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National Obesity  
Observatory



# The economic burden of obesity

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## Executive summary

Estimates of the direct NHS costs of treating overweight and obesity, and related morbidity in England have ranged<sup>a</sup> from £479.3 million in 1998<sup>1</sup> to £4.2 billion in 2007.<sup>2</sup> Estimates of the indirect costs (those costs arising from the impact of obesity on the wider economy such as loss of productivity) from these studies ranged between £2.6 billion<sup>1</sup> and £15.8 billion.<sup>2</sup>

Modelled projections suggest that indirect costs could be as much as £27 billion by 2015.<sup>2</sup> In 2006/07, obesity and obesity-related illness was estimated to have cost £148 million in inpatient stays in England.<sup>3</sup> In Scotland, the total societal cost of obesity and overweight in 2007/08 was estimated to be between £600 million and £1.4 billion,<sup>4</sup> the NHS cost may have contributed as much as £312 million.

Whilst these figures suggest an overall increase in the costs of treating overweight and obesity, in the absence of an agreed definition of costs, different studies have scoped and defined costs differently. It is therefore difficult to interpret trends and to compare cost estimates between studies.

Reports by the National Audit Office (NAO),<sup>1</sup> the House of Commons Health Committee (HCHC)<sup>5</sup> and Foresight<sup>2</sup> still underpin the majority of publications which have been published about the NHS and wider cost of obesity in the UK.

## Introduction

The increasing prevalence of obesity amongst adults and children is a major public health challenge both nationally and internationally. Being overweight or obese can increase the risk of developing a range of other health problems such as coronary heart disease (CHD), type 2 diabetes, some cancers, stroke and reduce life expectancy. The consequences of obesity are not limited to the direct impact on health. Overweight and obesity also have adverse social consequences through discrimination, social exclusion and loss of or lower earnings, and adverse consequences on the wider economy through, for example, working days lost and increased benefit payments.

## Background

The NHS costs of overweight and obesity had previously been estimated at £991 million to £1,124 million<sup>5</sup> in 2002 and the total impact on employment as much as £10 billion for the same time period. The 2007 report from Foresight (Tackling Obesities: Future Choices Project Report) provided an overview of obesity in the UK which included modelled estimates of future trends in levels of obesity and obesity-related diseases, and associated costs in terms of both the health service and of wider society.<sup>6</sup>

The purpose of this briefing note is to:

- Summarise key baseline documents
- Highlight and summarise any documents which have been published in the last three years which may provide more up-to-date figures

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a. The figures presented here come from different reports and are not directly comparable as they use different methods and include different costs.

- Provide options for updating estimates for the economic cost of obesity

## Methods

Literature searches of relevant medical databases (Medline and HMIC), and a search of grey literature was undertaken. Searches were limited to English language publications from 2006 onwards. The date limit was introduced on the basis that publications prior to 2006 are likely to have been considered as part of either the original Foresight report literature review or in the development of the modelling methodology.

## Summary of key baseline publications

Key publications and their findings are described below. A tabulated summary of the studies, their methodology and costs is provided in the Appendix.

- **Tackling Obesity in England (2001)**<sup>1</sup> This National Audit Office (NAO) report provided an overview on the causes, prevalence, costs and the management of obesity in England. Data on the economic burden of obesity was commissioned from the Dept of Economics, City University. The direct (healthcare) costs of obesity and obesity related diseases were derived from population attributable fractions (PAF)<sup>b</sup> obtained from a literature review which were then applied to GP consultation rates, hospital admissions and outpatient attendances. The indirect costs were restricted to earnings lost due to premature mortality and lost earnings due to obesity attributable sickness. Years of working life lost were estimated by applying data on obesity attributable deaths (from the literature review) to age- and sex-specific death rates and residual life expectancy in working aged adults. Mean annual earnings data was then applied to working life lost to estimate lost earnings. Lost earnings due to obesity attributable sickness was derived by applying mean daily earning figures to obesity and obesity-related work absences calculated from information on certified incapacity benefit provided by the then Dept of Social Security.

