EXPLANATORY MEMORANDUM TO

THE PROTECTION FROM TOBACCO (SALES FROM VENDING MACHINES) (ENGLAND) REGULATIONS 2010

2010 No. XXXX

1. This explanatory memorandum has been prepared by the Department of Health and is laid before Parliament by Command of Her Majesty.

2. Purpose of the instrument

2.1 The Protection from Tobacco (Sales from Vending Machines) (England) Regulations 2010 ("the Regulations") prohibit the sale of tobacco from vending machines. The regulations are part of ongoing work to reduce children and young people's access to tobacco. The Regulations specify who would be responsible for a breach of the Regulations and that the Regulations will come into force on 1st October 2011.

3. Matters of special interest to the Joint Committee on Statutory Instruments

3.1 None

4. Legislative Context

4.1 This instrument is the first use of the power given to the Secretary of State by the new section 3A of the Tobacco Advertising and Promotion Act 2002 (c.23), inserted by section 22 of the Health Act 2009 (c.21). Section 22 came into force for the purpose of making regulations on the day on which the Health Act 2009 obtained Royal Assent (12 November 2009). The new section 3A of the 2002 Act allows the appropriate Minister (in England, the Secretary of State for Health) to make provision prohibiting the sale of tobacco from an automatic machine in England and Wales. A similar provision was created for Northern Ireland by section 23 of the Health Act 2009.

4.2 The Health Act 2009 created a number of other new regulation-making powers in relation to tobacco (concerning prohibition of tobacco displays, special provisions for specialist tobacconists, and provisions for restricting the display of tobacco product price lists). The Secretary of State for Health intends to make regulations under these powers in early 2010; one of these other sets of regulations (on restricting the display of tobacco product price lists) is also subject to the affirmative procedure. The remaining two (on prohibition of tobacco displays and special provisions for specialist tobacconists) are subject to the negative procedure.

4.3 A draft of the Regulations was notified to the European Commission under the Technical Standards and Regulations Directive.

4.4 The Health Bill as introduced into Parliament contained a version of section 3A of the Children and Young Persons (Protection from Tobacco) Act 1991 which provided for regulations to impose restrictions on the sale of tobacco from vending machines or to prohibit the sale of tobacco from vending machines. During Report Stage in the House of Commons, an amendment was passed which narrowed the power so that the only possible exercise of the power is to prohibit the sale of tobacco from vending machines. The debate relating to the amendment can be found in Hansard at:
http://www.publications.parliament.uk/pa/cm200809/cmhansrd/cm091012/debtext/91012-0016.htm

5. Territorial Extent and Application

5.1 The Regulations apply to England.

6. European Convention on Human Rights

6.1 The Minister for Public Health Gillian Merron MP has made the following statement regarding Human Rights:

"In my view the provisions of the Protection from Tobacco (Sales from Vending Machines) (England) Regulations 2010 are compatible with the Convention rights".

7. Policy background

- ***What is being done and why***

7.1 Protecting children from the health harms of smoking is a public health priority for the Government. There is evidence that in 2008, 12% of young people aged 11-15 who are regular smokers usually access cigarettes through vending machines (2008 is the latest data set). Removing this form of access to cigarettes for young people will assist our key public health priority of reducing smoking uptake amongst young people. With two thirds of smokers stating that they started smoking before the age of 18, the Government believes that preventing the uptake of smoking by young people is vital.

7.2 The National Association of Cigarette Machine Operators (NACMO) has had in place a voluntary code designed to limit the number of under age sales made from vending machines, for over 10 years. This has not achieved adequate results, as demonstrated by the proportion of young people still using tobacco vending machines and therefore the Government believes it is necessary to introduce these regulations.

7.3 The Regulations are designed to help prevent access to tobacco products by children. Adults will be able to buy tobacco from other sources.

8. Consultation Outcome

8.1 The Department of Health published a consultation document on 12 October 2009, seeking views on four sets of proposed regulations on tobacco control, including proposed regulations on tobacco vending machines; these were based on the vending machine provisions in the Health Bill at that time. The closing date for responses to this consultation was 4 January 2010. Following the amendment to those
primary provisions, a supplementary consultation document, dealing only with proposed regulations to prohibit the sale of tobacco from vending machines under the changed powers, was published on 12 November 2009. The closing date for responses to this supplementary consultation document remained the 4 January 2010. Proposed legislation on vending machines was also subject to a full 12 week public consultation in 2008.

8.2 The Department of Health carefully considered the need for full consultation on the revised regulations. The key question of whether to prohibit tobacco vending machines had been under debate for a long time, and detailed options were considered in the Department's "Consultation on the Future of Tobacco Control", published in May 2008. The arguments for and against a total prohibition of tobacco sales from vending machines were considered in detail during the debates on the Health Bill as it progressed through Parliament. Given the final version of the powers, the proposed regulations themselves are very brief and straightforward. The Department therefore considered that in these circumstances a shorter consultation period was sufficient to enable stakeholders to give the proposed regulations full consideration; it also considered that having a common end date for consultation on all the proposed tobacco control regulations would avoid any possible confusion that might arise from having two different deadlines.

8.3 Responses to the consultation were received from the tobacco vending machine industry, the wider tobacco industry and health NGOs. There were also some responses from individuals. No changes

were made to the Regulations on tobacco vending machines, in response to consultation, as there were not any comments made on the drafting of the regulations, only feedback from stakeholders on the principle of stopping the sale of tobacco from vending machines. This feedback was considered carefully by the Department of Health.

9. Guidance

The Regulations will not be the subject of separate guidance.

10. Impact

10.1 The impact on business, charities or voluntary bodies is:
These regulations will impact on independent tobacco vending businesses as once the Regulations are in force these businesses will no longer be able to carry out what is now their principal or only business, or use their machines in the same way as present. It is unlikely to have a large impact on the tobacco manufacturing and/or supply industry as sales from vending machines only represent 1% of tobacco sales in England.

10.2 The regulations impact on the public sector is:

The policy is intended to have a positive impact on the NHS due to the improved health of population as achieved by reduced smoking rates.

10.3 An Impact Assessment is attached to this memorandum. The impact assessment demonstrates the regulations result in a combined net benefit of £116 million.

11. Regulating small business

11.1 The legislation applies to small business.

11.2 To minimise the impact of the requirements on firms employing up to 20 people, the approach taken is to not commence the regulations until October 2011, which will allow businesses to prepare, and to consider diversification and adaptation.

