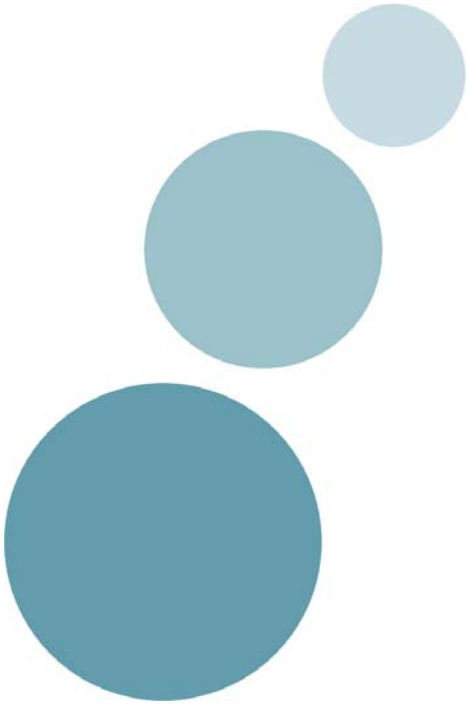
National Institute for Health and Clinical Excellence

Economic analysis of interventions to improve the use of smoking cessation interventions in the general population

08 May 2008



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1.0 Executive summary

Introduction

The National Institute for Health and Clinical Excellence (NICE) has been asked by the Department of Health to develop 'guidance for reducing health inequalities in the short, medium and long term'. Specifically, the guidance will focus on interventions that reduce the rates of premature death in the most disadvantaged with particular reference to proactive case finding, retention and improving access to services. In particular, the focus of this guidance is on interventions that identify disadvantaged groups in need of statins and smoking cessation interventions, that improve disadvantaged groups' use of statins and smoking cessation interventions, and that improve the retention of disadvantaged groups within statins and smoking cessation interventions.

The economic analysis takes as its starting point the evidence on effectiveness of interventions to improve the reach, use and retention of smoking cessation interventions and statins identified by Bath University (Bauld et al, 2007) and the University of Cardiff (Turley et al, 2007). The effectiveness evidence identified was of two types: studies that measured the effectiveness of interventions for disadvantaged groups; and studies that measured the effectiveness of interventions for the general population. It was decided that two types of economic analysis would be run. First, an analysis of the cost per QALY gained of interventions targeted at disadvantaged groups. Second, an analysis of the cost per QALY gained of interventions targeted at the general population, as well as an analysis of how the costs and effects of the interventions could vary when applied to disadvantaged groups without causing the cost per QALY gained estimate to exceed £30,000.

As each of these analyses was undertaken for smoking cessation interventions and statins interventions, The Matrix Knowledge Group produced four sets of economic analysis to inform the development of NICE guidance in this area:

1. An economic analysis of interventions to improve the reach, use and retention of ***statins*** interventions in ***disadvantaged groups***.
2. An economic analysis of interventions to improve the reach, use and retention of ***statins*** interventions in the ***general population***.
3. An economic analysis of interventions to improve the reach, use and retention of ***smoking cessation*** interventions in ***disadvantaged groups***.
4. An economic analysis of interventions to improve the reach, use and retention of ***smoking cessation*** interventions in the ***general population***.

This report presents the economic analysis of interventions to improve the reach, use and retention of smoking cessation interventions in general population that might be extended to disadvantaged groups.

Method

The following steps are undertaken to estimate the cost per QALY gained associated with interventions to improve the reach, use and retention of smoking cessation interventions among the general population:

1. Effect studies identified in the review undertaken by Bath University (Bauld et al, 2007) were included if they measured the impact of interventions on the general population.
2. Cost and effect data was extracted from the effect studies.
3. Economic models were constructed to transform this cost and effect data into estimates of the cost per QALY gained from interventions.
4. For those interventions with a cost per QALY gained estimate lower than the £30,000 threshold, the parameters in the models were varied to determine the extra cost and reduced effect the interventions could be allowed if they were still to be considered cost-effective when applied to disadvantaged groups.

Findings

From the effectiveness review, 21 studies of interventions to improve the reach, use and retention of smoking cessation interventions among general population were identified and included in the economic analysis. These studies provided 61 estimates of the effectiveness of interventions.

The following interventions were included in the economic analysis: client-centred approaches (social marketing, nurse run clinics, recruitment of smokers in the community, interventions at cervical screening appointments, proactive telephone counselling, free mobile phones for use in smoking cessation counselling), identifying and reaching smokers (media campaigns to recruit to quit-to-win contests), improving access to interventions (dentist-based interventions, community-based drop in interventions, pharmacist-based interventions), and incentives (free NRT, incentives as part of workplace interventions).

The following results are produced by the economic analysis:

- The cost per QALY gained for ***client-centred interventions*** ranges from £10 to £1,041 per QALY gained. However, a number of examples of telephone counselling are dominated by the alternatives against which they are evaluated.
- The cost per QALY gained for interventions to ***identify and reach smokers*** range from £11 to £2,701. However, a number of examples of recruitment to quit-to-win contests are dominated by the alternatives against which they are evaluated.
- The cost per QALY gained for interventions to ***improve access to smoking cessation*** interventions ranges from £200 to £667. However, one dentist based intervention is dominated by the alternative against which it is evaluated.
- The cost per QALY gained for ***incentive-based interventions*** ranges from £29 to £1,038.

The analysis is subject to a number of caveats, including limitations in the quality of the effect studies, unit costs calculated from intervention descriptions within effect studies, and an assumed zero percent relapse rate. A sensitivity analysis suggests that the conclusion that the interventions are cost-effective is not sensitive to any of the above caveats. For instance, while the assumption that the relapse rate is zero is unrealistic, the sensitivity analysis suggests that the conclusion that interventions are cost-effective is not sensitive to the relapse rate employed in the model, with a relapse rate of about 94% being required before the cost per QALY gained estimate for any of the interventions passes above the £30,000 cost-effectiveness threshold.

Thus, while the above figures should not be taken as accurate estimates of the cost per QALY gained associated with the interventions, the sensitivity analysis suggests that we can be confident in the conclusion that the interventions have a cost per QALY gained estimate lower than the £20,000 - £30,000 threshold traditionally employed by NICE.

The above analysis determines the cost effectiveness of smoking cessation interventions when they are targeted at the general population. However, the NICE guidance that the analysis is designed to inform is interested in the cost-effectiveness of interventions when applied to disadvantaged groups. The sensitivity analysis demonstrates that costs would have to increase by very large amounts or effects would have to reduce by very large amounts before the interventions would have a cost per QALY gained of greater than £30,000. For instance, the lowest increase in costs required to cause the cost per QALY gained to be greater than £30,000 is 450 percent. A similar story is told for changes in effect. Most interventions require a reduction in effect of about 99% before the cost per QALY gained becomes greater than £30,000.

Discussion

The analysis suggests that a number of the above interventions have a cost per QALY gained of less than £20,000-£30,000, including:

- Recruitment of smokers in the community (£10 per QALY gained based on one observation)
- Community drop in centres (£667 per QALY gained based on one observation)
- Pharmacist-based interventions (a mean of £381 per QALY gained based on two observations)
- Interventions at cervical screening clinics (a mean of £35 per QALY gained based on three observations)
- Nurse run clinics (£92 per QALY gained based on one observation)
- Social marketing (£42 per QALY gained based on one observation)
- Free phones for use in telephone counselling (a mean of £105 per QALY gained based on two observation)
- Prescriptions for free NRT (a mean of £579 per QALY gained based on three observations)

- Workplace-based incentives (a mean of £112 per QALY gained based on six observations)

While this analysis is based on smoking cessation interventions when they are targeted at the general population, the analysis suggests that intervention costs would have to increase by very large amounts or intervention effects would have to reduce by very large amounts when the interventions are applied to disadvantaged groups before the interventions would have a cost per QALY gained of greater than £30,000. For instance, costs would have to increase c450% before the cost per QALY gained of any of the interventions exceeds £30,000. These large increases can be compared against Dolan et al's (2006) estimates of the relative cost effectiveness of NHS Stop Smoking Services for disadvantaged and non-disadvantaged groups. Dolan et al (2006) estimate that the cost per QALY for low socio-economic groups is only about 20% greater than that for high socio-economic groups. As this difference is much smaller than the change required to cause the interventions' cost per QALY gained to exceed £30,000, it would be reasonable to suggests that the interventions evaluated in this report could be applied to disadvantaged groups and still be cost-effective.

The evidence for a number of other interventions was mixed, with some instances of the interventions having a cost per QALY gained less than £30,000 and other instances being dominated by the alternative against which it was evaluated. These interventions include:

- Telephone counselling (four observations suggested telephone counselling was dominated, however nine other observations suggested a mean ICER of £350 per QALY gained).
- Recruitment to quit to win (three observations suggested that recruitment to quit-to-win was dominated, however fifteen other observations suggested a mean ICER of £407 per QALY gained).
- Dentist-based interventions (one observation suggested that dentist-based interventions were dominated, however three other observations suggested a mean ICER of £216 per QALY gained).

Further research needs to be done to understand the variations in intervention, counterfactual, target population or implementation context that cause the cost-effectiveness of these interventions to vary.

While the above analysis measures the impact of the interventions on health outcomes, as the target population for these interventions belong to disadvantaged groups, their impact is both to increase health outcomes and reduce health inequalities. One way to account for this is to adjust the £30,000 per QALY threshold against which interventions are assessed to include the value of reducing health inequalities. Work on equity adjustments to the cost-effectiveness threshold is in its very early days and only provides very indicative estimates of possible equity-efficiency weights. Work by Professor Dolan and colleagues suggest that interventions that reduce health inequalities should be assessed against a cost-effectiveness threshold of £120,000.

However, further work by Dolan and Tsuchiya (forthcoming, b) using the same data suggests that the equity weights would change if the health inequalities are perceived to be the responsibility of the individual. For instance, if the poorer health of smokers is entirely their responsibility, the weight given to a smoker relative to a non-smoker is about one half. All else equal, this would suggest that the cost-effectiveness threshold be reduced to £15,000 for smokers. Assuming that these two sets of weights are independent of one another, it would suggest that benefits to smokers in the lowest social class are weighted about twice as highly as benefits to non-smokers in the highest social class (i.e. a threshold of £60,000 per QALY).

As the equity-weights cost-effectiveness threshold is greater than the traditional NICE threshold of £30,000, this adjustment would reinforce the conclusion that the above interventions would be cost-effective for a disadvantaged population. However, these equity- and responsibility-weighted thresholds should be treatment with caution. Research on how to weight the cost-effectiveness threshold is in its very early days. Furthermore, assuming that the weights can be added together in this way is a rather heroic assumption given the current state of knowledge and it is certainly not one that we would wish to defend. Professor Dolan will be presenting fresh empirical evidence, from much larger samples, shortly.

2.0 Introduction

The National Institute for Health and Clinical Excellence (NICE) has been asked by the Department of Health to develop 'guidance for reducing health inequalities in the short, medium and long term', on interventions that reduce the rates of premature death in the most disadvantaged with particular reference to proactive case finding, retention and improving access to services. The focus of this guidance is on interventions that identify disadvantaged groups in need of statins and smoking cessation interventions, that improve disadvantaged groups' use of statins and smoking cessation interventions, and that improve the retention of disadvantaged groups within statins and smoking cessation interventions.

The economic analysis takes as its starting point the evidence on effectiveness of interventions to improve the reach, use and retention of smoking cessation interventions and statins identified by Bath University (Bauld et al, 2007) and the University of Cardiff (Turley et al, 2007). The effectiveness evidence identified was of two types: studies that measured the effectiveness of interventions for disadvantaged groups; and studies that measured the effectiveness of interventions for the general population. It was decided that two types of economic analysis would be run. First, an analysis of the cost per QALY gained of interventions targeted at disadvantaged groups. Second, an analysis of the cost per QALY gained of interventions targeted at the general population, as well as an analysis of how the costs and effects of the interventions could vary when applied to disadvantaged groups without causing the cost per QALY gained estimate to exceed £30,000.

