Benefits of reducing health inequalities

Summary
The benefits of reducing health inequalities are economic as well as social. The cost of health inequalities can be measured in both human terms, lost years of life and active life; and in economic terms, the cost to the economy of additional illness. If everyone in England had the same death rates as the most advantaged, people who are currently dying prematurely as a result of health inequalities would, in total, have enjoyed between 1.3 and 2.5 million extra years of life[1,2]. They would, in addition, have had a further 2.8 million years free of limiting illness or disability[2]. It is estimated that this illness accounts for productivity losses of £31-33 billion per year[2], lost taxes and higher welfare payments in the range of £20-32 billion per year[2] and additional NHS healthcare costs well in excess of £5.5 billion per year[3]. If no action is taken, the cost of treating the various illnesses that result from inequalities in obesity alone will rise from £2 billion per year to £5 billion per year in 2025[4].

1 Background

The overarching rationale for reducing socioeconomic inequalities in health is a moral or "social justice" one: health "inequalities" are seen as an issue of fairness. In this paper the benefits of reducing health inequalities are examined, by estimating what benefits might result, if health inequalities were reduced or even eliminated in England.

There are few studies estimating the economic benefits of reducing health inequalities, or the cost of not doing so. The two most relevant studies are by Mackenbach et al[5] on the EU-25 countries and Dow and Schoeni[6] on the US. Mackenbach et al pursued two different approaches in measuring economic costs of health inequalities in one year, 2004: for the EU-25 as a whole the estimates of inequalities-related losses to health as a 'capital good' (leading to less labour productivity) seem to be modest when compared to other economic indicators (1.4% of the value of GDP) but large in absolute terms (€141 billion). They also valued health as a 'consumption good' – through the application of the concept of the value of a statistical life (VSL). From this more comprehensive perspective the economic impact of socioeconomic inequalities in health may well be large across the EU: in the order of about €1,000 billion, or 9.5% of the value of GDP. [1] Machenbach et al also separately estimated the impacts on costs of social security and health care systems and health care. Inequalities-related losses to health account for 15% of the costs of social security systems, and for 20% of the costs of health care systems in the European Union as a whole. It should, of course, be noted that the calculation

of GDP does not include health, so that this sum does not represent a valuation of the impact on GDP. Rather it sets the value of this 'consumption good' against the basket of economic activity that is included.

Dow and Schoeni applied the VSL approach to the US. They also found a large potential benefit of improving the health of disadvantaged Americans: raising the health of all Americans to that of college educated Americans would result in annual gains of just over 1 trillion dollars worth of increased health as of 2006.

This paper focuses on a number of different approaches, both the human and economic costs of:

- loss of life years
- loss of active life years
- the economic costs of lives lost
- the cost to the economy of loss of activity

2 Loss of years of life

Inequalities in *mortality* are only part of the overall *health* inequalities that exist between socioeconomic groups. However they provide a sound starting point for building up an estimate of the full benefits of reducing *health* inequalities. The size of socioeconomic inequalities in health depends, among others, on the socioeconomic indicator chosen. Here we present three approaches. Two are based on different socioeconomic status (SES) variables, occupational class (NS-SEC) and education.[1] The third is based on systematic neighbourhood differences in life expectancy by income deprivation.[2]

In each case potential reductions in the social gradient in health are identified and the value of the improvement this would represent in deaths avoided and extra population longevity is quantified. The economic benefits of each scenario are estimated using the value of a statistical life.

2.1 Occupational class

Using occupational class data available around the time of the 2001 Census in England and Wales, Mazzuco, Meggiolaro and Suhrcke [1] focused on deaths in a core set of working ages (ages 30-59), to avoid problems of misclassification. As a result, no estimate was made of premature deaths prevented at younger or older ages. Four of the scenarios they considered are presented here:

1. Improve mortality rates of routine classes, never worked and long term unemployed to the level of "semi-routine occupations" (NS-SEC 6)

2. Improve mortality rates of the above classes and all other classes contained in the broad grouping "routine and manual classes" to the level of "small employers and own account workers" (NS-SEC 4)
3. Reduce by half the difference between the mortality rates of the "higher managerial and professional" class (NS-SEC 1)and each of the other classes
4. Improve the mortality rates of all classes to that higher managerial and professional" class

