Natural England Technical Information Note TIN055

An estimate of the economic and health value and cost effectiveness of the expanded WHI scheme 2009

The aim of the Walking the Way to Health Initiative (WHI) is to get more people walking, especially those who take little exercise or live in areas of poor health. The initiative has helped to create over 500 local health walk schemes. Green spaces are areas of natural or semi-natural land that are accessible to people. The aim of this note is to provide an assessment of the health value and economic benefits of the WHI scheme and of providing wide spread green space access.

Summary

Estimating economic values for public health interventions is problematic, but not impossible. Drawing on previous costing approaches by the National Institute for Health and Clinical Excellence (NICE) and others, this paper presents estimates of:

- the value of the expanded WHI programme for its duration; and
- the health value of universal provision of greenspace access.

It is important to note that the values presented in the paper are illustrative estimates based on assumptive models. Available data is limited and this prevents all costs and benefits from being included in the calculations.

The models gave the following illustrative estimates of value of the expanded WHI programme over the 3 year period:

- 2817 Quality Adjusted Life Years (QALY) delivered at a cost of £4008.98 per QALY.
- Savings to the health service of £81,167,864 (based on life-cost averted).
- A cost-benefit ratio of 1:7.18.

If the data was available that allowed for the full financial costs to be considered across the range of delivery partners, it is still highly likely that the models would show WHI to be cost-effective, with substantial life-cost averted savings and a high cost benefit ratio.

Recent work has shown that where people have good perceived and/or actual access to green space they are 24% more like to physically active. If this effect was universal and the population of England was afforded equitable good access to green space it is estimated that the life-cost averted saving to the health service could be in the order of £2.1 billion per annum.

As already mentioned these values are illustrative. Limitations of available data preclude inclusion of all costs and benefits associated with the expanded WHI programme.

Introduction

Even modest increases in physical activity can delay or even prevent the onset of recognised medical conditions (Warburton and others, 2006). However, attributing an accurate cost-benefit valuation from an increase in walking associated with a direct intervention such as the WHI is fraught with difficulties, not least a lack of cost data.

First edition 10 July 2009

www.naturalengland.org.uk

An estimate of the economic and health value and cost effectiveness of the expanded WHI scheme 2009

NICE (2006) modelled the cost effectiveness of physical activity interventions as a part of a review of four brief interventions (NICE, 2006a).

Despite the limitations of the available data the models consistently showed brief physical activity interventions to be cost effective.

Cost per QALY gained varied from £746.93 to £3,142.95. All were significantly less than the £30,000 ceiling normally applied by NICE when determining if an intervention is cost effective. WHI was one of the interventions examined in that review.

The health outcome value of walking interventions has been difficult to attribute mainly due to a lack of data about costs and actual physical activity. Nevertheless, estimates of the net costs and health outcome (that is, QALY) value of physical activity have been developed by a number of people including NICE (2006, 2006a, 2007), Wang and others (2005), Franco and others (2005), Tsuji and others (2003), Jones and Eaton (1994).

Based on their work this paper presents some estimates of cost-benefit and cost-effectiveness for two aspects of the Natural Health Service:

- the expanded WHI programme; and
- green space access.

Details of the expanded WHI programme

Natural England and the Department of Health (England) have joined in partnership to expand the WHI programme. The aim is to increase the number of regular walkers four-fold. In an attempt to achieve this a direct investment of £11.3 million will be made over three years, starting 2009.

Local partners engaged in delivery on-the-ground, eg Local Authorities and Primary Care Trusts, will make additional investments into local schemes. However, a lack of data about this has prevented estimates of these additional local investments being made and so they are not included in the value and cost effectiveness models.

The *Case for Investment* report (DH, 2009) forms the basis of figures for estimating the health value / benefit arising from the expanded programme.

It will take some time to achieve the four-fold increase in the number of walkers through expanding WHI. Table 1 and Figure 1 on page 5 show the predicted growth in the number of walkers over the 3 year expansion period. The net population participating in the expanded WHI programme is calculated from this growth pattern.