As each of these analyses was undertaken for smoking cessation interventions and statins interventions, The Matrix Knowledge Group produced four sets of economic analysis to inform the development of NICE guidance in this area:

5. An economic analysis of interventions to improve the reach, use and retention of ***statins*** interventions in ***disadvantaged groups***.
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7. An economic analysis of interventions to improve the reach, use and retention of ***smoking cessation*** interventions in ***disadvantaged groups***.
8. An economic analysis of interventions to improve the reach, use and retention of ***smoking cessation*** interventions in the ***general population***.

This report presents the economic analysis of interventions to improve the reach, use and retention of smoking cessation interventions in general population that might be extended to disadvantaged groups. Particularly, the analysis seeks to answer two questions. First, what is cost per QALY gained for the intervention when applied to the general population? Second, assuming interventions are most costly for disadvantaged groups and/or less effective for disadvantaged groups, for those interventions that are cost-effective for the general population,

what is the extra cost and/or reduced effect the interventions could be allowed if they were still to be considered cost-effective when applied to disadvantaged groups.

The remainder of this section outlines the need for guidance in this policy area and the precise scope of the review, of which the economic analysis is a part. Section 3.0 outlines the methods employed in the economic analysis. Section 4.0 outlines the results of the analysis, and section 5.0 draws conclusions from the analysis.

2.1 The need for guidance: back

In common with most industrialised countries, smoking rates in the UK are not evenly distributed across the population but are considerably higher amongst less affluent groups. Smoking rates in 2006 were 32% for men and 30% for women in routine and manual occupations, compared with 20% for men and 17% for women in managerial and professional groups (ONS, 2006a).

These differences in smoking rates have serious implications for inequalities in health. Among men, smoking is responsible for over half of the excess risk of premature death between the highest and lowest socio-economic groups (Jha et al, 2006). The most recent analysis by ONS of causes of death in England and Wales argues that smoking plays a key role in the relationship between deprivation and mortality (Romeri et al, 2006). It is for these reasons that addressing smoking-related inequalities in health has become a policy priority in the UK.

Targets have been established in all parts of the UK to reduce smoking rates and address inequalities in health. In England, the key targets (Department of Health 1998, 2000) are, by 2010 to:

- Reduce by at least 10% the gap in infant mortality between routine and manual groups and the population as a whole.
- Reduce by at least 10% the gap in life expectancy between the fifth of areas with the lowest life expectancy and the population as a whole.
- Reduce adult smoking prevalence in routine and manual groups to 26% or less.
- Reduce in the fifth of areas with the worst health and deprivation indicators and the population as a whole the gap in cardiovascular disease (CVD) and cancer by 40% and 6% respectively.

Following the publication of the 1998 White Paper, *Smoking Kills* (Department of Health, 1998), smoking cessation services, now known as NHS stop smoking services, were established in the UK. They were initially set up in more deprived areas of England (Health Action Zones) in 1999 and extended to the rest of the country from 2000 (Adams et al, 2000). NHS stop smoking services now exist in all parts of the UK and provide free-at-the-point-of-use access to behavioural support from a trained adviser in a range of settings (one-to-one or group) plus access to appropriate pharmacotherapies which are free apart from a prescription fee. NHS stop smoking services were intended to target particular groups (pregnant women, young people and disadvantaged groups) from their inception (Pound et al, 2005).

2.2 Scope of the modelling exercise

The interventions and participants included in the modelling exercise were driven by the evidence provided by the smoking cessation review (Bauld et al, 2007). These were undertaken in correspondence with the parameters set out for the review, and include:

- ***Participants:***
  - Including: people aged 16 years and over who smoke, in particular pregnant women, disadvantaged groups and manual workers.
  - Including: disadvantaged groups will be defined as individuals with mental health problems; people who are institutionalised including those serving a custodial sentence; some black and minority ethnic groups; homeless people; people on low incomes; lone parents and poor families; and people on benefits and living in public housing.
  - Excluding: people aged 16 years and over who do not smoke.

- ***Interventions***:
  - Including: NHS interventions aimed at finding and then supporting people aged 16 years and over who smoke. These activities will cover both primary and secondary prevention.
  - Including: NHS interventions aimed at providing – and improving access to – services for people aged 16 years and over who smoke. These activities will cover both primary and secondary prevention.
  - Excluding: interventions and activities not aimed at reducing and/or eliminating premature death from smoking related causes of premature death.
  - Excluding: interventions and activities aimed at reducing and/or eliminating infant mortality.
  - Excluding: the wider determinants of health inequalities such as macro level policies aimed at tackling poverty and economic disadvantage.

- ***Comparators***. Interventions will be examined, where possible, against relevant comparators and/or no intervention.

The review identified studies of a number of interventions for non-disadvantaged groups that could be employed to improve the reach, use and retention of smoking cessation interventions for disadvantaged groups. This paper reports therefore relaxes the criteria that participants have to be from disadvantaged groups.

The economic model diverges from the effectiveness review in the outcomes of interest. The review identified studies with the following ***outcomes***:

  - How services identify and reach people aged 16 years and over who smoke.
  - Service use, accessibility and availability among people aged 16 years and over who smoke.

Where possible, the economic model extrapolates from these outcomes to estimate the cost per Quality Adjusted Life Year (QALY) associated with the intervention. Further detail on the method employed to undertake this extrapolation is available in section 3.0.

3.0 Method

The following four steps are undertaken to estimate the cost per QALY gained associated with interventions to improve the reach, use and retention of smoking cessation interventions among the general population:

1. Effect studies identified in the review undertaken by Bath University (Bauld et al, 2007) were included if they measured the impact of interventions on the general population.
2. Cost and effect data was extracted from the effect studies.
3. Economic models were constructed to transform this cost and effect data into estimates of the cost per QALY gained from interventions.
4. For those interventions with a cost per QALY gained estimate lower than the £30,000 threshold, the parameters in the models were varied to determine the extra cost and reduced effect the interventions could be allowed if they were still to be considered cost-effective when applied to disadvantaged groups.

The remainder of this section provides more detail on each of these steps.

3.1 Selection of effect studies for inclusion in the economic analysis

The economic model is built on the evidence employed by the review team at Bath University on the effectiveness of interventions (Bauld et al, 2007). The effectiveness studies had to fulfil two criteria before they were included in the economic analysis:

1. Studies had to measure effect for the general population. A number of the effect studies measured the impact of interventions to improve the reach, use and retention of smoking cessation interventions for disadvantaged groups. These studies were excluded from the analysis presented in this report. Economic analysis for these studies are presented in Matrix Evidence (2007).
2. Studies had to measure reach, use or retention. Studies that did not provide a measure of reach, use or retention were excluded from the modelling. For instance, a number of studies identified participants perceptions of the barriers to accessing smoking cessation interventions or practitioners perceptions of the effect of interventions.

Once the criteria were applied, 61 estimates of the effect of interventions were extracted from 21 different studies for inclusion in the economic analysis. Appendix one summarises the studies that were included and excluded, and the reasons for any exclusions.

3.2 Extraction of data from effect studies

Data on the cost and effect of the intervention were extracted from the studies included in the analysis:

1. Effect data. Where a choice of effect data was available, the effect 'closest to quit' was selected. As the objective of the economic analysis was to estimate the cost per QALY gained associated with the interventions, and the QALY gains achieved by the interventions are most likely due to their impact on the probability that participants quit smoking, the economic analysis estimated the cost per QALY gained for the interventions as a result of their impact on quit rates. Therefore, while the aim of an intervention may be to increase calls to "quitline", the QALY gained associated with this intervention results not just from calling quitline, but from the impact that this call subsequently has on quit rates. In this instance, if the study reported the impact of the intervention on both the chance that a participant calls quitline, as well as the chance that a participant quits smoking, the latter data was extracted. The economic analysis then converted the chance of quitting smoking into an estimate of QALY gains. However, if the study only reported the impact of the intervention on the chance that a participant calls quitline, this data was extracted and the economic analysis extrapolated from calling quitline to QALY gains.
2. Cost data[1]. A number of the studies reported the cost of implementing the intervention. Where this was the case, implementation costs were extracted from the study. Where this was not the case, a description of the resources employed by the intervention was constructed from the intervention description in the study, and standard UK-based unit costs[2] applied to this resource use to estimate the cost of the intervention. All intervention costs are presented at 2007 prices.

Appendix two summarises the cost and effect data extracted from the studies, any assumptions necessary to calculate resource use from intervention descriptions, as well as the unit cost data used to transform resource use into cost estimates.

Assessment of the quality of the effectiveness studies employed in the economic analysis were taken from the effectiveness review undertaken by Bath University which identified the studies (Bauld et al, 2007).

3.3 Economic analysis

Models were built to transform the effect and resource use measurements taken from the effectiveness studies into estimates of the cost per QALY gained associated with the interventions. As two different effect measures were extracted from the studies (quit and use of quitline services), two different models had to be built. Each model assumes that the ultimate value of each intervention was derived from stopping participants smoking.This section

[1] The model assumes that those participants who receive the intervention but who would have experienced a positive outcome even in the absence of the intervention still incur the cost of the intervention. For instance, if an effect study suggests that some participants would have accessed NRT even if they had not participated in a motivational interview with their GP, we assume that the GP delivers the same intervention to this group as to those who only access NRT having received the intervention, as well as to those who do not access NRT with or without the intervention. An alternative approach would have been to assume that participants who would have achieved a positive outcome in the absence of the intervention incur none of the intervention costs. In reality it is likely that these participants incur some intervention costs but less than other participants. The approach adopted will cause the model to overestimate the cost per QALY gained associated with the intervention.

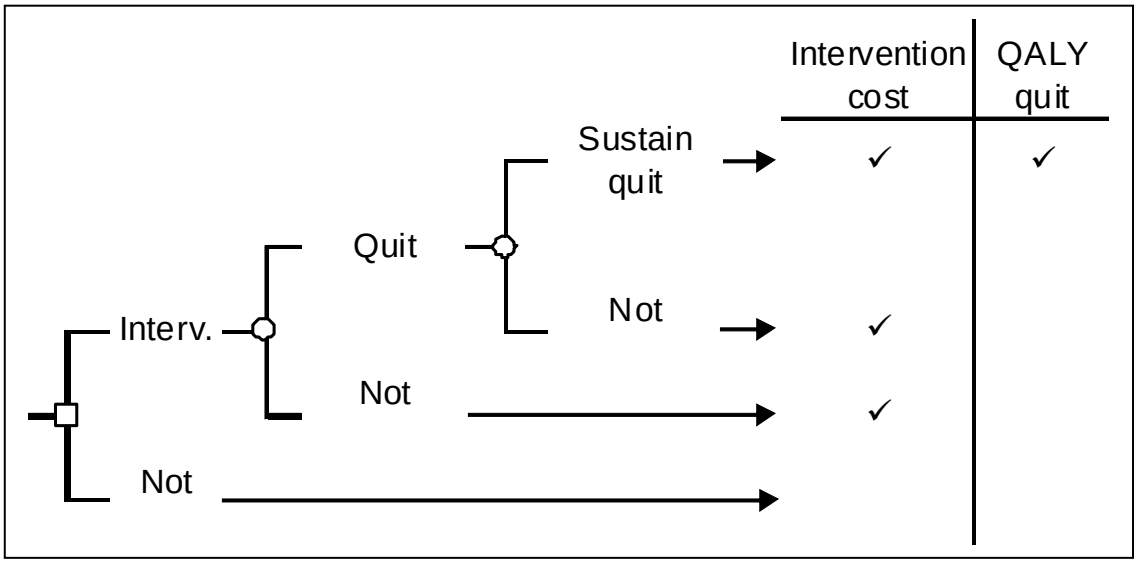
[2] Further detail on the source of unit cost data is available in appendix two

summarises the structure of the models built to estimate the cost per QALY gained for the interventions. Appendix three summarises which model is employed for each effect study.

