IEA Discussion Paper No.80

OBESITY AND THE PUBLIC PURSE

Weighing up the true cost to the taxpayer

Mark Tovey
January 2017

iea
Institute of Economic Affairs

With some exceptions, such as with the publication of lectures, IEA Discussion Papers are blind peer-reviewed by at least one academic or researcher who is an expert in the field. As with all IEA publications, the views expressed in IEA Discussion Papers are those of the author and not those of the Institute (which has no corporate view), its managing trustees, Academic Advisory Council or senior staff.

Contents

About the author

Mark Tovey recently graduated with a first-class honours in economics from the University of Sussex. He is a freelance researcher and journalist with an interest in health issues. Both local newspapers in Brighton, his hometown, have carried exclusive news reports and interviews under his name. He has written a series of articles for the Ludwig von Mises Institute's daily blog, *Mises Wire*, in which he teases out economic insights from popular culture. Some of those pieces have been picked up by other sites and translated into Spanish, Portuguese, Polish and Romanian.

Summary

This is the first study to estimate the annual savings that overweight and obese people bring UK taxpayers by dying prematurely (in 2016 prices). Ignoring these savings leads to substantial overestimation of the true burden of elevated body mass index (BMI) to the taxpayer.

Our estimate of the present value of pension, healthcare and other benefit payments avoided through early, BMI-caused deaths (net of foregone tax payments) is **£3.6 billion** per annum.

This paper argues the 'burden-on-the-taxpayer' narrative, propagated by public health campaigners, is overblown. While claims of a crippling cost are a good way to get media attention, especially during a time of slow motion crisis in the NHS, they irresponsibly incite resentment of a vulnerable group.

The *net* cost of overweight and obesity to the government is calculated by subtracting £3.6 billion from an estimate of the healthcare and welfare costs. This paper estimates the net cost at **£2.47 billion**, which is 0.3 per cent of the UK government's total budget in 2016 or 1.8 per cent of the NHS budget in the same year.

An estimated **7.1 per cent of deaths** (35,820) are attributable to elevated BMI in England and Wales in 2014. Each individual lost **12 years** on average.

To produce our estimate of the savings, we constructed a counterfactual in which all those who died prematurely from BMI-attributable deaths in a year were resurrected and allowed to live out average lifespans, incurring costs to the government and paying taxes at typical rates. The projected financial flows were discounted at a three per cent rate to get the present value of the cost associated with the extra life years.

The average government spending on a retiree, net of taxes, is **£10,947** per annum.

The relationship between the present value of government savings (y-axis) and the age of the deceased (x-axis) is roughly an upside-down parabola. The death of a 40-to-54 year old is only worth **£11,100** to the government, because foregone years of net contribution must be subtracted from the savings. At the apex of the parabola are 65-to-74 year olds, whose deaths are worth **£166,000** per head to the Treasury. The 90+ age group brings in **£32,000** per death.

Introduction: What is seen, and what is not seen

In 2014, a 120-page report called 'How the world could better fight obesity' was released by the McKinsey Global Institute. The authors were promoting to the world's governments a set of 44 interventions, and in their appeal to the UK they wrote:

> '*..the government currently spends about £6 billion a year on the direct medical costs related to being overweight or obese… It spends a further £10 billion on diabetes. The cost of obesity and diabetes to the healthcare system is equivalent to the United Kingdom's combined 'protection budget' for the police and fire services, law courts and prisons; 40 percent of total spending on education; and about 35 percent of the country's defence budget'* (McKinsey Global Institute 2014: 22).

Though the £6 billion and £10 billion look impressive together, especially when compared to various departmental budgets, they cannot legitimately be summed. The £6 billion is an inflation-adjusted version of a figure from a 2011 study by researchers at the University of Oxford, who *included the proportion of diabetes costs attributable to overweight and obesity* in their estimate. So the McKinsey report was double-counting, and also including costs wholly unrelated to body size when it added £10 billion on top. That did not stop the *Telegraph*, the *Daily Mail*, the *Independent,* the *Guardian* and even the Chief Executive of NHS England from uncritically reporting the offending figure.

Advocates for policy proposals have an incentive to exaggerate the problem they aim to fix, because it gets them a place in the news cycle and makes them more likely to gain traction with politicians. Though their intentions

are good, campaigners who use these tactics incite a climate of resentment against obese people (BBC 2015). Ironically, this may exacerbate the very problem they seek to solve: fat shaming causes obese people to eat more (Brownell 2011).

This report counteracts the catastrophists' claims, estimating the *net* cost of overweight and obesity at £2.47 billion (less than half of the most commonly cited estimate), which is about two per cent of the NHS budget or 0.3 per cent of the UK government's total budget in 2016. This surprising conclusion is not based on the re-estimation of any existing figures; we did not pioneer some state-of-the-art statistical modelling, nor did we gain access to a game-changing dataset. The arithmetic used throughout the paper is quite simple, and could be replicated by any economist. The data are readily available to all.

This paper imbibes the lesson of Frederic Bastiat, the 19th century French economist, who wrote the essay 'What is seen, and what is not seen'. In this classic work, Bastiat tells the story of an 'incorrigible' young boy who smashes his father's window. One onlooker says by way of consolation that 'such accidents keep industry going', at which point Bastiat balks, pointing out that this focuses only on what is immediately seen. The unseen requires one to entertain the counterfactual: what would the money have been spent on had it not been necessary to pay the glaziers?

> '*It is not seen that, since our citizen has spent six francs for one thing, he will not be able to spend them for another. It is not seen that if he had not had a windowpane to replace, he would have replaced, for example, his worn-out shoes or added another book to his library'* (Bastiat 1850: 1.10).

This basic concept of opportunity cost, taught immediately to every young economist, is sadly lacking from the public conversation surrounding body weight. This paper asks how UK government finances would be affected were overweight and obesity totally vanquished. In such a world, the government might not have to spend so much on treating hypertension, diabetes, heart disease, breast cancer, etc. Over 1600 people would be expunged from its Employment Support Allowance list overnight (Department of Work and Pensions 2016). But, crucially, it would also mean more people would live into their sunset years, incurring extra pension, healthcare and benefit costs.

