

IEA Discussion Paper No.67

DEATH AND TAXES

Why longer lives cost money

Christopher Snowdon
December 2015



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	04
Summary	06
Introduction	08
1. The economics of an ageing population	10
2. Morbidity: Compression or expansion?	13
3. Unhealthy lifestyles: costs or savings?	21
Conclusion	29
References	33

Christopher Snowden is the Director of Lifestyle Economics at the IEA. He is the author of *Selfishness, Greed and Capitalism*, *The Art of Suppression*, *The Spirit Level Delusion* and *Velvet Glove; Iron Fist*. He has authored a number of IEA publications including *Closing Time*, *Sock Puppets*, *The Proof of the Pudding*, *The Crack Cocaine of Gambling?* and *Alcohol and the Public Purse*.

Summary

The British population is getting older. In 1948, life expectancy was 68. Thanks to healthier lifestyles and medical advances, it is now 81 and is expected to rise to 87 by the end of the next decade. The rapid growth of the elderly population will put a strain on healthcare, social care and welfare provision.

The Office for Budget Responsibility predicts that health spending in the UK will rise from 6.2 per cent of GDP in 2019/20 to 8.0 per cent of GDP in 2064/65. Spending on long-term care is expected to nearly double from 1.2 per cent of GDP to 2.2 per cent of GDP in the same period, and spending on state pensions will rise from 5.1 per cent of GDP to 7.3 per cent of GDP.

This means that health, long-term care and state pensions spending will rise by 5 percentage points from 12.5% of GDP in 2019/20 to 17.5% of GDP in 2064/64.

Despite the costs associated with the ageing population, it is sometimes claimed that people who are at risk of premature mortality due to lifestyle factors are a 'drain on the taxpayer'. Smokers, drinkers and the obese, in particular, are blamed for rising costs to the general taxpayer.

These claims do not stand up against the evidence. If one looks at the lifetime costs to all public services, it is clear that the 'longevity-related' costs of healthier people are considerably higher than the 'lifestyle-related' costs of less healthy people. Acute healthcare costs are usually higher, long-term healthcare costs are invariably higher, and welfare costs (eg. pensions) are vastly higher.

End-of-life costs are similar regardless of the age at which a person dies, but older people consume additional years of healthcare, thereby pushing up their lifetime costs at a time when they are economically inactive.

In recent decades, healthier lifestyles and longer lifespans have been associated with a rise in the number of years spent in poor health. There has been a rise in the number of people suffering from chronic and non-fatal conditions which are often expensive to treat and manage. Medical science and healthier living do not eradicate the costs of disability and disease, they merely postpone them and pave the way for more expensive non-fatal conditions amongst very old people.

Long-term healthcare and nursing home costs are strongly associated with age and cannot be driven down by healthier lifestyles. Pensions and social care costs dwarf the healthcare costs associated with ageing and are intractable in an ageing society. These costs cannot be mitigated by policies that encourage healthy lifestyles. On the contrary, healthy lifestyles directly lead to higher costs by increasing the size and age of the retired cohort.

There is strong and consistent evidence that smokers incur less public expenditure than non-smokers. People who do not smoke have lower annual healthcare costs but higher lifetime costs due to their longer lifespans. They also incur much higher social security costs as a result of their extra pensionable years. The general taxpayer therefore saves money if other people smoke.

Evidence on the full costs and savings associated with obesity is scanty and mixed. If obesity reduces life expectancy by five to ten years, as some claim, it is likely to be cost-saving for the same reason as smoking is cost-saving. However, if it shortens lives by only a year or so, the healthcare costs associated with obesity probably outweigh the savings from premature mortality. Like smoking, obesity may be cost-saving.

There is evidence that drinkers do not consume more healthcare than non-drinkers, but accurate statistics for the UK are not available. It is clear, however, that revenues from alcohol duty comfortably exceed all alcohol-related costs to public services.

Long term planning of public finances should not be based on the fantasy that people can live longer lives without incurring additional costs, nor can it be based on the delusion that healthcare costs will fall if unhealthy lifestyles are stamped out. The reality is that it is healthy, not unhealthy, lifestyles that have driven up costs and they will continue to do so. It makes no sense to blame escalating public sector budgets on people whose lifestyle choices tend to be cost-saving.

Introduction

The British population is getting older. At the start of the last century, there were two million people aged over 65. Today, there are more than ten million and this is expected to rise to nearly twenty million by 2050 (Cracknell 2007: 44). The number of people aged 75 and over is expected to reach nearly nine million by 2035, up from less than five million in 2010 (Rutherford 2012: 4).

Falling fertility rates and the baby boom have played a part in recent demographic change, but old people getting older as a result of medical advancements and healthier lifestyles has been the overwhelming driver of increased life expectancy in the last fifty years (Rechel et al., 2009: 2).

The financial impacts of an ageing society are profound. When the basic state pension was introduced after the Second World War, life expectancy was 68. It is now 81. It is expected to be 87 by 2030. Governments have long recognised that the working age population is under increasing pressure as the number of working taxpayers falls relative to the number of dependents. Longer lives necessitate greater expenditure on healthcare, social care and welfare.

If healthy lifestyles lead to longer lives and higher costs, it might be expected that unhealthy lifestyles lead to shorter lives and fewer costs. Nobody would advocate unhealthy lifestyles on the basis that they save money, but if the issue is reduced to cold financial facts this is a logical conclusion to draw. However, quite the opposite conclusion would be reached by reading the popular press and listening to public health campaigners. It is routinely claimed that groups with lower life expectancy, particularly smokers and the obese, are a 'drain on the taxpayer' because of the costs of treating smoking and obesity-related diseases. The clear implication is that expenditure on public services would be lower if there was less smoking and less obesity.

This argument is often made explicitly. In 2014, Simon Stevens, the Chief Executive of the NHS, warned that if 'we keep piling on the pounds around the waistline, we'll be piling on the pounds in terms of future taxes needed just to keep the NHS afloat' (NHS England 2014). A month later, the NHS published a five year plan which concluded that 'the sustainability of the NHS' requires 'hard-hitting national action on obesity, smoking, alcohol and other major health risks' (NHS 2014: 9-10).

There is no doubt that lifestyle-related illnesses require healthcare expenditure. The real question is whether these costs are higher than the longevity-related costs associated with ageing, not only to the NHS but to the government as a whole, including the social security system. The aim of this discussion paper is to find an answer to that question.

1. The economics of an ageing population

Health care

The assumption that healthcare costs rise as the population ages seems to pass the common sense test. Since old people consume more healthcare than the young, we would expect an increase in the number of old people to lead to an increase in healthcare expenditure. In the UK, the annual healthcare costs of a person aged 85 or over are five times higher than those of somebody in their early 60s and ten times higher than somebody in their 40s (NHS England, 2013: 23). As a House of Commons analysis notes, 'It is generally agreed that the increase in the elderly population, and in particular the number of people aged 85 and over, will put greater pressure on the National Health Service and care-home capacity' (ibid. : 8).

In the past, predictions about the future cost of healthcare in an ageing society were based on a naive interpretation of the cross sectional relationship between costs and age. It was observed that annual healthcare costs rise with age and so it was assumed that costs would rise dramatically if life expectancy rose by ten years. However, these assumptions failed to recognise that higher health costs amongst older cohorts partly reflect their proximity to death. In a landmark paper, Zweifel et al. (1999) concluded that age was a 'red herring' and that a person's proximity to death was more important than their age in determining healthcare expenditure. A large chunk of the average citizen's healthcare costs are spent in the last year or two of life, and these 'costs of dying' are much the same whether a person dies at 70 or 100. Indeed, there is evidence that end-of-life costs for very old people are *lower* than those of younger people because they are more likely to die at home and doctors are less likely to do everything possible to keep them alive (Wanless 2002: 152).