11.3 The basis for the final decision on what action to take to assist small business was to comply with the Governments principles and policy on better regulations principles

12. Monitoring & review

12.1 The impact of the amendments made by the Regulations, will be kept under review by the Department of Health

13. Contact

13.1 Andrew Black at the Department of Health can answer any queries regarding the instrument.
Tel: 020 7972 2554 or
E-mail: andrew.black@dh.gsi.gov.uk

Summary: Intervention & Options		
Department /Agency: Department of Health	**Title:** Impact Assessment for a prohibition on the sale of tobacco from vending machines	
Stage: Final	**Version:** 7	**Date:** 27 January 2010
Related Publications: Health Act 2009 (c.21), *Cancer Reform Strategy* (2007), *Consultation on the future of tobacco control* (2008), *Consultation on proposed tobacco control regulations for England (under the Health Bill 2009)* (2009)		

Available to view or download at:

http://www.dh.gov.uk/tobacco

Contact for enquiries: Hannah Tait **Telephone:** 0207 972 1322

What is the problem under consideration? Why is government intervention necessary?

Smoking remains the main cause of preventable morbidity and premature death, accounting for over 80,000 deaths a year in England. It is a leading cause of health inequality and according to the National Institute for Health and Clinical Excellence (NICE), tobacco use is the primary reason for the gap in healthy life expectancy between rich and poor. Young people are uniquely vulnerable consumers, as they do not always have the capacity to make informed decisions, and society generally recognises this by providing greater protections for children than for adults. Nicotine addiction can develop extremely quickly in children. Two-thirds of smokers say they started smoking regularly before turning 18.

Government intervention is justified to prevent young people from accessing tobacco. The Government believes that children can too easily access tobacco from vending machines, and that action is necessary to prevent this. The current voluntary code of practice on the siting of tobacco vending machines to prevent underage access (the NACMO code of practice) has proved to be not sufficiently effective in restricting the access young people have to this source of tobacco.

What are the policy objectives and the intended effects?

The primary policy objective is to reduce smoking take-up, prevalence and/or the number of cigarettes smoked by under-18s, thus creating a future beneficial effect for public health. As some 12% of regular smokers aged 11 to 15 report that cigarette vending machines are a usual source of tobacco, further restricting access to these machines will contribute to this objective. A consequential benefit of the policy will be to create a more supportive environment for adults who are trying to quit smoking.

What policy options have been considered? Please justify any preferred option.

1. Retain the status quo, including the voluntary code of practice on the siting of vending machines.

2. Prohibit the sale of tobacco from vending machines.

The Health Act 2009 only provides regulation making powers to prohibit the sale of tobacco from vending machines. The Government remains concerned that vending machines continue to be an easy and often unsupervised source of tobacco from young people, and that the current voluntary code of practice has not achieved the intended effect of limiting access to tobacco from vending machines adequately.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects? Three years after the date of implementation of the policy, expected to be October 2014.

Ministerial Sign-off For final proposal Impact Assessments:

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.

Signed by the responsible Minister: ***Gillian Merron***

Date: ***27 January 2010***

Summary: Analysis & Evidence

Policy Option: 2	Description: Prohibit the sale of tobacco from vending machines

COSTS

ANNUAL COSTS	
One-off (Transition)	**Yrs**
£ 22m	0
Average Annual Cost (excluding one-off)	
£ 64m to £141m	

Description and scale of **key monetised costs** by 'main affected groups' Immediate one-off cost: £22m, the total value of UK cigarette vending machines (57,934 machines up to £375 each).

Annual costs: £38m to £114m annual opportunity cost of lost tobacco duty. £24m annual cost to legitimate smokers who no longer have the convenience of vending machines.

Total Cost (PV) **£ 542m to 1.2bn**

Other **key non-monetised costs** by 'main affected groups' Costs arising from the bringing forward of disposal costs for existing cigarette vending machines.

BENEFITS

ANNUAL BENEFITS	
One-off	**Yrs**
£ 0	
Average Annual Benefit (excluding one-off)	
£ 45m to £180m	

Description and scale of **key monetised benefits** by 'main affected groups' Health benefits to children of a reduction in cigarette consumption £20m to £100m per year.

Health benefits to adults of a reduction in smoking £25m to £80m per year

Total Benefit (PV) **£ 400m to £1.5 bn**

Other **key non-monetised benefits** by 'main affected groups' Reduced morbidity arising from reduced cigarette consumption.

Key Assumptions/Sensitivities/Risks Enforcement is fully effective. Benefits range is due to uncertainty on exactly how many young smokers and adult smokers would be affected, and what proportion of tobacco sales would transfer to other retail sources versus those that would be lost altogether.

Price Base Year 2008	Time Period Years 10	**Net Benefit Range** (NPV) **£ -145m to £378m**	**NET BENEFIT** (NPV Best estimate) **£ 116m**

What is the geographic coverage of the policy/option?			England	
On what date will the policy be implemented?			1 October 2011	
Which organisation(s) will enforce the policy?			Trading Standards	
What is the total annual cost of enforcement for these organisations?			£ 0	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			Yes	
What is the value of the proposed offsetting measure per year?			£ 0	
What is the value of changes in greenhouse gas emissions?			£ 0	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro **£0**	Small **£0**	Medium **£0**	Large **No firms.**
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Notice regarding Summary: Analysis and Evidence sheets: The 'average annual cost' and 'average annual benefit' boxes for option 2 take into account the lead-in period for the policy option. Additionally, costs are rounded to the nearest million and benefits are rounded to the nearest five million in the summary sheets. Totals may not exactly sum due to rounding. The Impact Assessment covers a 10-year period, starting one year before vending machine operators are required to be compliant.

Introductory Notice: The Health Act 2009 contains provisions that allow the Government to make regulations to prohibit the sale of tobacco from vending machines. This Impact Assessment (IA) calculates the associated costs and benefits (both quantifiable and unquantifiable) associated with the making of such regulations. Further country-specific Impact Assessments may follow for Wales and Northern Ireland if those countries decide to proceed with prohibiting sales of tobacco from vending machines. Cost and benefit calculations in those Impact Assessments may differ due to the use of data that is specific to the country in question. In this IA, the costs and benefits for option 2 are measured against option 1 (i.e., the status quo).