This paper has produced the first estimate of the savings that overweight and obese people bring the government in England and Wales each year by dying early. Only by making such an estimate is it possible to find the only figure that is relevant to taxpayers: the *net* cost.

In section one, we calculate the number of deaths in England and Wales attributable to overweight and obesity by applying population attributable fractions sourced from the WHO and ONS mortality data. Then, the average number of years lost is estimated using a life-expectancy calculator.

In section two, we calculate the average amount of pension, healthcare and benefit costs incurred every year by retirees. That figure is then applied to lives and years lost. The discounted value of the resultant government savings is given, and broken down by age category.

In section three, the *net* cost to the government of overweight and obesity is calculated, by setting the health and welfare cost of obesity against the savings brought about by premature mortality.

Section four lists six sources of potential error in our estimate of government savings and the net cost resulting from excess, BMI-attributable mortality. Five out of six of these result in underestimation, meaning our estimates are conservative.

Section five concludes the paper.

1. Number of deaths attributable to overweight and obesity in England and Wales

Background

More than 15 years ago, the National Audit Office commissioned researchers from City University London to estimate the number of excess deaths attributable to overweight (25-29.9 kg/m^2) and obesity ($\geq$ 30 kg/m^2) in England. They found, using relative risk data from an American study, that six per cent of deaths in England resulted from higher than normal body mass index (BMI) (NAO 2001: 58). A different study, this one of European Union countries, concluded that 8.7 per cent of Britain's deaths were attributable to overweight and obesity (Banegas 2003). Few further estimates of annual, excess deaths have been made in the intervening time period, even as the proportion of obese adults in England has risen by six per cent between 2006 and 2014[1] (Baker and Bate 2016).

On some academic questions, new estimates stop being produced because consensus has ossified debate. But the BMI-mortality question has produced little agreement. After decades of research, public health experts continue to publish conclusions which contradict those of their esteemed colleagues, on such ostensibly basic questions as whether obesity-caused mortality has been rising or falling over time, and whether overweight confers more or less risk of death, relative to a normal BMI (Greenberg 2006).

1 A six per cent increase in the incidence of obesity coincided with a 24 per cent increase in estimates of the healthcare cost. The estimated NHS cost of overweight and obesity was £4.2 billion in 2007 and £5.2 billion in 2011. However these estimates, the first from the Government Office for Science and the second from Scarborough et al., use different methodologies, and so a time trend cannot be reliably inferred.

The fraction of deaths attributable to overweight and obesity is usually calculated using a straightforward equation. A crucial component in this formula is the *hazard ratio* (relative risk), the likelihood of death in one BMI category divided by that in the reference category. Using longitudinal datasets and regression models, researchers have estimated hazard ratios for different BMI categories. However, methodological issues plague this task, in particular the problem of reverse causality, whereby smokers and people in poor health (who typically have low BMIs) make overweight and obese people look relatively less prone to death by biasing the hazard ratios downward. All studies correct for this, though to differing degrees. One researcher was able to credibly claim he could *triple* an estimate of excess deaths in America produced by his colleague, using the same dataset, partly by more thoroughly adjusting for reverse causation (Greenberg 2006).

So diverse and manifold are the estimates of all-cause mortality by BMI category that, in 2011, the National Obesity Observatory said that further attempts at calculating overweight and obesity's death toll in Britain based on the newest hazard ratios would be of 'questionable' value (NOO 2011). Even small differences in relative risk matter hugely for the calculation of excess deaths, as one renowned epidemiologist explained:

> '*The [fraction of deaths attributable to overweight and obesity] is a nonlinear function of relative risk and changes rapidly at low levels of relative risk. For example, in a hypothetical population in which the prevalence of obesity (BMI ≥30) was 30 per cent and there were 2 million deaths per year, the attributable fraction for unadjusted relative risks of 1.2*[2]*, 1.4 or 1.6 would translate into 113,000, 214,000 or 305,000 deaths per year, a difference of about 100,000 deaths for a slight change in relative risk'* (Flegal et al. 2005: 1,886).

In 2013, after years of gridlock, some finality seemed to grace the obesity-mortality debate when Dr. Katherine Flegal, a highly cited American epidemiologist, published a meta-analysis which pooled together 141 prospective studies, amassing data on 2.88 million participants (Flegal et al. 2013). Dr. Flegal and her colleagues found a negative association between overweight and all-cause mortality, no significant association between grade 1 obesity (30-34.9 kg/m^2) and all-cause mortality, and positive hazard ratios for all BMIs equal to or greater than 35.

2 A relative risk of 1.2 indicates a 20 per cent increased probability of death compared to the reference category.

But the supremacy of those findings was subsequently challenged by the release of another meta-analysis in the summer of 2016, the Global BMI Mortality Collaboration, which boasted a titanic sample size of over ten million (GBMIC 2016). This study reported overweight and grade 1 obesity were, after all, associated with an increase in all-cause mortality. Also, its hazard ratios for grades 2 and 3 obesity (35-39.9 and 40-60 kg/m^2 respectively) were stratospheric compared to Dr. Flegal's.

Clearly, one of these sets of findings must be wrong. But it does not follow that one must be correct. Indeed, because obesity-mortality studies seldom adjust for the effect of *regression-dilution bias*, meta-analyses like Flegal's and the GBMIC's will be affected by it too. Regression-dilution bias occurs in longitudinal data because of regression-to-the-mean patterns, whereby extreme recordings tend to increase or decrease after measurement. That is, somebody who is in a very high BMI category at the start of the study is expected to shed weight over time, reducing his mortality risk. This will cause any study which does not use a measure of *normal BMI* (e.g. the average over multiple follow-ups) to underestimate the hazard ratio at the high-end extreme (Greenberg 2006).

Method

This paper does not rely on obesity-mortality hazard ratios, which are highly variable between studies, to derive its estimate of excess deaths attributable to elevated BMI in England and Wales. Instead, it applies six separate population attributable fractions (PAFs), each relating BMI to a different fatal disease, to data from the Office for National Statistics (ONS) on recorded deaths in England and Wales in 2014.