Table 1 *Estimated number of premature deaths prevented and life years that could be saved under alternative scenarios based on occupational class (NS-SEC), persons aged 30-59 in England and Wales, 2003.*

	Scenarios for targeting mortality improvement			
	Improve mortality rates to NS-SEC 6 levels	Improve mortality rates to NS-SEC 4 levels	Halve mortality differences between each class and NS-SEC 1	Improve mortality rates to NS-SEC 1 levels
Potential premature deaths prevented at ages 30-59 in 2003	13,158	32,672	33,324	66,611
Potential years of extra lives lived among those dying at ages 30-59 in 2003	391,909	1,054,163	1,049,079	2,301,500

This suggests that if, under scenario 4 above, the mortality rates of all classes in this core working age group had been the same as the 'higher managerial and professional' class in England and Wales in 2003, around 67,000 fewer premature deaths in this age group would have taken place and a total of 2.3 million years of life potentially saved. On a proportionate basis, this equates to 62,000 fewer deaths and 2.2 million years if life potentially saved in England.

2.2 Education

A similar analysis of mortality was carried out by Mazzuco, Meggiolaro and Mazzuco, Meggiolaro and Suhrcke [1] based on educational qualification recorded in the Census – using data on education from the Office for National Statistics Longitudinal Study of England and Wales that had been supplied to the Eurothine project, an EU-wide effort to produce data on socioeconomic inequalities in health, see http://survey.erasmusmc.nl/eurothine/. In this analysis, attention was focused on those who are beyond normal ages of

attaining qualifications (aged 30 and over). Three of the scenarios examined are presented here:

1. Improve mortality level of people with no qualifications below A-level to that of the people with A-level;
2. Decrease by half the difference between the mortality rate of people with and without degree level qualifications
3. Improve the mortality level of all people to that of those with degree level qualifications.

Table 2 *Estimated number of premature deaths prevented and life years that could be saved under alternative scenarios based on historic levels of educational attainment, persons aged 30 and over*

	Scenarios for targeting mortality improvement		
	Improve mortality rates to rates of those with A-levels only	Halve mortality differences between each educational level and those with degrees	Improve mortality rates to rates of those with degrees
Potential premature deaths prevented at ages 30 and over each year	47,323	100,968	201,938
Potential years of extra lives lived among those dying each year at ages 30 and over	782,085	1,161,017	2,569,306

This suggests (scenario 3) that if the mortality level of all people was the same as for those with degree-level qualifications, 202,000 premature deaths would be prevented at ages 30 and over each year and 2.6 million years of life potentially saved. On a proportionate basis, this equates to around 2.5 million years of life for England.

2.3 Neighbourhood

Finally, scenarios were considered by Frontier Economics[2] that relate to improvement in the mortality rates of neighbourhoods. Specifically, this was done by considering potential reductions in life expectancy differences among middle level super output areas (MSOAs). While there is a strong relationship between deprivation of these areas and their life expectancy levels, there is also considerable variability between areas with the same level of deprivation (principally due to the region in which the area is located). For this reason, Frontier Economics considered two scenarios that did not remove the variability between areas with the same level of deprivation:

1. Improve life expectancy in the bottom half of the deprivation distribution to exactly match the life expectancy distribution of the top half
2. Improve life expectancy in the bottom ninety per cent of the deprivation distribution to exactly match the life expectancy distribution within the top ten per cent.

Table 3 *Estimated number life years that could be saved under alternative scenarios based on neighbourhood deprivation*

	Scenarios for targeting area life expectancy improvement	
	Improve LE to level of top 50 per cent of areas	Improve LE to level of top 10 per cent of areas
Potential years of extra lives lived among those dying in 2010	400,000	600,000
Potential years of extra lives lived among those born in 2010	800,000	1,300,000
Potential years of extra lives lived by everyone alive in 2010	58 million	98 million

This suggests that, under scenario 2, that if life expectancy we raised to the level of the least deprived ten per cent of neighbourhoods in England, there would be around 600,000 extra years of life lived among those who will die in 2010. The method also allows us to estimate the extra years that would be lived if all those born in 2010 experienced the current death rates in the 10 per cent of least deprived areas (1.3 million years) or if everyone currently alive experienced these more favourable death rates (98 million extra years).