Background

1. It is illegal to sell tobacco products to those under the age of 18. The age of sale for tobacco products was increased from 16 to 18 years on 1 October 2007. However, because of their automated and often unsupervised nature, vending machines continue to present a means for under-18s to purchase tobacco products.

2. In reflection of the often easy access that young people have to tobacco from vending machines, the Government worked with the National Association of Cigarette Machine Operators (NACMO) to develop a code of practice defining the siting arrangements of vending machines (the NACMO code of practice). The NACMO code of practice was set out in the 1998 *Smoking Kills* White Paper that said:

> The new code provides clear guidance to machine operators on the siting arrangements expected. A machine should be sited in a monitored, supervised area so that staff can be sure of preventing its use by young people…. There is now no excuse for machine operators or pub, club and restaurant managers to site machine inappropriately.[1]

3. Information from NACMO suggests that 78% of machines are located in public houses, with 10% being located in clubs, 7% in hotels or restaurants, 3% in shops, 1% in bingo halls and 1% elsewhere.

4. Nonetheless, National Statistics survey evidence published in *Smoking, drinking and drug use among young people in 2008*[2] suggests that vending machines remain a source of tobacco for those aged 11 to 15 despite being comparatively more expensive than cigarettes from retail outlets. The importance of vending machines as a source of cigarettes for young people has decreased in recent years, and they are less commonly cited than other sources of tobacco (such as purchases from shops and being given cigarettes by friends). Although the minimum of age of sale has now risen to 18, this is unlikely to impact on the ease of accessing tobacco from vending machines.

5. The other common sources of tobacco for young people are being addressed by other measures such as raising the age of sale, strengthening sanctions against retailers who sell

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1 HM Government (1998). *Smoking Kills: A White Paper on Tobacco*. TSO, London.

2 NHS Information Centre (2009). *Smoking, drinking and drug use among young people in 2008.* NHS Information Centre, Leeds.

to people under the legal age, increased activity to reduce the availability of illicit tobacco, enforcement activity by local authorities and through effective media communications campaigns.

6. As tobacco vending machines are estimated to account for 1% of the UK market in tobacco sales, it appears that a disproportionate number of young people under the minimum legal age for sale of tobacco purchase their cigarettes from vending machines.

Rationale for further control on tobacco vending machines

7. Tobacco smoking is proven to cause serious harm to the health of the smoker. It also poses significant externalities to the rest of society and is a leading cause of health inequalities. Smoking prevalence is higher among routine and manual groups, and tobacco use is a significant cause of health inequalities.

8. Young people are uniquely vulnerable consumers, as they do not always have the capacity to make informed decisions, and society generally recognises this by providing greater protections for children than for adults. Nicotine addiction can develop extremely quickly in children. The National Statistics *General Household Survey* estimates that around two-thirds of smokers say they started smoking regularly before turning 18.

9. Government intervention is justified to prevent young people from accessing tobacco. The Government believes that children can far too easily access tobacco from vending machines, and that action is necessary to prevent this. The current voluntary code of practice on the siting of tobacco vending machines to prevent underage access (the NACMO code of practice) has proved to be insufficiently effective in restricting the access young people have to this source of tobacco.

10. Latest data collected from the English local authorities by the Local Authorities Coordinators of Regulatory Services (LACORS) on test purchasing from vending machines covers the 2008-09 period and shows that illegal sales to under-18s were made at the majority (58%) of vending machines tested across England during this period.[3, 4] Despite the NACMO voluntary code of practice on the siting of vending machines, LACORS found that 26.5% of vending machines checked in England over 2008-09 were located in unsupervised areas and nearly a third of vending machines checked were assessed by trading standards officers as being *likely* to result in sales to under 18s.[4]

11. The UK is a party to the WHO Framework Convention on Tobacco Control (FCTC), the world's first public health treaty.[5] The treaty includes the following treaty obligations under Article 16 (sales to and by minors):

> Each Party shall adopt and implement effective legislative, executive, administrative or other measures at the appropriate government level to prohibit the sales of tobacco products to persons under the age set by domestic law, national law or eighteen. These measures may include… ensuring that tobacco vending machines under its jurisdiction are not accessible to minors and do not promote the sale of tobacco products to minors.
>
> When signing, ratifying, accepting, approving or acceding to the Convention or at any time thereafter, a Party may, by means of a binding written declaration, indicate its commitment to prohibit the introduction of tobacco vending machines within its jurisdiction or, as appropriate, to a total ban on tobacco vending machines.

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3 Test purchasing conducted on 634 vending machines across England over 2008-09, using volunteer "test purchasers" aged 11-16 years old.

4 LACORS (2010). *Comprehensive Tobacco Control and Council Trading Standards: Delivering outcomes 2008 and 2009.* LACORS, London.

5 Available at: www.who.int/fctc

12. The FCTC is elaborated through guidelines for parties. Under Article 13 (tobacco advertising, promotion and sponsorship), guidelines have been agreed and provided to parties that suggest that "vending machines should be banned because they constitute by their very presence a means of advertising or promotion under the terms of the Convention".

13. The World Health Organization's *European Strategy for Tobacco Control*[6] recommends that strategic national action should include "banning sales [of tobacco] through vending machines". According to the World Health Organisation, 22 countries in the WHO EURO region have banned the sale of tobacco through vending machines (10 since 2002). Of these 22 countries, 12 are European Union Member States.

Policy options

14. The following policy options are considered:

    - *Option 1:* Retain the status quo, including the voluntary NACMO guidance on the siting of vending machines.

    - *Option 2:* Prohibit the sale of tobacco from vending machines.

Option 2: Prohibit the sale of tobacco from vending machines.

15. NACMO have stated that the tobacco vending machine industry currently:

    a. Has an annual gross margin of £102 million.

    b. Consists of around 200 private businesses and one large business with a total of circa 550 employees.

    c. Note that these figures are for the whole of the UK, so will be higher than if they only covered England. Based on the National Statistics population data, a population-based scaling factor of 0.84 would be appropriate.

16. The cost of option 2 to vending machine companies is calculated as the total value of the machines currently used in England. The rationale is that the value of an asset is equivalent to the expected future profit stream of that asset. There are an estimated 57,934 machines in the UK minus Scotland. A search of the market for second hand vending machines provided an upper estimate of £375. Hence, bearing in mind that the average machine is not new, a **one-off cost of £22m million** is estimated. It is likely that the one-off cost would be incurred very soon after the policy announcement.