It is assumed that *participant turnover* will be balanced by continuous recruitment to achieve and maintain the desired four-fold increase, and that there will be programme fidelity. (Table 1 and Figure 1 on page 5).

It is recognised that this is not an entirely realistic picture of the WHI population behaviour. However, it represents a reasonable proxy on which to base illustrative value and benefit estimates as it does not appear to overly inflate the population.

WHI: estimate of QALYs delivered over the 3 year period

QALY is a standardised unit of health outcome. It is used extensively in the UK as a means of expressing the health benefit from an intervention and to enable different interventions to be compared.

NICE use a £30,000 per QALY upper threshold for cost effectiveness assessment.

It is assumed that participants attend weekly walks and that this is an additional physical activity, not a substitute. The QALY gained from the physical activity is calculated using figures from NICE (2007). These are shown in Appendix A on page 10.

QALY Model 1 Table 2 on page 6 shows the calculation for QALY Model 1.

This assumes that all participants do one additional physical activity event per week and adhere to the programme for the duration.

An estimate of the economic and health value and cost effectiveness of the expanded WHI scheme 2009

Over the 3 year period of the WHI expansion 2817 QALY would be delivered at a cost of £4008.98 per QALY.

QALY Model 2 Table 3 on page 7 shows the calculation for QALY Model 2.

This assumes that 20% of the participants do two additional physical activity events per week and 80% one additional physical activity event.

Over the 3 year period of the WHI expansion 3382 QALY would be delivered at a cost of £3340.81 per QALY.

Both models produce values that are well below the NICE cost-effectiveness threshold and these are also consistent with estimates from other authors.

Estimates of life-costs averted by expanded WHI over 3 year period

Life-cost averted is effectively what the National Health Service save by not having to treat illness.

For this paper the life-cost averted model is based on three health conditions for which the prevalence in the general population and the annual cost per person of treatment are known (NICE, 2006). These are:

- cardio-vascular heart disease (CHD);
- stroke; and
- type 2 diabetes.

The model assumes that WHI participants are representative of the general population, and that they adhere to the programme of physical activity.

Table 4 on page 8 shows that the annualised cost-averted saving increases with increasing participation. The model estimates that the cumulative life-cost averted saving to the health service will be £81,167,864 over the 3 year period.

This level of life-cost saving gives a cost-benefit ratio of 1:7.18. In other words for every £1 invested in the WHI programme £7.18 worth of health benefit is delivered. This ratio is consistent with other public health estimates of cost-benefit.

Table 5 on page 9 shows the application of Wang (2005) cost-benefit ratio which yields the annualised figure of £11.07 billion.

Table 6 (page 9) also calculates the annualised cost-benefit of the WHI programme but using the standardised cost-benefit adjusted for a number of physical activity events (NICE, 2007). This model yields a cost-benefit of £28,206,728.53 per annum.

The Wang and standardised cost-benefit models assume a constant participatory population, and both are too simple. However, they confirm that the magnitude of the benefit derived through the life-cost averted model is consistent with other valuations.

Estimate of the life-costs averted by improving and increasing access to green spaces

Recent work has shown that where people have good perceived and/or actual access to green space they are 27% more like to be physically active (Hillsdon and others, in press; Coombs and others, in press). Tsuji (2003) showed the medical cost saving per capita of people walking an hour a day, for example, as part of their journey to work.

Taking these pieces of information, a life-cost averted saving to the health service arising from universal and equitable access to green space has been calculated assuming that:

- Everyone behaves in a similar manner.
- Everyone's health outcome benefits equally.
- All things being equal 24% of the population would increase their level of physical activity to recommended levels through access to green space (based on Coombs and others, in press).

Table 7 on page 10 shows the simple model of life-cost averted saving under this greenspace scenario. The model shows a potential life-cost averted saving of £2.119 billion per annum. The

figure for the total population cost saving (£8.8 billion) is consistent with estimates of the cost of physical inactivity (DH, 2004).