3 Loss of healthy life years

This section focuses on years spent with a limiting long-term illness or disability. By applying the technique used in the previous example of neighbourhood's variation to disability free life expectancy, Frontier economics produced estimates of the extra years spent with a limiting long-term illness or disability by those in neighbourhoods in England with higher levels of deprivation[2]. For consistency, the same scenarios as those considered for life expectancy reduction were used. Clearly, the potential extra years of healthy life shown in Table 4 include the extra years lived shown in Table 3.

Table 4 *Estimated number life years that could be saved under alternative scenarios based on neighbourhood deprivation*

	Scenarios for targeting area life expectancy improvement	
	Improve LE to level of top 50 per cent of areas	Improve LE to level of top 10 per cent of areas
Potential extra healthy years of life among those born in 2010	2,500,000	4,100,000
Potential extra healthy years of life for everyone alive in 2010	171 million	285 million

This analysis suggests that if all those born in 2010 experienced the current rates of illness, disability and death seen in the 10 per cent of least deprived areas they would enjoy some 4.1 million extra years of healthy life. The comparable gain for everyone currently alive is 285 million years of healthy life.

4 The economic cost of years of life lost

Mazzuco, Meggiolaro and Suhrcke [1] identified a number of estimates of the VSL in the literature, including a growing number based on European labour market data. For example, one recent study, using surveys from France, Italy and the UK, estimated a VSL range of €1.052 to €2.258 million, with a life year valued between €55,000 and €142,000. These estimates are comparable to those from a 2006 study of German labour market data, which estimated the VSL at €1.9 million to €3.5 million, depending on the method of calculation.

These estimates are not too dissimilar from values that have been proposed and are being used in the UK. A seemingly well established VSL estimate has been derived by the Department for Transport: £1.25 million (in 2002 prices), based on 2002 road traffic data.[7] This value has been used, typically with a range of plus or minus 25 per cent around its central value, by the Home Office, HSE, Environment Agency, Food Standards Agency and other government bodies.[8]

With a number of simplifying assumptions it is possible to convert the VSL value into a Value of a Statistical Life *Year* (VoSLY) using the standard compound interest formulae and a discount rate of 3.5 per cent. In addition to the critical assumption that each year of life over the life cycle has the same value, this approach assumes that the VSL can be expressed as the present discounted value of these annual amounts. In practice, a number of factors are likely to lead to differences in how one values survival at different ages, e.g. changes in wealth levels, family responsibilities, health status, and other aspects of one's life cycle. For a critical discussion of these issues see for

example Hammitt.[9] For the UK VoSLY would be about £58,000 on this basis. To express future amounts in present value terms (see Dow and Schoeni[6]), a discount rate of 3.5% is used.

Using these figures the calculation of potential life years saved, shown in Tables 1-3, is presented in monetary terms in Tables 5-7 based on the respective calculations presented by Mazzuco, Meggiolaro and Suhrcke [1] and Frontier Economics.[2] The greatest part of these benefits are about the intangible economic value of life and health and, for this reason, they do not represent the value of potential savings.

Table 5 *Expected benefits (in* ***billion £)*** *associated with improved mortality under alternative scenarios, NS-SEC classification, persons aged 30-59 in England and Wales.*

	Scenarios for targeting mortality improvement			
	Improve mortality rates to NS-SEC 6 levels	Improve mortality rates to NS-SEC 4 levels	Halve mortality differences between each class and NS-SEC 1	Improve mortality rates to NS-SEC 1 levels
Expected economic benefit from premature deaths prevented at ages 30-59	42.2	118	117.6	273
Range	31.6 -52.7	88.5 – 147.5	88.2 – 147.0	204.8 – 341.2

Table 6 *Expected benefits (in billion £) associated with improved mortality under alternative scenarios, education classification, persons aged 30 and over in England and Wales.*

	Scenarios for targeting mortality improvement		
	Improve mortality rates to rates of those with A-levels only	Halve mortality differences between each educational level and those with degrees	Improve mortality rates to rates of those with degrees
Expected economic benefit from premature deaths prevented at ages 30-59	72.7	97.4	221.8
Range	54.5 – 90.9	73.0 – 121.7	166.5 – 277.3

In Tables 5 and 6, the range shown for each VoSLY estimate is based on +/- 25% of the mean value (i.e. £43,500 and £72,500).[1] Figures for England are approximately 94 per cent of those for England and Wales, on a pro rata basis.