17. In responding to the 2009 consultation, the British Beer and Pub Association (BBPA) told the Department of Health that "vending machines sales are made at a premium price and sales do not provide a major income stream".

18. The following points refer to annual costs:

[6] The European Strategy for Tobacco Control (ESTC) was adopted by the WHO Regional Committee for Europe at its fifty-second session in September 2002 and provides an evidence-based framework and guidance for effective national action and international cooperation. The ESTC sets out strategic directions for action in the Region, to be carried out through national policies, legislation and action plans.

a. Although they only represent a small proportion of tobacco sales, if purchases from cigarette vending machines are not fully offset by an increase in cigarette sales elsewhere, this will result in a revenue loss to the Exchequer. Duty revenue is a transfer of benefit from tobacco consumers to the community (the Exchequer). Lost duty revenue is treated as an economic cost in this IA as smokers may no longer buy as much tobacco, and part of the transfer to the Exchequer ceases.

b. To quantify the possible impact on tax revenues, consider that HMRC forecast £7.602 billion tobacco duty revenues in 2008/9 for the UK as a whole.[7] This is estimated to be £6.385 billion for England (using a population-based scaling factor of 0.84). NACMO estimate that 1% of cigarette sales are from vending machines. Therefore the forecast vending machine-associated tax revenue must equal £63.9 million for 2008/9. There is uncertainty over how much demand will be diverted to other sources, so a range of estimates is presented here. Assuming that 25% to 75% of vending machine cigarette sales are not offset by increased sales elsewhere, the impact on the Exchequer as a result of this policy option is £16 million to £48 million per annum.

c. Based on the Department for Transport statistical estimate of the value of a life[8] of £1.6million the estimated value of a quality-adjusted life-year (QALY) is £60,000. The NICE budget threshold (i.e. the price at which the NHS purchases a QALY) is £20 000 to £30 000. The mid-point of this range is £25,000. Therefore the ratio of this to the societal value of a QALY £60,000) is 2.4 meaning the reduced Government health expenditure has an opportunity cost of £2.40. Hence, reductions in tax revenue are multiplied by 2.4 in the net benefit calculation, to take account of the monetised gains that could have been achieved with that revenue. Therefore the opportunity cost of lost tax revenue equals **£38 million to £115 million per annum**.

d. The additional price paid by users of vending machines represents a convenience value to the consumer. This option will result in lost utility to legitimate cigarette machine users; cigarette vending machines are clearly a convenience for which some consumers are willing to pay. The Tobacco Manufacturers Association[9] state that (in 2007) 47 billion duty-paid cigarettes were consumed in the UK. For England only (using a scaling factor of 0.84) this gives 39.5 billion cigarettes and 1% of these (i.e. 395 million cigarettes) would have been sold in vending machines. Vending machine cigarette packets are typically contain 16 cigarettes so this equates to 24.3 million packets. Using the mark-up of circa £1 per packet for vending machine cigarettes, and using this as a proxy for the lost consumer surplus lost, gives an annual cost to the consumer of **£24.3 million per annum**.

19. The following costs are not quantified; they are unlikely to be significant enough to shift the judgements this IA is designed to inform:

a. The cost of bringing forward disposal of cigarette vending machines will be incurred at some point in time, irrespective of policy, but (due to the policy) this would occur sooner than would otherwise have been the case. Because costs incurred closer to the present are discounted less heavily, bringing forward the disposal would involve some economic cost. In addition to this, the Department of Health has received a proposal from a company offering to provide free disposal of vending machines across England, meaning that price of disposal could be close to zero.

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7 See www.hmrc.gov.uk/stats/tax_receipts/table1-2.pdf

8 Carthy *et al*. (1999). "The contingent valuation of safety and the safety of contingent valuation, part 2 – The CV/SG 'Chained' approach" in *Journal of Risk and Uncertainty,* 17, pp.187-213.

9 See: www.the-tma.org.uk/uk-cigarette-consumption.aspx

b. A marginal increase in the cost of current enforcement visits could result in the short term to assist with compliance building. Such visits would now take note if a vending machine were still in operation. However, this would be offset because there would be no further need to undertake test purchasing enforcement activity with vending machines.

c. Lost manufacturers' profit from reduced tobacco sales. This is largely not an economic cost, as it would likely be offset by increased expenditure (and profit) elsewhere in the economy. There would be some cost inherent in the retraining/reconfiguration of labour and capital currently used by the tobacco industry (so that it can be used elsewhere). Additionally, some resources may be less productive in their new alternative use (or they may not have an alterative use) due to their specificity to the tobacco context. These costs are not quantified due to lack of data, though it is noted (through stock market data) that the tobacco industry return on capital employed (ROCE) may be higher than average.

20. Overall, the costs of option 2 include a one-off cost of £22 million plus annual costs of £64 million to £141 million. **Discounted over ten years, the total cost ranges from £542 million to £1.2bn**

Benefits

21. The health benefits of policy option 2 through preventing children from smoking can be estimated and monetised.

22. The following sections explain the methodology for estimating the monetised benefit of smoking one fewer cigarette per day. This is then applied to a possible range of outcomes for the effectiveness of the option in terms of reducing child smoking.

Quantifying the monetised benefit of smoking one fewer cigarette per day

23. The analysis in the Annex identifies (i) the discounted number of life-years saved from each young person who does not start smoking, and (ii) the number of life-years saved for an average adult smoker who quits smoking. The estimates are adjusted as smokers may quit anyway in the future.

24. It is suggested that the mortality impact of smoking increases linearly (from zero) with each cigarette smoked per day. The National Statistics *General Household Survey 2006* found that the average number of cigarettes smoked per day equals 15 per day for men and 13 per day for women. It is possible to calculate the number of life-years saved by smoking one fewer cigarette per day from a young age, given that the individual may quit in the future: for men. It is one fifteenth of the male value calculated in (i) above. For women, it is one thirteenth of the female value calculated in (i) above.

25. The same method can be used to estimate adult life-years saved. The number of life-years saved by an average adult smoking one fewer cigarette per day, given that they may quit in future, is equal to one fifteenth of the male value calculated in (ii) above (for men). For women, it equals one thirteenth of the female value calculated in (ii) above.

