heart disease), mass media and school programmes. The review of trials found some evidence that co-ordinated multi-component programmes can reduce smoking among young people, and do so more effectively than single strategies alone.
Secker-Walker, R.H., Gnich, W., Platt, S. and Lancaster, T. 2002. *Community Interventions for Reducing Smoking among Adults. Cochrane Library.*	*Cochrane Review:* There is little convincing evidence that community interventions reduce smoking among adults. Although intervention communities often showed substantial awareness of their programme, this rarely led to higher quit rates. Similarly, increased knowledge of health risks, changes in attitudes to smoking, more quit attempts and better environmental and social support for quitting were not accompanied by reductions in community smoking levels. Light to moderate smokers did slightly better than heavy smokers and men did a little better than women, but overall smoking rates remained similar between intervention and control communities.

Review	Notes
Sowden, A. and Stead, L. 2002. Community Interventions for Preventing Smoking in Young People. Cochrane Library.	*Cochrane Review:* Community interventions use co-ordinated, widespread, multi-component programmes to try and influence people's behaviour. Community members are often involved in determining and/or implementing programmes. These include age restrictions on tobacco purchase, programmes for the prevention of disease (like heart disease), mass media and school programmes. The review of trials found some evidence that co-ordinated multi-component programmes can reduce smoking among young people, and do so more effectively than single strategies alone.
Thomas, R. 2002. School-Based Programmes for Preventing Smoking. Cochrane Library.	*Cochrane Review:* There is little evidence that information alone is effective. The majority of studies drew on a social influences intervention. Although half of the best-quality studies found short-term effects on children's smoking behaviour, the best-quality and longest trial showed no long-term effects from 65 lessons over eight years. There was limited evidence for the effects of interventions that included developing generic social competence, and for those with a multi-modal approach that included community initiatives.
Serra, C., Cabezas, C., Bonfill, X. and Pladevall-Vila, M. 2000. *Interventions for Preventing Tobacco Smoking in Public Places. Cochrane Library.*	*Cochrane Review:* Different methods are used to try and stop people smoking in public places such as hospitals and workplaces. The review looked at trials of different strategies, and found that simply putting up signs of a 'no smoking' policy does not seem to help prevent people smoking in public places. However, complete bans that have strong support from management do work. Intensive educational campaigns and multi-component strategies also help reduce smoking in public places. Such strategies have been shown to work for hospitals in the United States, but research is needed on the best strategies for other places and other countries.
Sowden, A.J. and Arblaster, L. 1998. Mass Media Interventions for Preventing Smoking in Young People. Cochrane Library.	*Cochrane Review:* Mass-media campaigns (television, radio, newspapers, billboards and booklets) may deter young people from starting to smoke, but the evidence is not strong. Campaigns which researched and developed their message to reach their target audience had a higher success rate than those that did not. Effective campaigns also lasted longer and were more intense than less successful ones.

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Appendix 7

Trends in horticultural produce price

Examples of commodity trends in grains (starches), soy, meat, oils, sugar, flavourings (cocoa, coffee) and fresh citrus fruit