The cost of treating obesity in England in 1998 was estimated at £9.4 million; the cost of treating disease attributable to obesity was estimated at £469.9 million. Both were likely to be an underestimate. The cost of lost earnings due to premature mortality was estimated at £827 million; the costs of obesity and obesity-related lost earnings were estimated at £1,322 million. A total projected figure of £3.6 billion was given for 2010.

- **House of Commons Health Committee (HCHC) Third Report of Session 03/04 (2004)**<sup>5</sup> This report applied the same general principles and methodology as the NAO report, updated to use 2002 data sources and an extended list of obesity-related diseases. The estimated costs of obesity in 2002 compared to 1998 are summarised in Table 1.

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b. The PAF is the proportion of cases/disease attributable to a particular exposure or risk factor in a given population.

**Table 1:** Estimated direct and indirect costs of obesity (1998 and 2002)

Estimated costs	1998 (£ millions)	2002 (£ millions)
Treating obesity	9.4	45.8 – 49.0 <sup>c</sup>
Treating consequences of obesity	469.9	945 – 1,075 <sup>d</sup>
<b>Total direct costs</b>	<b>479.3</b>	<b>990.8 – 1,124</b>
Lost earnings due to premature mortality	827.8	1,050 – 1,150
Lost earnings due to attributable sickness	1,321.7	1,300 – 1,450
<b>Total indirect costs</b>	<b>2,149.5</b>	<b>2,350 – 2,600</b>
<b>Total economic cost of obesity</b>	<b>2,628.9</b>	<b>3,340 – 3,724</b>

Using the crude assumption that the costs of being overweight are on average only half of those of being obese then, based on the estimate that the prevalence of overweight is twice that of obesity, the cost would double. The total economic cost of for overweight and obesity would therefore be £6.6 to £7.4 billion per year.

- **Tackling Obesities: Future Choices Project Report (2007).**<sup>2</sup> The estimates used in the Tackling Obesities: Future Choices report was based on a micro simulation model.<sup>2</sup> In simple terms, this model derived estimated projections of BMI distribution and obesity-related diseases based on an initial analysis of Health Survey for England (HSE) annual datasets from 1993 to 2004 and population projections. Using a disease-cost model, the implications for NHS expenditure were estimated and projected for 2007, 2015, 2025 and 2050. Using this model and assumptions regarding the relationship between NHS and total costs from the HCHC report it was estimated that in 2050, the NHS cost attributable to obesity and overweight would be £9.7 billion and the total costs would be £49.9 billion at 2007 prices.

### What has been published since 2007 which may contribute to the evidence?

The majority of publications relating to the cost of obesity have been generated from North America with a handful from Europe. Since the publication of the Future Choices report there seems to have been relatively little readily accessible data which relates to the future NHS costs of obesity and overweight. Publications which do relate to this specific area frequently refer back to, or are based on either the Foresight report or the HCHC and NAO reports which contributed to the modelling. One such report – *Healthy*

c. The 4 fold increase in the cost of treating obesity was attributable largely to increased drug costs.

d. £390 million – £435 million of the increase is due to the inclusion of new obesity related diseases.

*Weight, Healthy Lives: a toolkit for developing local strategies*<sup>7</sup> – was published in 2008. This report includes estimates at individual primary care trust level of the annual cost of diseases related to overweight and obesity. The cost estimates are based on those in the Foresight report and relate to the years 2007, 2010 and 2015.

Other publications which may consolidate and/or add to current knowledge on the economic burden of obesity are described below.

A review<sup>8</sup> published shortly before the Foresight report reviewed cost studies of overweight and obesity in the UK. These were limited to the NAO and HCHC reports and an earlier study<sup>9</sup> which estimated the excess costs attributable to overweight and obesity in the north west of England. The authors also developed their own method to estimate NHS costs. This involved the application of PAF data from the WHO Burden of Disease Project to NHS costs for overweight and obesity-related disease based on figures from a 1996 DH discussion document updated to 2002. Using this method, the NHS costs in 2002 were estimated to be £3.23 billion, equivalent to 4.6% of total NHS expenditure. This figure seems high relative to other estimates and may be due to the methodology used. Also, the WHO 'Burden of Disease' group provide PAFs for obesity on a country groupings basis (e.g. Northern Europe), so the figures used are not specific to the UK.