Further information

Walking the Way to Health Initiative website - **http://www.whi.org.uk/**

Natural England Technical Information Notes are available to download from the Natural England website: **www.naturalengland.org.uk**.

For further information contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**.

Author and contributors

This Technical Information Note was written by Dave Stone, Natural England Principal Specialist, Environment and Human Health. Contributor Judith Hanna Principal Specialist Social Science. Editor Susie Smith, Technical Information Services.

References

COOMBS, E., JONES, A. HILLSDON, M. (in press): *Objectively measured green space access, green space use, physical activity and overweight.* Department of Health (2004): Choosing Health White Paper. HMSO, London

Department of Health (2009): *Case for Investment: Walking the Way to Health - Final Report* March 2009.

FRANCO OH, de LAET C, PEETERS A, JONKER J, MACKENBACH J, NUSSELDER W. (2005) Effects of physical activity on life expectancy with cardiovascular disease. *Archives of Internal Medicine 2005 Nov 14: 165* (20): 2355 - 60

JONES, T.T. AND EATON, C.B. (1994): Cost-benefit analysis of walking to prevent coronary heart disease. *Archives of Family Medicine 1994;3*(8): 703 - 710.

HILLSDON, M., COOMBS, E., JONES, A.,(in press) *Perceived green space access, green space use, physical activity and overweight*

National Institute for Health and Clinical Excellence (NICE) (2006): *Modelling the cost effectiveness of physical activity interventions*. **www.nice.org.uk**

National Institute for Health and Clinical Excellence (NICE) (2006a): PH002: *Four commonly used methods to increase physical activity: brief interventions in primary care, exercise referral schemes, pedometers and community-based exercise programmes for walking and cycling*. NICE, London. **www.nice.org.uk**

National Institute for Health and Clinical Excellence (NICE) (2007): *An economic analysis of environmental interventions that promote physical activity*: PDG Report. NICE, London. **www.nice.org.uk**

TSUJI, I. TAKAHASHI, K. NISHINO, Y. TAKAYOSHI, O. KURIYAMA, S. WATANABE, Y. ANZAI, Y. TSUBONO, Y., and HISMICHI, S. (2003): Impact of walking upon medical care expenditure in Japan: *the Ohsaki cohort study. Int. J. Epidemiology 2003*: 32: 809 - 814.

WANG, G., MACERA, C., SCUDDER-SOUCIE, B., SCHMID, T., PRATT, M., and BUCHNER, D. (2005): A cost-benefit analysis of physical activity using bike / pedestrian trails. *Health Promotion Practice 6(2): 174-179*.

WARBURTON, D.E.R., NICOL, C.W., & BREDIN, S.S.D., (2006): Health benefits of physical activity: the evidence. *CMAJ 2006; 174*(6): 801-09.

Table 1 Number of people assumed participating in 1 physical activity (WHI) session over the expanded programme period

Time (6 month periods)	No of regular walkers
0	33000
0.5	33000
1	66000
1.5	99000
2	132000
2.5	132000
3	132000