Figure 1: Grain, deflated price trends

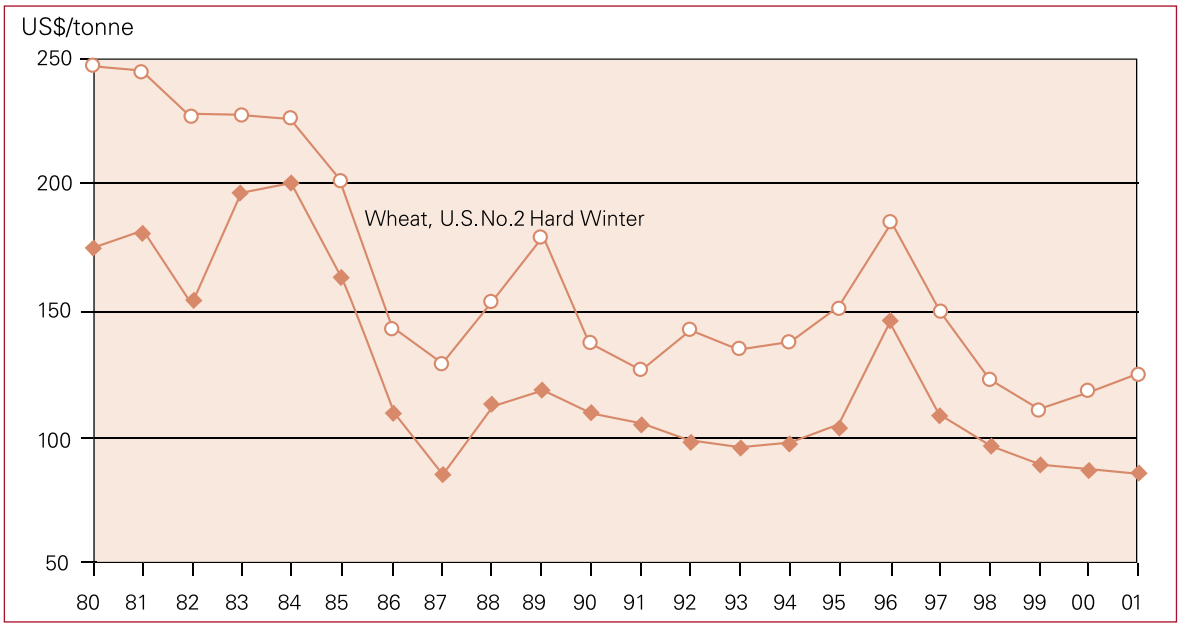


Figure 2: Soybeans, nominal (lower) and deflated (upper) prices, 1970–2000

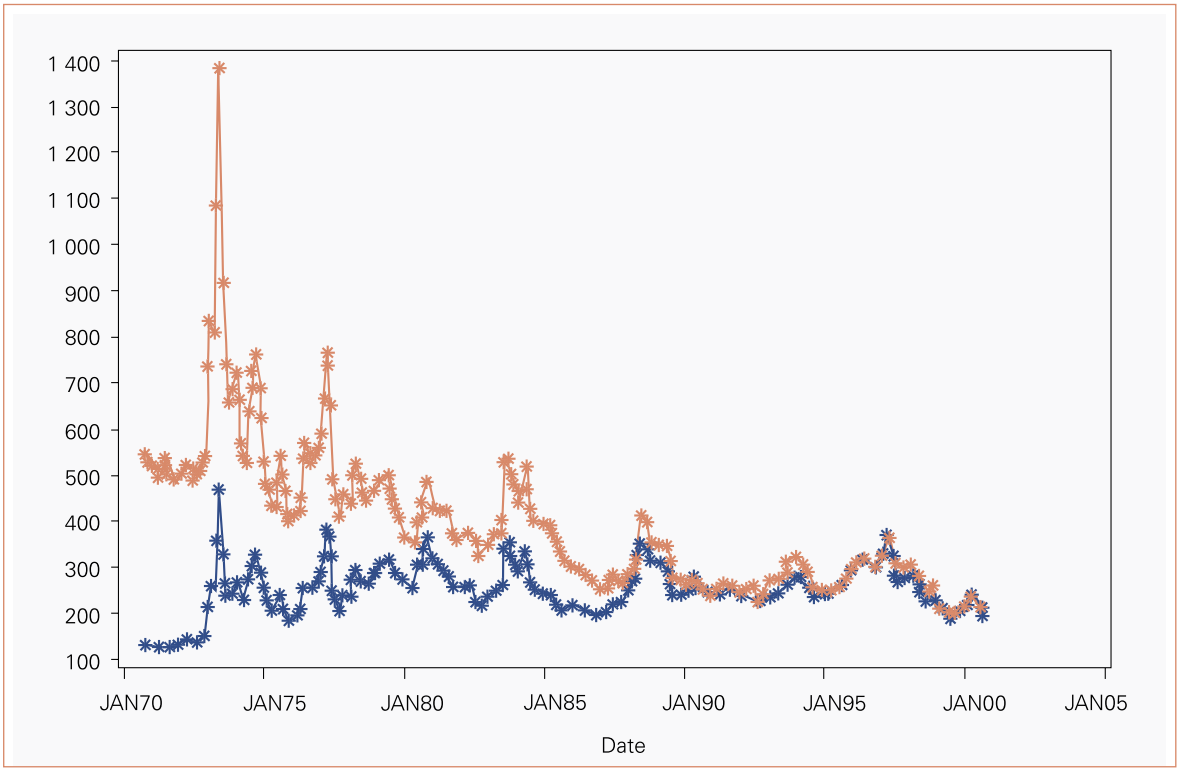


Figure 3: World meat price index, 1990–2001

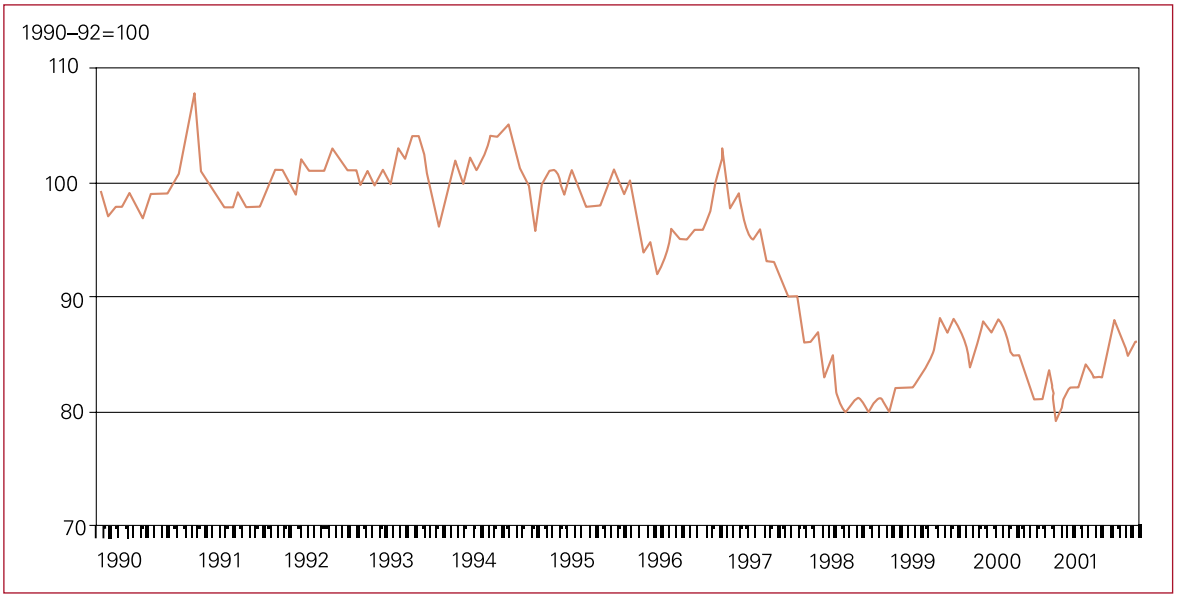


Figure 4: Sugar, deflated ISA prices (US$ = 1990), 1970–2001