Using data from Switzerland, Zweifel et al. showed that healthcare costs in the last two years of life were similar for people of all ages and concluded that 'per capita [healthcare expenditure] is not necessarily affected by the ageing of the population' (ibid. 493). In this view, end-of-life healthcare costs do not grow as a result of ageing, they are merely postponed. Ageing is therefore perceived as less of a threat to government finances than previously feared because 'individuals will simply enter the costly final year of their lives at a later age' (Steinmann et al. 2006: 6).

Subsequent studies have shown that end-of-life costs do, in fact, increase with age, albeit less than was previously believed (Spillman and Lubitz 2000, Seshamani and Gray 2004). Nevertheless, it is now generally agreed that the major causes of rising healthcare costs are economic growth, higher incomes and - above all - advanced (and expensive) medical technology, rather than ageing *per se*. It is estimated that ageing alone increases per capita healthcare costs by 0.5 to 1.5 per cent per year.

Annual increases in expenditure of 0.5 to 1.5 per cent are not trivial. A year-on-year rise of just 0.75 per cent would amount to a cumulative increase of 16 per cent every twenty years, equivalent to an added burden on the NHS of £25 billion in today's prices. But it is generally assumed that GDP will grow at a faster pace than this, making the growth of age-related healthcare costs manageable. However, several important caveats need to be added before we conclude that ageing populations have a relatively minor impact on healthcare costs.

Firstly, it is difficult to disentangle economic growth, technology and ageing when looking at the causes of rising healthcare costs. As de Meijer et al. (2013: 35) note, there is significant interaction. Economic growth facilitates additional spending on the medical technology needed to treat a larger cohort of elderly people. In turn, the use of this technology keeps people alive for longer, thereby further increasing the size of the elderly population.

Secondly, Zweifel et al.'s analysis looked only at the last two years of life. It did not look at cumulative healthcare costs over a lifetime. It is true that the last twelve months are typically an adult's most expensive year of life from a healthcare perspective, but they still only represent a quarter of total lifetime expenditure (Gray 2005: 17, Wanless 2002: 152). Most healthcare costs are not associated with dying but with old age. The cost-of-dying may be the same for someone who perishes at 90 as for someone who perishes at 70, but there is a significant cost-of-survival that amounts

to twenty years of additional healthcare. Whatever the average annual healthcare costs of a healthy pensioner may be, they are clearly not zero. It is highly implausible that the lifetime healthcare costs of the average 70 year old would not be lower than those of the average 90 year old. This is further evidenced by the fact that women's healthcare costs are higher than those of men. Alemayehu and Warner (2004: 635) estimate that men's healthcare costs would rise by 14 per cent if they lived as long as women.

Thirdly, even if it were true, as Zweifel et al. argued, that *per capita* healthcare costs *per annum* were unaffected by age, it cannot be denied that the *nation's* healthcare expenditure would rise. This is significant because the extra years of life come about when the person is economically inactive. In countries with socialised healthcare, such as Britain, additional costs fall on economically active taxpayers rather than on the elderly themselves. The burden on taxpayers therefore grows even if per capita costs remain the same. In Britain, the dependency ratio - the number of working age people to the number of pensioners - is expected to fall from 3.14 in 2010 to 2.61 in 2035 (Rutherford 2012: 4). This is a more policy-relevant metric than the per capita cost.

By encouraging the belief that ageing has a trivial impact on overall healthcare costs, it could be argued that Zweifel et al. replaced one red herring with another. The observation that the cost-of-dying is similar at all ages is a useful one, but it does not address the question of whether healthcare expenditure will rise or fall as people live longer. If the elderly were net taxpayers, the economic difference would not be profound, but they are not. Since they pay much less in tax than they claim in benefits (including healthcare) they are - to borrow the colloquial term often applied to smokers and the obese - a 'drain on the taxpayer'. Once retired, each additional year of life represents a net cost to the taxpayer and the cost rises as the person gets older, with the largest costs coming in extreme old age.

When the proximity to death is taken into account, predictions of future healthcare costs are lower than they would be under a more naive analysis, but they do not fall to zero. Even those who believe that population ageing is in the 'minor league of demand drivers in health care' acknowledge that it is responsible for *some* increase in healthcare spending (Reinhart 2003: 29). Nearly all studies find excess costs associated with greater longevity and no realistic model assumes that healthcare costs will decline as the population lives longer (Gray 2005, Caley and Sidhu 2010).

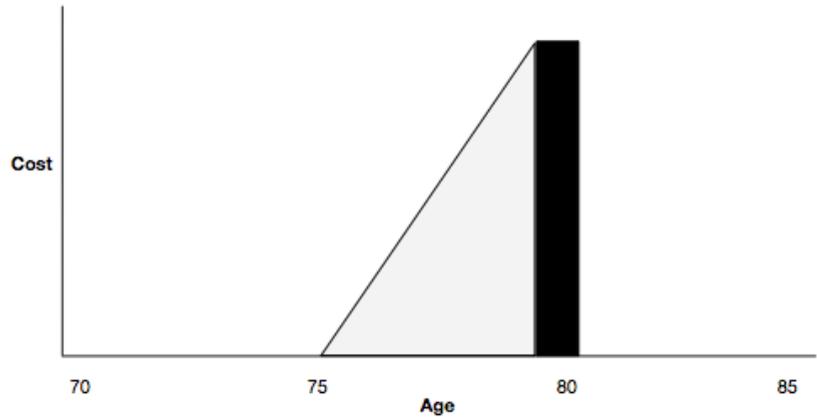
2. Morbidity: Compression or expansion?

We might expect a 90 year old to incur more healthcare costs than a 70 year old, but not if the 70 year old spends many years with chronic illness while the 90 year old dies suddenly after living a healthy life. It is theoretically possible for an ageing population to be associated with lower healthcare costs. The ideal scenario is one in which people live healthy lifestyles and enjoy healthy ageing. They avoid chronic (and expensive) diseases and live to a ripe old age before dying in their sleep. This is both socially and economically preferable to people dying at a younger age from a long-term health problem.

Such a scenario is the Holy Grail of the public health movement, but is it realistic? To answer that question we must examine the assumption that greater longevity merely pushes healthcare costs to the last years of life where they would be concentrated in any case. In this view, age is a minor issue and the real drivers of healthcare costs are technology and the state's ability to pay. It assumes that people are essentially healthy until they reach a certain age before they rapidly go down hill, require hospital treatment and die. The age at death is consequently of no importance because healthcare expenditure is negligible until the final days. Unfortunately this is not consistent with the realities of extreme old age which often involve frailty and chronic fatal and non-fatal diseases.

Figure 1 shows a scenario in which healthcare costs rise in the last years of life as a result of poor health and/or chronic disease. The black bar represents the costs of dying in the last year of life, which are assumed to be the same regardless of age at death.¹

1 In these graphs, costs act as a proxy for morbidity. Baseline annual healthcare costs are not shown before end-of-life morbidity rises, but they should not be assumed to be zero.

Figure 1: Age and healthcare costs under the status quo

As people live longer there are three possible outcomes. The optimistic scenario, shown in Figure 2, assumes that 'healthy life expectancy' (ie. the years spent in good health) increases faster than the increase in life expectancy, thus leading to a 'compression of morbidity' (Fries 1980). In this scenario, increased longevity could have a cost-saving effect on healthcare.