3.3.1 Model 1: smoking cessation

Data on the proportion of the targeted population who quit smoking as a result of an intervention were extracted from a number of studies. Figure one summarises the hypothesised pathways post quit and the cost and benefits associated with each pathway included in the economic model.

Figure 1: Economic model of interventions that improve quit rates



The following probabilities that participants follow a particular pathway were employed in the model:

1. ***Quit***: The probability that a participant quits smoking as a result of the intervention was drawn from the effect studies.
2. ***Sustain quit***: The probability that a participant who quits smoking does not relapse is assumed to be 100%. The sensitivity of the conclusions of the analysis to this assumption was tested.

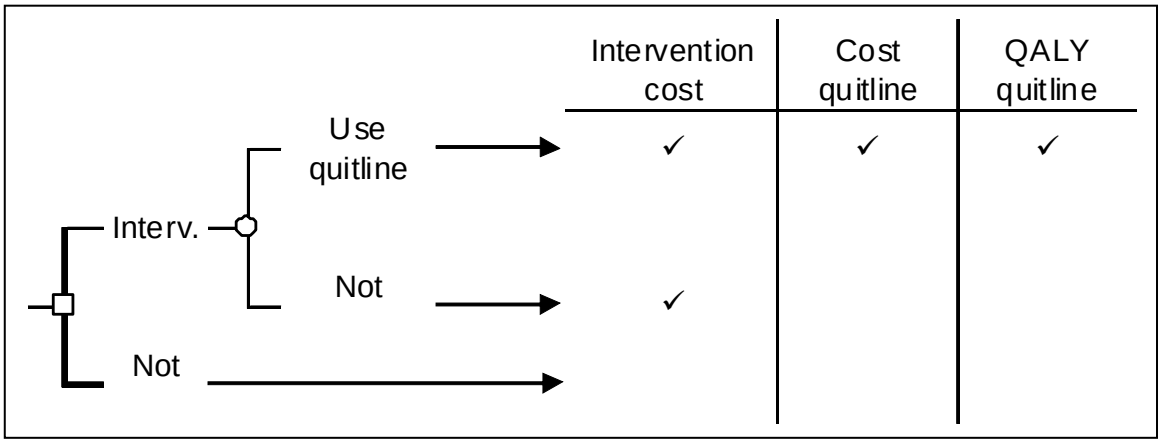
The costs and values attached to these pathways were as follows:

1. ***Intervention costs***: Intervention costs were extracted from the individual effect studies (see appendix two for more detail).
2. ***QALY gain associated with quitting***: A review was undertaken to identify estimates of the benefits of quit. Individual study interventions and populations were matched to the data identified through this review to determine the most appropriate benefit data in each instance. Further detail of this review and matching exercise are available in section 3.4.

3.3.2 Model 2: use of quitline services

Data on the proportion of the targeted population who use quitline as a result of an intervention were extracted from a number of studies. Figure two summarises the hypothesised pathways post using quitline and the cost and benefits associated with each pathway included in the economic model

Figure 2: Economic model of interventions to increase use of quitline



The probability that a participant uses quitline as a result of the intervention was drawn from the effect studies.

The costs and values attached to these pathways were as follows:

1. ***Intervention costs***: Intervention costs were extracted from the individual effect studies (see appendix two for more detail).
2. ***Costs and QALY gains associated with quitting***: A review was undertaken to identify estimates of the benefits of quit. Individual study interventions and populations were matched to the data identified through this review to determine the most appropriate benefit data in each instance. Further detail of this review and matching exercise are available in section 3.4. The only ICERs for quitline that could be identified were cost per twelve month quit. In order to transform this into a cost per QALY estimate, it was combined with data on the value of a quit.

Hypothetical example of the calculation of cost per QALY for interventions to improve the use of smoking cessation services

An intervention involves a GP delivering a motivational interview aimed at improving the use of NRT. From the effectiveness study we know that the GP spends 20 mins on the motivational interview and that the intervention causes 50% of participants to use NRT when only 25% would have done so in the absence of the GP-based intervention. A review of other studies tells us

that 20 minutes of GP time costs £50, and that NRT costs £500 and results in a gain of 2 QALYs as a result of reduced smoking.

Costs: As every participant receives the intervention, the average GP cost per participant is £50 (100% * £50). As 25% of participants now use NRT when they would not have done so previously, the average NRT cost per participant is £125 (25% * £500). Thus, the overall average cost of the intervention per participant is £175 (£50 + £125).

Benefit: As 25% of participants now use NRT when they would not have done so previously, the average benefit per participant is 0.5 QALYs (25% * 2 QALYs).

Cost per QALY gained: combining the estimates of the cost and benefit of the interventions, we can say that the cost per QALY gained of the GP-based intervention is £350 (£175 / 0.5 QALYs).

3.4 Review of economic data on quits and cessation interventions

A review was undertaken to identify estimates of the costs and QALY gains associated with NRT plus counselling for smokers and the QALY gains associated with quitting smoking. The review focused on existing NICE Health Technology Appraisals (Woolacott, 2001; Flack et al, 2006a; Flack et al, 2006b; Flack et al, 2006c; Flack et al, 2006d; Parrott and Godfrey; Fry-Smith et al, 2006; Parrott et al, 2006; and Wang et al, 2006). The results of the review were as follows:

1. 42 estimates of the benefit of quitting smoking were collected.
2. 2 ICERs for quitline were collected

Appendix four summarises the ICERs for quitline identified in the review. Appendices five and six summarise the value of a quit data identified in the review.

Selection of smoking cessation ICERs for use in the models

Of the two ICERs for quitline that were identified from the review, one measured the cost per life year gained associated with quitline, the other measured the cost per twelve month quit. The latter of these was employed with the model, as it could be combined with the QALY value of a quit in order to model the cost per QALY gained of quitline. Appendix eight summarises the ICERs used in the models.

Selection of benefit of quit data for use in the models

Two types of measures of the benefits of quit were identified in the literature: Life Years Gained and Quality Adjusted Life Years (QALYs). In order to correspond with the NICE reference case, QALYs were preferred. The most appropriate QALY estimate was then selected based upon the

population within the effect study. Appendix seven summarises the value of a quit data included in the model for each effect study.

3.5 Output from the model

As a result of the approach to extracting and modelling effect data from the studies outlined above, the economic analysis reports only the cost per QALY gained associated with each intervention. It does not report on the separate probabilities along the pathway between the interventions and quitting smoking. For instance, if the objective of an intervention is to increase calls to quitline, the QALY gained associated with the intervention is contingent upon the following probabilities: the probability that participants complete the intervention; the probability that participants access quitline as a result of the intervention; the probability that accessing quitline results in quitting smoking; and the probability that quitters do not relapse.

However, while the analysis does not report on these probabilities explicitly, all these probabilities are implicit in the economic analysis. For instance, the economic analysis of a study that reports the probability that participants access quitline as a result of a media campaign may employ the following two pieces of data: the probability that participants access quitline extracted from the effect study; and the QALY gained associated with accessing quitline identified through the literature review. While the results only report the cost per QALY gained associated with the intervention, implicit in these two pieces of data is the probabilities along the pathway outlined above. For example, the probability that quitline leads to quitting smoking and the probability that quitters do not relapse are implicit in the estimate of the QALY gained associated with quitline.

3.6 Sensitivity analysis

Sensitivity analysis was undertaken to test the impact of the following caveats on the results of the economic analysis:

1. Effect size: two questions were raised about the accuracy of the effect data extracted from the studies. First, while the sample of studies modelled includes a number of good quality RCTs, it also includes a number of poor quality observational studies. The potentially poor measurement of the counterfactual means that there is a possibility that the model overestimates the effect and cost-effectiveness of the intervention. Second, 11 of the 16 studies for which location data is available are non-UK-based, raising questions about the transferability of the effect data to the UK context.
2. Relapse rates: Where the model extrapolated from an estimate of the proportion of participants quitting smoking to an estimate of the cost per QALY gained form the intervention, it was assumed that none of the quitters relapsed. Depending on the length of follow-up of the study, this assumption could result in an underestimate of the cost per QALY gained for an intervention.
3. Intervention costs: In the majority of cases, the estimates of the cost of the interventions were based on descriptions of the interventions within the effectiveness studies. It is

likely that these estimates therefore exclude some of the costs of the intervention, resulting in an overestimation of the cost-effectiveness of the intervention.

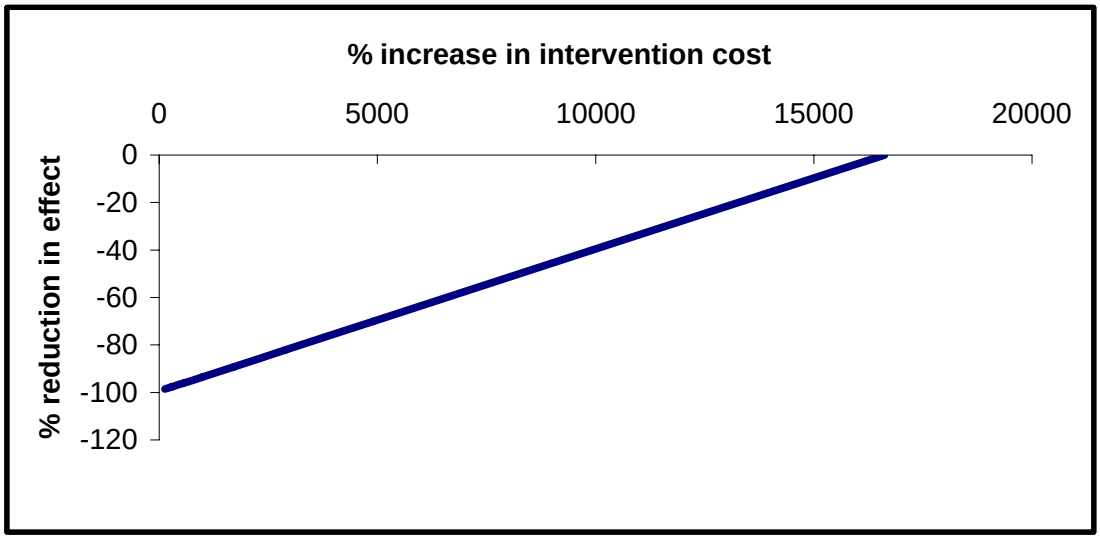
More detail on the sensitivity analysis conducted is available in appendix 10.

3.7 Cost-effectiveness when applied to disadvantaged groups

The above analysis produces an estimate of the cost per QALY gained for interventions when applied to the general population. Assuming that the interventions would be less cost-effective for disadvantaged groups, the final part of the analysis estimates how much more costly or less effective the interventions could be for a disadvantaged group while still having an ICER of less than £30,000 per QALY gained. This is performed by calculating the cost-effect combinations for each study which would cause the intervention to have a cost per QALY threshold of £30,000.

An example of the output from this analysis is shown in figure three. This shows the combination of increases in cost and reductions in effect that would cause the intervention to have a cost per QALY gained of £30,000. For instance, the intervention would have a cost per QALY gained of £30,000 if costs were increased by about 16500% compared to those derived from the study, keeping effect estimates constant. Or, the intervention would have a cost per QALY gained of £30,000 if the effect size was reduced by about 99% compared to those derived from the study, keeping cost estimates constant. These estimates reflect the range of changes in costs and effect possible if the intervention were applied to disadvantaged groups, while still ensuring the intervention is cost-effective.