Dr Foster Research published a report in 2008<sup>3</sup> which attempted to estimate the acute costs of obesity in England using HES for April 2006 – March 2007. It is unclear whether a population attributable fraction was applied to the numbers of hospital stays (spells) or whether the stays were based on identifying records with a dual diagnosis code of an obesity-related disease plus obesity. The latter method, in particular, is likely to result in an underestimate due to coding deficiencies. However, on the basis of the data extracted and the application of 2007/08 cost data (source unknown), the report estimated that during 2006/07 there were 68,627 obesity-related diagnosis stays with an NHS cost of nearly £148 million.

The Scottish Government has published a strategy for the prevention of obesity<sup>4</sup> which provides direction for national and local government decision making in the short and medium term. The report provided the following key figures on the cost of obesity in Scotland in 2007/8:

- More than £175 million of the cost of obesity was direct NHS costs (equivalent to 2% of the budget allocated to Health Boards) of which £4.5 million were drug costs. Nearly half the cost was attributable to obesity-related type 2 diabetes (£48 million) and hypertension (£38 million).
- Using the Foresight report assumptions, the NHS cost of being overweight and obese could be in the region of £312 million.
- Lost earnings due to premature mortality were estimated to be £87 million.
- Lost earnings due to obesity and obesity-related illness were estimated to be £195 million. Total indirect costs were therefore estimated at £282 million.
- Estimates of the total cost of obesity to society in 07/08 could be £0.6 billion to £1.4 billion.

The costs were calculated using the same principles as the NAO and HCHC reports i.e. based on healthcare activity data, sickness absence and estimates of premature mortality and future obesity prevalence.<sup>10</sup>

A recent systematic review<sup>11</sup> which aimed to assess the current published literature on the direct costs associated with obesity concluded that obesity was estimated to account for 0.7% (from a French study) to 2.8% (from a US study) of a country's total healthcare expenditure. A third study estimated that including overweight, the proportion of expenditure was in the region of 9.1% (Canada). The modelling undertaken to inform the Foresight report quoted a figure of 6% as the projected proportion of NHS cost for 2007. There were no studies from the UK included in the review; most were based on the US healthcare system; five papers were based on data from European countries. The studies used both database and modelling methods.

The recently published report by the National Heart Forum (NHF) on adult obesity trends<sup>12</sup> in England updates (based on a further three years HSE data) and develops further the micro simulation model used to predict future trends in obesity and obesity-related disease. In contrast to future projections of obesity trends in children, obesity trends in adults were predicted to be only slightly less than those predicted in the Foresight report. The resource implications were not calculated.

### **Further considerations**

NICE guidelines were published in 2006<sup>13</sup> which covered the prevention identification, assessment and management of overweight and obesity in adults and children. As part of the costing template developed to support PCTs in implementing the guideline, NICE identified three key priorities for implementation that would have a significant resource implication and for which costs could be estimated: bariatric surgery, children's services for the overweight and obese, and training. The national costs of fully implementing the guideline were estimated to be £63.3 million in the first year, with potential costs in year ten of £35.5 million and identified savings of £55.6 million.

The NHS costs are not, however, restricted to expenditure on activity. A survey of 150 hospital trusts in England in 2008<sup>14</sup> suggested that each Trust spent on average £60k on specialist equipment (for example beds, chairs, hoists, operating tables and radiological equipment with a larger weight capacity), a figure that had doubled in three years. This equated to £10 million per annum if all the Trusts in England and Wales were spending the same.

The NHS costs are wider than those attributable to primary and secondary healthcare activity; there are also equipment and infrastructure costs. Organisations other than the NHS also have to plan for and accommodate the wider costs of obesity and obesity-related disease for example, the increasing cost of social care.<sup>15</sup>

### **Options for updating figures on the economic burden of obesity**

Options for updating the cost of obesity include the following:

- a. Use the methodological principles used by the NAO/HCHC updated to encompass new healthcare activity, social service and wider economic cost data, prevalence and assessments of population attributable risk.