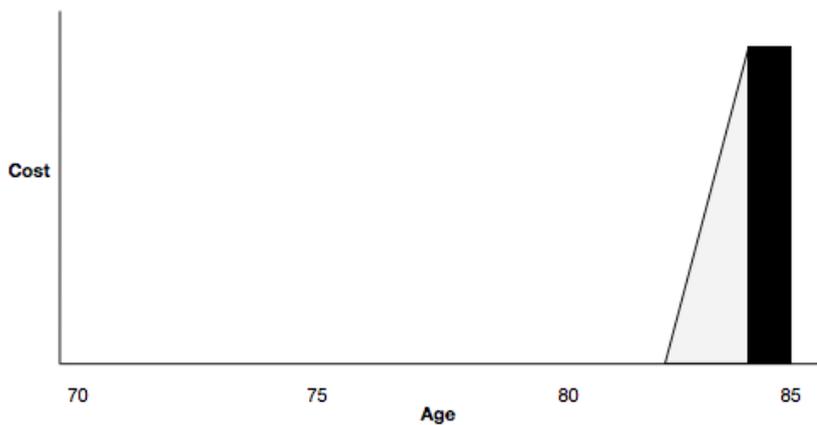
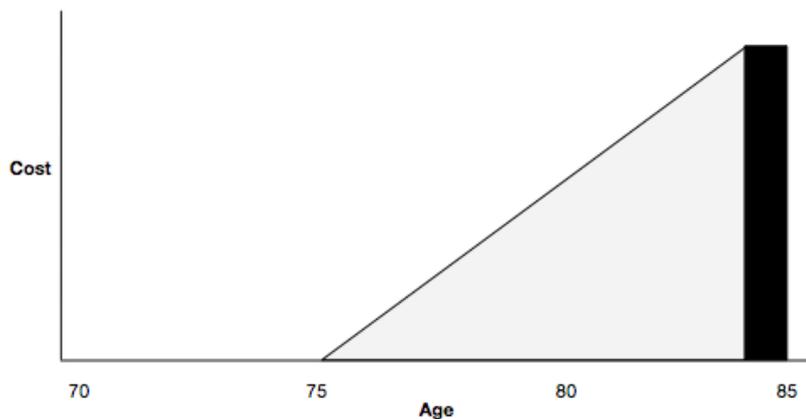
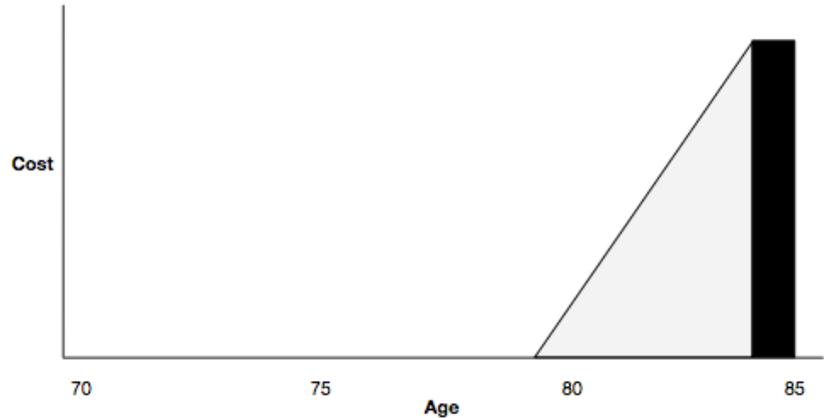
Figure 2: Age and healthcare costs if there is a compression of morbidity

Figure 3: Age and healthcare costs if there is an expansion of morbidity



The more pessimistic model, shown in Figure 3, predicts an 'expansion of morbidity' in which people live longer but the age at which they begin to suffer ill health does not increase - or, if it increases, it does so more slowly than life expectancy. As a result, people spend more years in ill health and incur higher healthcare costs (Olshansky et al. 1991).

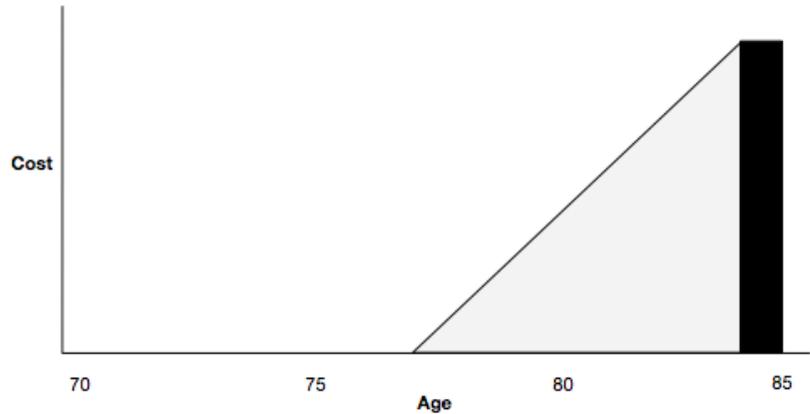
The third model, known as 'dynamic equilibrium', predicts that healthy life expectancy increases at the same pace as life expectancy, leaving the number of years spent in poor health unchanged. In this scenario, shown in Figure 4, the costs are identical to those shown in Figure 1.

Figure 4: Age and healthcare costs under dynamic equilibrium

All three scenarios are plausible but in Britain, as in most countries, rising life expectancy seems to have been accompanied by an expansion of morbidity, not a compression (Bone et al. 1995, Caley and Sidhu 2011). Since 1990, male life expectancy has risen by six years but healthy life expectancy has risen by only four and a half years. Female life expectancy has risen by four and a half years but healthy life expectancy has risen by only three and a half years (Murray et al. 2015: 23).

What is true of Britain is broadly true worldwide. There have been impressive rises in life expectancy around the world, but healthy life expectancy has risen more slowly. Between 1990 and 2013, global life expectancy rose by 6.2 years but healthy life expectancy rose by only 5.4 years (Murray et al. 2015). In the developed world male life expectancy rose by five years and female life expectancy rose by four years, but healthy life expectancy only rose by four and three years respectively (ibid.: 21). In the rich world, as in the poor, the data since 1990 show that people are living longer but are spending an additional year in poor health. A comparison between Figure 1 and Figure 5 illustrates the general picture: people are living longer and suffering ill health at an older age, but life expectancy has risen more quickly than healthy life expectancy.

Figure 5: Age and healthcare costs in practice



Morbidity has expanded and so too have the costs associated with morbidity. As people live longer, they spend more years with non-fatal and non-preventable health conditions such as osteoarthritis, musculoskeletal disorders, hearing loss and cataracts (Kelly and Baker 2000, Parker and Thorsland 2007). Other conditions such as Parkinson's, Alzheimer's and cerebrovascular disease are also closely associated with old age and have become more prevalent.

Much of this is due to simple ageing, but advances in medical technology and pharmacology have also led to more years being spent with disability because they increase the number of survivors of disease. As Newton et al. (2015: 14) note, elderly people often live with conditions that would have killed previous generations and the survivors 'will also be at risk of developing other disorders, particularly disorders associated with ageing, leading to steadily increasing lifetime risks of some cancers and of musculoskeletal disease, for example.'

Moreover, ageing is associated with multi-morbidity, ie. suffering from more than one debilitating condition simultaneously. 'As individuals increasingly survive to 80 years and older,' explain the authors of a recent *Lancet* study, 'the amount of time spent with a combination of these disorders increases, even though age-standardised rates have not increased over time (Murray et al. 2015: 38).