Because PAFs estimate the proportional reduction in disease burden that would occur if overweight and obese people's BMIs were reduced to the reference level, they can be used in combination with mortality data to find the number of obesity-attributable deaths. For example, the PAF for ischaemic heart disease is 0.34, meaning 34 per cent of deaths by that cause can be included in overweight and obesity's death toll.

The PAFs were sourced from the WHO's global burden of disease project, and were chosen because Scarborough et al. used them in their much-cited estimate of the cost of overweight and obesity to the National Health Service (Scarborough et al. 2011: table 3). Using the same PAF data boosts comparability between Scarborough et al.'s estimate and our own, which will be useful in section three when we calculate the net cost of obesity to the UK government. Our ultimate purpose for working out lives and years lost to overweight and obesity is, of course, the estimation of total government savings associated with early deaths.

The PAFs use BMI = 21 as their counterfactual and relate to the WHO's EUR-A region of rich European countries with low child and adult mortality.

The ONS's cause-of-death data is categorised by age, which means average years of life lost could also be estimated. To do this, we used an ONS tool which calculates life expectancy at whatever age is inputted (ONS digital 2015).

Results

Figure 1: Number of deaths and years lost to obesity-attributable illnesses, by sex and age category in England and Wales in 2014.

Sex	Age	Excess deaths/ year	Average years of life lost per death
Male	45-54	933	36
Male	55-64	1990	26
Male	65-74	3713	18
Male	75-84	5959	10
Male	85-89	3065	6
Male	90+	2275	3
Female	45-54	469	39
Female	55-64	1022	28
Female	65-74	2290	20
Female	75-84	5044	12
Female	85-89	3861	6
Female	90+	5199	3
		35,820	

A total of **35,820 deaths** were attributable to obesity in England and Wales in 2014. This represents 7.1 per cent of total deaths in that year, which is greater than the NAO's 1999 estimate (6 per cent) but lower than the one published as part of a wider study of European Union countries in 2003 (8.7 per cent).

In sum, **430,029 years of life** were lost, meaning each individual died **12 years** early on average. The NAO's estimate of years lost per obesity-attributable death in 1999 was a bit lower: nine. The difference in our estimate could reflect increasing average lifespans, as well as differences in methodology.

In spite of their longer lifespans, women on average lost fewer years from early, BMI-caused deaths than men. Women lost 10.8 years, while men lost 13.2.

Though distributed differently over the age categories, total deaths were almost equally split between the two sexes, with 17,963 being male and 17,912 female.

Figure 2: Obesity-attributable deaths in England and Wales in 2014 broken down by sex into eight disease categories, with population attributable fractions given in the final column.

Sex	Disease	Deaths attributable to obesity	As a percentage of total deaths by that cause
Male	Ischaemic heart disease	12123	34 per cent
Female	Ischaemic heart disease	8199	34 per cent
Male	Ischaemic stroke	1823	34 per cent
Female	Ischaemic stroke	2772	34 per cent
Male	Colon/rectum cancer	536	16 per cent
Female	Colon/rectum cancer	379	16 per cent
Male	Hypertensive disease	1398	58 per cent
Female	Hypertensive disease	2114	58 per cent
Male	Corpus uteri cancer	-	-
Female	Corpus uteri cancer	920	49 per cent
Male	Breast cancer	7	12 per cent
Female	Breast cancer	1155	12 per cent
Male	Diabetes mellitus	1902	79 per cent
Female	Diabetes mellitus	2146	79 per cent
Male	Obesity	147	100 per cent
Female	Obesity	227	100 per cent

The biggest killer by far for both sexes was ischaemic heart disease, which represented 57 per cent of all obesity-attributable deaths. Hypertensive disease was second for females (12 per cent of female deaths) and ischaemic stroke was second for males (15 per cent of male deaths).

There were slight inconsistencies between the disease terminology used by the ONS to record deaths and by the WHO in its estimation of PAFs. For example, corpus uteri cancer was designated a PAF by the WHO, but the nearest match in the ONS's cause-of-death data was 'malignant

neoplasm of other and unspecified parts of the uterus'. This excluded cervical cancer deaths, which were listed separately, but may have included some deaths to which the WHO's corpus uteri cancer PAF did not apply.

In addition, the ONS death data lumped haemorrhagic and ischaemic strokes together, while the WHO's population attributable fraction was applicable only to the latter type. We assumed 87 per cent of the ONS's stroke deaths were ischaemic, based on an estimate by the Stroke Association (2016).

Discussion

The above estimate of early deaths attributable to overweight and obesity was produced as a preliminary stage in the calculation of government savings. It was desirable that this figure be closely comparable with the major component of the cost of elevated BMI (i.e. Scarborough et al.'s estimate of the burden on the NHS) against which it will be contrasted in section three of this paper.

The financial benefit of overweight and obesity to the Treasury, calculated in section three, is a positive function of lives and years lost. Therefore, if the WHO's population attributable fractions are overestimated, our reporting of the amount of pension and other welfare payments saved by early deaths will also be too high.

However, because Scarborough et al.'s estimate of the NHS costs are also a positive function of the same set of PAFs, any error that exists individually in the two numbers from this source will be positively associated, thereby reducing potential misreporting of the *net* cost of overweight and obesity in section three. The arithmetic is as follows: say 200 and 100 are the correct numbers, making the net cost 100. Now, if the PAF-based error in the two numbers is independent, and both estimates are one per cent away from their true values, we could end up with a net figure which is three per cent too high (202 - 99). However, when the errors are positively associated, the maximum overestimate is lower, in this case one per cent (202 - 101).

Another benefit of hitching our wagon to Scarborough et al.'s is that it allows us to avoid wading into the fractious world of obesity-mortality hazard ratios. This not to discount the difficulties of estimating BMI's contribution to individual disease burdens but, unlike in the estimation of

mortality hazard ratios, PAFs for the seven diseases listed above are not biased by the same pernicious problem of reverse causality.

