

Costing the burden of ill health related to physical inactivity for Scotland

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August 2015

Commissioned by

British Heart Foundation

The Cost of Physical Inactivity to Scotland

Based on research commissioned by the British Heart Foundation

These figures do not include the costs of conditions including dementia and mental health issues



Physical Inactivity costs the NHS in Scotland

~£77 million p/a

equating to a cost of £14.60 per person!

The Cost of the Big 5

per year due to physical inactivity

Coronary Heart Disease

£25 million



Diabetes

£15 million



Cerebrovascular Disease

£15 million



Gastro Intestinal Cancer

£12 million



Breast Cancer

£9.5 million



Sector Expenditure

per year due to physical inactivity



Acute Services

£44 million



Pharmaceutical Services

£11 million



General Medical Services

£7.5 million



Geriatric Long Stay

£5 million



A&E and Outpatients

£3 million

Coronary Heart Disease costs equate to

32%

of all the costs incurred due to physical inactivity



The cost per person in Scotland for physical inactivity is more than **£1** higher than England

Acute & Pharmaceutical Services combined accounted for

90%

of the total costs to the NHS



British Heart Foundation Centre on Population Approaches for NCD Prevention



WHO Collaborating Centre
on Population Approaches for Non-Communicable Disease Prevention

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INTRODUCTION

The UK analysis of the Global Burden of Diseases, Injuries and Risk Factors Study found physical inactivity and low physical activity to be the fourth most important risk factor in the UK. They estimated that physical inactivity contributes to almost one in ten premature deaths (based on life expectancy estimates for world regions) from coronary heart disease (CHD) and one in six deaths from any cause¹.

Although the introduction of new PA recommendations in 2011², the first to be released by CMOs from all UK countries, meant that a greater proportion of adults were achieving recommended levels of physical activity, the Scottish Health Survey data show no overall change between 2008 and 2012 in the percentage of adults reaching recommended levels using the new more flexible recommendations³ (Table 1).

Table 1 Adults meeting the 2011 physical activity recommendations, by age and gender, Scotland 2008 to 2012

	All adults	16-24	25-34	35-44	45-54	55-64	65-74	75+
	%	%	%	%	%	%	%	%
Men								
2008	62	77	77	73	64	51	37	21
2009	62	78	74	70	62	56	41	23
2010	62	81	78	68	63	54	40	19
2011	62	80	79	73	65	49	40	21
2012	63	80	72	72	65	57	43	21
Women								
2008	55	68	65	65	62	53	40	12
2009	55	63	67	67	64	52	36	15
2010	54	62	66	69	63	52	35	14
2011	54	65	67	65	61	51	36	13
2012	53	65	62	66	61	50	41	13

As sedentary behaviour is not simply a lack of physical activity, the association between physical inactivity (PiA) and health has been found to be independent of the level of overall physical activity^{4,5,6,7}. This means that even among individuals who are active at the recommended levels, spending large amounts of time sedentary may increase risk of some adverse health outcomes.

As well as the health burden of PiA, there is also a cost burden in treating diseases related to, or arising from, inactivity. Estimates calculated in 2012 suggested that treating the diseases related to PiA cost the NHS in Scotland around £90 million per year, equating to around £18 per person per year. However, data used to calculate these estimates came from a series of sources and used old population attributable fractions (PAFs) which have now been updated. The Scottish NHS released programme budgeting data for the first time in 2015. The programme budgeting data return is an analysis of commissioning expenditure by healthcare condition (such as circulatory diseases) and care setting (for example, pharmaceutical or acute services). It provides commissioner-level analysis of NHS expenditure on specific healthcare conditions. Estimates of expenditure are calculated using the price paid for specific activities and services purchased from healthcare providers. Although this does not include total NHS expenditure, around 80% of planned NHS funding is allocated in this way. Within this study we have used these data along with updated PAFs to provide a more contemporary estimate on the cost to the NHS in Scotland in treating ill health due to PiA.

The estimates provided here are a starting point in understanding the cost of physical inactivity in Scotland as a result of treating these adverse health outcomes. The five disease areas used in this estimate contribute a smaller proportion than the true total value of disease related physical inactivity. Other important NHS disease areas were not included in this estimate due to a lack of population attributable fractions. These include obesity, musculoskeletal health, mental health and functional health, amongst others. We were also unable to take account of indirect costs and only consider those to the NHS in Scotland allocated to Primary Care Trusts in 2011/12.