The general trend in the rich world has been towards less severe disability but more mild disability and more chronic disease, ultimately leading to more years spent in poor health. Milder disabilities are not necessarily cheaper to treat than severe disabilities and it is an expensive job to prevent mild disabilities from becoming severe. Public health campaigners have been encouraged by evidence suggesting a compression of morbidity in the USA (Cutler and Sheiner 1998, Fries 2003), but this is far from universal. In the Netherlands, there is a suggestion that severe disability has declined somewhat, but there has been a commensurate increase in mild disability and no decline in the associated healthcare costs (de Meijer et al. 2012). A decline in severe disability also seems to have taken place in Japan, Spain and several other countries, but this has not translated into a decline in the number of years spent without any disability (Robine and Michel 2004). 'While severe disability is declining in some countries, it is increasing in others', conclude Rechel et al. (2009: 24), 'and mild disability and chronic disease are generally showing an increasing trend.'

Given that the costs of dying are similar amongst all groups over the age of 65, morbidity is the key determinant of healthcare costs and there is no doubt that rates of morbidity increase with age. Medical science and healthier living do not eradicate the costs of disability and disease, they merely postpone them and pave the way for more expensive non-fatal conditions amongst very old people.

Radical breakthroughs in medical treatment may change matters in the future, but the present reality is that the short term healthcare costs of unhealthy people are lower than the long-term healthcare costs of healthy people. A Dutch study of people over the age of 70 found that 'hospital costs for individuals in bad health decline rapidly and become lower than those for people in good health after about six to seven years. The higher mortality rate among people in bad health is the primary cause' (Wouterse et al. 2011). The authors conclude that the 'ageing of the population will put pressure on healthcare expenditures... counting on general trends in health to lower long-term costs of health care is too optimistic' (ibid.).

It is naive to think that the frailty and chronic diseases of old age can be avoided entirely. The evidence to date points to the unsurprising fact that the diseases of old age - and the costs associated with them - increase as the number of old people grows.

Long-term healthcare and social care

Much of the discussion about the costs of ageing focus on acute healthcare costs (eg. hospital treatment). These costs are far from trivial but they are a relatively small part of the overall costs. Morbidity has been expanding as people live longer, but even if it was being compressed, the costs of an ageing population would lead to greater public expenditure on social care.

Long-term costs, such as nursing home provision, rise sharply with age. As de Meijer et al. (2013) note, an ageing population 'moderately increases expenditures on acute care and strongly increases expenditure on long-term care'. Even studies which find that end-of-life healthcare costs decline after a certain age have found that these savings are greatly exceeded by rapidly rising nursing home costs. An American study estimated that lifetime expenditure on healthcare was nearly twice as high amongst those who died at the age of 90 than for those who died at the age of 75, once nursing home care was accounted for (Spillman and Lubitz 2000: 1410). Compared with those who died at the age of 65, the costs were more than six times as high.

Based on data from the Netherlands, de Meijer et al. (2009) conclude that, although rates of disability could be influenced by policy, the long-term care needs 'of ageing populations will keep increasing regardless of trends in disability by age'. They found that age is the key driver of long-term health costs whereas 'general health hardly affects [long-term care] use'. Even those who take a relatively optimistic view of the impact of ageing on acute healthcare budgets acknowledge that 'expenditure on long-term care is certain to increase with the ageing of the population' (Rechel et al. 2009: 12).

Pensions

The debate about the economic consequences of ageing populations often ignores the largest component of all - pensions and benefits. Social security costs tend to be overlooked in the public health literature because they do not come out of the health budget, but they are the most significant costs to government as a whole. As McMorrow and Roeger (1999: 66) note, 'While health care costs are clearly an issue, the pure ageing effects on health care budgets is dwarfed by the expected pensions increases.' Similarly, whilst Bonneux et al. (1998: 28) found that longer lifespans

significantly increase healthcare costs, they noted that ‘non-medical costs of added life years, such as pensions and non-medical care for elderly people, would far outweigh any non-medical costs of disease and death’.

It is a mathematical certainty that pensions payments will rise as the population ages unless there are dramatic (and politically unfeasible) increases in the retirement age. By the age of 65, the average Briton has become a net beneficiary of the tax system. Tax payments peak at £10,800 a year in middle age and fall to £4,700 by the age of 75 (mostly made up of VAT and other indirect taxes) (IFS 2015: 19). Benefit payments rise sharply in a person’s early 60s and reach an average of £7,500 by the age of 65. Annual benefit payments continue to rise as the person ages, going to £10,000 at the age of 80 and exceeding £15,000 for those who reach the age of 100 (ibid. 20).

Although the retirement age is set to rise in Britain², it will not compensate for the rise in life expectancy and it cannot be expected to keep rising at the rate required to keep a lid on old age expenditure. The number of people aged over 85 is predicted to rise from three million in 2007 to eight million in 2030 (Cracknell 2007: 44) and the number of centenarians is expected to rise from 14,500 to 110,000 by 2035 (Local Government Association 2015: 18). This represents a dramatic increase in the size of the most expensive elderly cohorts, the financial impact of which cannot be addressed with appeals to make people eat less and stop smoking.

As Meier and Werder (2010) note, ‘increasing old-age dependency ratios will exert an enormous upward pressure on welfare spending in most developed countries ... mainly due to existing unfunded public pension schemes’. Not only will demand for old age benefits inevitably grow as the population ages, but the political power of the elderly as a voting bloc will continue to put pressure on governments to favour pensioners with above-inflation increases in welfare payments.

Pensions and long-term care costs are intractable in an ageing society. Pensions are self-evidently linked to old age and long-term healthcare costs are more closely linked to age than to health. These costs cannot be mitigated by policies that encourage healthy lifestyles. On the contrary, healthy lifestyles directly lead to higher costs by increasing the size and age of the retired cohort.

2 To the age of 68 for both men and women by the middle of the next decade.

3. Unhealthy lifestyles: costs or savings?

Costs of smoking

The hopeful assumption that healthier lifestyles will lead to lower healthcare costs fails to acknowledge the fact that increases in longevity in recent decades have been largely due to healthier lifestyles. Smoking prevalence has more than halved since the 1970s and has been an important driver of population ageing. This has not led to lower costs, however. On the contrary, there is every reason to think that it has led to higher expenditure for both the NHS and the welfare system.

On the question of whether smoking leads to an expansion or compression of morbidity the evidence is mixed. A Dutch study concluded that smokers suffered disability for around two years more than non-smokers (Nusselder et al. 2000) and a Danish study found that smokers lived fewer years in good health (Brønnum-Hansen and Juel 2001). By contrast, a recent study from Belgium found that smokers spend fewer years with a disability (van Oyen et al. 2014) and evidence from the USA shows that non-smokers spend more years with cardiovascular disease than smokers (Al Mamun et al. 2004).

The most detailed study of the costs of smoking found that a person who quits smoking only marginally reduces the number of years spent with a major disability and concluded:

‘... if we were able to achieve much lower rates of smoking, we would realise an improvement in the population’s health and functioning temporarily, but eventually these nonsmokers would contract nonsmoking-related diseases, become disabled, and

eventually succumb from these diseases as well. There would only be a slight contraction in life years with disability. At the same time, pressures on some public budgets would increase, such as for Social Security, as longevity is extended' (Sloan et al. 2004: 257).

As such, the authors 'do not anticipate that a massive decline in smoking rates would lead to a major compression of time in disability' (ibid.: 258).

Put simply, the healthcare costs of smokers tend to be lower over the course of a lifetime because their lifespans tend to be shorter. Since the costs of dying can only be postponed, not prevented, a reduction in smoking-related deaths will not reduce healthcare costs in the long-term. Instead, it will lead to higher healthcare costs due to the expansion of the elderly cohort.