The method used is expected to underestimate excess deaths relative to an analysis based on accurate mortality-attributable hazard ratios, because it does not pick up the increased susceptibility of individuals with above-normal BMIs to all-cause mortality, as well as to specific obesity-attributable diseases for which no PAFs are available, like cancers of the kidney, gallbladder and liver. For this reason and others outlined in the 'limitations' section, we expect our estimate of government savings from BMI-attributable deaths, calculated in section three, to be conservative.

2. Government savings from early deaths

Method

In section one, we estimated that 35,820 lives were lost in England and Wales in 2014 due to obesity-caused illness. Each of those lives would have gone on for another 12 years on average, had they not been forestalled by the effects of a high BMI. This section estimates how much those lost 430,029 years would have cost the government had they been lived out.

To be clear, the counterfactual we are considering is not one in which those 35,820 people are artificially brought back from the brink of death, only to live out the remainder of their lives pallid faced and limping. That is, we assume they would have been in average health, paying taxes and incurring costs at a rate typical of individuals in their age category.

The financial flows to and from the government over those 430,029 lost years were discounted at a three per cent rate.

Roughly 13 per cent of the obesity-attributable deaths in 2014 involved people of pre-retirement age. The net contribution they would have made before retiring was factored into our estimate. In addition, the direct and indirect taxes paid by retirees were subtracted from the gross government costs.

All values reported were adjusted into 2016 prices using the GDP deflator index.

Results

By dying early, overweight and obese people saved the government **£3.228 billion** in pension, healthcare and benefit payments in England and Wales in 2014.

Given that England and Wales make up 89 per cent of the UK population, it follows that the cost to the UK as a whole is **£3.6 billion**[3].

Baked into the £3.228 billion is the assumption that the generous triple lock on State pensions will be scrapped after 2020. When we assumed pensions will continue to rise beyond 2020 by the highest of price inflation, earnings growth or 2.5 per cent, the savings increased by £42 million to **£3.270 billion**.

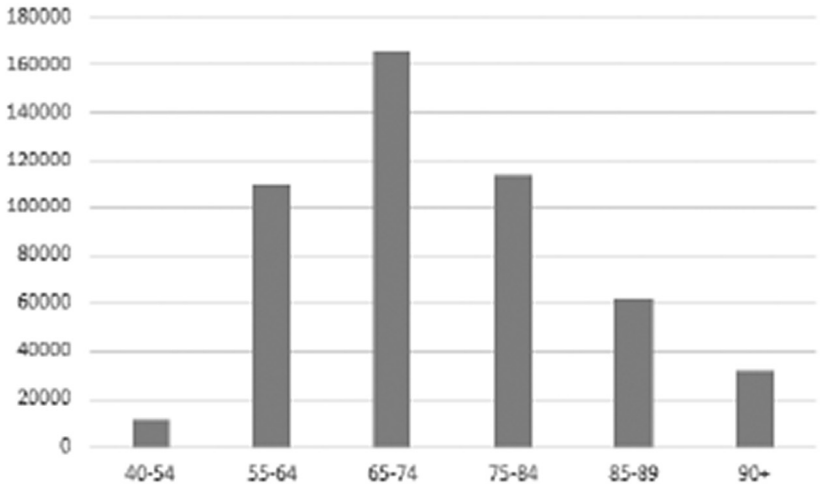
The gross, average amount saved by the British government for each retirement year lost is **£18,979**. This saving consists of unpaid State pension and pension credits (50 per cent of the whole), NHS spending (30 per cent), cash transfers (9 per cent), public pension (5 per cent), adult social care (5 per cent), benefits in kind (1 per cent>) and late-life education (1 per cent>).

The average, annual amount a retiree pays in direct and indirect taxes is £8,032, making the net saving to the government **£10,947** per year per pensioner.

By dying early, the overweight and obese pay inheritance tax before the average person. The present value of this early payment to the Treasury was **£60.38 million** in 2014 in England and Wales. This number is included in the £3.228 billion. On a similar note, the government loses out by paying end-of-life medical costs in the present instead of deferring them into the future. This cost, **£43.82 million**, was also factored into the total.

3 89 x 1.124 = 100. Therefore, **£3.228** billion multiplied by 1.124 gives the cost to the UK: **£3.6 billion.**

Figure 3: Average discounted saving per death for each age group



The distribution of the gains is strongly age dependent, with 65-to-74 being the 'sweet spot' in terms of potential savings from early death. The relationship between the age of the deceased and the present value of government savings is roughly an upside-down parabola. This is because, as a 40 year old ages, his remaining years of positive net contribution dwindle, while the present value of his post-retirement payments increases. The apex is reached on the day when he retires, because at this point he has no more years of net contribution left within him. Further ageing only reduces the amount of retirement life left, and hence reduces the value of his death to the government.

The present value of government savings associated with the death of a 40-to-54 year old, net of taxes, is £11,100, £110,000 for a 55-to-64 year old, £166,000 for a 65-to-74 year old, £113,600 for a 75-to-84 year old, £61,700 for a 85-to-89 year old and £32,000 for a 90+.

Figure 4: Average years of retirement lost and present value of total saving, by sex and age group

Sex	Age	Excess deaths in England and Wales in 2014	Average years of retirement lost	Present value of total saving, net of taxes
Male	45-54	933	19	£8,299,218
Male	55-64	1990	20	£210,118,276
Male	65-74	3713	18	£585,159,210
Male	75-84	5959	10	£582,159,210
Male	85-89	3065	6	£189,689,832
Male	90+	2275	3	£73,253,416
Female	45-54	469	22	£6,236,136
Female	55-64	1022	20	£117,066,549
Female	65-74	2290	20	£398,790,320
Female	75-84	5044	12	£653,068,927
Female	85-89	3861	6	£237,262,531
Female	90+	5199	3	£166,213,898
				£3,277,600,217

The lost retirement years reported in figure X above were calculated on the assumption that 45-to-54 year old males and females will retire when they are 67, and that 55-to-64 year olds will retire when they are 66. The 65-to-90+ year olds were assumed to have already retired, meaning their lost retirement years equalled their lost life years.