Figure 3: Example of analysis of the changes in cost and effect that produce a cost per QALY gained of £30,000



4.0 Findings

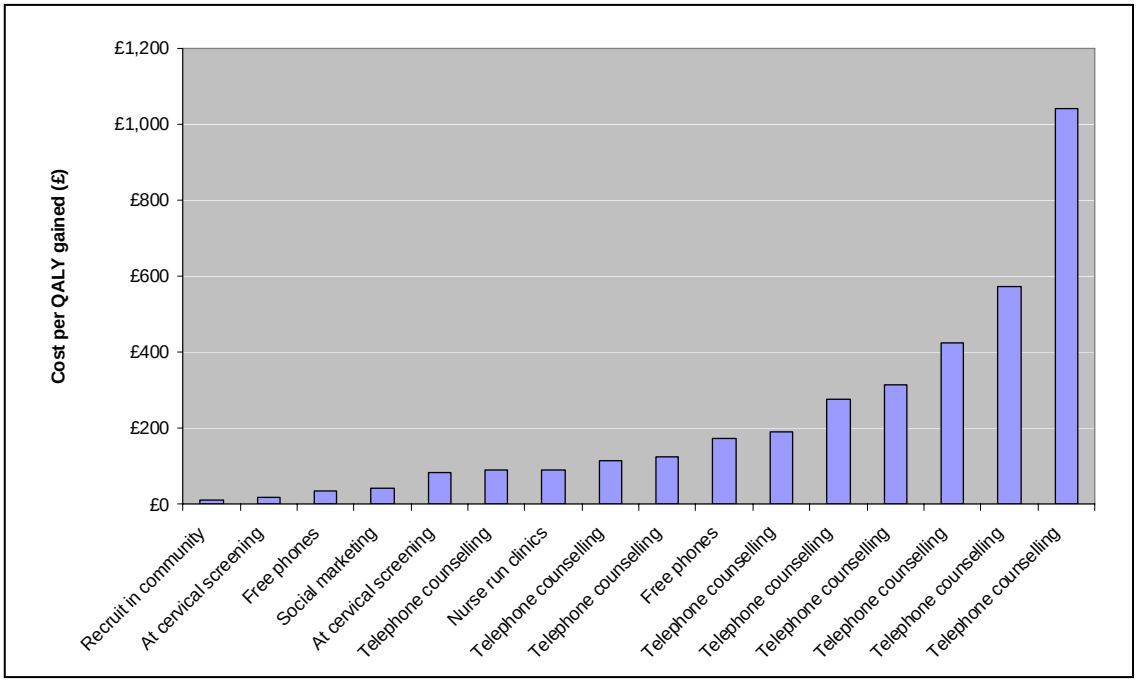
From the effectiveness review, 21 studies of interventions to improve the reach, use and retention of smoking cessation interventions among general population were identified and included in the economic analysis. These studies provided 61 estimates of the effectiveness of interventions.

The following interventions were included in the economic analysis: client-centred approaches (social marketing, nurse run clinics, recruitment of smokers in the community, interventions at cervical screening appointments, proactive telephone counselling, free mobile phones for use in smoking cessation counselling), identifying and reaching smokers (media campaigns to recruit to quit-to-win contests), improving access to interventions (dentist-based interventions, community-based drop in interventions, pharmacist-based interventions), and incentives (free NRT, incentives as part of workplace interventions).

The data available to the analysis meant that estimates of the cost per QALY gained (excluding future public sector costs saved) were produced for all the interventions.

Figure 4 shows the cost per QALY gained for ***client-centred interventions***. It demonstrates that the cost per QALY gained for client-centred interventions ranges from £10 to £1,041 per QALY gained. Recruitment of smokers in the community has the lowest cost per QALY gained, and proactive telephone counselling has the highest cost per QALY. Providing free phones for use in telephone counselling is more expensive than telephone counselling alone, but tends to lower the cost per QALY gained.

Figure 4: Cost per QALY gained of client-centred interventions for the general population



Four examples of telephone counselling are excluded from figure 4 as they are dominated by the alternatives against which they are evaluated. As the data on these interventions is extracted from a review (Lichtenstein et al, 1996), there is insufficient information on the counterfactuals employed in these studies to say why the cost per QALY gained of telephone counselling varies, including why these four examples were cost-ineffective when most instances of telephone counselling have a low cost per QALY gained.

Figure 5 shows the cost per QALY gained for interventions to identify and reach smokers. Most of the interventions are media campaigns to recruit smokers to quit-to-win contests. It demonstrates the cost per QALY gained for interventions to identify and reach smokers range from £11 to £2,701. The effect of many of the interventions to recruit to quit-to-win contests with very low costs per QALY gained are estimated by measuring the proportion of participants who quit post intervention. That is, the counterfactual is not measured in these studies. Only four of studies of recruitment to quit-to-win contests included in the analysis measure the counterfactual. These have cost per QALY gained ranging from £209 to £2,701.

Three examples of recruitment to quit-to-win contests are excluded from the figure 5 as they are dominated by the alternatives against which they are evaluated. Two of these examples employ other geographic areas as measures of the counterfactual, which makes it difficult to be specific about the alternative services against which the interventions are evaluated. The other example compared recruitment to quit-to-win against a control group of smokers attending cessation classes.

Figure 5: Cost per QALY gained of interventions to identify and reach smokers in the general population

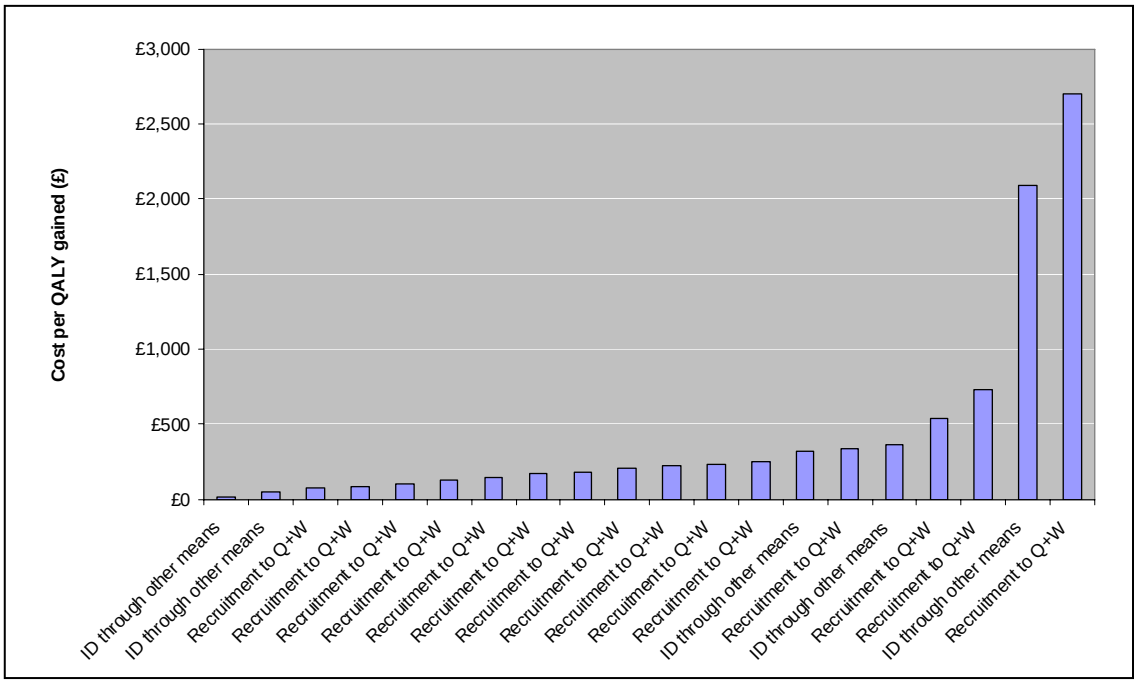


Figure 6 shows the cost per QALY gained for interventions to improve the access of smokers to cessation interventions. It demonstrates that the cost per QALY gained for interventions to improve access to smoking cessation interventions ranges from £200 to £667. One dentist based intervention is excluded from figure 6 as it is dominated by the alternative against which it is evaluated.

As the data on dentist-based and pharmacist-based interventions are extracted from reviews, there is insufficient information on the interventions or the controls against which they are evaluated to explore why three examples of dentist-based interventions have a cost per QALY gained of about £200 and one example is dominated by the counterfactual, or why the cost per QALY gained for one pharmacist-based interventions is twice the other.

Figure 6: Cost per QALY gained of interventions to improve the access of smokers in the general population to cessation interventions.

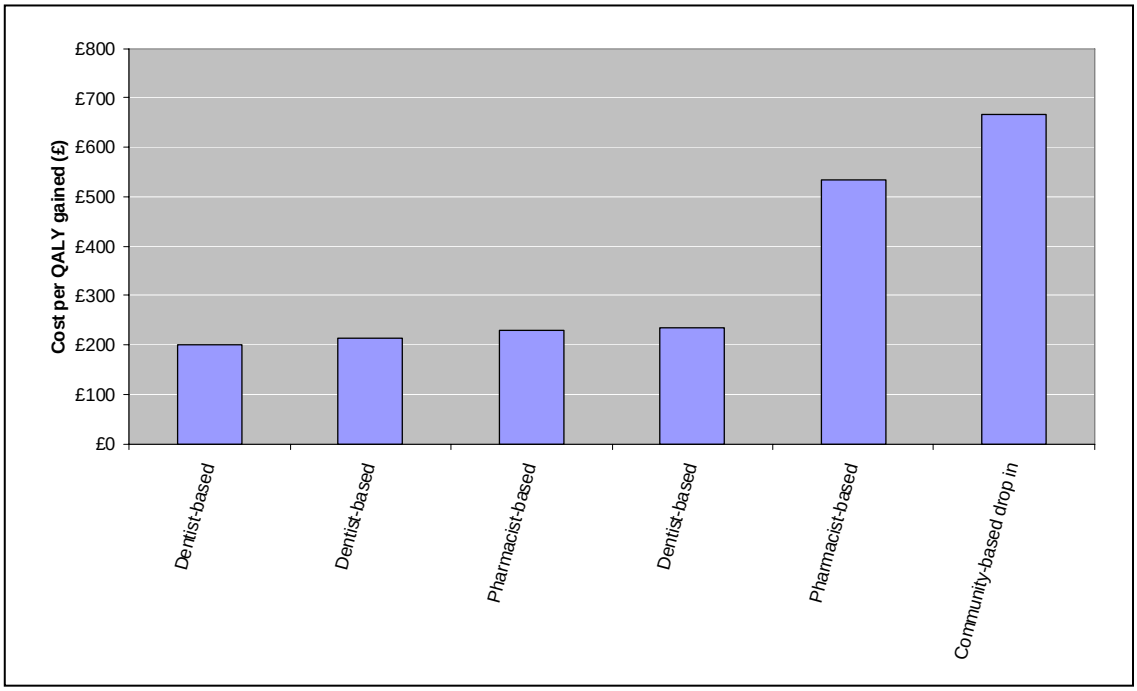


Figure 7 shows the cost per QALY gained for incentive-based interventions. It demonstrates that the cost per QALY gained for incentive-based interventions ranges from £29 to £1,038. Workplace-based incentives had a fairly consistent cost per QALY gained, ranging from c£100 to c£150. The cost per QALY gained of free NRT has a larger range of £29 to £1,038. One possible explanation for this variation is the counterfactual against which free NRT is measured. The £29 per QALY gained example measures free NRT against a do nothing alternative. The £1,038 per QALY gained example measures free NRT against an alternative intervention – a guide to stopping smoking.