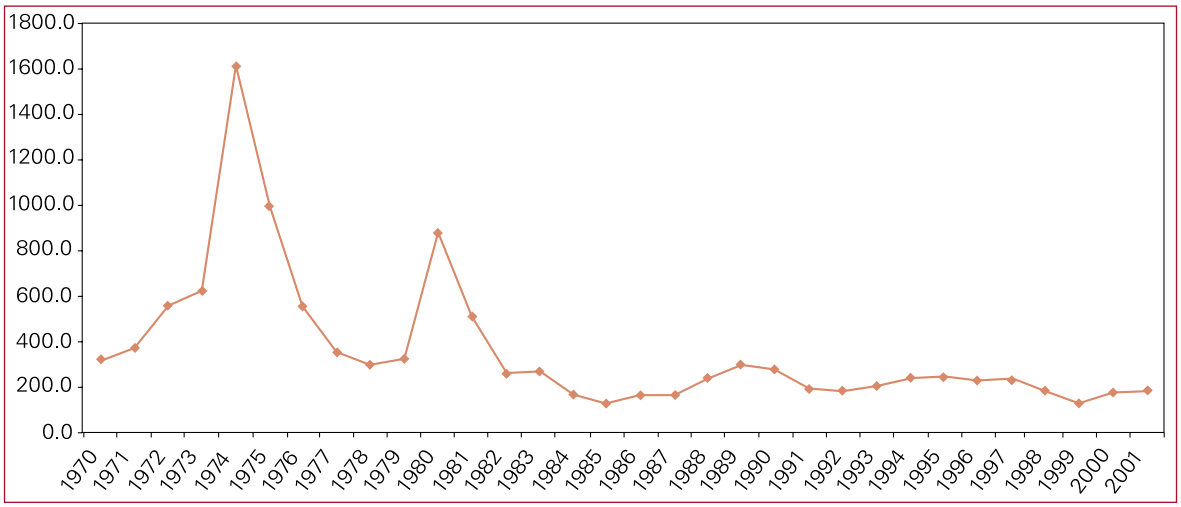


Figure 5: Sugar, refined and raw, 1900–2003

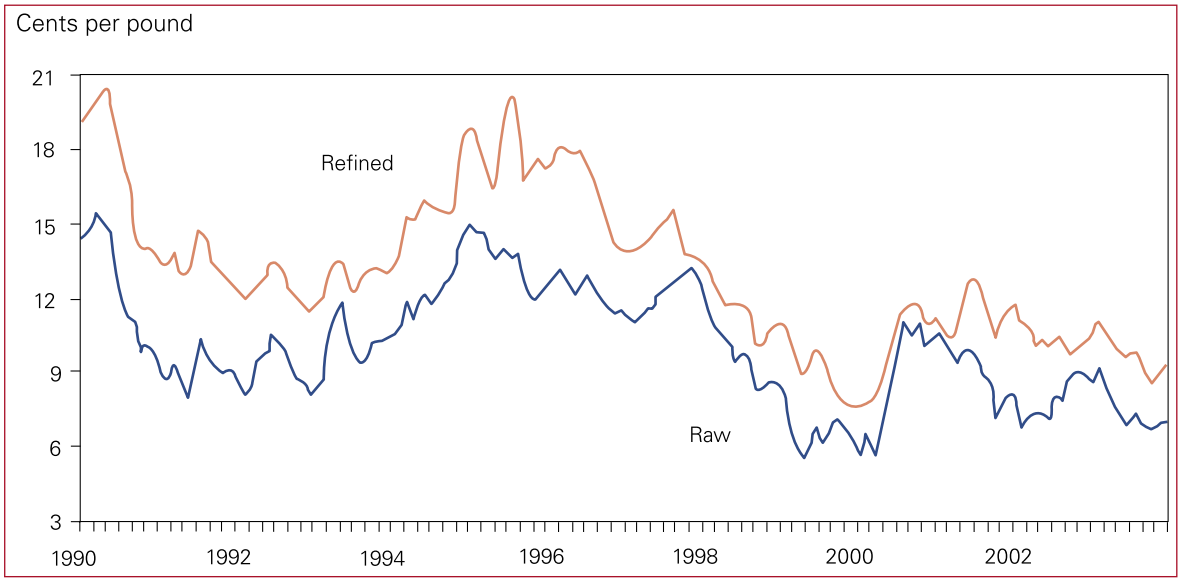


Figure 6: Palm oil, nominal (lower) and deflated (upper) prices, 1970–2000

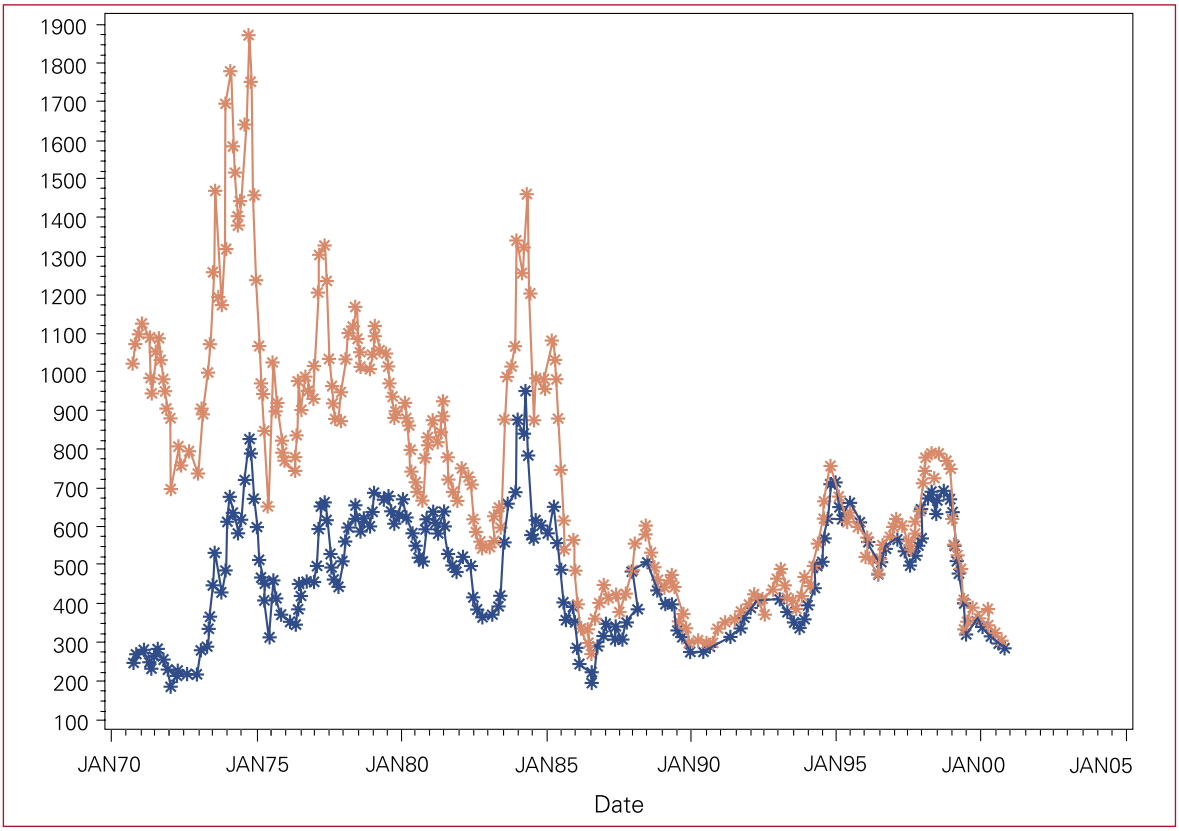


Figure 7: Rape oil, nominal (lower) and deflated (upper) prices, 1970–2000

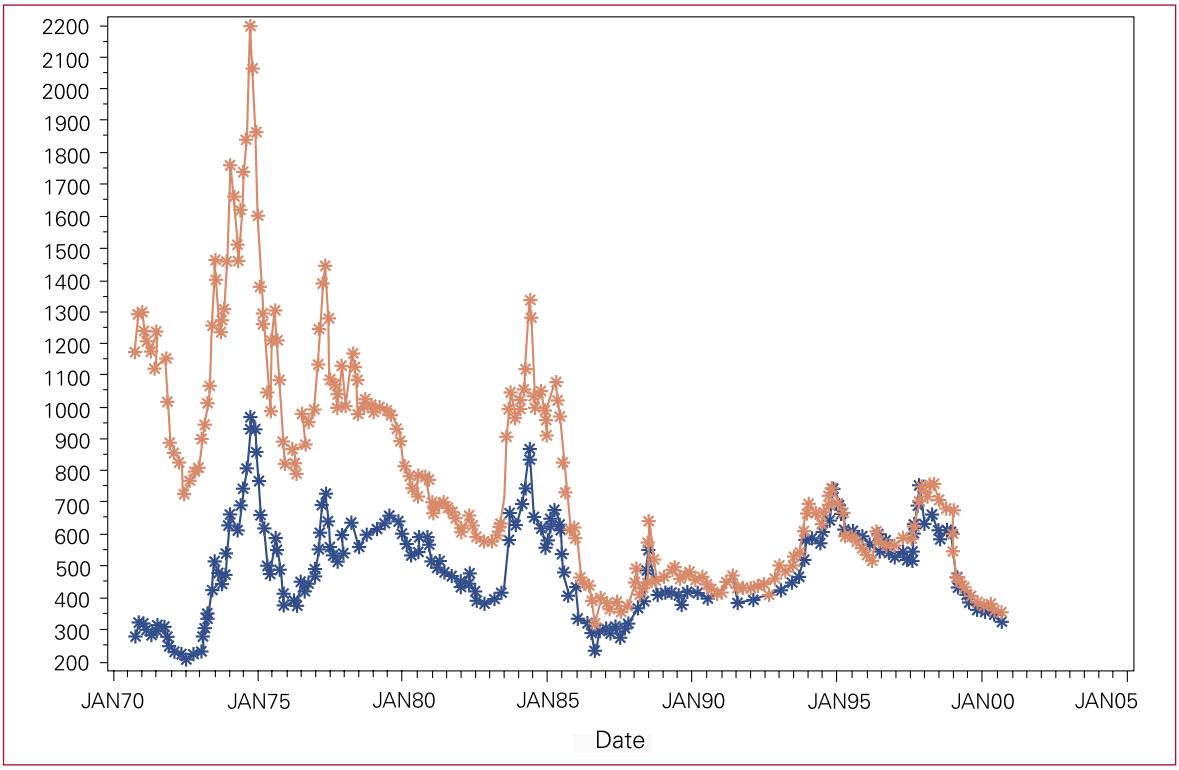