26. The male and female results are averaged to give an overall value.

27. The results are as follows:

- i. Smoking one fewer cigarette per day from a young age: 0.11 life years gained
- ii. Smoking one fewer cigarette per day (average adult): 0.09 life years gained

28. The following paragraphs explain the derivation of the estimates for (i) and (ii) above. A detailed description of the calculations is provided in the Annex, including references for all sources of data. The values are discounted in line with Green Book principles and a standard £60,000 value per quality-adjusted life-year (QALY) is applied to each.

29. The calculations begin with data from the *General Household Survey 2006* on smokers' ages, smoking prevalence and smoking status (i.e. whether the respondents are current smokers, former smokers or those who have never smoked). The proportion of smokers who have quit as they get older is found to increase at a fairly steady and constant rate (with roughly an extra 1% of smokers quitting at every year of age; 18% of those who have ever smoked by age 16 have already stopped at that age).

30. The seminal 50-year study of smoking mortality in British doctors by Doll *et al.*[10] is used to obtain mortality rates for the following categories of smoker:

- those who have quit between ages 35-44,
- those who have quit between ages 45-54,
- those who have quit between ages 55-64, and
- those who continue to smoke beyond age 65

31. Non-smokers' mortality rates are also obtained from this study. The results are combined with smoking prevalence data for the above age groups and the latest Office for National Statistics population mortality data to produce eight sets of two life tables: one life table for non-smokers, and one for the category of smoker under consideration ((i) to (iv) above, for both males and females). The differences between each pair of life tables indicate how the smokers' life expectancy loss is distributed between different years of age. The figures are discounted appropriately to take account of the fact that benefits accrued in the future are worth less than benefits accrued today.

32. The results of these calculations are presented in the table below, and are used to calculate the final estimates:

Quit age band	**Percentage of smokers in this band**	**Change in life years lived for this band (discounted, male)**	**Change in life years lived for this band (discounted, female)**
Under 35	38.2%	0.00	0.00
35 to 44	10.5%	-0.85	-0.66
45 to 54	10.5%	-2.75	-2.34
55 to 64	10.5%	-3.48	-3.03
65 or over	30.2%	-4.49	-4.15

33. For each sex, the number of life years saved for each young smoker (given that they may have quit anyway in future) is calculated by weighting the number of life years lost in each quit age band by the percentage of smokers who quit in that age band.

34. For each sex, the estimated monetary benefit for each adult who is induced to quit smoking (as opposed to each child who does not start smoking) is derived by a similar calculation to above. Calculations are made for each age band, and the results are then weighted by the percentage of smokers in each age band in order to give a final figure.

[10] Doll, R. *et al.* (2004). "Mortality in relation to smoking: 50 years' observations on male British doctors" in *BMJ*, 26 June 2004.

35. The calculations described in the two paragraphs above deliver two results: one for men, and one for women. Each result is adjusted downwards to take account of the fact that the doctors in the study by Doll *et al.*[10] consumed a median of 18 cigarettes per day; current average consumption is less than this, at 15 per day for men and 13 per day for women.

36. A full discussion is presented in the Appendix, but the above calculations are argued to be conservative. For example, improvements in the quality of life from quitting smoking (or never starting to smoke) – such as avoiding the morbidity associated with various smoking-related diseases – are not taken account of in the above calculations. Other limitations of the analysis are also discussed in the Appendix.

Quantifying the benefits of policy option 2

37. For 12% of regular smokers aged 11-15, a vending machine is a usual source of tobacco products. However, respondents were allowed to specify more than one 'usual source', meaning that the responses sum to 237% (instead of 100%). It seems unreasonable to state that 12% of the respondents' cigarettes came from vending machines; the 12% estimate is therefore adjusted downwards to 4.5% (calculated so if all the other responses were adjusted downwards by the same factor, they would sum to 100%).

38. Therefore a 4.5% average reduction in under-18s' cigarette consumption is estimated. The National Statistics publication *Smoking, drinking and drug use among young people in England 2008* finds that 11-15 year olds who smoke regularly, smoke an average of 6 cigarettes per day. A 4.5% reduction in this figure would lead to, on average, 0.27 fewer cigarettes per day. This figure is an average as some children may completely stop smoking, whereas others may not reduce their smoking at all.

39. If this average reduction in daily cigarette consumption persists throughout a cohort's life and using the estimates provided in the previous section, and taking averages across the male and female results in 0.03 life years saved per person.

40. Using a birth cohort size of 650,000 per annum and a smoking prevalence of 20% for 16-19 year olds (as taken from *Smoking and drinking among adults 2006*), 130,000 smokers per year would be affected by the proposed policy. 3,900 life years would be saved per annum (i.e. per cohort). Taken over a 10 years this will account for new smokers entering the age group in question and smoking at reduced levels.

41. The reduction needs to persist throughout the cohort's lifetime. It is likely that this will be the case for some individuals, especially those who do not start smoking because of the difficulty of buying from vending machines, but it may not be the case for all individuals. There is also the possibility that young people will be very effective at finding alternative sources of cigarettes (thus blunting the policy benefits), although recent changes (such as the new minimum age of sale) imply that they may not be entirely successful. The benefits are therefore presented as a range, equal to 10% - 50% of the values calculated above. A more conservative assumption than that for adults.

42. Using *Health Survey for England 2008* data, on the average number of lifetime QALYs, gives a weighting of 0.86 that can be applied to the estimated expected number of life years gained as a result of the policy option

43. Overall, the estimated (health) benefits to children range between £19.9 million to £100 million per annum. **£183 million to £918 million** when discounted over ten years.

44. Policy option 2 is likely to have a positive health impact on adults. The number of cigarettes smoked by adults may fall and therefore there would be an associated health gain.

45. The basis for the calculation regarding the opportunity cost of lost tax revenue is a reduction in the overall number of cigarettes consumed of between 25% and 75% of vending machine sales. Vending machine sales equate to 1% of the overall cigarette market and therefore this equates to a reduction in overall cigarette consumption of between 0.25% and 0.75%.

46. The estimated number of cigarettes sold annually in England is 39.48bn. Hence based on the range in paragraph 53, this would lead to a reduction in the number of cigarettes smoked by adults annually of 82 million and 248 million per year (net of the reduced number of cigarettes smoked by children).

47. This equates to between 9 and 28 fewer cigarettes per adult smoker, per year (assuming 21% prevalence of smoking and approximately 48 million adults, according to National Statistics data). This is equivalent to between 0.03 and 0.08 fewer cigarettes per adult smoker per day.