Cardiovascular disease, for example, can be described as a smoking-related illness but women who have never smoked are as likely as smokers to suffer from it and men who have never smoked are *more likely* to suffer from it. The difference is that smokers are more likely to suffer (and die) from heart disease before the age of 70 whereas non-smokers suffer from it at an older age (Al Mamun et al. 2004: 415).

A large number of studies have shown that smoking cessation does not lead to fewer healthcare costs in the long term. On the contrary, like most public health prevention schemes, it leads to more costs. Norman J. Temple explained this using the simple example of somebody who quits smoking at the age of 40, thereby avoiding a fatal heart attack at the age of 65, but succumbs to heart disease at the age of 75. In the short term, his cessation reduces health spending because his cost-of-dying expenses are postponed by ten years. In the long term, however, 'the savings brought about by improved health before the age of 65 years are likely to be cancelled out, perhaps even exceeded, by the increased health-care spending that typically occurs with people aged over 65 years (Temple 2011: 618). Moreover, the government misses out on more than £40,000 of tobacco duty that would have been collected if the man had not stopped smoking and instead pays out nearly £30,000 in state pensions.

Barendregt et al.'s study of healthcare expenditure found that 'the nonsmoking population as a whole is more expensive than the smoking population' (Barendregt et al. 1997: 1054). They found that, on average, nonsmokers' lifetime healthcare costs were 15 to 18 percent higher than those of smokers and predicted that:

'If people stopped smoking, there would be savings in health care costs, but only in the short term. Eventually, smoking cessation would lead to increased health care costs.' (ibid. : 1052)

Many studies have come to a similar conclusion. Leu and Schaub (1983) concluded that 'lifetime expenditure is higher for nonsmokers than for smokers because smokers' higher annual utilisation rates are overcompensated for by nonsmokers' higher life expectancy.' A 1990 study from the USA found that a decline in cigarette sales would lead to higher healthcare costs in the long run 'because quitters incur added costs over their extra years of life' (Lippiatt 1990: 516). Likewise, a recent German study concluded that 'smokers are actually net contributors to the social security system' (Stiedl and Wigger 2015).

This would be true even if smokers did not pay additional taxes on tobacco products. As it is, however, tobacco tax revenues mean that 'government is able to receive a considerable monetary gain from the smoking habit' (Doran et al. 1996: 610). A study from Canada found that any transfer of medical costs from non-smokers to smokers was repaid thirteen times over by tobacco taxes - and was repaid six times over by the transfer in pensions from smokers to non-smokers (Raynauld 1992). The study was published in 1992 when tobacco taxes were considerably lower than they are today.

In line with research into the ageing population in general, the impact of smoking on healthcare costs is relatively small compared with the impact on pension payments. For example, a study from Finland found that smokers' lifetime healthcare costs were €4,700 lower than those of non-smokers, but this paled into insignificance compared with the difference in pension payments, of which smokers received €126,850 less than non-smokers (Tilhonen 2012).

In sum, people who do not smoke have lower annual healthcare costs but higher lifetime costs due to their longer lifespans. They also incur much higher social security costs as a result of their extra pensionable years. The general taxpayer therefore saves money if other people smoke.

The amount they save depends on the discount rate³ and the amount of revenue collected from tobacco duty, but the simple fact is that, as Cohen and Barton (1998: 541) note, 'Non-smokers live longer and thus impose higher costs on society in old age.'

The costs of obesity

While the evidence that smoking reduces health and social security costs is strong and consistent, the evidence for obesity is more scanty. Since obese people tend to live several years less than the healthy population, we might expect them to be cost-saving for the same reason that smokers are cost-saving. On the other hand, some of the diseases associated with obesity, notably diabetes, are chronic and often non-fatal (and thus more expensive). Obesity-related diseases (like alcohol-related diseases) are also more likely to affect people of working age whereas smoking-related diseases tend to occur later in life. If the disease is serious, it can take people out of the productive economy at a time when they would otherwise be net taxpayers rather than net beneficiaries of the welfare state.

On balance, the evidence suggests that obesity, like smoking, reduces healthcare costs. A Dutch study of smokers, obese people and non-smoking, non-obese people found that the obese had higher lifetime healthcare costs than smokers but both groups had lower costs than the 'health-living' cohort (van Baal et al. 2008). Again, the outcome is sensitive to the discount rate, but the authors found that costs would have to be discounted at more than 4.7 per cent before obesity incurred net costs (ibid.: 244). As with smoking, the differences in healthcare consumption was primarily due to differences in life expectancy. The study did not look at pension payments, but it is self-evident that they would have been highest amongst the 'healthy living' cohort since their life expectancy at the age of 20 was 84.4 years (compared with 75.9 years for the obese and 77.4 years for the smokers).

3 Barendregt et al. found that the discount rate would have to be very high (ten per cent or more) for smokers' costs to catch up with those of nonsmokers. A discount rate of three per cent is typical in this kind of forecasting. Looking at the USA, Sloan et al. (2004: 9-10) found that 'the general consensus from studies as of the mid-1990s was that, using a three percent discount rate, smokers generally more than "paid their own way" when only financial costs (such as medical care, Social Security, and retirement) were taken into account'.

The issue at stake is not just that healthy people consume more healthcare by living longer, but that the diseases they develop tend to be more expensive than the diseases that kill smokers and the obese. 'Obesity prevention, just like smoking prevention, will not stem the tide of increasing health-care expenditures', explain van Baal et al. (2008). 'The underlying mechanism is that there is a substitution of inexpensive, lethal diseases toward less lethal, and therefore more costly, diseases.' Or, as Kampen et al. (2014: 5) put it, 'the stronger the negative impact of a disease on longevity, the higher health care costs would be after hypothetical elimination of that disease.'

It is a case of what is seen and what is unseen. The cost of diseases that are caused by lifestyle factors can be seen and counted, but the unseen costs that would have arisen had these diseases not occurred are often ignored. Several studies have arrived at estimates which appear to show that obesity increases healthcare costs but they typically ignore the costs of substitute diseases (ie. what the person would have died of had they not died from an obesity-related disease) and do not account for the savings associated with reduced life expectancy. They also tend to ignore long-term care costs and pension costs. One such study from the USA acknowledged that there would be savings from premature mortality that were not included but noted that these were unlikely to be large because there were only 'modest differences in life expectancy' between the obese and non-obese subjects (Thompson et al. 1999: 2183). This is a telling point. If obesity reduces life expectancy by five to ten years, as some claim, it is likely to be cost-saving for the same reason as smoking is cost-saving. However, if it shortens lives by only a year or so (as Thompson et al.'s study suggests), the healthcare costs associated with obesity probably outweigh the savings from premature mortality. More research is needed to assess the full cost of obesity to public services over the course of a lifetime, but there is no clear evidence that they exceed the costs that would be incurred in the absence of obesity. Like smoking, obesity may be cost-saving.

The costs of drinking

Surprisingly little research has been published on the lifetime healthcare costs of drinkers, and virtually no research has been done on their overall costs to the state. Unlike smokers and the obese, drinkers are a large majority in most developed countries and there are major differences between heavy and light consumers. While heavy drinking can undoubtedly lead to health problems, moderate drinking is beneficial to health. Moderate drinkers have lower rates of mortality than teetotallers - from cardiovascular disease, in particular - but mortality risk increases at higher doses (Ronksley et al. 2011, Di Castelnuovo 2006).