Sources, assumptions and calculations

Above, we reported a gross saving of **£18,979** for each year of retirement life foregone. Importantly, this is not the same as the annual amount spent per pensioner by the government. These two figures are different, because public and State pensions are not completely effaced from the books after death, but often continue to be paid to surviving kin, either in lump sum

or over time. Another difference comes in the fact that the health and adult social care figures were adjusted to take out the influence of obesity-attributable medical expenses. The calculation of the £18,979 is outlined in detail below.

Pension and pension credits

The data came from a statistical bulletin produced by the ONS for England, Wales and Scotland, called 'The effects of taxes and benefits on household income: financial year ending 2015' (ONS 2016: figure 13). This bulletin cited the average pension and pension credit paid per person, broken down into age categories. The age categories above 65 were taken, adjusted for inflation and population weights were applied to get a single number that represented the average amount of State pension and pension credits paid to over-65s: **£9,686**.

A freedom of information request to the Department of Work and Pensions in 2012 revealed the average State pension is £130 per week, and is expected to remain at that level following the introduction of the new State pension in 2016 (DWP 2012). From this, we were able to unpick the aggregate number reported above into its two components: **£6,760** State pension, **£3,108** pension credit.

We assumed that, upon death, no amount of the £3,108 paid out in pension credits was transferred to surviving kin. The question then became what proportion of the State pension continues to be paid after death. To simplify, we worked it out using the old, pre-2016 State pension guidelines. Only the second State pension can be inherited, not the basic State pension. The second State pension's average value is £10.70 per week. We assumed 100 per cent of this was transferred to the spouse or civil partner every year for which the deceased was expected to live in 75 per cent of deaths. So the saving associated with each death in terms of State pension is (£119.30 + 0.25(£10.70)) x 52 = **£6,342**

100 per cent is certainly an overestimate, because only men over 79 and women over 74 can claim all of the second State pension of their spouses or civil partners under current guidelines (gov.uk 2016). We assumed 75 per cent of deceased people have an eligible spouse or civil partner, even though only 62 per cent of over-55s are cohabiting and married or in a civil partnership in England and Wales (ONS 2015). We did this to take account of divorced people subject to pension sharing orders.

Widows and widowers who have not qualified for a basic State pension themselves can use some of the National Insurance contributions of their deceased spouse to top themselves up (Department of Work and Pensions 2016). This is unlikely to constitute much of a burden on State finances on net, because they were probably receiving pension credits prior to their spouse's death, in which case they will get less of those once they start receiving a full basic State pension of their own. Therefore, no account of this was taken in our analysis.

The amount of pension saved per death was concluded to be £6,342 State pension + £3108 pension credit = **£9,450**.

Public pensions

Spending on public pensions was estimated to be £42 billion in 2016 (UK Public Spending 2016). By looking at annual reports produced by the pension schemes of the different classes of public sector employee, it was determined that a little over 2.3 million people were in receipt of an unfunded public pension in 2014, which is approximately 19 per cent of the over-65s in England and Wales. The pension's average value in 2016 was estimated at £10,321 per year. Therefore, the average over-65 cost to the government was 0.19 x £10,321 = **£1961** in public pensions in 2016.

There is a clear connection between the unfunded public pensions and HM Treasury. When income exceeds payments made, the surplus is handed to the Chancellor of the Exchequer. Conversely, shortfalls of income relative to liabilities due are papered over by the government (NHS Pension Scheme 2015: 4). Therefore, longer lives and increased demands for public pensions directly impact government finances.

As with State pensions, the saving to the government when dead is not the same as the amount paid while alive, because a certain fraction is often inherited as a lump sum or regular payment by the deceased's next of kin. Determining the average value of that fraction was extremely difficult, because each class of public sector employee has a separate set of guidelines governing inheritance. We estimated the proportion inherited at 50 per cent, meaning the per death saving was **£981** per year.

The civil service pays 37.5 per cent of the deceased's pension to dependants along with a one-off lump sum worth five times the annual payment, in cases where the scheme member dies within five years of retirement (Civil Service Pensions 2016). Teachers who are members of career average salary arrangements also get 37.5 per cent of their pension paid out to dependants after death, along with a lump sum based on annual salary (teachers' pensions 2016). The armed forces 1975 pension scheme continues to pay out 50 per cent after death, but only to a spouse or civil partner, and only so long as that person does not re-marry or co-habit (Marsh 2014). A considerable number of public pension scheme members do not bequeath any fraction of their entitlement, due to their lack of a partner meeting the financial interdependence criterion present in most guidelines. In addition, assuming couples are typically of similar age and in similar health, any payments made after death will likely not be dragged out for as long as assumed in our analysis. On the whole, we consider 50 per cent to be a conservative assumption, i.e., it probably understates the savings to the government from the death of public pension recipients.

NHS cost

The average amount spent on over-65s by the NHS annually was sourced from the ONS's statistical bulletin, 'The effects of taxes and benefits on household income: financial year ending 2015'. The number was adjusted for inflation, and the estimates given for the different over-65 age categories were applied to population weights to get the average: **£6,330**.

Some of that £6,330 includes obesity-related health costs, which were removed. Our purpose was to calculate the effect on government balance sheets of the eradication of overweight and obesity. In that counterfactual, the government must pay the health costs of 35,820 additional people for an average of 12 years, but that burden will be slightly lighter than £6,330 per head. To remove the influence of overweight and obesity completely, we multiplied £6330 by the number of over-65s in Britain in 2014, and then removed £6.05 billion, the largest available estimate of elevated BMI's cost burden on the NHS (Scarborough et al. 2011). We then divided it by the number of over-65s in Britain, to derive the obesity-removed estimate of over-65s' annual health costs: **£5,813.**

End-of-life costs are notoriously high, and there is some debate about whether or not they increase or decrease depending on the age of death (Snowdon 2015). Either way, it is clear that any estimate of over-65s'

average health costs will be influenced by the fact that this is the age category in which most people die. We do not want to capture end-of-life costs in our savings, since they are only postponed. An estimate of the average cost to the NHS and local governments of treating people in their last 90 days of life was obtained from a 2014 report by the Nuffield Trust, and adjusted for inflation: £5,185 (Nuffield Trust 2014). The obesity-removed health cost was altered in light of this, decreasing it to **£5,612.**

The postponement of 35,820 deaths benefits the government in one respect, because it means end-of-life costs can be deferred for an average of 12 years. The net present value of this gain was worked out for each age category using a three per cent discount rate, and summed: **£43.82 million.** This was subtracted from our estimate of the cost savings from obesity.