Figure 7: Cost per QALY gained of incentive-based interventions in the general population

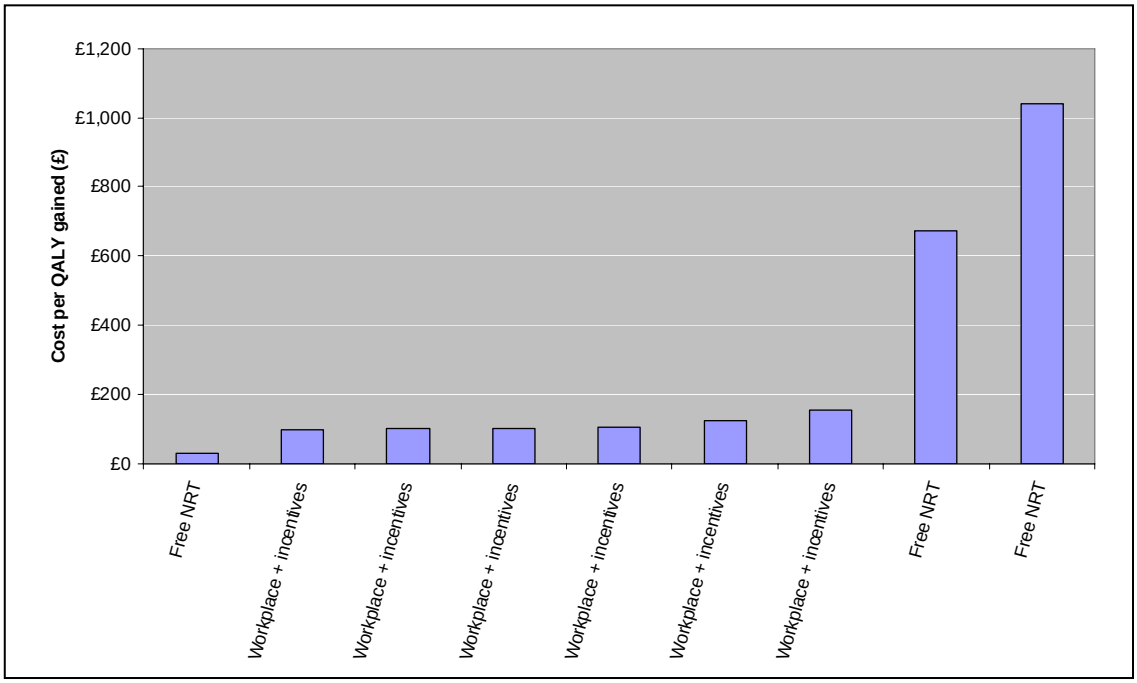


Figure 8 provides a more detailed summary of the result of the economic modelling. This also serves to highlight a number of important caveats to the model that may cause the cost per QALY gained estimate to be underestimated.

1. Methods quality. While the sample of studies modelled includes a number of good quality RCTs, it also includes a number of poor quality observational studies. In these instances, there are a number of concerns over the quality of the effect data employed in the model. The potentially poor measurement of the counterfactual means that there is a possibility that the model overestimates the effect and cost-effectiveness of the intervention. However, the analysis undertaken in appendix 9 suggests that the conclusion that interventions are cost-effective is not sensitive to effect size employed in the model, with reductions in effect size of about 94% being required before the cost per QALY gained estimate for any of the interventions passes above the £30,000 cost-effectiveness threshold.

2. Location. 18 of the 21 of the studies are non-UK-based, raising questions about the transferability of the data to the UK context.

A number of other caveats should also be noted. These include:

1. Relapse rates: Where the model extrapolated from an estimate of the proportion of participants quitting smoking to an estimate of the cost per QALY gained form the intervention, it was assumed that none of the quitters relapsed. This assumption is likely to result in an underestimate of the cost per QALY gained for an intervention. While this assumption is unrealistic, again the analysis in appendix 9 suggests that the conclusion that interventions are cost-effective is not sensitive to the relapse rate employed in the model, with a relapse rate of about 94% being required before the cost per QALY gained estimate for any of the interventions passes above the £30,000 cost-effectiveness threshold. Therefore, the conclusion that the intervention are cost-effective is unlikely to be sensitive to the relapse rate included in the model.
2. Intervention costs: In the majority of cases, the estimates of the cost of the interventions were based on descriptions of the interventions within the effectiveness studies. It is likely that these estimates therefore exclude some of the costs of the intervention, resulting in an overestimation of the cost-effectiveness of the intervention. However, the analysis undertaken in appendix 9 suggests that even when intervention costs are increased by about 900% none of the interventions has a cost per QALY gained estimate greater than the £30,000 cost-effectiveness threshold. It is therefore reasonable to conclude that the results of the analysis are not sensitive to any inaccuracies in the estimate of intervention costs.

Thus, while the above figures should not be taken as accurate estimates of the cost per QALY gained associated with the interventions, the sensitivity analysis suggests that we can be confident in the conclusion that the interventions have a cost per QALY gained estimate lower than the £20,000 - £30,000 threshold traditionally employed by NICE.

The above analysis determines the cost effectiveness of smoking cessation interventions when they are targeted at the general population. However, the NICE guidance that the analysis is designed to inform is interested in the cost-effectiveness of interventions when applied to disadvantaged groups. Appendix 10 presents a sensitivity analysis to determine the change in cost and/or effect required before the cost per QALY gained for an intervention becomes £30,000. This analysis is performed on only those interventions with a cost per QALY gained less than £30,000. It assumes that interventions are less cost-effective for disadvantaged groups and thus calculates the increase in cost and/or the reduction in effect required before the cost per QALY gained for an intervention becomes £30,000.

The analysis in appendix 10 demonstrates that, for those interventions with a cost per QALY gained lower than £30,000, costs would have to increase by very large amounts or effects would have to reduce by very large amounts before the interventions would have a cost per QALY gained of greater than £30,000. For instance, the lowest increase in costs required to cause the cost per QALY gained to be greater than £30,000 is 450 percent – interventions to recruit smokers to quit to win contests (Korhonen et al, 1992). All the interventions require increases in cost in the magnitude of many thousands of percent before they become cost-ineffective. A similar story is told for changes in effect. The lowest reduction in effect required to cause the cost per QALY gained to be greater than £30,000 is 81 percent, again for the intervention to recruit smokers to quit and win contests (Korhonen et al, 1992). However, most

interventions require a reduction in effect of about 99% before the cost per QALY gained becomes greater than £30,000.

Figure 8: Estimate ICERs (2007 prices)

Intervention type	Intervention	Study	Method	Method quality	Location	Cost	Cost per QALY gained
Client-centred approaches	Recruiting smokers from community	Harding et al, 2004	Descr. study	+	UK	£17	£10
	Social marketing to deliver client centred approaches to SC	Turner et al 2001	CBA	-	non-UK	£1	£42
	Free mobile phones for use in SC counselling	Lavez et al 2004	Obs. study		non-UK	£68	£35
		Vidrine et al 2006	RCT	+	non-UK	£91	£175
	Interventions at cervical screening appointments	Hall et al, 2007	RCT	+	UK	£18	£86
		Hall et al, 2003a	RCT	-	UK	£3	£19
		Hall et al, 2003b	RCT	-	UK	£0	£0
	Nurse run clinics	Campbell et al, 1998	RCT	++	UK	£53	£92
Combined approaches	Proactive telephone counselling	Curry et al 1996 (in Lichtenstein et al 1996)	Review			£22	£572
		DeBusk et al 1994 (in Lichtenstein et al 1996)	Review			£105	£314
		Lando et al 1992 (in Lichtenstein et al 1996)	Review			£15	Dominated
		Lando et al 1994a (in Lichtenstein et al 1996)	Review			£45	£1,041
		Lando et al 1994b (in Lichtenstein et al 1996)	Review			£23	Dominated
		Ockene et al 1991 (in Lichtenstein et al 1996)	Review			£22	£424
		Ockene et al 1992	Review			£22	£127
		Prochaska et al 1993 (in Lichtenstein et al 1996)	Review			£30	Dominated
		Rimer et al 1994a (in Lichtenstein et al 1996)	Review			£9	Dominated

Intervention type	Intervention	Study	Method	Method quality	Location	Cost	Cost per QALY gained
		Rimer et al 1994b (in Lichtenstein et al 1996)	Review			£9	£115
		Taylor et al 1990 (in Lichtenstein et al 1996)	Review			£52	£92
		Zhu et al 1996a (in Lichtenstein et al 1996)	Review			£37	£277
		Zhu et al 1996b (in Lichtenstein et al 1996)	Review			£45	£191
Identifying & reaching target populations	Recruitment to Quit and Win	Tillgren et al 2000	Obs. study	+	non-UK	£2	£99
		Altman et al 1987a (in Bains et al 1998)	Review			£53	Dominated
		Altman et al 1987b (in Bains et al 1998)	Review			£53	£2,701
		Cummings et al 1990 (in Bains et al 1998)	Review			£53	£84
		Elder et al 1991 (in Bains et al 1998)	Review			£53	£209
		Elder et al 1987a (in Bains et al 1998)	Review			£53	£232
		Elder et al 1987b (in Bains et al 1998)	Review			£53	£77
		Fortmann and Killen 1995 (in Bains et al 1998)	Review			£53	£150
		King et al 1987 (in Bains et al 1998)	Review			£53	£179
		Korhonen et al 1992 (in Bains et al 1998)	Review			£53	£538
		Korhonen et al 1993 (in Bains et al 1998)	Review			£53	Dominated

Intervention type	Intervention	Study	Method	Method quality	Location	Cost	Cost per QALY gained
		Lando et al (1991) (in Bains et al 1998)	Review			£53	£728
		Lando et al 1990 (in Bains et al 1998)	Review			£53	Dominated
		Lefebvre et al 1990a (in Bains et al 1998)	Review			£53	£222
		Lefebvre et al 1990b (in Bains et al 1998)	Review			£53	£169
		Lefebvre et al 1990c (in Bains et al 1998)	Review			£53	£254
		Leinweber et al. 1994 (in Bains et al 1998)	Review			£53	£128
		Roberts et al 1993 (in Bains et al 1998)	Review			£53	£336
	ID smokers through other means	Bentz et al, 2006	Obs. study	-	non-UK	£1	£365
		Chapman et al, 1993	Obs. study	-	non-UK	£70	Dominated
		Milch et al 2003a	Controlled trial	+	non-UK	£6	£11
		Milch et al 2003b	Controlled trial	+	non-UK	£17	£47
		Prochaska et al 2001	RCT	+	non-UK	£36	£322
		Murray et al, 2007	RCT	++	UK	£41	£2,089
Improving access	Dentist-based interventions	Andrews 1999 (in Carr and Ebbert et al 2007)	Review			£37	£234
		Gansky 2002 (in Carr and Ebbert et al 2007)	Review			£42	£215
		Gansky 2005 (in Carr and Ebbert et al 2007)	Review			£65	Dominated

Intervention type	Intervention	Study	Method	Method quality	Location	Cost	Cost per QALY gained
		Walsh 1999 (in Carr and Ebbert et al 2007)	Review			£75	£200
	Drop-in / rolling community based sessions	Owens and Springett, 2007	Obs. study	-	UK	£22	£667
	Pharmacist-based interventions	Maguire et al 2001 (in Blenkinsopp et al 2001)	Review			£121	£533
		Sinclair et al 1998 (in Blenkinsopp et al 2001)	Review			£23	£229
Incentive Schemes	Free NRT	An et al 2006	Cohort Study	+	non-UK	£108	£671
		Bauer et al 2006a	Cohort Study	+	non-UK	£6	£29
		Bauer et al 2006b	Cohort Study	+	non-UK	-£81	£1,038
	Workplace smoking cessation + incentives	Hennrikus et al 2002a	RCT	+	non-UK	£37	£103
		Hennrikus et al 2002b	RCT	+	non-UK	£29	£95
		Hennrikus et al 2002c	RCT	+	non-UK	£64	£153
		Hennrikus et al 2002d	RCT	+	non-UK	£55	£100
		Hennrikus et al 2002e	RCT	+	non-UK	£50	£122
		Hennrikus et al 2002f	RCT	+	non-UK	£42	£100

5.0 Discussion

This report assesses the cost-effectiveness of the following smoking cessation interventions: client-centred approaches (social marketing, nurse run clinics, recruitment of smokers in the community, interventions at cervical screening appointments, proactive telephone counselling, free mobile phones for use in smoking cessation counselling), identifying and reaching smokers (media campaigns to recruit to quit-to-win contests), improving access to interventions (dentist-based interventions, community-based drop in interventions, pharmacist-based interventions), and incentives (free NRT, incentives as part of workplace interventions).