Most of the relevant scientific literature comes from the USA but it is quite consistent in finding little or no difference between the lifetime healthcare costs of drinkers and nondrinkers. In their study of primary care users, Polen et al. (2001) concluded that 'Drinking patterns did not appear to be an important predictor of short-term health care costs'. Zarkin et al. (2004) found that alcohol was associated with less consumption of healthcare. Heise (2010) found that 'high at-risk drinkers were less likely to use the healthcare system than other drinkers'. A study of older people found no significant difference in healthcare costs between heavier and lighter drinkers (Yan et al. 2014). Cherpitel and Ye (2015) found no difference in the consumption of emergency medical care between risky and non-risky drinkers, although they did find increased consumption by people who had an alcohol use disorder.

Much more research needs to be carried out in this area, particularly on the long-term healthcare costs, but the available evidence suggests that drinking has little or no net cost to the healthcare system. In Britain, it has been estimated that alcohol use costs the NHS around £2 billion, but it is important to note that this is a *gross cost* which does not include benefits or savings. Even without accounting for savings, it is clear that revenues from alcohol duty comfortably exceed all alcohol-related costs to public services (Snowdon 2015).

The costs of prevention

As we have seen, a society in which a growing number of people are old or very old incurs higher costs to public services because the elderly:

- a) consume more years of healthcare
- b) spend more years with chronic, non-fatal disease and disability
- c) are much more likely to require long-term care
- d) are net beneficiaries from the welfare system due to pension payments.

It should therefore not be surprising that risk factors such as smoking and obesity which reduce life expectancy by several years tend to be associated not only with lower pension payments but also with less expenditure on healthcare and long-term care.

It could be argued that ‘hard-hitting national action on obesity, smoking, alcohol and other major health risks’ (NHS 2014: 9) is justified on health grounds, but it is difficult to justify on purely economic grounds. Such initiatives, if successful, would lead to higher costs in the long term. The same can be said of most preventive health measures. The old adage that ‘an ounce of prevention is worth a pound of cure’ may be true of health and wellbeing, but almost the exact opposite applies to financial costs. ‘Over the past four decades,’ writes Russell (2009: 45), ‘hundreds of studies have shown that prevention usually adds to medical spending.’ A study in the *British Medical Journal* concluded that the elimination of ‘coronary heart disease, cancer and chronic obstructive lung disease - the present targets of health promotion - would augment healthcare costs substantially’ because ‘lengthening life generally will increase healthcare needs, particularly long term nursing costs’ (Bonneux et al. 1998: 27). There are some exceptions to the rule that successful public health initiatives cost money, such as the prevention of accidents, childhood disease and lifelong disabilities, but most preventive measures to tackle diseases of old age merely lead to more chronic ailments and infirmity over a longer period of time and, ultimately, death from a substitute disease which is no cheaper - and often more expensive - to treat.

All of this runs contrary to the conventional wisdom. When the UK government cut the £3 billion public health budget by £200 million in 2015, the Faculty of Public Health (2015) claimed that it would cost the NHS ‘at least £1bn’ in the long run. This is most unlikely. As Jane Hall (2011: 564) explains in the *Oxford Handbook of Health Economics*: ‘Although it is

frequently argued (but not by economists) that prevention will save expenditure on future treatment, the current body of evidence demonstrates that it is more likely to generate additional health care costs.'

This cold economic fact seems to have passed many politicians and health campaigners by. Quoting Barack Obama, who claimed in 2008 that 'Devoting more of our health-care funds to prevention will save tens of millions of dollars', Rappange et al. (21010: 1) replied that 'although prevention may indeed increase the health of populations, these interventions, unfortunately, are, in general, unlikely to result in lower expenditures.' They continued:

'While preventive interventions may reduce illnesses and expenditures related to risk factors, especially when they successfully prolong life, they will increase illnesses and expenditures unrelated to those risk factors primarily in gained life years. The costs of these unrelated illnesses have been demonstrated to outweigh the savings on related illnesses for the important risk factors of smoking and obesity. In spite of this, the suggestion that prevention is cost saving remains persistent both in the academic field as well as in health-care policymaking. For many, it remains counterintuitive that a healthy lifestyle results in more rather than in less lifetime health-care expenditures. This is problematic as it may result in inefficient use of health-care resources based on overly optimistic assumptions regarding lower health-care expenditures due to prevention, and thus may cause disappointment (among policymakers) when prevention fails to meet these expectations.'

Bonneux et al (1998: 28) put it still more bluntly, saying:

'There is no evidence that healthcare costs are increasing because citizens live unhealthier lives. In fact, quite the contrary would seem to be the case.'

Conclusion

The ineffectiveness of public health prevention in reducing costs has occasionally surfaced in the mainstream media⁴ and is no secret amongst those who work in the field. Some public health advocates acknowledge that most prevention strategies will, if effective, cost more money than they save and so argue instead that the real issue is not cost but cost-effectiveness (Woolf et al. 2009, Goetzel 2009).

It should go without saying that premature mortality is undesirable regardless of whether it saves the government money. Few would disagree with Steven H. Woolf (2009: 537) when he says that 'preventing sickness has value in human terms that econometrics cannot capture.' The macabre business of counting financial savings to the state from death and disease does not undermine moral arguments for better health. It does, however, undermine spurious economic arguments which promise an implausible win-win of longer lives at a lower price.

At times, the true costs of the ageing population have been downplayed in a manner that is likely to breed complacency. In his 2002 review of long-term trends affecting the health service, Derek Wanless stated that the 'predominant view which emerged from the consultation process is that there will be less ill health in old age, a so-called compression of morbidity' (Wanless 2002: 45). More recently, the King's Fund has stated that 'demographic factors are probably relatively insignificant' as a cause of rising healthcare costs (Appleby 2013: 8). Neither claim is based on strong evidence.

4 For example, the *Daily Mirror* recently reported: 'There is good news and bad news. We are going to live five years longer... but it turns out we'll probably be ill for most of it' (Aspinall 2015). See also Kliff 2011, Sanger-Katz 2015, Alexander, 2015.

It is in the interests of public health pressure groups to spread the win-win fallacy and they have obvious political reasons for downplaying the financial costs associated with healthy living and longer lives. They do so in five ways:

Firstly, by focusing on end-of-life costs (which are similar regardless of the age at death) while ignoring the additional years of life which require more healthcare expenditure.

Secondly, by paying little attention to long-term care costs, which everyone agrees will increase significantly as the population ages. In the Wanless Review, for example, long-term costs are mentioned very briefly despite these costs being greater than the acute healthcare costs associated with ageing.

Thirdly, by ignoring welfare payments, of which pensions are by far the largest component. Since public health authorities are concerned with healthcare budgets, rather than welfare budgets, this is an understandable oversight, but the effect is to sideline the biggest expense associated with the ageing population.

Fourthly, by focusing on per capita costs rather than the costs that are met by working taxpayers. Without steep rises in the retirement age, the ratio of working taxpayers to pensioners will continue to decline.

Finally, by arguing (or implying) that public health policies will reduce healthcare costs by facilitating healthy ageing. It is shown here that this is unlikely to happen. It is not clear that, even with static demographics, public health policy will reduce healthcare costs. Healthier lifestyles correlate strongly with longer life expectancies, just as longer life expectancies correlate with higher costs. This is true of acute healthcare costs, but the link with long-term costs and pension payments is so strong as to make them practically indivisible.