Figure 8: World cocoa prices, ICCO composite prices

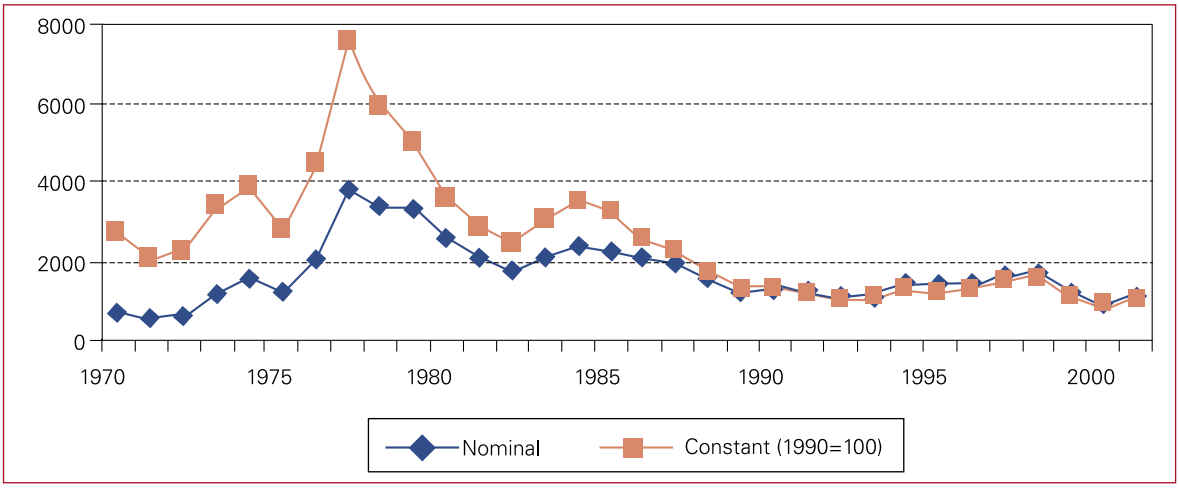


Figure 9: Coffee price, ICO composite

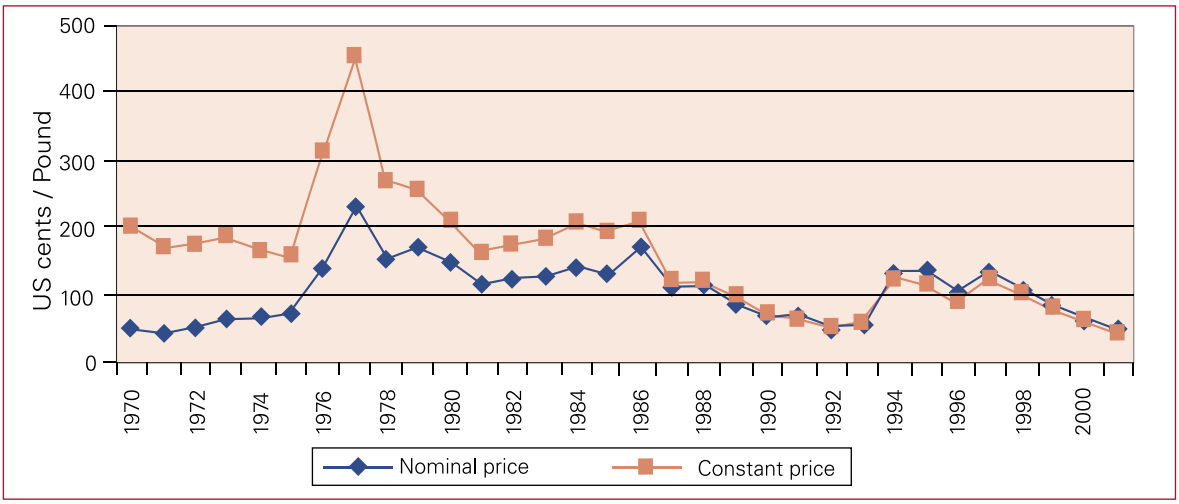
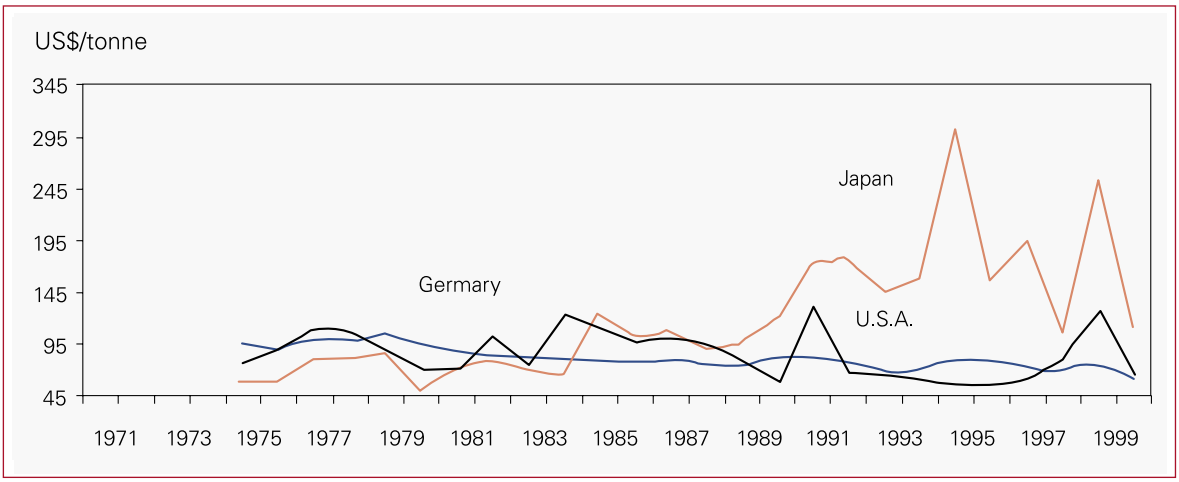


Figure 10: Fresh oranges, deflated wholesale prices, 1971–2000



Sources: Food and Agriculture Organisation. 2002. *Agricultural Commodities: Profiles and Relevant WTO Negotiating Issues.* http://www.fao.org//docrep/006/y4343e/y4343e02.htm (accessed April 2007); Food and Agriculture Organisation. 2002. *Consultation on Agricultural Commodity Price Problems.* http://www.fao.org/DOCREP/006/Y4344E/y4344e00.htm (accessed April 2007); Coffee, Sugar and Cocoa Exchange; London International Futures Exchange.