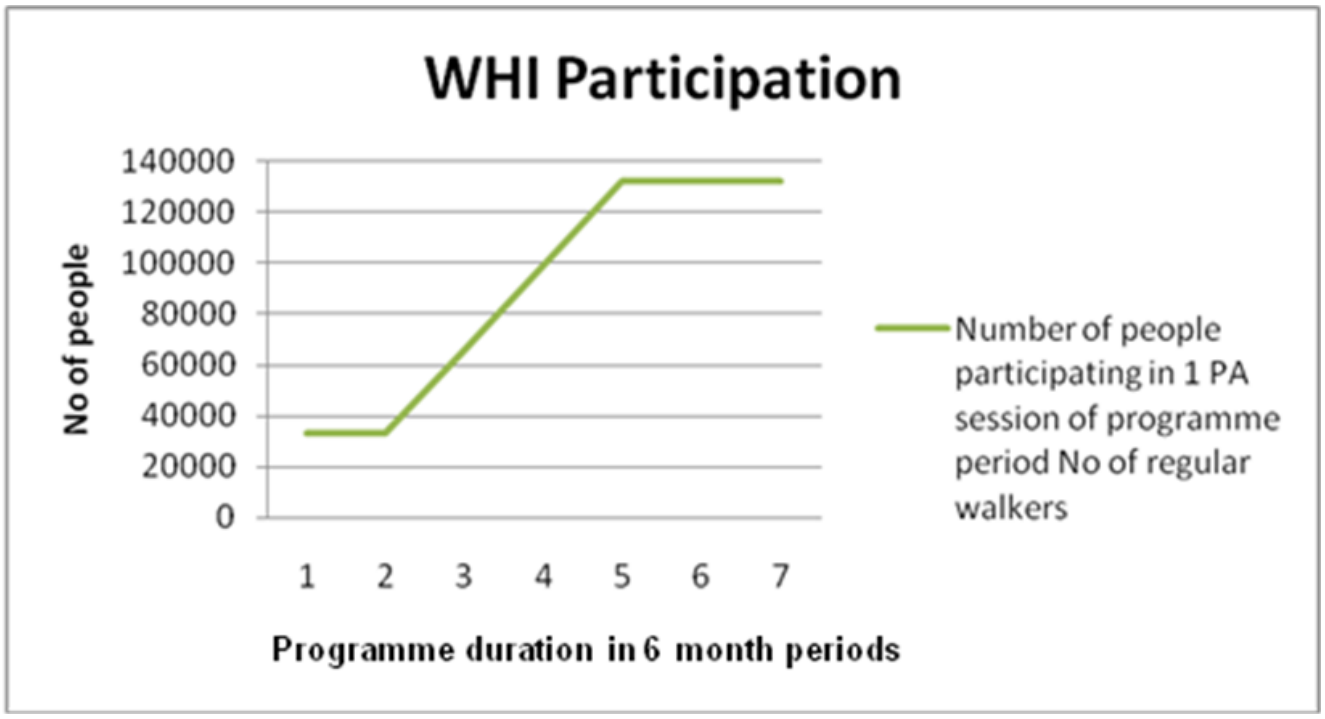

Figure 1 Number of people assumed participating in 1 physical activity (WHI) session over the programme period

Table 2 QALY gains and cost from participation in 1 WHI event per week

	No of participants		
Yrs of Activity	Year 1 Cohort	Year 2 cohort	Year 3 cohort
1			33000
2		66000	
3	33000		
QALY gained	0.0320304	0.0213536	0.010677
Total QALY addition from WHI participation	1057.0032	1409.3376	352.3344
Total Additional QALY delivered by WHI expansion	**2818.6752**		
Programme Cost	£11,300,000.00		
Cost per QALY	**£4,008.98**		

Table 3 QALY gains and cost from 80% participation in 1 physical activity event per week, and 20% participation in 2 physical activity events

	No of participants doing 1 physical activity events		
Yrs of Activity	Year 1 Cohort	Year 2 cohort	Year 3 cohort
1			26400
2		52800	
3	26400		
QALY gained	0.0320304	0.0213536	0.010677
QALY addition from WHI participation	845.60256	1127.47008	281.8675

	No of participants doing 2 physical activity events		
Yrs of Activity	Year 1 Cohort	Year 2 cohort	Year 3 cohort
1			6600
2		13200	
3	6600		
QALY Gained	0.064061	0.042707	0.021354
QALY addition from WHI participation	422.8026	563.7324	140.9364

Total Additional QALY delivered by WHI expansion	**3382.41156**
Programme Cost	£11,300,000.00
Cost per QALY	**£3,340.81**