Fortunately, the British treasury is more realistic about the economic consequences of an ageing population. The Office for Budget Responsibility's long-term forecasts predict health spending in the UK will rise from 6.2 per cent of GDP in 2019/20 to 8.0 per cent of GDP in 2064/65. Spending on long-term care is expected to nearly double from 1.2 per cent of GDP to 2.2 per cent of GDP in the same period, and spending on state pensions will rise from 5.1 per cent of GDP to 7.3 per cent of GDP (Office for Budget

Responsibility 2015: 68-71). Taken together, these spending increases, which the OBR says are 'due mainly to the ageing population', amount to an additional five per cent of national output being taxed and spent by the government, the equivalent of more than £90 billion today.

Long term planning of public finances should not be based on the fantasy that people can live longer lives without incurring additional costs, nor can it be based on the delusion that healthcare costs will fall if unhealthy lifestyles are stamped out. This has not happened in the past when lifestyles have become healthier and it cannot be expected to happen in the future without dramatic breakthroughs to counter the ageing process.

With life expectancy predicted to continue rising for many years, society needs to be prepared for the financial costs that will fall on the working age population. In all likelihood, longer lives will be accompanied by more years spent with disability, infirmity and dementia, and the costs associated with them. The dependency ratio between workers and the elderly could be addressed with sustained mass immigration or a new (and continuous) baby boom, but former would be politically unpopular and the latter cannot be engineered (and is unlikely to occur spontaneously).

Alternatively, the government could make individuals responsible for their own healthcare and pension pot. This, again, could be politically unpopular but it would likely incentivise more efficient and prudent behaviour. A health and pension funding system that involved pre-funding and personal responsibility would mean that the additional years of healthy and productive life could be used to accumulate capital to help finance retirement, health and long-term care in the additional years of unhealthy life. By contrast, a system that relies on the working generation bearing the costs of the longer lives of the elderly generation offers no incentive for people to work longer and so the costs fall on the state.

Regardless of whether the costs are borne privately or collectively, the overwhelming likelihood is that healthier lifestyles will mean people spend more years in good health and more years in poor health. It will certainly mean greater expenditure on healthcare, pensions and nursing homes. A health and pension funding system that involved pre-funding and personal responsibility would, though, mean that the additional years of healthy and productive life could be used to accumulate capital to help finance retirement, health and long-term care in the additional years of unhealthy life. With a system that relies on the working generation bearing the costs

of the longer lives of the elderly generation, there are no incentives for people to work longer and the costs of the longer life caused by better health fall on the state.

To claim the improved public health reduces costs for the government otherwise raises false expectations about what public health policy, 'sin taxes' and regulation can achieve. There are many benefits from people living healthy, longer lives but, in the context of our current pension and healthcare system, these benefits are social, not economic and certainly do not accrue to taxpayers. 'Arguments in favour of policies designed to prevent fatal disease,' writes Temple (2012), 'such as by reducing the prevalence of smoking, should be based on improvements to population health rather than on misleading claims that this will reduce spending on health care.'

It can certainly be argued that greater expenditure on healthcare, long-term care and welfare is a worthwhile price to pay for a healthier society, but under a system of state-run health and welfare we must accept that it is a price that will have to be paid by taxpayers. The reality is that it is healthy, not unhealthy, lifestyles that have driven up costs and they will continue to do so. It makes no sense to blame escalating public sector budgets on people whose lifestyle choices tend to be cost-saving.

References

- Al Mamun, A., Peeters, A., Barendregt, J., Willekens, F., Nusselder, W. and Bonneux, L. (2004) Smoking decreases the duration of life lived with and without cardiovascular disease: a life course analysis of the Framingham Heart Study. *European Heart Journal* 25: 409-15
- Alemayehu, B. and Warner, K. (2004) The lifetime distribution of health care costs. *Health Services Research* 39(3): 627-42
- Alexander, S. (2015) Rising life expectancy means we spend more time being ill. *Telegraph* 2 September
- Appleby, J. (2013) Spending on health and social care over the next 50 years. London: King's Fund
- Aspinall, A. (2015) Good news! We're ALL living longer - but there is still a north-south divide. *Daily Mirror* 15 September
- Barendregt, J., Bonneux, L., van der Maas, P. (1997) The Health Care Costs of Smoking. *New England Journal of Medicine* 337(15): 1052-57
- Bone, M., Bebbington, A., Jagger, C., Morgan, K. and Nicolaas, G. (1995) Health Expectancy and its Uses. London: HMSO
- Bonneux, L., Barendregt, J., Nusselder, W. and Van der Maas, P. (1998) Preventing fatal diseases increases healthcare costs: cause elimination life table approach. *British Medical Journal* 316: 26-29
- Brønnum-Hansen, H. and Juel, K. (2001) Abstinence from smoking extends life and compresses morbidity: a population based study of health expectancy among smokers and never smokers in Denmark. *Tobacco Control* 10(3): 273-8

Caley, M. and Sidhu, K. (2010) Estimating the future healthcare costs of an aging population in the UK: expansion of morbidity and the need for preventative care. *Journal of Public Health* 33(1): 117-22

Callum, C., Boyle, S. and Sandford, A. (2011) Estimating the cost of smoking to the NHS in England and the impact of declining prevalence. *Health Economics, Policy and Law* 6: 489-508

Cohen, D. and Barton, G. (1998) The cost to society of smoking cessation. *Thorax* 53(Supp 2): 538-42

Cracknell, R. (2007) *The Ageing Population: Key issues for the new parliament 2010*. London: House of Commons Library Research

Cutler, D. and Sheiner, L. (1998) Demographics and medical care spending: standard and non-standard effects. *NBER Working Paper No. 6866*

Cutler, D. and Meara, E. (2001) The concentration of medical spending in *Themes of the Economics of Ageing* (ed. Wise, D.) University of Chicago Press: 217-240

de Meijer, C., Koopmanschap, M., Koolman, X., van Doorslaer, E. (2009) The role of disability in explaining long-term care utilization. *Medical Care* 47(11): 1156-63

de Meijer, C., Majer, I., Koopmanschap, M. and van Baal, P. (2012) Forecasting lifetime and aggregate long-term care spending: accounting for changing disability patterns. *Medical Care* 50(8): 722-9

de Meijer, C., Wouterse, B., Polder, J. and Koopmanschap, M. (2013) Aging perspectives on health care expenditures - theories, facts and forecasts in *Studies of Health and Long-Term Care Expenditure Growth in Aging Populations* (ed. C. de Meijer) Erasmus University

Di Castelnuovo, A., Costanzo, S., Bagnardi, V., Donati, M., Iacoviello, L. and Gaetano, G. (2006) Alcohol dosing and total mortality in men and women: An updated meta-analysis of 34 prospective studies. *Archives of Internal Medicine* 166(22): 2437-45

Doran, C., Sanson-Fisher, R. and Gordon, M. (1996) A cost-benefit analysis of the average smoker: a government perspective. *Australian and New Zealand Journal of Public Health* 20(6): 607-611

Faculty of Public Health (2015) http://www.fph.org.uk/leading_organisations_call_on_chancellor_to_reverse_public_health_cuts_to_public_health_budget

Fries, J. F. (1980). Ageing, Natural Death, and the Compression of Morbidity. *New England Journal of Medicine*, 303(3):130–135

Fries, J. F. (2003) Measuring and monitoring success in compressing morbidity. *Annals of Internal Medicine* 139(5): 455-9

Goetzel, R. Z. (2009) Do prevention or treatment services save money? The wrong debate. *Health Affairs* 28(1): 37-41

Gray, A. (2005) Population ageing and health care expenditures. *Ageing Horizons* 2: 15-20

Hall, J. (2011) 'Disease prevention, health care, and economics' in *Oxford Handbook of Health Economics* (eds. Glied, S. and Smith, P.) Oxford: Oxford University Press

Heise, B. (2010) Healthcare system use by risky alcohol drinkers: A secondary data analysis. *Journal of the American Academy of Nurse Practitioners* 22(5): 256-63

Institute for Fiscal Studies (2015) Redistribution from a lifetime perspective. IFS Working Paper W15/27

Kampen, I. G., Engelfreit, P., van Baal, P. (2014) Disease prevention: saving lives or reducing health care costs? *PLOS One* 9(8) e104469: 1-5

Kelly, S. and Baker, A. (2000) Healthy life expectancy in Great Britain, 1980-96, and its use as an indicator in United Kingdom Government strategies. *Health Statistics Quarterly* 7: 32-7

Kliff, S. (2011) What if prevention doesn't save money? *Washington Post* 11 December

Leu, R.E., Schaub, T. Does smoking increase medical care expenditure? *Social Science and Medicine* 17(23): 1907-1914

Lippiatt, B. (1990) Measuring medical cost and life expectancy impacts of changes in cigarette sales. *Preventive Medicine* 19: 515-32

Local Government Association (2015) Investing in Our Nation's Future.