The analysis suggests that a number of the above interventions have a cost per QALY gained of less than £20,000-£30,000, including:

- Recruitment of smokers in the community (£10 per QALY gained based on one observation)
- Community drop in centres (£667 per QALY gained based on one observation)
- Pharmacist-based interventions (a mean of £381 per QALY gained based on two observations)
- Interventions at cervical screening clinics (a mean of £35 per QALY gained based on three observations)
- Nurse run clinics (£92 per QALY gained based on one observation)
- Social marketing (£42 per QALY gained based on one observation)
- Free phones for use in telephone counselling (a mean of £105 per QALY gained based on two observation)
- Prescriptions for free NRT (a mean of £579 per QALY gained based on three observations)
- Workplace-based incentives (a mean of £112 per QALY gained based on six observations)

It is important to note that these cost per QALY estimates are based on the assumption that none of those participants who quit smoking as a result of the intervention relapse. While this assumption is unrealistic, the sensitivity analysis suggests that the conclusion that interventions are cost-effective is not sensitive to the relapse rate employed in the model, with a relapse rate of about 94% being required before the cost per QALY gained estimate for any of the interventions passes above the £30,000 cost-effectiveness threshold.

The above analysis determines the cost effectiveness of smoking cessation interventions when they are targeted at the general population. However, the analysis suggests that intervention costs would have to increase by very large amounts or intervention effects would have to reduce by very large amounts when the interventions are applied to disadvantaged groups before the interventions would have a cost per QALY gained of greater than £30,000. For instance, most of the interventions require increases in cost in the magnitude of many

thousands of percent or a reduction in effect of about 99% before the cost per QALY gained becomes greater than £30,000.

These large increases can be compared against Dolan et al's (2006) estimates of the relative cost effectiveness of NHS Stop Smoking Services for disadvantaged and non-disadvantaged groups. Dolan et al (2006) estimate that the cost per QALY gained from NHSSSS for low socio-economic groups is £692. This compares with a cost per QALY gained for high-socio economic groups of £503. That the cost per QALY for low socio-economic groups is only about 20% greater than that for high socio-economic groups – a magnitude much smaller than the change required to cause the interventions' cost per QALY gained to exceed £30,000 – suggests that the interventions evaluated in this report could be applied to disadvantaged groups and still be cost-effective.

The evidence for a number of other interventions was mixed, with some instances of the interventions having a cost per QALY gained less than £30,000 and other instances being dominated by the alternative against which they were evaluated. These interventions include:

- Telephone counselling (four observations suggested telephone counselling was dominated, however nine other observations suggested a mean ICER of £350 per QALY gained).
- Recruitment to quit to win (three observations suggested that recruitment to quit-to-win was dominated, however fifteen other observations suggested a mean ICER of £407 per QALY gained).
- Dentist-based interventions (one observation suggested that dentist-based interventions were dominated, however three other observations suggested a mean ICER of £216 per QALY gained).

Further research needs to be done to understand the variations in intervention, counterfactual, target population or implementation context that cause the cost-effectiveness of these interventions to vary.

While the above analysis measures the impact of the interventions on health outcomes, as the target population for these interventions belong to disadvantaged groups, their impact is both to increase health outcomes and reduce health inequalities. One way to account for this is to adjust the £30,000 per QALY threshold against which interventions are assessed to include the value of reducing health inequalities. Work on equity adjustments to the cost-effectiveness threshold is in its very early days and only provides very indicative estimates of possible equity-efficiency weights. Professor Dolan and colleagues are engaged in on-going research into public preferences over various efficiency-equity trade-offs in health. In one small study of 66 respondents, Dolan and Tsuchiya (forthcoming, a) have estimated the weight given to a unit health gain to the lowest social class compared to a unit health gain for the highest social class. When differences in health are expressed in terms of life expectancy, the average respondent weights a marginal gain in life expectancy to the lowest social class about seven times more highly than the same gain to the highest social class. When differences are expressed in terms of rates of limiting long-term illness, the corresponding weight is four. The lower of these

estimates would suggest that an intervention that reduces health inequalities should be assessed against a cost-effectiveness threshold of £120,000.

However, further work by Dolan and Tsuchiya (forthcoming, b) using the same data suggests that the equity weights would change if the health inequalities are perceived to be the responsibility of the individual. For instance, if the poorer health of smokers is entirely their responsibility, the weight given to a smoker relative to a non-smoker is about one half. All else equal, this would suggest that the cost-effectiveness threshold be reduced to for smokers £15,000. Assuming that these two sets of weights are independent of one another, it would suggest that benefits to smokers in the lowest social class are weighted about twice as highly as benefits to non-smokers in the highest social class (i.e. a threshold of £60,000 per QALY).

As the equity-weights cost-effectiveness threshold is greater than the traditional NICE threshold of £30,000, this adjustment would reinforce the conclusion that the above interventions would be cost-effective for a disadvantaged population. However, these equity- and responsibility-weighted thresholds should be treatment with caution. Research on how to weight the cost-effectiveness threshold is in its very early days. Furthermore, assuming that the weights can be added together in this way is a rather heroic assumption given the current state of knowledge and it is certainly not one that we would wish to defend. Professor Dolan will be presenting fresh empirical evidence, from much larger samples, shortly.

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7.0 Appendix 1: Effect review studies included and excluded from the model

Study	Included/excluded
An et al 2006	Included
Bains et al 1998	Included
Barbeau et al 2006	Excluded – not general population
Bauer et al 2006	Included
Bauld et al 2006	Excluded – not general population
Bentz et al 2006	Included
Blenkinsopp et al 2003	Included
Boyd et al 1998	Excluded – not general population
Campbell et al 1998	Included
Carr & Ebbert 2007	Included
Chesterman et al 2005	Excluded – not general population
Curry et al 2003	Excluded – not general population
Doescher et al 2002	Excluded – not general population
Dornelas et a 2006	Excluded – not general population
Hall et al 2003	Included
Hall et al 2007	Included
Harding et al 2004	Included
Haviland et al 2004	Excluded - not report relevant outcome data
Hennrikus et al 2002	Included
Lazev et al 2004	Included
Lichenstein et al 1996	Included
Lowey et al 2003	Excluded – not general population
Lowry et al 2004	Excluded - not report relevant outcome data
McDaniel et al 2005	Excluded - not report relevant outcome data
McLean et al 2006	Excluded - not report relevant outcome data
Milch et al 2004	Included
Murray et al 2007	Included
Needleman et al 2006	Included
Okuyemi et al 2007	Excluded - not report relevant outcome data
Owens & Springett 2007	Included
Perry et al 2005	Included
Prochaska et al 2001	Included
Ritchie et al 2007	Excluded - not report relevant outcome data
Roddy et al 2006	Excluded - not report relevant outcome data
Schorling et al 1997	Excluded – not general population
Solomon et al 2000	Excluded – not general population
Springett et al 2007	Included
Stevens et al 2002	Excluded – not general population
Tappin et al 2000	Excluded - not report relevent outcome data
Ussher et al 2004	Excluded - not report relevent outcome data
Ussher et al 2006	Excluded - not report relevent outcome data

Study	Included/excluded
Vidrine et al 2006	Included
Wiltshire et al 2003	Excluded - not report relevant outcome data

8.0 Appendix 2: data extraction tables

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Altman et al (1987) (from Bains et al 1998)	Quit-to-win	£52.83	N=498; 5 weeks on average; % quit: 22% (contestants); Control group rate: 35% (attend class), 21% (self-help kit)	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
An et al (2006)	Quitline + NRT,	£107.232	Quit rate (1m): Before (N=380) - 10%, After (N=373) - 18.2%	Resources: ➢ Provision of NRT + quitline counselling Costs: ➢ NRT: £107.92 – Source: An et al (2006) ➢ Quitline: £68.09 – Source: An et al (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Andrews (1999) (from Carr and Ebbert et al 2007)	Dentist-based intervention	£37.33	Quit (12m): Treatment - 40/394; Control – 8/239	Costs: ➢ GP cost: £25.00 – assuming 10 mins (Netten and Curtis 2006) ➢ Motivational video: £5 (Netten Curtis 2006) ➢ Social Work assistant: £7.33 (Nettan and Curtis)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Bauer et al (2006)	Free NRT	£5.64	Quit rate: 22% treatment, 12% control	Resources: ➢ Voucher for free NRT Costs: ➢ Voucher for free NRT:– £5.64 per participant (Total cost of the programme is $51,304 ; Subtracting out the median number of calls to the quitline in the 2-week period of the promotion the article calculates that 4724 extra calls generated - cost per person receiving NRT = $11); Source: Bauer et al (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Bauer et al (2006)	Study 2: Treatment: advert for free better quit cigarette substitute; Control: Advert for free stop smoking guide)	-£81	Quit rate: treatment 20%, control 24% quit.	Incremental costing includes: ➢ Advert for quitline + Better Quit (vs. advert for quitline) ➢ Quitline newspaper advert offering a free stop smoking guide + free Better Quit stop smoking aide. Costs: o Cost per caller (advert for quitline + BQ) = $80 =$41 o Cost per caller (advert for quitline) = $239 = £122.49 o Cost per participant: £-81.49 Source: Bauer et al (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Bentz et al. (2006)	Giving local level GPs a fax or brochure connection with a national level quitline	£1.40	3.1% of tobacco users accepted a one time intervention from a quit line counsellor.	Resources: ➢ Programmer (92 hours) ➢ Project manager – (120 hours) ➢ Physician (72 hours) ➢ IS project manager (20 hours) ➢ MA (53 hours) ➢ Nurse (7 hours) ➢ NP (4 hours) ➢ Clinical Manager (8 hours) ➢ Food Costs: ➢ Programmer £31.35/ hour – Source: Tjobswatch ➢ Project manager – Source £42/ hour: N&C (2006) ➢ Physician (£25/ ten minutes) ➢ IS project manager £31.35 –Source: IT jobs watch (2007) ➢ MA £16/ hour – Source: Netten and Curtis (2006) ➢ Nurse £29/ hour – Source: Netten and Curtis (2006) ➢ NP £72/ hour – Source Netten and Curtis (2006) ➢ Clinical Manager £30/ hour - Source Netten and Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Campbell et al 1998	Nurse run clinics in general practice	£70.48	Non-smoking: Baseline/Intervention: 82.5%, Outcome/Intervention: 82.7%; Baseline/Control: 82.7%, Outcome/Control: 84.7%;	Resources: ➢ First stage: Symptoms review (45 mins), practice nurse ➢ Second stage: Drug treatment review (20mins), practice nurse ➢ Third stage: Blood pressure and lipids review (20 mins), practice nurse ➢ Fourth stage: Review of behavioural risk factors (exercise, diet, smoking) (20mons), practice nurse ➢ Training the nurses (1.5 days) ➢ Clinic co-ordinator provided support by phone (20 mins) ➢ Clinic protocols were detailed in a manual ➢ Client record card ➢ One Step at a Time leaflet Costs: ➢ Practice nurse £26/ hour. Source Netten and Curtis (2006) ➢ Clinic co-ordinator: assuming the wage to be equivalent to coordinator = £6. Source Netten and Curtis (2006) ➢ Clinic protocols were detailed in a manual: assuming the cost to be equivalent to a booklet = £5.95. Source MIDIRS Survey 2007 ➢ Client record card: assuming the cost to be equivalent to a leaflet = £2.95. Source MIDIRS Survey 2007.