Appendix 8
Prevalence of childhood overweight and obesity

Table 1: Comparative data from 55 countries

	Childhood overweight (including obesity)				
	Year of survey	Age (years)	Boys	Girls	Cut-off
WHO Africa Region					
Algeria[1]	2003	7–17	6.0	5.6	IOTF
Ethiopia[2]	1987–1995	5–17	0.1	0.4	IOTF
Mali[2]	1993	5–17	0.2	0.5	IOTF
Senegal[2]	1992	5–17	0.1	0.5	IOTF
Seychelles[3]	1999	5, 9, 12, 16	9.2	15.8	IOTF
South Africa[4]	2001–2004	6–13	14.0	17.9	IOTF
Zimbabwe[2]	1990–1994	5–17	1.7	2.4	IOTF
WHO Americas Region					
Bolivia (urban)[5]	2003	14–17	15.6	27.5	IOTF
Brazil (southern)[6]	2002	7–10	23.0	21.1	IOTF
Canada[7]	1996	7–13	33.0	27.0	IOTF
Chile[8]	2000	6	26.0	27.1	IOTF
Mexico[9]	1995	5–17	32.3	31.1	IOTF
Trinidad and Tobago[10]	1999	5, 6, 9, 10	8.1	8.8	IOTF
USA[11]	1988–1994	5–17	26.8	28.1	IOTF
Venezuela[12]	1976–1982	10, 15	21.1	17.2	IOTF
WHO Eastern Mediterranean Region					
Bahrain[13]	2000	12–17	29.9	42.4	IOTF
Iran[14]	1995	6	24.7	26.8	IOTF
Lebanon[15]	1996	5–17	23.4	19.7	IOTF
Saudi Arabia[16]	2002	5–17	16.7	19.4	IOTF
Kuwait[17]	1999–2000	10–14	30.0	31.8	85th/95th
WHO European Region					
Bulgaria[18]	1998	7–17	18.9	16.1	IOTF
Cyprus[19]	1999–2000	6–17	25.4	22.6	IOTF
Czech Republic[20]	2001	5–17	14.7	13.4	IOTF
Denmark[21]	1996/1997	5–16	14.1	15.3	IOTF

Table 1: Comparative data from 55 countries (*Continued*)

	Childhood overweight (including obesity)				
	Year of survey	**Age (years)**	**Boys**	**Girls**	**Cut-off**
Finland (self-reported data)[22]	1999	12–17	19.4	11.2	IOTF
France[23]	2000 (12 years 2001[24])	7, 8, 9, 12	19.1	19.3	IOTF
Germany[25]	1995	5–17	14.1	14.0	IOTF
Greece[26]	2003/2004	6–11	40.1	36.4	IOTF
Hungary[12]	1993–1994	10, 15	17.8	15.9	IOTF
Iceland[27]	1998	9	22.0	25.5	IOTF
Italy[28]	1993–2001	5–17	26.6	24.8	IOTF
Malta[12]	1992	10	32.7	38.5	IOTF
Netherlands[29]	1997	5–17	8.8	11.8	IOTF
Poland[30]	1996	5–17	16.7	13.6	IOTF
Portugal[31]	2002/3	7–9	29.5	34.3	IOTF
Russian Federation[32]	1992	5–17	24.2	19.7	IOTF
Slovakia[33]	1995–1999	11–17	9.8	8.2	IOTF
Spain[34]	1998–2000	5–16	31.0	19.5	IOTF
Sweden[35]	2001	6–11	17.6	27.4	IOTF
Switzerland[36]	2002	6–12	21.0	23.2	IOTF
Turkey[37]	2001	12–17	11.4	10.3	IOTF
England[38]	2001	5–17	21.8	27.1	IOTF
Austria[39]	2003	8–12	22.5	16.7	90th/97th
Belgium[40]	1998–1999	5–15	27.7	26.8	85th/95th
Former Yugoslavia[41]	1995–2002	6–17	18.6	16.7	85th, 95th
WHO South-East Asia Region					
India[42]	2002	5–17*	12.9	8.2	IOTF
Nepal[2]	1997	5–17	0.0	0.0	IOTF
Sri Lanka[43]	2002	10–15	1.7	2.7	IOTF
Thailand[44]	1997	5–15	21.1	12.6	WHO/NCHS
WHO Western Pacific Region					
Australia[45]	1995	7–17	21.1	21.3	IOTF
China[12]	1999–2000	11, 15	14.9	8.0	IOTF
Japan[46]	1996–2000	6–14	16.2	14.3	IOTF

Table 1: Comparative data from 55 countries (*Continued*)

	Childhood overweight (including obesity)				
	Year of survey	Age (years)	Boys	Girls	Cut-off
New Zealand[47]	2000	11, 12	30.0	30.0	IOTF
Singapore[12]	1993	10, 15	20.4	14.6	IOTF
Taiwan[48]	2001	6–18	26.8	16.5	IOTF

*5–15 for girls

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Global annual increment in overweight in children

Source: Wang, Y. and Lobstein, T. 2006. Worldwide Trends in Childhood Overweight and Obesity. International Journal of Pediatric Obesity, 1:11–25.