McMorrow, K. and Roeger, W. (1999) The economic consequences of ageing populations (a comparison of the EU, US and Japan). *Economic Papers* 138 [EU Commission - Working Document]

Meier, V. and Werding, M. (2010) Ageing and the welfare state: securing sustainability. *Oxford Review of Economic Policy* 26(4): 655-73

de Meijer, C., Wouterse, B., Polder, J. and Koopmanschap, M. (2013) The effect of population ageing on health expenditure growth: a critical review. *European Journal of Ageing* 10: 353-61

Murray, C. (2015) Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. *Lancet* (online first) 26 August

Nash, R. and Featherstone, H. (2010) Cough Up. London: Policy Exchange

Newton, J. et al. (2015) Changes in health in England, with analysis by English regions and areas of deprivation, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet* [http://dx.doi.org/10.1016/S0140-6736\(15\)00195-6](http://dx.doi.org/10.1016/S0140-6736(15)00195-6)

NHS England (2013) The NHS belongs to the people: A Call to Action - The Technical Appendix. 19 December

NHS England (2013) Get serious about obesity or bankrupt the NHS - Simon Stevens. 17 September <https://www.england.nhs.uk/2014/09/17/serious-about-obesity/>

NHS (2014) Five Year Forward View. October

-
- Nusselder, W., Looman, C., Marang-van de Mheen, P. and Machenbach, J. (2000) Smoking and the compression of morbidity. *Journal of Epidemiology and Community Health* 54: 566-74
- Office for Budget Responsibility (2015) Fiscal sustainability report. June.
- Olshansky, S., Rudberg, M., Carnes, B., Cassel, B. and Brady, J. (1991). Trading off Longer Life for Worsening Health: The Expansion of Morbidity Hypothesis. *Journal of Ageing and Health*, 3(2):194–216.
- Parker, M. and Thorsland, M. (2007) Health trends in the elderly population: Getting better and getting worse. *The Gerontologist* 47(2): 150-8
- Polen, M., Green, C., Freeborn, D., Mullooly, J. and Lynch, F. (2001) Drinking patterns, health care utilisation, and costs among HMO primary care patients. *Journal of Behavioral Health Services & Research* 28(4): 378-99
- Rappange, D., Brouwer, W., Rutten, F., van Baal, P. (2010) Lifestyle intervention: from cost savings to value for money. *Journal of Public Health* 32(3): 440-7
- Raynauld, A. (1992) Smokers' burden on society: Myth and reality in Canada. *Canadian Public Policy* XVIII(3): 300-17
- Rechel, B., Doyle, Y., Grundy, E. and McKee, M. (2009) How can health systems respond to population ageing? World Health Organisation Policy Brief 10
- Reinhart, U. (2003) Does the ageing of the population really drive the demand for healthcare? *Health Affairs* 22(6): 27-39
- Robine, J-M. and Michel, J-P. (2004) Looking forward to a general theory on population ageing. *Journal of Gerontology* 59A(6): 590-7
- Ronksley, P., Brien, S., Turner, B., Mukamal, K. and Ghali, W. (2011) Association of alcohol consumption with selected cardiovascular disease outcomes: a systematic review and meta-analysis. *British Medical Journal* 342:d671

Russell, L. (2009) Preventing Chronic Disease: An Important Investment, But Don't Count On Cost Savings. *Health Affairs* 28 (1): 42-45

Rutherford, T. (2012) Population ageing: statistics. House of Commons Standard Note SN/SG/3228. 10 February.

Sanger-Katz, M. (2011) No, giving more people health insurance doesn't save money. *New York Times (Upshot blog)* 5 August.

Seshamani, M. and Gray, A. (2004) Ageing and health-care expenditure: the red herring argument revisited. *Health Economics* 13: 303-14

Sloan, F., Ostermann, J., Picone, G., Conover, C. and Taylor, D. (2004) *The Price of Smoking*. Cambridge, Massachusetts: The MIT Press

Spillman, B. and Lubitz, J. (2000) The effect of longevity on spending for acute and long-term care. *New England Journal of Medicine* 342(19): 1409-15

Steidl, F. and Wigger, B. (2015) Die externen kosten des rauchen in Deutschland. *Wirtschaftsdienst* 95(8): 563-8

Steinmann, L., Telser, H. and Zweifel, P. (2006) The impact of ageing on future healthcare expenditure. University of Zurich working paper 0510

Temple, N. J. (2012) Why prevention can increase health-care spending. *European Journal of Public Health* 22(9): 618-9

Thompson, D., Edelsberg, J., Colditz, G., Bird, A., Oster, G. (1999) Lifetime health and economic consequences of obesity. *Archives of Internal Medicine* 159: 2177-2183

Tilhonen, J., Ronkainen, K., Kangasharju, A. and Kauhanen, J. (2012) The net effect of smoking on healthcare and welfare costs: a cohort study. *BMJ Open* 2:e001678. doi:10.1136/bmjopen-2012-001678

- van Oyen, H., Berger, N., Nusselder, W., Charafeddine, R., Jagger, C., Cambois, E., Robine, J. and Demarest, S. (2014) The effect of smoking on the duration of life with and without disability, Belgium 1997-2011. *BMC Public Health* 14: 723
- Wanless, D. (2002) Securing our Future Health: Taking a Long-Term View. HM Treasury.
- Wolf, A. and Colditz, G. (1998) Current estimate of the economic cost of obesity in the United States. *Obesity Research* 6(2): 97-106
- Woolf, S. (2009) A closer look at the economic argument for disease prevention. *Journal of the American Medical Association* 301(5): 536-8
- Woolf, S., Husten, C., Lewin, L., Marks, J. S., Fielding, J. and Sanchez, E. (2009) The economic argument for disease prevention: Distinguishing between value and savings. Partnership for Prevention.
- Wouterse, B., Meijboom, B. R. and Polder, J. J. (2011) The relationship between baseline health and longitudinal costs of hospital use. *Health Economics* 20(7): 355-362.
- Yan, T., Xu, H., Ettner, S., Barnes, A. and Moore, A. (2014) At-risk drinking and outpatient healthcare expenditures in older adults. *Journal of the American Geriatrics Society* 62(2): 325-8
- Zarkin, G., Bray, J., Babor, T. and Higgins-Biddle, J. (2004) Alcohol drinking patterns and health care utilisation in a managed care organisation. *Health Services Research* 39(3): 553-70
- Zweifel, P., Felder, S. and Meier, M. (1999) Ageing of population and health care expenditure: a red herring? *Health Economics* 8(6): 485-96

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


Institute of
Economic Affairs