- b. Apply healthcare cost data to the updated modelling undertaken by the NHF and apply the same principles used in the Foresight report (updated to reflect current literature estimates of the relationship between direct and indirect costs) to estimate the wider economic costs.
- c. Explore the direct healthcare costs of obesity in specific areas. For instance, the excess costs of obesity-related caesarean sections could be calculated by applying PAF and tariff costs to caesarean section figures obtained from HES.

The methodological approach used by the NAO/HCHC may be the most meaningful option for providing figures on the current economic burden of obesity. The estimates are based on healthcare activity data directly attributable to obesity along with an estimate of obesity-related costs, also derived from current healthcare activity. The indirect costs are based on actual benefit data; literature estimates of the relationship between direct and indirect costs provide additional figures.

The NHS costs in the Foresight report are generated from modelled estimates of the distribution of elevated BMI in the population, based on HSE data. The indirect costs were estimated using an assumption about the ratio of the NHS costs of obesity/obesity-related disease to indirect costs rather than any specific modelling.

Whilst modelling is helpful, it necessarily relies on existing patterns of treatment and assumptions about continued patterns of eating and physical activity as well as behavioural and social responses to obesity. Dynamic modelling is seldom used in such estimates but might be helpful here. It might also be helpful to look at alternative scenarios as part of modelling estimates such as: obesity trends continue; obesity continues to rise by a specified percentage per year; obesity is reduced by a specified percentage per year.

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## Appendix

### Summary of relevant key baseline documents and publications from 2006

Report	Summary of outputs	Year and country to which data refers	Methods	Comments
NAO (2001)	<ul style="list-style-type: none"> <li>• Direct costs of treating obesity – £9.4 million</li> <li>• Cost of treating the consequences of obesity – £469.9 million</li> <li>• Total direct costs – £479.3 million</li> <li>• Earnings lost due to premature mortality – £828 million</li> <li>• Earnings lost due to sickness absence – £1,322 million.</li> </ul>	England 1998	Cost of illness study undertaken by Dept of Economics, City University. Direct costs – hospital admissions, day cases, outpatient attendances, prescribing data (all from 2002/03), GP consultations (from 1991/92), DH financial data (from 2002) and obesity prevalence data (from HSE 1998). Indirect costs – earnings lost due to premature mortality estimated from PAFs, ONS mortality statistics and mean annual earnings data; earnings lost due to sickness absence estimated from days of certified incapacity Apr 97 – Mar 98, obesity attributable sickness from DSS and mean daily earning figures,	<p>Costs relate to obesity alone as opposed to overweight and obesity. Direct costs – GP consultations may be underestimate as used 1991/92 data. If number of consultations increased at the same rate as the increase in prevalence of obesity then cost of GP consultations would increase from £6.8 million to over £9 million. Excludes data on consultations with other primary care practitioners e.g. practice nurses, dieticians. Cost of drugs likely to be much higher as Orlistat (one of the principle drugs used) was only licensed in late 1998. Data coding for HES may have been less reliable. Relative risk was not calculable for a number of disease areas e.g. depression, back pain.</p> <p>Indirect costs – may overestimate loss of earnings as the prevalence of obesity is higher in lower socioeconomic groups which may also have below average earnings. Excludes wider costs such as social service costs and productivity losses.</p>