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Chapman et al (1990) (from Bains et al 1998)	Quit-to-win promoted through television, radio and press ads	£52.83	4 mth quit rate: 29.2%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Cummings et al (1990) (from Bains et al 1998)	Quit-to-Win promoted through Newspaper campaign. Also promoted through cancer center, voluntary organizations, flyers, posters, and recruitment at shopping	£52.83	% Quit at 8 mth: 32%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Curry et al, 1996 quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£22.47	12m quit, treatment 11%, control 9%	Resources: ➢ 3 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Elder et al (1987) (from Bains et al 1998)	Quit-to-Win: Flyers to physicians, dentists, schools, stores, laundromats, PSAs on radio, ads in newspapers; face-to face recruitment	£52.83	% quit: 22% (contestants); Control group rate: 35% (attend class), 21% (self-help kit)	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Elder et al (1991) (from Bains et al 1998)	Quit-to-Win advertised on TV and radio PSAs, ads in local and major newspapers. Entry forms distributed in health facilities, restaurants, and shopping malls	£52.83	% Quit: 35%; Quit rates of control groups were not measured	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Fortmann and Killen (1995)) (from Bains et al 1998)	Quit-to-Win. Media campaign during national non-smoking week, radio, newspaper, ads, posters, brochures	£52.83	12 mth quit 18%.	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Gansky 2002 (from Carr and Ebbert et al 2007)	Dentist-based intervention	£42.32	Quit (24 m):Treatment: 32/141; Control:21/166	Resources: ➢ 60 min educational meeting ➢ Oral cancer screening + advice to stop ➢ Self-help guide ➢ 15 mins counselling ➢ 10 min follow-up Costs ➢ Assume cost meeting chair equivalent to social work assistant (£22ph) + 10 people attend = £2.20. Source Netten & Curtis (2006) ➢ Assume GP cost (£25/10mins), 10 mins more than usual examination = £25.00. Source Netten & Curtis (2006) ➢ Self-help guide = £5.95. Source MIDIRS Survey 2007 ➢ Counselling: Assume social work assistant cost (£22ph) = £5.50. Source Netten & Curtis (2006) ➢ Follow-up: assume social work assistant cost (£22ph) = £3.67. Source Netten & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Gansky 2005 (from Carr and Ebbert et al 2007)	Dentist-based intervention Control: usual care	£65.45	Quit (12 m):Treatment: 103/285; Control:130/352	Resources: ➢ Video conference for dentist (3 hours) ➢ Newsletter for dentist ➢ Oral cancer screening + advice to stop ➢ Self-help guide ➢ 15 mins counselling ➢ Develop a plan ➢ Develop a plan ➢ 60 min educational meeting with peers Costs: ➢ Assume GP cost, attended by 5 dentists, each dentist supports 20 patients: £4.50. Source Netten & Curtis (2006) ➢ Newsletter: £0.30, assuming each dentist supports 20 patients and each newsletter cost £5.95. Source MIDIRS Survey 2007 ➢ Assume GP cost (£25/10mins), 10 mins more than usual examination: £25.00. Source Netten & Curtis (2006) ➢ Self-help guide: £5.95 (MIDIRS Survey 2007) ➢ Counselling: assume social work assistant cost (£22ph) = £5.50. Source Netten and Curtis (2006) ➢ Develop a plan: assume social work assistant cost (£22ph), takes 30 mins = £11.00. Source: Netten & Curtis (2006) ➢ Develop a plan: assume social work assistant cost (£22ph), takes 30 mins = £11.00. Source: Netten & Curtis (2006) ➢ Educational meeting with peers: assume cost meeting

				chair equivalent to social work assistant (£22ph) + 10 people attend = £2.20. Source Netten & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hall et al (2003)a	Treatment: Extended Leaflet containing two threat and two efficacy messages related to cervical cancer. Control: Brief leaflet	£0.00	Readiness to quit (6 m): Extended leaflet (N=50): 46%, Brief leaflet (N=53): 75%	Costs: ➢ Extended Leaflet: £2.95 (MIDIRS Survey 2007) ➢ Brief Leaflet: £2.95 (MIDIRS Survey 2007)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hall et al (2003)b	Extended Leaflet containing two threat and two efficacy messages related to cervical cancer. Control: No leaflet	£2.95	Readiness to quit (6 m): No leaflet (N=69): 40%, Extended leaflet (N=50): 46%,	Resources: ➢ An extended leaflet Costs: ➢ Extended Leaflet: £2.95 (MIDIRS Survey 2007)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hall et al (2007)	Brief smoking cessation advice and written info given by practice nurses during cervical smear tests appointments	£17.66	Treatment (N=79):Quit:15%; Control (n=74):Quit:7%	Costs: ➢ Nurses time in delivering the intervention - 3 mins (£29 ph): £1.45. Source Netten & Curtis (2006) ➢ Training to the nurses (1-1/2day): assuming each day of training costs £550; each training session attended by 10 nurses; + 2 nurses required to deliver the intervention = £1.36. Source Netten & Curtis (2006) ➢ Self-help booklet: £5.95. Source MIDIRS Survey (2007) ➢ Booklet produced by QUIT: £5.95 (MIDIRS Survey 2007) ➢ Card listing local and national smoking cessation services: £2.95

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Harding et al (2004)	Smoking cessation program for gay men:	**£16.84**	Quit: Before: 0%, After: 64% (n=69)	Costs: ➢ Withdrawal oriented treatment - groups works, nicotine replacement therapy and peer support: 7 volunteers were trained in the 3 day course: assuming per day training cost to be £550 = 3*£550 = £1650/98 = £16.84. Source Netten & Curtis (2006) ➢ 4 delivered group sessions of 2 hr each run by volunteer: assuming the volunteer is not paid ➢ 7 weekly meetings of 2 hr each run by volunteer: assuming the volunteer is not paid. ➢ 7 weekly meetings of 2 hr each run by volunteer: assuming the volunteer is not paid ➢ 24 recruitment advertisements accompanied with editorial and articles: advertisements were free

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hennrikus et al (2002)a	Group counselling + incentive	**£36.86**	Quit (24m): Treatment - 13.85%;	Costs: ➢ 13 group sessions: assume each 1 hour, wage equivalent to social worker assistant (£22ph), 10 people attend each session: £28.60. Source Netten & Curtis (2006) ➢ Incentive (10$ + $20 if succeed): assume % quit at 12m receive incentive (13.85%) = £6.39 ➢ Prize draw (((3*$500)/400))/2: £1.88

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hennrikus et al (2002)b	Group counselling with no incentive.	**£28.60**	Quit (24m): 11.65%	Costs: ➢ 13 group sessions: Assume each 1 hour, wage equivalent to social worker assistant (£22ph), 10 people attend each session = £28.60. Source Netten & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hennrikus et al (2002)c	Phone counselling + incentive	**£63.95**	Quit (24m): Treatment : 16.2%;	Resources: ➢ Sent smoking cessation materials ➢ Contacted by phone counsellor (average 4.5 times) ➢ Incentive (10$ + $20 if succeed) ➢ Prize (3*$500) Costs: ➢ Smoking cessation materials: £5.95. Source MIDIRS Survey 2007) ➢ Phone counsellor: assume wage social assistant (£22ph), each call lasts 30 mins = £49.50. Source Netten & Curtis (2006) ➢ Incentive: Assume % quit at 12m receive incentive (16.20%) = £6.62 Source Netten & Curtis (2006) ➢ Prize draw (((3*$500)/400))/2: £1.88

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hennrikus et al (2002)d	Phone counselling with no incentive	**£55.45**	Quit (24m): 21.53%	Resources: ➢ Sent smoking cessation materials ➢ Contacted by phone counsellor (average 4.5 times) Costs: ➢ Smoking cessation materials = £5.95 (MIDIRS Survey 2007) ➢ Phone counsellor: assume wage social assistant (£22ph), each call lasts 30 mins = £49.50. Source Netten and Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Hennrikus et al (2002)e	Choice (Assume average of group counselling + phone counselling)+ incentive	**£50.40**	Quit (24m): Treatment: 16.06%	Resources and Costs: Group counselling + incentives: ➢ 13 group sessions: assume each 1 hour, wage equivalent to social worker assistant (£22ph), 10 people attend each session = £28.60. Source Netten & Curtis (2006) ➢ Incentive (10$ + $20 if succeed): assume % quit at 12m receive incentive (13.85%) = £6.39 ➢ Prize draw (((3*$500)/400))/2 = £1.88 **Cost per participant: £36.86** Group counselling with no incentive: ➢ 13 group sessions: assume each 1 hour, wage equivalent to social worker assistant (£22ph), 10 people attend each session = £28.60. Source Netten & Curtis (2006) **Cost per participant: £28.60** Phone counselling with incentive: ➢ Sent smoking cessation materials: £5.95. Source MIDIRS Survey 2007 ➢ Contacted by phone counsellor (average 4.5 times): assume wage social assistant (£22ph), each call lasts 30 mins = £49.50. Source Netten & Curtis (2006) ➢ Incentive (10$ + $20 if succeed): assume % quit at 12m receive incentive (16.20%): £6.62 ➢ Prize draw (((3*$500)/400))/2 = £1.88

				Cost per participant: £63.95 Phone counselling with no incentive: ➢ Sent smoking cessation materials: £5.95. Source MIDIRS Survey 2007 ➢ Contacted by phone counsellor (average 4.5 times): assume wage social assistant (£22ph), each call lasts 30 mins = £49.50. Source Netten & Curtis (2006) ➢ Prize draw (((3*$500)/400))/2 = £1.88 **Cost per participant: £55.45**

Author And Year	**Intervention**	**Incremental Cost per participant**	**Effect Data**	**Comment**
Hennrikus et al (2002)f	Choice (average of group counselling + phone counselling) with no incentive	**£42.03**	Quit (24m): Treatment: 16.33%	Resources and costs: Assume average cost of group + phone (above)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
King et al (1987) (from Bains et al 1998)	Quit-to-Win with 1 month promotion, radio and TV	£52.83	% Quit 1 yr: 15%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Korhonen et al (1990) (from Bains et al 1998)	Quit-to-Win. with TV program, leaflets, posters	£52.83	6 month quit rate: N.Karelia: 22%, Rest of Finland: 17%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source Shipley et al (1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Korhonen et al (1993) (from Bains et al 1998)	Quit-to-Win promoted through health care services, health organizations, and media (national TV program);	£52.83	% 6 mth quit rate: Finland: 19%,, Estonia: 23%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Lando et al (1990) (from Bains et al 1998)	Quit-to-Win promoted through radio, TV, newspapers, posters, flyers, billboards	£52.83	6 mth % quit: 37% in Bloomington and 45% in state-wide control group	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Lando et al (1991) (from Bains et al 1998)	Quit-to-win promoted through ads and articles in local newspaper, flyers, entry forms, and recruitment letters mailed to residents;	£52.83	% quit rates at 12 mth (validated): 1984: 10.6%, 1985: 15.9%, 1986: 12.1	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Lando et al, 1992 quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£14.19	12m quit, treatment 14%, control 16%	Resources: ➢ 2 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Lando et al, 1994a quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£44.94	12m quit, treatment 34.2%, control 32%	Resources: ➢ Up to 3 proactive phone calls at three time points. Assumes an average of 2 calls per time point, that calls are conducted by a nurse and that calls last 15 minutes Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Lando et al, 1994b quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£22.96	12m quit, treatment 21%, control 22%	Resources: ➢ 4 proactive phone calls. Assumes that calls are conducted by a nurse and that calls last 15 minutes Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Lavez et al, 2004	Smoking cessation intervention via cellular telephone: cellular phone with 500 minutes of airtime; 6 cellular phone-delivered counselling sessions (10 mins each); brief instruction about using the cellphone (10 mins); reminder calendar with schedule of calls; a 24 hour, 7 day a week hotline was provided for two weeks; information packs	£68.00	Quit: Before: 0%; After: 75%; N=20	Resources: ➢ Cellular phone with 500 min of airtime ➢ 6 cellular phone-delivered counselling sessions (10 mins each) ➢ Brief instruction about using the cell phone (10 mins) ➢ Reminder calendar with schedule of calls ➢ A 24 hr, 7 day-a-week hotline was provided for two weeks ➢ Information packs Costs: ➢ Cellular phone: £30. Source: http://www.broadband-tv-phone.com/virgin-media/bundle.php ➢ Assuming the counselling sessions is run by practice nurse (£26): £26. Source Netten & Curtis (2006) ➢ Assuming the instruction is given by social work assistant (£22): £3.67. Source Netten and Curtis (2006) ➢ Assume the cost of the reminder calendar to be negligible ➢ Cost per call is £1.91 (2001) = £2.22 (2007), using the appropriate inflation rate; participants made a total of 20 calls to the hotline: £1.91. Source National Audit Office (2002) ➢ Information packs: Assuming the cost to be the same as the booklet = £5.95. Source MIDIRS Survey 2007