Table 4 Annualised life-cost averted for 3 years of WHI

Year 3				
	Prevalence in population	WHI Cohort prevalence	Cost/ person/year	Total per annum saving
CHD	0.043	5676	£2,205.00	£12,515,580.00
Stroke	0.0251	3313	£3,010.00	£9,972,732.00
Type 2 diabetes	0.0369	4871	£3,225.00	£15,708,330.00
				£38,196,642.00
Year 2				
	Prevalence in population	WHI Cohort prevalence	Cost/ person/year	Total per annum saving
CHD	0.043	4257	£2,205.00	£9,386,685.00
Stroke	0.0251	2485	£3,010.00	£7,479,549.00
Type 2 diabetes	0.0369	3653	£3,225.00	£11,781,247.50
				£28,647,481.50
Year 1				
	Prevalence in population	WHI Cohort prevalence	Cost/ person/year	Total per annum saving
CHD	0.043	2129	£2,205.00	£4,693,342.50
Stroke	0.0251	1242	£3,010.00	£3,739,774.50
Type 2 diabetes	0.0369	1827	£3,225.00	£5,890,623.75
				£14,323,740.75
		Total Cost averted over 3 year period		**£81,167,864.25**

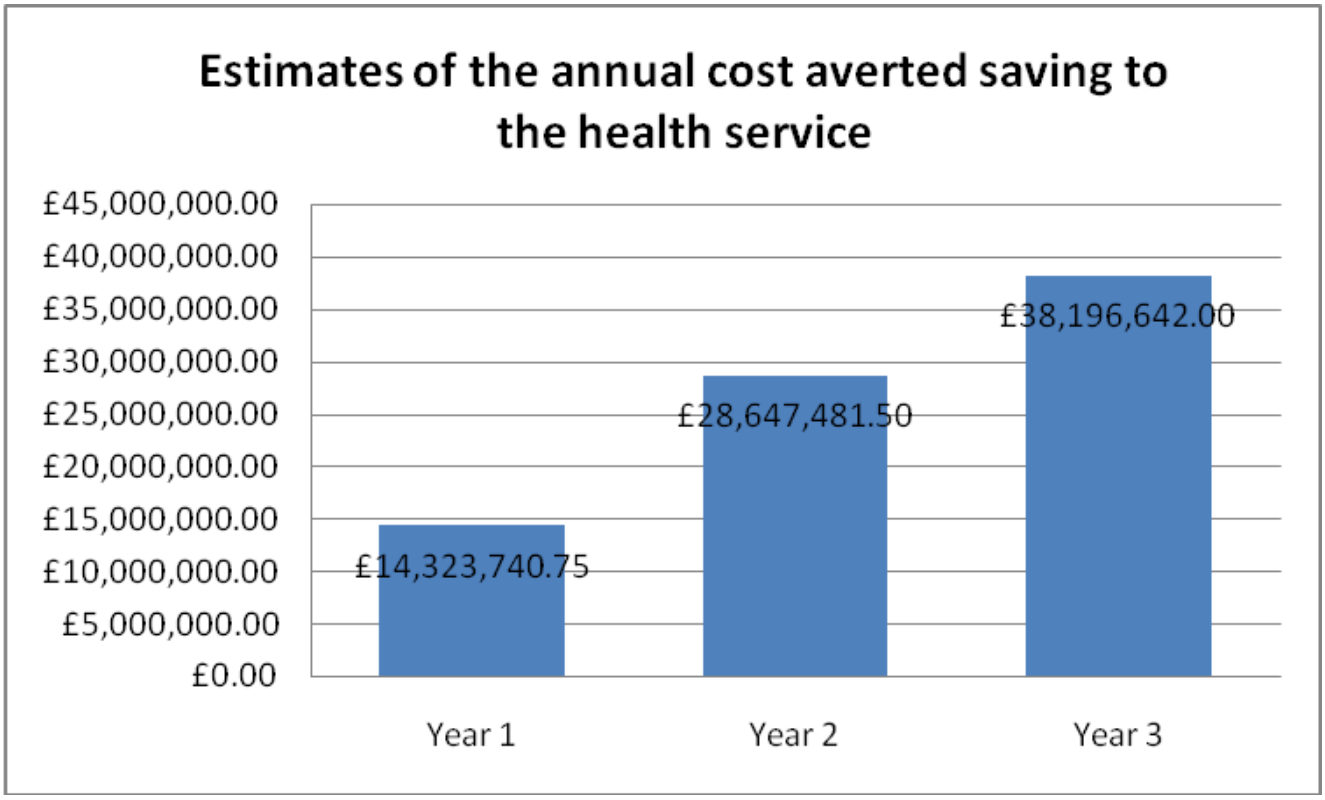

Figure 2 Annualised life-cost saving to the health service from the expanded WHI programme

Table 5 Estimate of WHI cost benefit using Wang (2005) ratio

Ratio	**2.94**
Proportion of health benefit	1.00%
Annual WHI Programme cost	£3,766,666.67
Value of annual health benefit	£11,074,000.00

Table 6 Standardised cost benefit based on 50 physical activity episodes per annum

Ratio	**11.36**
Proportion of health benefit	65.92%
Annual Programme cost	£3,766,666.67
Value of health benefit	£28,206,728.53

Table 7 Life-cost averted saving through increasing walking across the population through access to greenspace

Est. pop of England 2009	**50762000**
Tsuji - monthly cost saving	£14.50
Tsuji annualised	£174.00
Total pop cost saving	£8,832,588,000.00
Cost saving assuming 24% likelihood of Physical Activity with green space access	£2,119,821,120.00