48. An average adult smoker gains 0.09 life-years from smoking one fewer cigarette per day over their life-time. The effect of the option will be a reduction of between 0.03 and 0.08 cigarettes per day. So this will equate to between 0.002 and 0.006 QALYs gained per adult smoker, over their life-time (using the QALY weighting in paragraph 50 above of 0.86, from the Health Survey for England data). Monetising using a QALY value of £60,000 gives an estimate of between £1bn and £3bn lifetime benefits.

49. To convert this into annual benefits, take the average age of an adult (37) and the life-expectancy of a 37-year-old smoker – approximately 41 years (based on National Statistics Life Tables for the general population and the calculated loss of life years presented here). This gives an annual benefit to smokers (life-time benefit divided by expected life years) of between £24m and £74m. There will be a very small addition (not quantified) to this each year to account for children turning 18 and the reduction in their taking up smoking, through this policy option.

50. Therefore, the discounted net present value of the health benefits to adults over the ten year period of analysis is between £213m and £640m. This gives total benefits to adults and children for this option of between £396bn and £1.6bn.

Implications of the cost-benefit analysis

51. The present value of the net benefit ranges from **-£143million and £380 million** for this option. To calculate the low end of the net benefit range (-£143m) the low end of the cost range is subtracted from the low end of the benefit range, this is because the costs and benefits move together due to the varying assumptions about the proportion of cigarettes purchased from vending machines which are no longer consumed. The same approach is applied to the upper end of the range. There is uncertainty over the magnitude of the effects of the policy so the midpoint of this range is taken as **the best estimate: £118million.**

Specific Impact Tests: Checklist

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	*Results in Evidence Base?*	*Results annexed?*
Competition Assessment	No	Yes
Small Firms Impact Test	No	Yes
Legal Aid	No	No
Sustainable Development	No	No
Carbon Assessment	No	No
Other Environment	No	No
Health Impact Assessment	Yes	Yes
Race Equality	No	Yes
Disability Equality	No	Yes
Gender Equality	No	Yes
Human Rights	No	Yes
Rural Proofing	No	No

Annexes

Specific Impact Tests

Competition assessment for option 2 (prohibition of cigarette vending machines):

1. Option 2 would limit the range of suppliers, in that cigarettes could now only be purchased from suppliers who do not use vending machines. It should nonetheless be noted that only 1% of UK cigarettes are purchased from vending machines.

2. Aside from the obvious implication that vending machine operators will no longer be able to compete, option 2 is unlikely to further limit the ability of cigarette manufacturers and/or suppliers to compete.

3. Option 2 is unlikely to limit the incentive for suppliers to compete vigorously.

4. Option 2 could have a greater impact on competition than option 1, but tobacco sold from vending machines is usually more expensive and sold in smaller packs compared to tobacco sold from other retail outlets.

Small firms impact test

Consultation

5. The proposed option is likely to impact upon small businesses as there would be costs in complying with the option. The Government has engaged with, and received information and estimates from, representatives of small businesses (such as the National Association of Cigarette Machine Operators, which represents small vending machine operators) prior to the publication of consultations regarding vending machines. It has also received consultation responses from them and from individual vending machine operators.

Timing

6. The Government recognises that sufficient lead-in time is needed for regulations that prohibit the sale of tobacco from vending machines. Throughout the passage of the Health Act 2009 through Parliament, Ministers stated that any regulations that are made would be implemented in October 2011. Any regulations will come into effect on a common commencement date (6th April or 1st October) and guidance would be made available in advance to relevant parties. This would follow the example set by smokefree legislation, where DH provided guidance and advice to relevant businesses and to enforcement authorities.

7. It will be important to provide transitional support through Trading Standards, in terms of training and resources to support compliance, particularly for smaller businesses. As with smokefree legislation, we would look to support this centrally during transition to enable all businesses to implement changes while minimising any associated burdens.

Health

8. The proposed policy may result in a reduction in the number of cigarettes smoked by under-18s. As stated (and quantified) in the cost-benefit analysis above, this reduction would have a beneficial impact on the health of the population by reducing the incidence of smoking related morbidity and mortality. It may also have a wider impact on the general well being of

the population by children taking less time off school and adults taking less time of work due to smoking related illness.

Age

9. The proposed policy is likely to impact differently on people on grounds of their age.

10. A prohibition on the sale of tobacco from vending machines would prevent all smokers from purchasing their tobacco from vending machines. Whereas adult smokers would be able to purchase tobacco from other sources, such as supermarkets and newsagents, such retail outlets would be breaking the law and be liable for enforcement action if they sold tobacco to children and young people under the age of 18 years.

11. The differential impact of the proposal policy on young people under the age of 18 years would be a positive impact because it would help to reduce smoking levels amongst this age group.

Race and ethnicity

12. The proposed policy is not likely to impact differently on people on grounds of their race or ethnicity. The proposed policy is population-wide and will affect all adult smokers equally—it does not differentiate on the grounds of race or ethnicity.

13. Some ethnic and racial groups have higher smoking rates than the general adult population, for example Bangladeshi men.[11] However, there is no evidence of certain ethnic or racial groups purchasing their tobacco from vending machines more frequently than the population as a whole.

14. A policy that prohibits the sale of tobacco from one particular source could, in theory, have more impact on ethnic or racial groups with higher smoking rates than the general population as a whole. However, adult smokers in these ethnic and racial groups could purchase their tobacco from other sources, such as supermarkets and newsagents and it therefore should not have a differential impact.

15. The National Statistics survey used to establish smoking prevalence amongst young people aged between 11 and 15 years (*Smoking, drinking and drug use in England*) does not collect data on the smoking rates of various ethnic and racial groups. It is therefore not possible to assess whether the proposed policy of prohibiting the sale of tobacco from vending machines will impact differently on people under the age of 18 years on grounds of race or ethnicity. There is also no evidence available on whether smokers in certain ethnic or racial groups under the age of 18 years access vending machines more frequently than other ethnic or racial groups. In any event, any impact will be a beneficial impact by reducing the rates of smoking and the uptake of smoking within that racial or ethnic group.

Gender

16. The proposed policy is not likely to impact differently on people over the age of 18 years on grounds of their gender for the same reasons set out in more detail above in relation to age, ethnicity and race. Briefly, the reasons are that there is no evidence of one gender purchasing tobacco from vending machines more frequently than the other gender. With a prohibition on the sale of tobacco from vending machines adult smokers could purchase their tobacco from alternative sources. The proposed policy would affect all adult smokers

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11 NHS Information Centre (2006). *Health Survey for England 2004* (vol 1: the health of minority ethnic groups). NHS Information Centre, Leeds.

equally and does not differentiate on grounds of gender.