Adult social care

Local authority spending on adult social care was £17.7 billion in 2013/4 (HSCIC 2014). 52 per cent of the budget is spent on over-65s (NHS information centre 2014). We removed the end-of-life component from this figure, and then divided by the number of over-65s to get the final number used: **£942**.

Cash transfers, benefits in kind and education

All of these figures were found in the ONS's statistical bulletin, "the effects of taxes and benefits on household income: financial year ending 2015". A weighted average was worked out from the age categories above 65. All numbers were adjusted for inflation.

Cash transfers: £1,734
Benefits in kind: £160
Education: £99

Taxes and net contribution of 45-to-64 year olds

Average direct and indirect taxes paid annually by over-65s were sourced from the ONS's statistical bulletin 'The effects of taxes and benefits on household income: financial year ending 2015': **£8,032.** This was subtracted from gross government saving per retirement year lost to get the net figure: **£10,947.** The net figure was used in the final cost-saving analysis.

The annual net contribution of 45-to-49 year olds is, according to the same statistical bulletin, £5045, £7,916 for 50-to-54 year olds, £9,317 for 55-to-59 year olds and £4,620 for 60-to-64 year olds. These numbers were plugged in unaltered for each year before retirement, and discounted at three per cent.

Inheritance tax

The total amount of inheritance tax collected in 2015/16 was £4.6 billion (Morley 2016). That is an average bill of **£7,706** per British death. No data was available on differences in the amounts bequeathed between people of different weight categories, so income measures were used as a proxy. Studies show obese men are well represented in the top tiers of the income distribution (NOO 2011: 2). However, evidence from 2005-09 in England presented by the National Obesity Observatory shows women are about 35 per cent underrepresented in the top household earning quintile (NOO 2011). Therefore, we (somewhat arbitrarily) reduced the average inheritance tax paid by the same proportion: £7,706 x 0.65 = **£5,009.**

The tax bills for the two sexes were then divided by (1 + 0.03)^t, where t was the remaining average life expectancy for each age category. This discounted value was subtracted from the undiscounted one to calculate the net present value of the payment made.

3. The net cost of elevated BMI to the UK government

Introduction

By dying prematurely, overweight and obese people save the UK government £3.6 billion annually in pension, healthcare and benefit payments, according to our estimate from section two. Our task in this section is to set £3.6 billion, the benefit to taxpayers of elevated BMI, against the gross cost. We can safely set aside numbers relating to lost earnings and reduced productivity (usually estimated at between £2.6 and £15.8 billion), because these burdens are borne by businesses and individuals, not the Treasury (NOO 2010).

Result

The NHS cost attributable to overweight and obesity is estimated at £6.05 billion. Add £15.6 million, our estimate of the amount of Employment Allowance Support paid to out-of-work obese people. That is a rounded, gross cost to the government of **£6.07 billion** attributable to overweight and obesity each year. Subtract the amount that overweight and obese people save the UK government by dying early, £3.6 billion, and the net cost of overweight and obesity to the UK government is **£2.47 billion**. That is 0.3 per cent of its total budget in 2016, or **1.8 per cent of the NHS budget** in the same year.

NHS cost

The most recent estimate of the cost of overweight and obesity to the NHS was published in the *Journal of Public Health* by Dr. Peter Scarborough et al (2011). Their study identified obesity-related illnesses, and used population attributable fractions sourced from the WHO's global burden of disease project to estimate the contribution of elevated BMI to their incidence. These PAFs were applied to NHS cost data from 2006-07.

The PAFs use the reference category BMI = 21. They are from the WHO EUR-A region, which includes developed European countries with low child and adult mortality. The applicability of these PAFs to the UK was checked by Scarborough et al. using a sensitivity analysis.

The researchers' estimate of the cost burden was **£6.05 billion** (2016 prices).

As discussed in section one, our estimate of the savings from early, obesity-caused deaths is based on the same set of PAFs as used in the Scarborough et al. study. This makes the numbers highly comparable, because they both refer to the same groups of people through their shared use of BMI = 21 as the reference category. Also, as demonstrated numerically in section one, the error in the *net* cost figure has the potential to be smaller when its components both rely on the same PAF data.

Out-of-work welfare payments

The number of people receiving Employment Support Allowance (ESA) or Incapacity Benefit (IB) in May 2015 with a main disabling condition of obesity was 1,750 (Department of Work and Pensions 2016).

Given that Incapacity Benefit is now a defunct benefit, and that only seven percent of the too-obese-to-work claimants were receiving it in 2015, we based our estimate on the assumption that all 1750 were receiving ESA (Department of Work and Pensions 2016). We assumed all received the maximum available payment, i.e., £8,900 a year. That means our estimate is **£15.6 million** a year (gov.uk 2016).

4. Limitations

This section will list six sources of error in our estimate of the government savings from early, BMI-caused deaths in the UK. The magnitude of these effects is unknown. However, their direction is clear: with only one exception, all lead to underestimation. The exceptional case, number four below, could lead to overestimation or underestimation. In short, the number reported, £3.6 billion saved per annum by taxpayers due to overweight and obesity, is a conservative estimate. It follows that our estimate of the net cost, £2.47 billion, is likely an overestimate.

1) In section one, excess deaths attributable to overweight and obesity were estimated by applying disease-specific PAFs, sourced from the WHO's global burden of disease project, to mortality data from the ONS. This method is expected to **underestimate** excess deaths relative to an analysis based on accurate mortality-attributable hazard ratios, because it does not pick up the increased susceptibility of individuals with above-normal BMIs to obesity-attributable diseases for which no PAFs are available, like cancers of the kidney, gallbladder and liver. However, this method was used anyway, so as to parallel Scarborough et al.'s NHS cost estimate and thereby reduce the error in section six's calculation of the net cost of elevated BMI to the government.