Figure 1: Change in the prevalence of overweight (including obesity) among school children in surveys since 1960

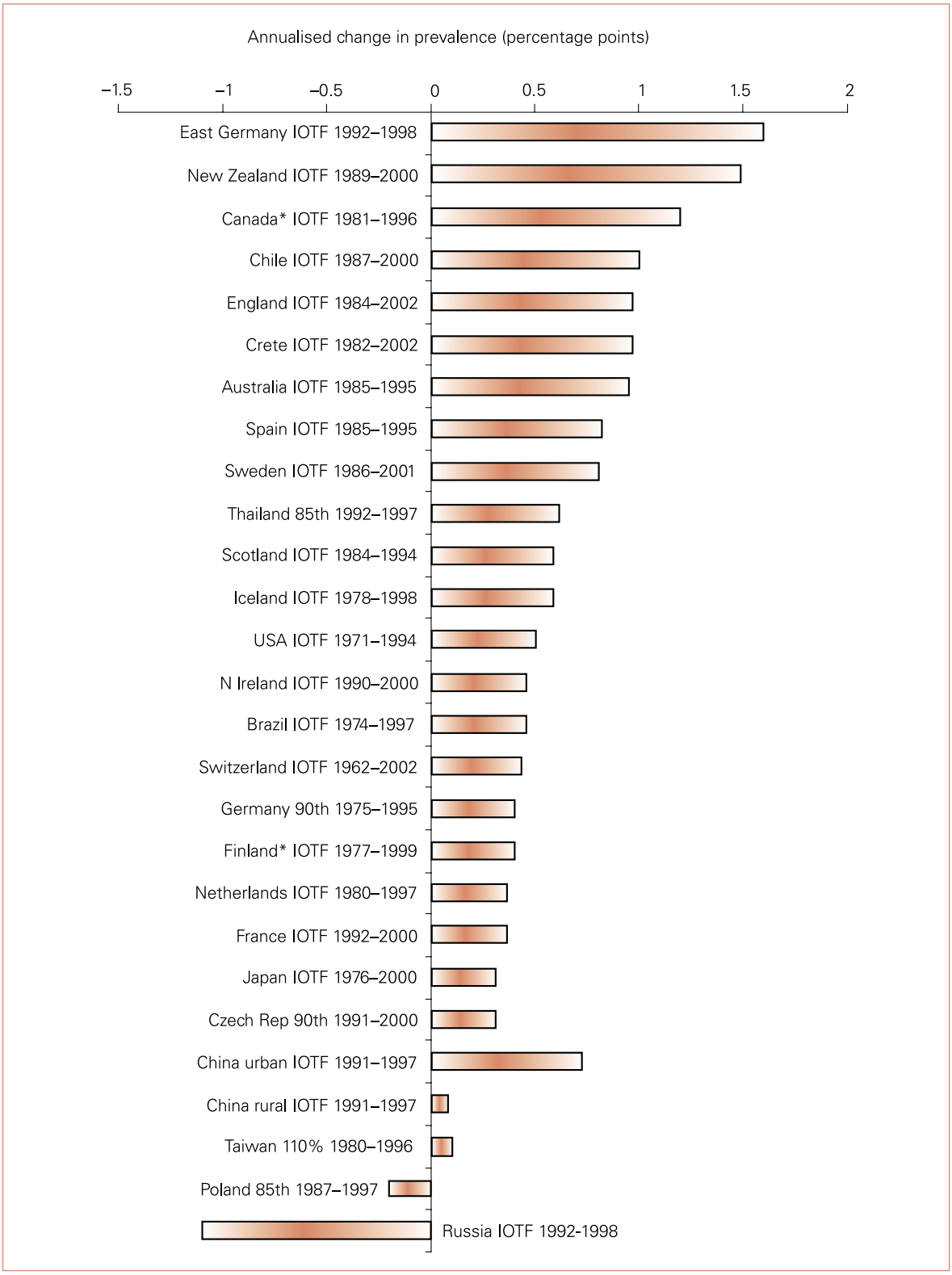


Figure 2: Change in the prevalence of obesity among school children in surveys since 1960