Appendix A QALY gains from additional sessions of physical activity (NICE, 2007,p23)

Time (years)	**Total QALYs (100% compliance)**				
	1 session per week	**2 sessions per week**	**3 session per week**	**4 sessions per week**	**5 session per week**
1	0.0106768	0.021354	0.03203	0.042707	0.053384
2	0.0213536	0.042707	0.064061	0.085414	0.106768
3	0.0320304	0.064061	0.096091	0.128122	0.160152
4	0.0427072	0.085414	0.128122	0.170829	0.213536
5	0.053384	0.106768	0.160152	0.213536	0.26692
6	0.0640608	0.128122	0.192182	0.256243	0.320304
7	0.0747376	0.149475	0.224213	0.29895	0.373688
8	0.0854144	0.170829	0.256243	0.341658	0.427072
9	0.0960912	0.192182	0.288274	0.384365	0.480456
10	0.106768	0.213536	0.320304	0.427072	0.53384
11	0.1174448	0.23489	0.352334	0.469779	0.587224
12	0.1281216	0.256243	0.384365	0.512486	0.640608
13	0.1387984	0.277597	0.416395	0.555194	0.693992
14	0.1494752	0.29895	0.448426	0.597901	0.747376
15	0.160152	0.320304	0.480456	0.640608	0.80076
16	0.1708288	0.341658	0.512486	0.683315	0.854144
17	0.1815056	0.363011	0.544517	0.726022	0.907528

Table continued...

Time (years)	Total QALYs (100% compliance)				
18	0.1921824	0.384365	0.576547	0.76873	0.960912
19	0.2028592	0.405718	0.608578	0.811437	1.014296
20	0.213536	0.427072	0.640608	0.854144	1.06768
21	0.2242128	0.448426	0.672638	0.896851	1.121064
22	0.2348896	0.469779	0.704669	0.939558	1.174448
23	0.2455664	0.491133	0.736699	0.982266	1.227832
24	0.2562432	0.512486	0.76873	1.024973	1.281216
25	0.26692	0.53384	0.80076	1.06768	1.3346
26	0.2775968	0.555194	0.83279	1.110387	1.387984
27	0.2882736	0.576547	0.864821	1.153094	1.441368
28	0.2989504	0.597901	0.896851	1.195802	1.494752
29	0.3096272	0.619254	0.928882	1.238509	1.548136
30	0.320304	0.640608	0.960912	1.281216	1.60152