2) The WHO's population attributable fractions, used in this study to calculate excess deaths in England and Wales, were generated for the WHO EUR-A region, a cluster of rich European countries with low mortality. Scarborough et al. performed a sensitivity analysis to test how sensitive their NHS cost estimate was to the assumption that the WHO's PAFs could be applied to the UK. They did this by comparing overweight and obesity prevalence rates between the UK and EUR-A and generating a sensitivity

range based on the discrepancy. The range was very narrow. However, since rates of overweight and obesity have increased in the UK since 2006 (Scarborough et al.'s sensitivity analysis used prevalence rates from Health Survey for England 2006), we might expect the PAFs to be less relevant today. We expect this to lead to **underestimation** of excess deaths, since the proportion of disease burden attributable to a risk factor is a positive function of the incidence of the determinant in the population, and overweight and obesity have increased in the population post-2006 (Baker and Bate 2016).

3) In section one, the number of life years lost to overweight and obesity was estimated by using an ONS data tool which calculates average life expectancy at any inputted age (ONS digital 2015). We entered the ages of the dead into the data tool, thereby generating an estimate of life years lost. However, the counterfactual this study aimed to construct was one in which nobody is overweight or obese. In such a world, life expectancy at any given age would, on average, be higher. That is, we **underestimated** the life years lost to elevated BMI by using life expectancy data which did not omit the influence of overweight and obesity on mortality. Also, the ONS data tool's life expectancy estimates were based on the UK, not just England and Wales, which will also have caused it to underestimate life years lost in England and Wales, since average life expectancy in Scotland is a bit lower (National Records of Scotland 2015).

4) In section three, we estimated the net present value of early inheritance tax payments to the Treasury. This was a component in the estimated savings of £3.6 billion per annum. We divided total inheritance tax collected in 2015/16 by the number of British deaths in the same year and found the average amount paid was £7,706. However, we hypothesised that obese women pay less tax than the average of £7,706, based on data about their low average earnings. We docked the average inheritance tax paid by obese women by 35 per cent, in light of a figure from Health Survey England which showed women were 35 per cent less represented in the top household earning quintile between 2005-09. While there is probably a relationship between these two things, it will not be a perfectly linear one, as we assumed. This type of **uncertainty** may lead to over- or underestimation.

5) Also in section two, while producing an estimate of the health cost of over-65s, we acknowledged the average is skewed upward because most people undergo the costly process of death while in this age category. Since end-of-life costs are deferred and not avoided in a no overweight/obesity scenario, they were removed from the average health costs of over-65s. The resulting figure was used to calculate the burden of keeping extra pensioners alive in a counterfactual where they do not die prematurely from BMI-attributable illness.

   Scarborough et al.'s estimate of the NHS burden, however, did not make any effort to remove end-of-life costs. That is, some portion of the costs they attributed to overweight and obesity would still be present in a world in which everyone's body weight was ideal, because death and its associated healthcare costs would still eventually come, just at a later date. Therefore, in this sense our savings figure is more conservative than Scarborough et al.'s NHS cost estimate, and so the net cost of overweight and obesity is **overestimated**.

6) In a footnote at the beginning of section two, we converted our estimate of the savings for England and Wales into one which would apply to the whole of the UK. England and Wales make up 89 per cent of the UK population, and since 89 x 1.124 = 100, £3.228 multiplied by the same number gives an estimate of the savings applicable to the whole of the UK. Because Scarborough et al.'s NHS cost of £6.05 billion (2016 prices) referred to the UK, it was necessary to have a comparable savings figure.

   Underlying this calculation is the assumption of homogeneity between England and Wales and the rest of the UK. In fact, the incidence of obesity in Scotland is higher than in England and Wales, meaning there should be more excess deaths attributable per unit of the population (NOO 2016). Therefore, the assumption of uniformity leads to **underestimation**.

5. Conclusion

This study explored the implications of increased, BMI-attributable mortality for UK taxpayers. It estimated **35,820** deaths resulted from overweight and obesity in England and Wales in 2014, and that each individual lost an average of 12 years. Extrapolating from this, and using the latest cost data, it found the UK government saves **£3.6 billion** every year in health, welfare and benefit payments (net of foregone taxes).

The burden on the taxpayer narrative has been exaggerated by anti-obesity policy wonks, looking to make their esoteric proposals newsworthy during a time of slow motion crisis in the NHS. Past researchers have completely omitted the fact that reducing body weight entails its own costs, because the extra life years gained lead to extra pension, healthcare and benefit spending by the government.

This study's findings were intended to complement, not substitute, existing and future research on the cost of overweight and obesity to the government. Estimates of the burden of BMI-attributable illnesses on the NHS and welfare bill can be set against the £3.6 billion saved to generate the *net* cost of overweight and obesity. This paper estimated a net cost of **£2.47 billion** in 2016 prices. The net cost of overweight and obesity is still positive and substantial, though it is markedly smaller than the gross figure.

Regardless of the cost to the government, a reduction in overweight and obesity could be desirable for the individuals concerned, who might enjoy longer and healthier lives by slimming down. It could also be desirable from a productivity perspective. Elevated BMI should be re-interpreted as a crisis for the individual, not the government.

A survey of 145 individuals with binge-eating disorder found a staggering 83 per cent had histories of childhood abuse, ranging from physical and

sexual violence to emotional neglect (Grilo and Masheb 2001). These experiences, especially when recurrent, have the potential to “interfere with neurobiological development”, leaving victims “unable to regulate their emotional states” and dependent on external sources of comfort, like drugs, alcohol and food (van der Kolk 2009: 3, 5). Obese people clearly constitute a vulnerable segment of society, and will not benefit from the stigmatisation inherent in the overblown ‘burden-on-the-taxpayer’ narrative.