METHODS

The cost data for this analysis were taken from the 2011/12 Programme Budgeting data for Scotland released by NHS Scotland in 2015. The dataset provides national level expenditure, allocated to disease subgroups.

The diseases defined by the WHO as having some relation to physical inactivity are coronary heart disease (CHD), cerebrovascular disease, breast cancer, lower gastrointestinal (GI) cancer and diabetes mellitus. By applying Population Attributable Fractions (PAFs) for PiA to these we can estimate costs of these diseases that are from inactivity.

Although many other diseases are associated with PiA, a lack of PAFs for them mean that they cannot be included within this estimation. PAFs quantify the contribution of a risk factor to a disease or a death. PAF correspond to the proportional reduction in population disease or mortality that would occur if exposure to a risk factor were reduced to an alternative ideal exposure scenario (e.g. no tobacco use or no overeating of animal fats in diets). Many diseases are caused by multiple risk factors, and individual risk factors may interact in their impact on overall risk of disease. As a result, PAFs for individual risk factors often overlap and add up to more than 100 per cent. PAFs express the amount and relative contribution of a risk factor to overall disease levels. The PAFs used in this estimation were calculated using conservative assumptions to estimate how much disease could be averted if PiA in Scotland were eliminated i.e. if activity levels of all individuals reached recommended levels⁸. This was done for all diseases described above (IHD, diabetes, breast cancer and lower GI cancer) except for cerebrovascular disease for which old PAFs, calculated at the EUR-A region in 2002, were used as UK level PAFs were not available.

The formulae for calculation of a PAF is presented for illustration below.

$$PAF = \frac{\sum_{i=1}^n P_i RR_i - \sum_{i=1}^n P'_i RR_i}{\sum_{i=1}^n P_i RR_i}$$

P_i = proportion of population at exposure level i, current exposure

P'_i = proportion of population at exposure level i, counterfactual or ideal level of exposure

RR = the relative risk at exposure level i

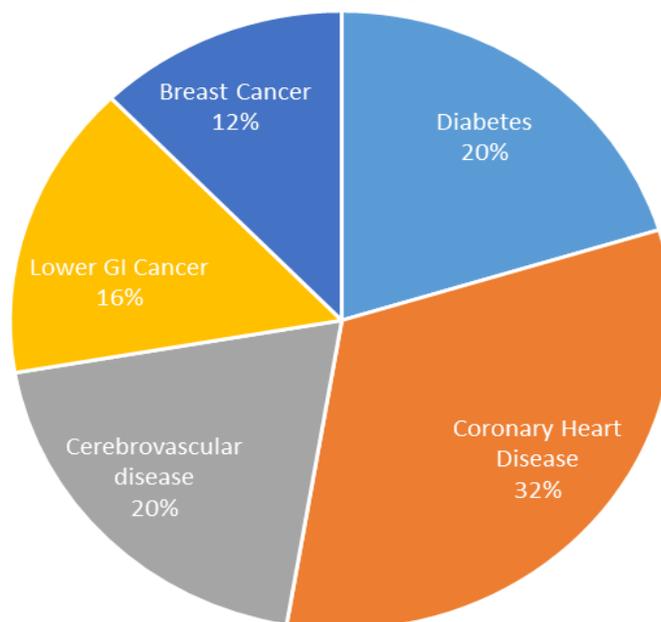
n = the number of exposure levels

Calculations were performed in STATA 11 SE.