Table 7 *Expected benefits (in billion £) associated with improved neighbourhood life expectancy under alternative scenarios*.

	Scenarios for targeting area life expectancy improvement	
	Improve LE to level of top 50 per cent of areas	Improve LE to level of top 10 per cent of areas
Expected economic benefit from extra years lived among those dying in 2010	20	36
Expected economic benefit from extra years lived among those born in 2010	2.2	3.5
Expected economic benefit from extra years lived by everyone alive in 2010	900	1,500

5 Cost to the economy of lost activity or illness

This section brings together several quantifiable dimensions of lost activity due to illness or disability. It draws on the work of Dame Carol Black's report,[10] analyses of the extra treatment costs borne by the NHS in England as a result of health inequalities[3] and work prepared for Foresight on the future costs of obesity.[4]

By comparing the current situation, with its considerable levels of inequality, with one in which everyone had the same health outcomes as the richest 10 per cent of the population in England, Frontier Economics estimated[2] that there are currently:

- Productivity losses of £31-33 billion per year
- Lost taxes and higher welfare payments in the range of £20-32 billion per year

Direct NHS healthcare costs in England associated with treating the consequences of inequality amount to £5.5 billion per year for treating acute illness and mental illness and prescriptions.[3] These activities represent

approximately one third of the NHS budget. In consequence, it is likely that the full impact of health inequalities on direct healthcare costs is considerably greater than this.

Taking an alternative approach, by modelling the costs of treating the various illnesses that result from inequalities in obesity this time in England and Wales, McPherson K and Brown[4] estimated that inequalities in obesity currently cost £2 billion per year, predicted to rise to nearly £5 billion per year in 2025. Separate estimates could be made for other risk factors for illness (such as lifestyle behaviours). However, there would be an element of double counting involved in trying to estimate too many separate risk factors for different illnesses.

6 Conclusion

These analyses, like others in this area,[5,6] do not measure the full social costs and benefits of particular policies and programs that could reduce health disparities. Equally, the scenarios are hypothetical. Nevertheless they clearly indicate the orders of magnitudes of the problems to be addressed when considering options that might help reduce health inequalities.

References

[1] Mazzuco S, Meggiolaro S and Suhrcke M (2009) Submission to the Marmot Review. www.ucl.ac.uk/gheg/marmotreview/Documents

[2] Frontier Economics (2009) Overall costs of health inequalities. Submission to the Marmot Review. www.ucl.ac.uk/gheg/marmotreview/Documents

[3] Morris S (2009) Private communication.

[4] McPherson K and Brown M (2009) Social class and obesity - effects on disease and health service treatment costs. Submission to the Marmot Review. www.ucl.ac.uk/gheg/marmotreview/Documents

[5] Mackenbach, J.P., W.J. Meerding, and A.E. Kunst. 2007. Economic Implications of Socio-economic Inequalities in Health in the European Union, Health and Consumer

[6] Dow W., Schoeni R. F. (2008). Economic Value of Improving the Health of Disadvantaged Americans. Technical Report for Overcoming Obstacles to Health: Report from the Robert Wood Johnson Foundation to the Commission to Build a Healthier America.

[7] Department for Transport's Highways Economics Notes, available at: http://www.dft.gov.uk/pgr/roadsafety/ea/ (last accessed 10/12/2009).

[8] HM Treasury (2005). Managing Risks to the Public: Appraisal Guidance.

[9] Hammitt J.K (2007) Valuing changes in mortality risk: lives saved vs. life years saved, Review of Environmental Economics and Policy 1 (2007), pp. 228–240.

[10] Black C (2008) Working for a healthier tomorrow. London: TSO. http://www.workingforhealth.gov.uk/documents/working-for-ahealthier-tomorrow-tagged.pdf.