References

Baker, C., and Bate, A. (2016) House of Commons Briefing Paper Number 3336

BBC (2015) 'Fat shaming' cards handed to London Tube passengers http://www.bbc.co.uk/news/uk-england-london-34969424

Banegas J.R., López-García E., Gutiérrez-Fisac L.J., Guallar-Castillón P. and Rodríguez-Artalejo F. A simple estimate of mortality attributable to excess weight in the European Union. http://www.ncbi.nlm.nih.gov/pubmed/12571650

Bastiat, F. (1850) What is seen, and what is not seen http://www.econlib.org/library/Bastiat/basEss1.html

Brownell, K.D., Puhl, R.M., and Schvey, N., A., et al. (2011) The impact of weight stigma on caloric consumption http://www.ncbi.nlm.nih.gov/pubmed/21760636

Civil service pensions (2016) section 6 alpha death benefits http://www.civilservicepensionscheme.org.uk/media/95092/alpha_schemeguides6_colour.pdf

Department of Work and Pensions (2016) Claiming your State pension through your husband, wife or civil partner https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/514271/claiming-your-state-pension-through-your-husband-wife-or-civil-partner-apr-2016.pdf

Department of Work and Pensions (2016) FOI request: IB/SDA/ESA claimants suffering from obesity, alcohol or drug misuse, severe stress or metabolic diseases, May 2010 to May 2015

Department of Work and Pensions (2012) Freedom of Information request 4994/2012 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551773/foi-4994-2013.pdf

Flegal, K.M., Graubard, B.I., Kit, B.K., Orpana, H. (2014) Association of all-cause mortality with overweight and obesity using standard BMI categories: a systematic review and meta-analysis. http://jama.jamanetwork.com/article.aspx?articleid=1555137

Flegal, K., Gail, M.H., Graubard, B.I., Williamson, D.F. (2005) Excess deaths associated with underweight, overweight and obesity http://jama.jamanetwork.com/article.aspx?articleid=200731

Global BMI mortality collaboration (2016) http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(16)30175-1.pdf

Gov.uk (2016) Employment and Support Allowance (ESA) https://www.gov.uk/employment-support-allowance/what-youll-get

Gov.uk (2016) Maximum State Earnings-Related Pension Scheme (SERPS) pension you can inherit https://www.gov.uk/additional-state-pension/further-information

Greenberg, J.,A., Correcting biases in estimates of mortality attributable to obesity http://onlinelibrary.wiley.com/doi/10.1038/oby.2006.242/pdf

Grilo CM, Masheb RM,Brody M, (2001) Childhood psychological, physical, and sexual maltreatement in outpatients with binge eating disorder: frequency and associations with gender, obesity, and eating-related psychopathology https://www.ncbi.nlm.nih.gov/pubmed/11346674

HSCIC (2014) Spending on adult social care statistics published http://digital.nhs.uk/article/5261/Spending-on-adult-social-care-statistics-published

Marsh, D. (2014) When I'm dead and gone what happens to my pension? http://www.pathfinderinternational.co.uk/index.php?option=com_content&task=view&id=1754&Itemid=173

McKinsey Global Institute (2014) How the world could better fight obesity http://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/how-the-world-could-better-fight-obesity

Morley (2016) Middle-class families 'resentful' as government takes record £4.6 billion inheritance tax bill http://www.telegraph.co.uk/tax/inheritance/middle-class-families-resentful-as-government-takes-record-46bn/

National Records of Scotland (2015) Life expectancy in Scottish parliamentary constituency areas, 2012-2014 including revised estimates for 2005-2007 to 2008-2010 http://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/life-expectancy/life-expectancy-in-scottish-areas/life-expectancy-in-scottish-parliamentary-constituency-areas/2012-2014-including-revised-estimates-for-2005-2007-to-2008-2010

NHS Information Centre (2012) Personal Social Services: Expenditure and Unit Costs, England Edition 2011-12 Provisional release.

NHS Pension Scheme (2015) Annual accounts 2014-15 http://www.nhsbsa.nhs.uk/Documents/Pensions/Resource_Accounts_2014-2015.PDF

NOO (2010) The economic burden of obesity http://www.noo.org.uk/uploads/doc/vid_8575_Burdenofobesity151110MG.pdf

NOO (2011) Adult obesity and socioeconomic status http://www.noo.org.uk/uploads/doc/vid_14069_noo_DB_AdultWtSocStatus3_221211.pdf

NOO (2011) Obesity and mortality https://www.noo.org.uk/NOO_about_obesity/mortality

NOO (2016) UK and Ireland obesity prevalence and trends https://www.noo.org.uk/NOO_about_obesity/adult_obesity/UK_prevalence_and_trends

Nuffield Trust (2014) Exploring the cost of care at the end of life http://www.nuffieldtrust.org.uk/sites/files/nuffield/publication/end_of_life_care.pdf

ONS digital (2015) http://visual.ons.gov.uk/how-long-will-my-pension-need-to-last/

ONS (2015) Population estimates by marital status and living arrangements https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesbymaritalstatusandlivingarrangements

ONS (2016) The effects of taxes and benefits on household income: financial year ending 2015 http://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/theeffectsoftaxesandbenefitsonhouseholdincome/financialyearending2015

Scarborough, P., Bhatnagar, P., Wickramsinghe, K.K., Allender, S., Foster, C., Rayner, M. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006-07 costs http://jpubhealth.oxfordjournals.org/content/early/2011/05/11/pubmed.fdr033.full

Snowdon, C. (2015) Death and taxes: why longer lives cost more money https://iea.org.uk/wp-content/uploads/2016/07/Death%20and%20Taxes%20December%202015.pdf

Stroke Association (2016) http://www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/Types-of-Stroke_UCM_308531_SubHomePage.jsp

Teachers' pensions (2016) After you've gone: https://www.teacherspensions.co.uk/members/your-scheme/your-retirement-years/after-youve-gone.aspx

UK Public Spending (2016) What is the total UK public spending? http://www.ukpublicspending.co.uk

van der Kolk, B. A. (2009) Developmental trauma disorder: Towards a rational diagnosis for children with complex trauma histories http://www.traumacenter.org/products/pdf_files/preprint_dev_trauma_disorder.pdf

The Institute of Economic Affairs
2 Lord North Street
London SW1P 3LB
Tel 020 7799 8900
email iea@iea.org.uk