RESULTS

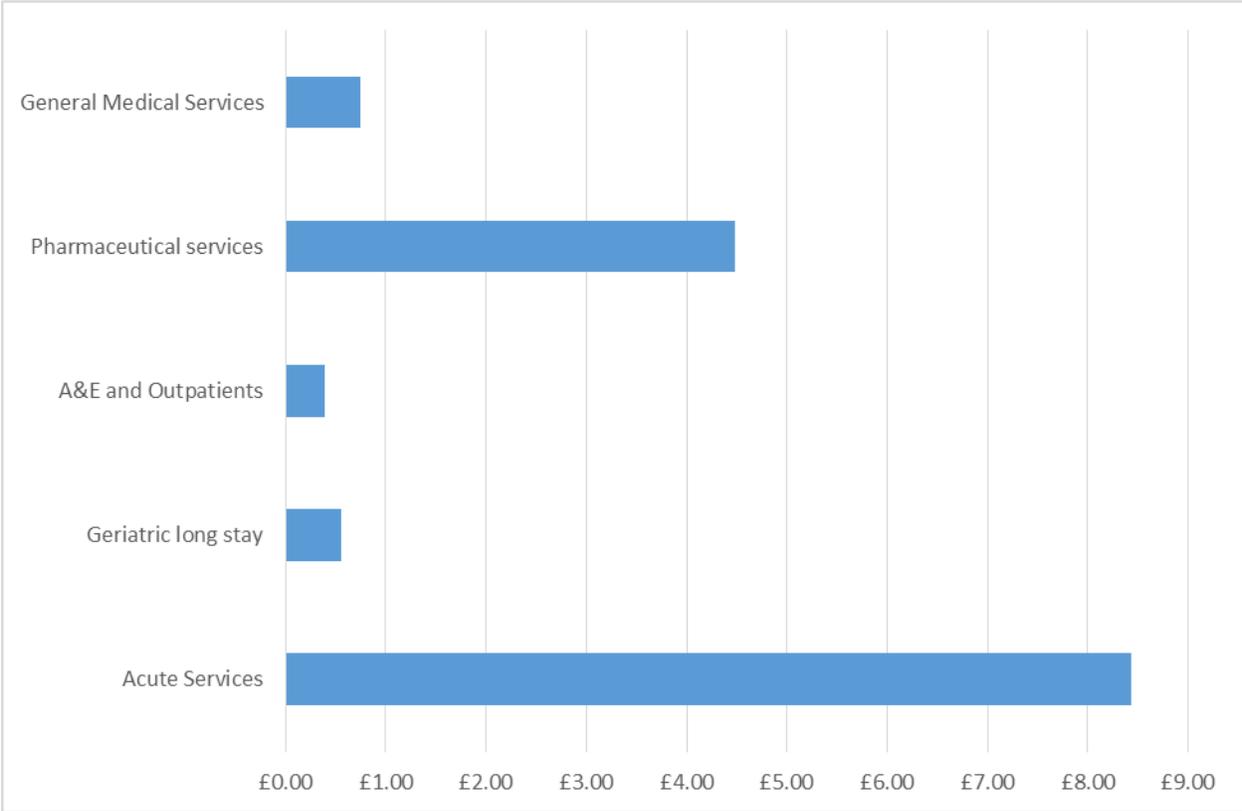
Using the most recent PAFs and 2011/12 data, PiA was found to cost the NHS in Scotland close to £77 million for that year, equating to £14.60 per person. The disease category with the highest expenditure due to PiA was Coronary Heart Disease (CHD), with a total cost of £25 million, around £4.73 per person, equating to nearly one third of all the costs due to PiA (32%). cerebrovascular disease and diabetes both cost around £15 million per year, 20% of total PiA costs, with lower GI cancer costing just under £12 million (16%), and breast cancer £9.5 million (12%) (Tables 2 and 3, Figure 1).

Figure 1 Percentage of costs of PiA by disease subgroup, Scotland 2011/12



Acute Services was the health care sector which had the highest expenditure due to PiA, £44 million, more than half of the total PiA costs, equating to £8.43 per person in Scotland. Around £12.6 million of the costs in Acute Services came from treating CHD, with just over £11 million spent on cerebrovascular disease and lower GI cancer. Although the cost of treatment of diabetes in Acute Settings was relatively low, around £2 million, more than £11 million was spent on treating PiA related diabetes through Pharmaceutical services, more than £2 per person. Together with CHD (£10.2 million, £1.93 per person) this accounted for around 90% of the costs of PiA in Pharmaceutical Services, the care setting with the second highest cost of PiA in the NHS in Scotland (Tables 2 and 3, Figure 2).

Figure 2 Cost per person in Scotland of PiA, by health sector, 2011/12



These two care settings (Acute Services and Pharmaceutical services) accounted for close to 90% of the total costs to the NHS of PiA.

Table 2 Total costs of physical inactivity in Scotland, 2011/12

Condition		All Services	Hospital Sector			Total Hospital Sector	Family Health Services		Total Family Health Services
			Acute Services	Geriatric long stay	A&E and Outpatients		Pharmaceutical services	General Medical Services	
Diabetes		£15,688,526.36	£2,124,558.41	£66,830.92	£196,265.16	£2,387,654.49	£11,211,605.60	£2,089,266.27	£13,300,871.87
Coronary Heart Disease		£25,069,139.09	£12,698,782.99	£307,620.54	£903,407.82	£13,909,811.36	£10,244,068.16	£915,259.57	£11,159,327.73
Cerebrovascular disease		£15,177,970.43	£11,215,198.46	£2,181,540.41	£564,165.75	£13,960,904.62	£411,816.62	£805,249.19	£1,217,065.81
Lower GI Cancer		£11,975,586.16	£11,351,062.98	£219,065.97	£338,687.52	£11,908,816.48	£3,280.31	£63,489.37	£66,769.69
Breast Cancer		£9,470,542.15	£7,280,086.63	£174,982.17	£56,185.13	£7,511,253.94	£1,882,243.09	£77,045.12	£1,959,288.22
Total		£77,381,764.19	£44,669,689.48	£2,950,040.02	£2,058,711.38	£49,678,440.88	£23,753,013.79	£3,950,309.52	£27,703,323.31