Report	Summary of outputs	Year and country to which data refers	Methods	Comments
HCHC (2004)	<ul style="list-style-type: none"> <li>• Direct costs of treating obesity – £45.8 million to £49.0 million</li> <li>• Cost of treating the consequences of obesity – £945 million to £1,075 million</li> <li>• Earnings lost due to premature mortality – £1,050 million to £1,150 million</li> <li>• Earnings lost due to sickness absence – £1,300 million to £1,450 million.</li> </ul>	England 2002	As above but using updated data sources. Also covers wider range of diseases attributable to obesity than that covered in NAO analysis.	Costs relate to obesity alone not overweight and obesity. Direct costs – GP costs based on 1991/92 figures but increased by 50% to reflect increase in prevalence of obesity. The inclusion of additional disease consequences, increased prescribing costs and the increased prevalence of obesity contributed the greatest to the increase in direct and indirect costs between 1998 and 2002. Other comments as for NAO report.
Foresight (2007)	<ul style="list-style-type: none"> <li>• NHS costs attributable to obesity and obesity-related disease – £2.3 billion (2007); £7.1 billion (2050).</li> <li>• NHS costs attributable to elevated BMI (overweight and obesity) and their consequences – £4.2 billion (2007); £9.7 billion (2050).</li> <li>• Indirect costs of overweight and obesity – £15.8 billion (2007); £49.9 billion (2050).</li> </ul>	England 2007 projected out to 2050	NHS cost data applied to microsimulation modelled estimates of elevated BMI and obesity-related disease, based on projections of BMI distribution from HSE data (1993–2004). Indirect costs for overweight and obesity estimated by multiplying total NHS costs for obesity alone by 7.	Crude estimation of wider economic costs based on arbitrary estimate of relationship between direct and indirect costs applied to a modelled estimate. Assumes no increase in NHS treatment costs. May be issues about assumptions made in modelling.

Report	Summary of outputs	Year and country to which data refers	Methods	Comments
Allender and Rayner (2007)	<ul style="list-style-type: none"> <li>NHS costs attributable to overweight and obesity and obesity-related disease – £3.23 billion.</li> </ul>	England 2002	Obesity and overweight attributable PAFs obtained from WHO EUR-A region figures. 1992/93 DH figures for proportion of total NHS (assumed England) costs attributable to different diseases extrapolated to calculate 2002 costs. PAFs originating from WHO report applied to 2002 NHS cost estimates.	WHO PAFs based on BMI of > 21 so will overestimate costs. 2002 costs were unavailable so extrapolation had to be used (no further details). Costs restricted to PAFs for certain disease. Also, PAFs only available on country grouping basis (e.g. Northern Europe) so not specific to UK.
Swanton (2008)	<ul style="list-style-type: none"> <li>Estimates of annual costs of diseases related to overweight and obesity for individual primary care trusts</li> </ul>	England 2007 projected to 2015	Cost estimates based on those presented in Foresight report (2007).	As per comments made in relation to Foresight report (above).
Dr Foster Research (2008)	<ul style="list-style-type: none"> <li>68,627 obesity-related diagnosis spells during 2007/08 with an NHS cost of nearly £148 million.</li> </ul>	England 2007/08	Estimate of the acute costs of obesity using HES for April 2006–March 2007	Obesity only rather than overweight and obesity. Unclear whether a PAF was applied to the numbers of hospital spells or whether the spells were based on identifying records with a dual diagnosis code of an obesity related diagnosis plus obesity.
Withrow and Alter (2010)	<ul style="list-style-type: none"> <li>Obesity estimated to account for 0.7% to 2.8% of a country's total healthcare expenditure; 9.1% for overweight and obesity.</li> <li>Obese individuals estimated to have medical costs 30% higher than normal weight peers</li> </ul>	Global	Systematic review (1990 – June 2009)	No studies of UK origin included. Mixed methodology – modelling and database. Estimates of costs as proportion of total healthcare expenditure based on 3 studies. Estimate of higher medical costs based on weighted average of 8 studies.

Report	Summary of outputs	Year and country to which data refers	Methods	Comments
Scottish Government (2010).	<ul style="list-style-type: none"> <li>• Treating obesity in 2007/08 £12.1 million.</li> <li>• Treating obesity and its consequences £175 million</li> <li>• Lost earnings due to premature mortality £87 million.</li> <li>• Lost earnings due to obesity and obesity related illness estimated at £195 million.</li> </ul>	Scotland 2007/08	Same principle methodology as NAO report using NHS Scotland Information Services Division activity data, incapacity benefit caseload figures and estimates of working life years lost using HCHC assumptions.	As for HCHC report.

## Reader Information

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