17. However, the proposed policy is likely to impact differently on people under the age of 18 years on grounds of their gender. Girls aged 11 to 15 years are more likely to be regular smokers than boys in the same age group (although boys and girls smoke at broadly the same levels by their mid-late teens). Therefore, a proposed policy that prohibits access to tobacco for people under the age of 18 may affect more girls than boys. However, this differential impact will be a beneficial one in helping to reduce smoking levels amongst young people, in particular young females.

Disability, transgender, religion or belief and sexual orientation

18. The proposed policy is not likely to impact differently on people on grounds of their disability, transgender, religion or belief, or sexual orientation. The proposed policy is a population wide policy that affects all adult smokers equally and does not differentiate on grounds of disability, transgender, religion or belief, or sexual orientation.

Human Rights

19. The proposed policy is to prohibit access to tobacco from vending machines. The Government believes that any interference with property interests under the ECHR is justified by the benefits to public health of regulations to prohibit the sale of tobacco from vending machines.

Measuring the impact of the policy

20. The National Statistics survey *Smoking, drinking and drug use among young people in England* measures smoking prevalence of boys and girls aged 11 to 15. The General Household Survey measures the smoking prevalence of men and women aged between 16 and 19 years. Both surveys also measure the number of cigarettes smoked per day.

21. It may be possible to measure the impact of the policy by comparing the results of these two surveys over time.

22. However, a multi-faceted response is necessary to effectively tackle tobacco use and a number of policies and initiatives to help reduce smoking prevalence will be active at any one time. Therefore, trends in smoking rates amongst young people and changes in smoking rates between genders cannot solely be attributed to any one policy.

Technical Appendix

23. This Technical Appendix describes the method and data sources behind the estimation of:

- The discounted number of life years saved for each young person who does not take up smoking.
- The discounted number of life years saved for a randomly chosen adult who quits smoking today. This figure is lower, as some harm may already have been done by past smoking.

24. To convert the above figures into a monetary value, a standard value of £60,000 per life year is applied. Both estimates take account of the fact that many smokers quit during their lifetime, thus reducing the expected number of life years lost from starting to smoke in the first place, and reducing the expected number of life years gained by quitting today.

25. The following main sources of data are used:

- *General Household Survey 2006* (GHS 2006) source data: Used to identify the age distribution of smokers and the relationship between age and the percentage of smokers who have quit.

- Doll *et al.*: Reports the impact of smoking on mortality, split by age of quitting smoking (if applicable).[10]

- Office for National Statistics (ONS) period life tables, United Kingdom, 2004-06:[12] Reports population mortality estimates and used to transform the outputs of the doctors' study into life years saved.

26. The steps common to both estimates are listed below:

- **Identify an estimate of the percentage of smokers who have quit by each year of age.** Data from GHS (2006)[13] is used here. The percentage who have quit increases at a fairly steady and constant rate as age increases. A linear relationship was therefore identified between age and the percentage who have quit; the results imply that 18.2% of 'ever-smokers' have already quit by age 16, with 1.05% quitting in each year thereafter up to age 94.

- **Identify an estimate of the prevalence of smoking at each year of age.** Data from GHS (2006) is used here.[14]

- **Identify an age distribution for the smoking population.** Data from GHS (2006) is used here.[15]

- **Identify mortality data (by year of age) for non-smokers and for four categories of smoker (as defined by quit age).** Mortality data are taken from table 5 of Doll *et al.*,[10] which lists number of deaths per 1,000 people at ages 34-44, 45-54, 55-64, 65-74 and 75-84. (These are referred to below as the five age bands). This information is presented at each age band for lifelong non-smokers, as well as:

  - (i) those who have quit between age 35-44,
  - (ii) those who have quit between age 45-54,
  - (iii) those who have quit between age 55-64, and
  - (iv) those who continue to smoke beyond age 65

- These categories of smoker are used throughout the calculations, and are referred to as quit age bands (alongside an 'age under 35' band). The data are converted into relative risks by dividing the number of deaths per 1,000 in each of these four categories by the equivalent number of deaths (i.e. the number of deaths in the same age band) for the lifelong non-smokers. The following formulae are then

12 Available at www.statistics.gov.uk/StatBase/Product.asp?vlnk=14459&Pos=&ColRank

13 Variables 'age' and 'cigsmk1' were used – the latter identifies 'ex-smokers', 'current smokers' and 'never smokers'. For each year of age, the percentage of smokers who have quit equals the number of 'ex-smokers' divided by the sum of 'ex-smokers' and 'current smokers'.

14 Prevalence at each year of age was defined as the number of current smokers (as indicated by the variable 'cigsmk1') at each age, divided by the total number of individuals of that age in the sample.

15 The variable 'age' was used on the subset of respondents who are current smokers (as indicated by the variable 'cigsmk1').

applied, which calculate mortality rates at each year of age (from 0 to 100) for smokers and non-smokers respectively.

- Smokers' mortality at age x = M * (r / (pr + 1 - p))
- Non-smokers' mortality at age x = M * (1 / (pr + 1 - p))
- Where M is the mortality estimate from the ONS life tables for age x, r is the relative risk at age x, and p is the prevalence (expressed as a proportion) at age x.
- The above formulae are calculated for each year of age, for each sex and for each of the four categories of smoker, as the relative risks differ between quit age categories and population mortality differs between the sexes.

- **Identify the number of life years lost (by year of age) for each combination of sex and the four categories of smoker.** For each combination of quit age band and sex[16], two life tables are calculated following the method of Chiang (1984)[17]. One of the two life tables starts with the smokers' mortality figures and the other starts with the non-smokers' mortality figures (both for each year of age, and as calculated above). Each life table models a birth cohort of 100,000 children; one column in particular measures the total number of life years lived by the cohort for each year of age. For each year of age, the difference in this column between the two life tables is calculated and divided by 100,000 to convert the value into the expected number of life years lost per capita (for that age). The sum of these values across all years of age (from 0 to 100) equals the number of life years lost by the specified combination of quit age band and sex.