Table 3 Costs of physical inactivity per head of population in Scotland, 2011/12

Condition		All Services	Hospital Sector			Total Hospital Sector	Family Health Services		Total Family Health Services
			Acute Services	Geriatric long stay	A&E and Outpatients		Pharmaceutical services	General Medical Services	
Diabetes		£2.96	£0.40	£0.01	£0.04	£0.45	£2.12	£0.39	£2.51
Coronary Heart Disease		£4.73	£2.40	£0.06	£0.17	£2.62	£1.93	£0.17	£2.11
Cerebrovascular disease		£2.86	£2.12	£0.41	£0.11	£2.63	£0.08	£0.15	£0.23
Lower GI Cancer		£2.26	£2.14	£0.04	£0.06	£2.25	£0.00	£0.01	£0.01
Breast Cancer		£1.79	£1.37	£0.03	£0.01	£1.42	£0.36	£0.01	£0.37
Total		£14.60	£8.43	£0.56	£0.39	£9.37	£4.48	£0.75	£5.23

DISCUSSION

Using the most recent cost data, PiA is estimated to cost the NHS in Scotland more than £77 million per year, around £14.60 per person living in the country. Although this is less than cost estimates calculated in 2012, these are not comparable as data sources used in the two reports are very different. The cost estimates presented here should provide a more accurate estimate.

It should also be recognised that updated PAFs, used here, are lower than in previous estimates for some disease groups. The methods used to develop previous estimates were based on PAFs calculated by the WHO in 2002^{9,10}. These PAFs are based on broad WHO regions (specifically the EUR-A region of developed European countries with very low child and adult mortality) and as such they may not accurately represent the picture in Scotland. PAFs must take account of the underlying prevalence of a risk factor within a population (since, for example, in a population with zero smokers, none of the CHD could be attributable to smoking), and the use of WHO regional PAFs will therefore affect the accuracy of these estimates. In this report, estimates were calculated using new UK specific PAFs for all conditions except cerebrovascular disease, for which no update was available. Although these PAFs are higher than those previously used for breast and colon cancer, they are lower for CHD and diabetes, resulting in lower cost estimates overall. Again these UK PAFs may not be an accurate reflection of the relationship between PiA and ill health in Scotland, as we know that mortality in many of these diseases (e.g. CHD and Cerebrovascular disease) are greater in Scotland than the other UK countries. However, they should provide a more accurate estimate than previously published PAFs.

Although data for other countries is not available for 2011/12, in England in 2010/11 PiA costs equated to £11.72 per person. This suggests that although PiA cost data for 2011/12 in England are not available, the cost per person in Scotland for PiA is more than £1 per person higher than England, equating to an additional total cost of greater than £5 million when considered at a national level. It should also be noted that estimates for the cost of PiA in England have reduced in recent years, with estimates for PiA expenditure in the NHS in England in 2012/13 around

£11.72 per person. Comparing between countries can be difficult, however, due to data collection differences.

It should also be noted that PAFs are only available for certain diseases and therefore not all diseases related to PiA can be included, in particular costs of conditions such as dementia, whose burden in the UK is growing rapidly, have not been possible. If PAFs were available for all disease categories related to PiA the estimated costs of PiA to Scotland would likely be substantially higher, so those cost estimates presented here must be taken as an indication of the cost of PiA from those diseases only.

Similarly it should also be noted that reducing costs of PiA may occur as a result of the treatment of the diseases associated with it, rather than improvements in PA across the country. For example, although trend data in Scotland is not available, programme budgeting data show a decrease in the cost of CHD and cerebrovascular disease to the NHS in England in the last few years. Although this may be partly as a result of decreasing incidence, it will also be due to cheaper treatment options with preventive drugs coming out of patent and the use of cheaper surgical interventions increasing, such as percutaneous coronary interventions (PCIs), in the place of more costly procedures such coronary artery bypass grafts (CAGBs).

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