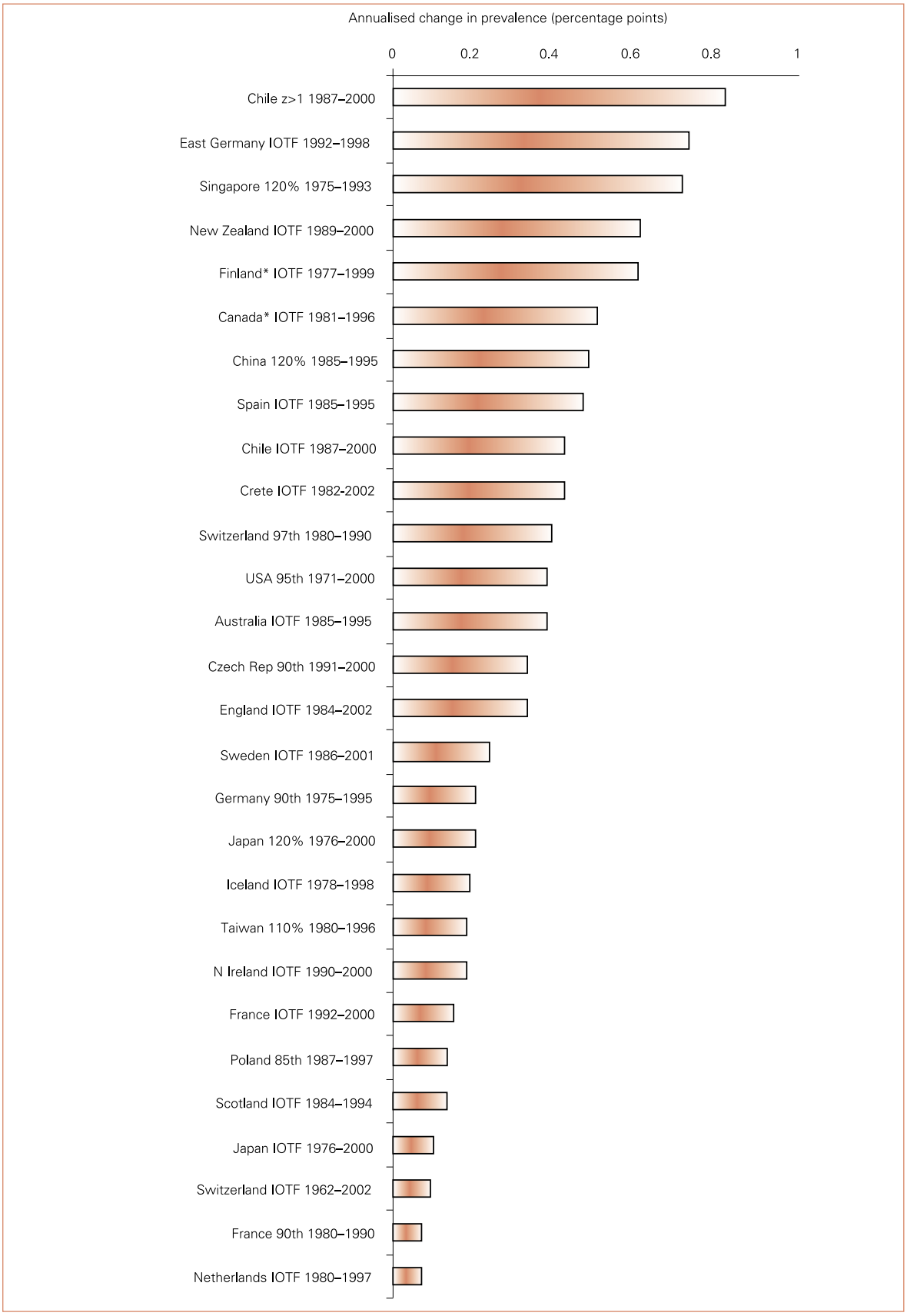
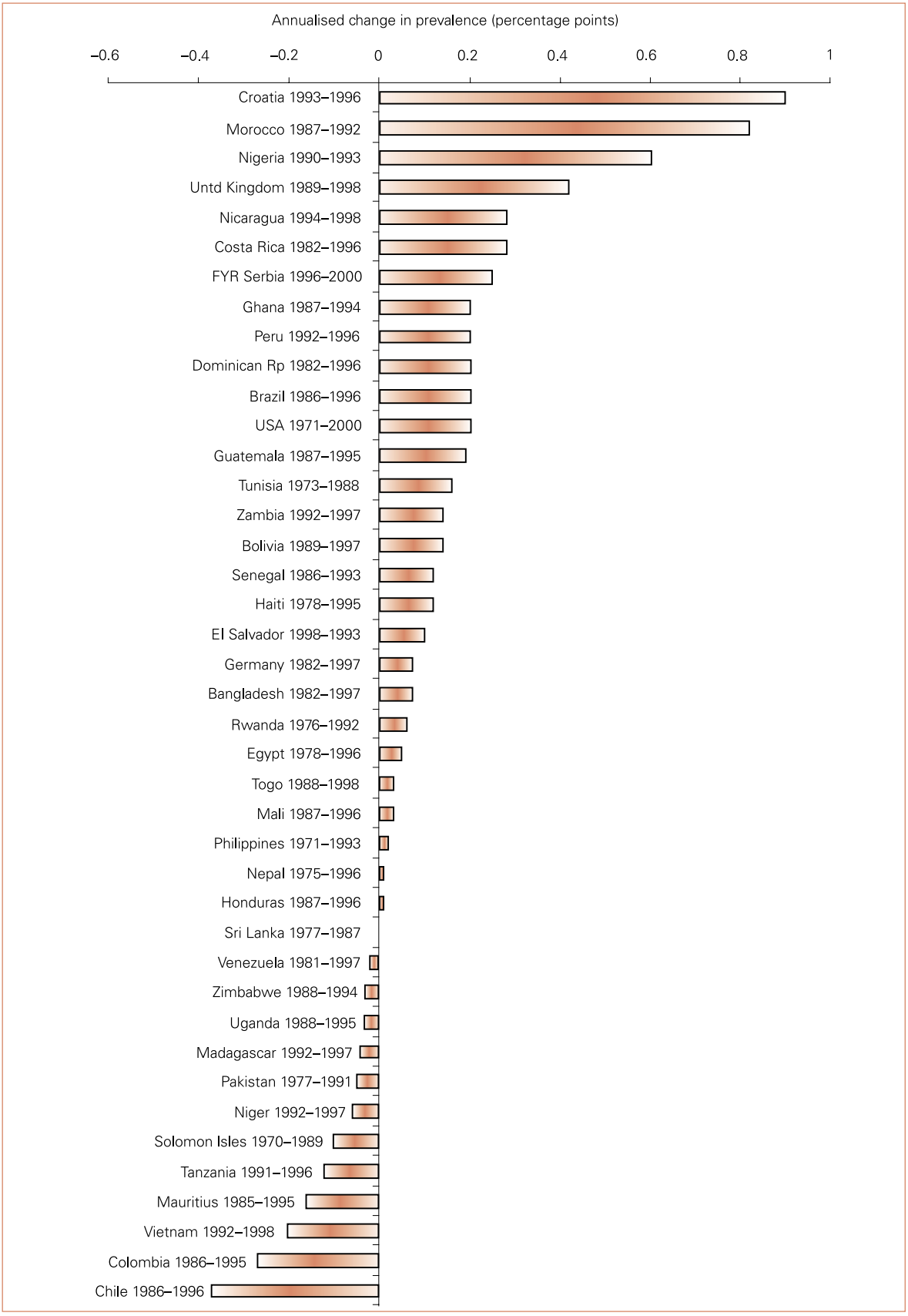


Figure 3: Change in the prevalence of obesity among infants and pre-school children in surveys since 1970



First published in October 2007. Department of Innovation Universities and Skills. www.dius.gov.uk
DIUS/PUB/2K/10/07/NP

SUMMARY URN 07/926A1.
ADULTS URN 07/926A2.
CHILDREN URN 07/926A3.
APPENDICES URN 07/926A4.