- **Discount the numbers of life years lost, as calculated in the previous step.** As the life years lost occur in future years of the cohort's life, they should be discounted appropriately. The discount rates used are equal to Green Book rates minus 2%. The 'minus 2%' takes account of the fact that the monetary value per life-year (which is applied later on) can be expected to grow at the same rate as real economic growth. The 2% figure for this is taken from the Social Rate of Time Preference assumptions underlying the Green Book discount rates. The sum of the discounted numbers of life years lost at each year of age equals the discounted number of life years lost by the specified combination of quit age band and sex.

27. The end results of these calculations are presented in the following table. The identified relationship between age and the percentage of smokers who have quit is used to calculate the percentages in the second column.

Quit age band	Percentage of smokers in this band	Change in life years lived for this band (discounted, male)	Change in life years lived for this band (discounted, female)
Under 35	38.2%	0.00	0.00
35 to 44	10.5%	-0.85	-0.66
45 to 54	10.5%	-2.75	-2.34
55 to 64	10.5%	-3.48	-3.03
65 or over	30.2%	-4.49	-4.15

28. The benefit (in discounted life-years) for each child who does not take up smoking is estimated as follows:

16 For example, one combination considers male smokers who quit between the ages of 35-44.

17 Chiang CL (1984), "The Life Table and its Applications". Malabar (FL): Robert E Krieger Publising.

- A weighted average of the number of life-years saved for male children is calculated, with the percentage of smokers who quit in each quit age band being used to weight the life expectancy penalties for those bands.

- A similar weighted average is calculated for female children.

- The resulting male and female estimates are then downscaled to 83% and 72% of their calculated value respectively. This reflects the fact that the median doctor from the doctors' study smoked 18 cigarettes per day, whereas current averages for men and women are lower:15 and 13 respectively (GHS 2006[18]). Current smokers can therefore be expected to experience less harm.

29. Therefore**: Benefit for each child who does not take up smoking:**

- Males: 1.75 life years

- Females: 1.36 life years

30. The benefit (in discounted life-years) for a randomly chosen adult who quits smoking is estimated as follows:

- The aforementioned five age bands for adult smokers are also used here: those aged (i) under 35, (ii) 35-44, (iii) 45-54, (iv) 55-64, and (v) over 65. The percentage of smokers that quit in each quit age band is then considered, *given that the smoker has already reached one of age categories (i) to (v) above.* For example, 10.5% of smokers quit in the 55-64 age band, whereas 30.2% go on to become lifetime smokers. For an individual who is already aged 55 to 64, it must be that (10.5% / (10.5% + 30.2%) = 25.9% will quit in the 55 to 64 age band, whereas the remaining 74.1% continue to smoke over the age of 65.

- For each category of smoker age, the percentage of smokers who quit in each quit age band (as adjusted above) is multiplied by the life year penalty associated with each quit age band. Obviously, as we move towards the older age bands, fewer and fewer quit age bands enter into the calculation (as it is not possible, say, to quit smoking at 35-44 if you are already aged 45-54). This calculation gives the expected number of life years lost given that the smoker may quit at some point in the future. The calculated values for the older age groups are larger, as they are more likely to become lifelong smokers.

- For each age band, the previous table indicates the number of life years that would be lost anyway if the smoker were to quit at their current age. This number is higher for the older age groups, as more harm has already been done. For each age band, these values are subtracted from the numbers calculated in the previous bullet. This gives the number of life-years that could be reclaimed if the smoker were to stop smoking at their current age.

- GHS (2006) data on the age distribution of smokers is used to weight the number of life years that could be saved in each age band. This yields a final estimate of the number of life years that could be saved if a random smoker were to quit today.

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18 ONS (2006). *Smoking and drinking amongst adults 2006.* (p.9). Available at: www.statistics.gov.uk/downloads/theme_compendia/GHS06/Smokinganddrinkingamongadults2006.pdf

31. Therefore, the benefit for each adult who decides to quit smoking:

- Males: 1.36 life years
- Females: 1.12 life years

32. For the following reasons, the benefit estimates described above are conservative:

- They do not take account of the improved quality of life that results from quitting smoking. For example, a quitter may escape diseases that reduce their quality of life as well as reduce their life expectancy (such as chronic obstructive pulmonary disease).
- It is assumed that no harm is incurred by smoking over the age of 84. There is likely to be some harm here (which would increase the measured benefits if counted), but there is a lack of precise data. In any case, as the cohort is fairly small by this age, the results are not particularly sensitive to this assumption. Even assuming that the relative risk for those aged 84 also holds for those who are aged 84 and over, the discounted 'child who does not start smoking' benefits only increase by less than 5%.
- It is assumed that no harm is incurred by smoking under the age of 35. Again, there is likely to be a benefit from not smoking at this age, but there is a lack of precise data.
- It is assumed that quitting after the age of 65 yields no health benefit. There is also likely to be a small benefit here, but again, there is a lack of precise data.
- The estimates do not take account of the fact that the resulting reduced smoking prevalence would reduce demand for stop-smoking goods and services. The economic resources saved could be used for other purposes.

33. Other limitations of the estimate include:

- It is assumed that the same smoking mortality impacts hold for both men and women. The Doll *et al.*[10] study only covers male doctors.
- It is assumed that the average daily number of cigarettes smoked throughout life is linearly related to the number of life years lost. The relationship is unlikely to be perfectly linear in practice.
- The Doll *et al.*[10] study does not explicitly adjust for confounding factors (although it does control for social class, given that its sample consists only of doctors). For example, if smokers are also more likely to drink heavily, this may exaggerate the mortality impact of smoking. However, a similar cohort study (based in The Netherlands)[19] does adjust for a long list of confounding factors, including socioeconomic status, alcohol use and body mass index. The authors conclude that adjusting for confounding factors reduces the estimated number of (undiscounted) life-years lost due to smoking by half a year. This is a fairly small effect given that the estimated life expectancy loss to smokers (including the adjustment for potential

[19] Streppel *et al.* (2007), "Mortality and life expectancy in relation to long-term cigarette, cigar and pipe smoking: the Zutphen Study" in *Tobacco Control,* 2007;16, pp.107-113. The Zutphen Study, based in Zutphen, The Netherlands, covers 1,373 men born between 1900 and 1920 and studied between 1960 and 2000.

confounders) is still equal to seven years. Given that the estimates presented in this annex are discounted and take account of future quit propensities, any reduction to take account of confounding factors would be considerably less than half a life year.