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Lefebvre et al (1990) (from Bains et al 1998)	Quit-to-Win: face-to-face recruitment; worksite solicitation; promotions through churches, schools, physicians' offices	£52.83	% quit rates at 12 mth (validated): 1984: 10.6%, 1985: 15.9%, 1986: 12.1	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Leinweber et al. (1994) (from Bains et al 1998)	Quit-to-win: media campaign during national non-smoking week, radio, newspaper, ads, posters, brochures	£52.83	12 mth quit rate: 21%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Maguire et al (2001) from Blenkinsopp et al (2003)	Pharmacist intervention vs normal care.	£121.45	12 m quit, treatment 14.3 %, control (do nothing) 2,7% quit rate.	Resources: ➢ Pharmacist Studies literature review: ➢ 3 hour training workshop ➢ 3 hour training workshop ➢ Counselling ➢ Information Leaflet ➢ Follow up Costs: ➢ Cost community pharmacist £35/hr, assume 2 hrs + each support 20 smokers = £3.50. Source Netten & Curtis (2006) ➢ Assumes 10 pharmacists attend + each support 20 smokers = £2.75. Source Netten & Curtis (2006) ➢ Cost community pharmacist £35/hr + each support 20 smokers = £5.25. Source Netten & Curtis (2006) ➢ Cost community pharmacist £35/hr + counselling lasts 30 mins = £19.50. Source Netten & Curtis (2006) ➢ Information leaflet = £5.95. Source MIDIRS Survey (2007) ➢ Cost community pharmacist £35/hr + follow-up lasts 315 mins = £84.50

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Milch et al (2003)a	Treatment : Smoking assessment questionnaire and Smoking status and vital signs recording. Control: Usual care	£5.83	Quit: Control (N=154): 11%, Treatment 1 (N=45)=4%; Treatment 2 (N=46)=30%; p=.001	Resources: ➢ Smoking assessment questionnaire ➢ Clinician Consultation (9% more patients receive cessation advice) ➢ Educational brochure ➢ Vitals check and smoking status recording - Medical assistant Costs: ➢ Smoking assessment questionnaire: £7.20 – Guidance material from Snap Surveys (approved NHS contractor) ➢ Assumes clinician equivalent to GP (£25 ph): £2.25. Source Nettan & Curtis (2006) ➢ Educational brochure: £5.95. Source MIDIRS Survey (2007) ➢ Assumes medical assistant equivalent to GP nurse and that vitals check takes 20 mins: £9.57. Source Nettan & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Milch et al (2003)b	Treatment : smoking assessment questionnaire Control: Usual care	£17.40	Quit: Control (N=154): 11%, Treatment 1 (N=45)=4%; Treatment 2 (N=46)=30%; p=.001	Resources: ➢ Smoking assessment questionnaire ➢ Clinician Consultation (17% more patients receive cessation advice) ➢ Educational brochure Costs: ➢ Smoking assessment questionnaire: £7.20 – Source Snap Surveys (approved NHS contractor) ➢ Assume clinician equivalent to GP (£25 ph) = £2.25 Source Netten & Curtis (2006) ➢ Educational brochure: £5.95. Source MIDIRS Survey (2007)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Murray et al (2007)	Treatment: Smoking cessation support in primary care Control: Usual care	£41.00	Quit 6m: Treatment: 3.5%, Control: 2.5%	Resources: ➢ Research staff contacts smokers by a telephone call and provides brief advise smoking cessation (2044) ➢ Postal information pack provided to smokers if not contactable by telephone, (1007) ➢ Smokers who attended the local NHS SSS received an initial consultation with a trained advisor (399) ➢ Smokers received NRT, or bupropion therapy for 8 weeks (399) Costs: ➢ Research staff: assuming the wage to be equivalent to social work assistant's wage and spends 20 mins with each smoker (£69ph) = £41. Source Netten & Curtis (2006) ➢ Postal information pack: assuming the cost to be equivalent to a booklet£5.95. Source MIDIRS Survey (2007) ➢ Trained advisor: Assume that the trained advisor's wage is equivalent to a pharmacist (£47 ph) and spend 20 mins with each smoker = £15.67. Source Nettan & Curtis (2006) ➢ NRT: assuming the cost of NRT for a week is £20.51 = £20.51. Source http://www.dh.gov.uk/en/Policyandguidance/Medicinespharmacyandindustry/Prescriptions/NHScosts/index.htm

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Ockene et al, 1991 quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£29.96	12m quit, treatment 57%, control, 48%	Resources: ➢ 4 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Ockene et al (1992)	Proactive telephone counselling	£29.96	Quit (12m): Treatment 57%, Control 48%	Costs: ➢ Four proactive phone calls: assumes calls conducted by a nurse and that calls last 15 minutes = £29.96 (ph). Source Netten & Curtis (2006)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Owens and Springett, 2007	Fag Ends Stop Smoking Service (community-based advisors, NRT, Bupropion)	£22.25	Estimated 8% of smokers attended RCFE duiring 04/5. 59% achieve 4 week quit, of these 36% achieve 52 week quit. Therefore, 1.7% of smoking population quit due to RCFE.	Resources: ➢ 10 full time, community-based advisors ➢ NRT ➢ Bupropion Costs: ➢ Community-based advisors: Assume equivalent to social worker assistant (annual cost: £17,723 + £3655 + £3207 + £2106) = £22.22. Source Netten and Curtis (2006) ➢ NRT: Assume participants use NRT for 12 weeks (£20.51pw) and 96% using NRT extracted from paper= £19.32. Source http://www.dh.gov.uk/en/Policyandguidance/Medicinespharmacyandindustry/Prescriptions/NHScosts/index.htm ➢ Bupropion: 2% using bupropion extracted from paper, assume participants use bupropion for 12 weeks = £0.71 Source: http://www.dh.gov.uk/en/Policyandguidance/Medicinespharmacyandindustry/Prescriptions/NHScosts/index.htm

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Prochaska et al, 1993 quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£29.96	12m quit treatment 18%, control 21%	Resources: ➢ 4 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Prochaska et al, 2001	Expert system intervention; Control: Assessment	£35.70	Quit (6 mth) : Treatment (N= 1358): 12.0%, Counterfactual (N=2786): 7.7%;	Costs: ➢ Mailed written materials at baseline, 3m and 6m. Assumes the cost to be equivalent to twice the cost of a booklet -£5.95 = £35.70

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Rimmer et al, 1994 quoted in Lichtenstein et al, 1996	Comparison 1: Proactive telephone counselling v tailored guide. Comparison 2: Proactive telephone counselling v control guide.	Comparison 1: £9.03. Comparison 2: £9.03	Comparison 1: 12m quit, treatment 19%, tailored guide 20%. Comparison 2: 12m quit, treatment 19%, control guide 15%.	Comparison 1 incremental costing includes: ➢ 2 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. ➢ Tailored guide. Assumes equivalent in cost to a booklet. Comparison 2 incremental costing includes: ➢ 2 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. ➢ Control guide. Assumes equivalent in cost to a booklet. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006) ➢ Booklet: £5.95 - Source: MIDIRS (2007)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Roberts et al (1993) (from Bains et al 1998)	Media promotion of Quit-to-win contests	£52.83	1 yr quit rate: 30%, Control: 22%	Resources: ➢ Cost of a 'quit to win contest' Costs: ➢ 'Quit to win contest': $78.57 – Source (Shipley et al 1995)

Author And Year	Intervention	Incremental Cost per participant	Effect Data	Comment
Sinclair et al 1998 (from Blenkinsopp 2003)	Counselling for smoking cessation vs. usual treatment	£25.50	9m quit, treatment 12%, control 7%	Resources: ➢ 3 hour training workshop – delivery cost ➢ 3 hour training workshop – pharmacist time ➢ Counselling Costs: ➢ 3 hour training workshop delivery: Assumes 10 pharmacists attend + each support 20 smokers = £2.75. Source Netten & Curtis (2006) ➢ 3 hour workshop - pharmacist time: cost community pharmacist £35/hr + each support 20 smokers = £5.25. Source Netten & Curtis (2006) ➢ Counselling: cost community pharmacist £35/hr + counselling lasts 30 mins = £17.50. Source Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Tillgren (2000)	Media recruitment for Quit and Win contest.	£1.56	Proportion of target population quit at 12m: 0.8% (34/4300)	Resources: ➢ Personally addressed mass communication ➢ Mass communication by media ➢ Personal Communication Costs: ➢ Campaign cost: $13,540 (2007) = £6727.34 = £1.56 Source from the study.

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Turner et al (2001)	Community Based Self-help Program	£1.25	Manual exposure (among representative same of population), 12m quit: 0.3% (2.8% report exposure * 10.5% stated helped quit); TV exposure (N=poulation), Quit: 1.5% (15.1% exposure * 10% exposed who reported help quit)	Resources: ➢ Motivational component: 3 televised commercial advertisements that run for 2 weeks; TV promotion of toll-free number. Registration component ➢ 24,926 called the toll-free number to receive free information about how to quit smoking ➢ Booklet was sent to 5234 eligible women ➢ Quit kit was sent to ineligible smokers, 19692 Televised cessation intervention ➢ 10 televised segments on the local NBC Costs: ➢ Commercial advertisement: assume $100,000 per advertisement (http://www.gaebler.com/Television-Advertising-Costs.htm) = £0.41. ➢ TV promotion of toll-free number: assume $100,000 per advertisement (http://www.gaebler.com/Television-Advertising-Costs.htm) = £0.14 ➢ Assume cost per call £2.22 = £0.15. Source National Audit Office (2002) ➢ Price of a booklet £5.95 = £0.09 Source MIDIRS Survey (2007) ➢ Quit kit: assume price of a booklet £5.96 = £0.32. Source MIDIRS Survey (2007 ➢ Televised segments: Assume $100,000 per advertisement

				(http://www.gaebler.com/Television-Advertising-Costs.htm) = £0.14 Data: 25% of adults smoke (from paper) * adult female population of Chicago area (2,900,000/2, http://www.chipublib.org/004chicago/chifacts.html)

Author and Year	**Intervention**	**Incremental Cost per participant (2007)**	**Effect Data**	**Comment**
Taylor et al, 1990 quoted in Lichtenstein et al, 1996	Proactive telephone counselling	£52.43	12m quit, treatment 61%, control 32%	Resources: ➢ 7 proactive phone calls in the first month followed by monthly calls. Assumes calls conducted by a nurse, that calls last 15 minutes and that 12 monthly calls are made. ➢ Other unspecified treatment components, but telephone counselling stated to represent main focus of intervention. Assumed to represent a negligible cost. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Vidrine et al (2006)	Treatment: Smoking cessation through telephone intervention + usual care: pre-paid cell phone; hotline; 8 proactive phone counselling sessions led by the research assistant Control: Usual Care	**£90.86**	3m quit: Treatment (N=38): 36.8%, Counterfactual (N=39): 10.3	Resources: ➢ Pre-paid cell phone ➢ Hotline ➢ 8 proactive phone counselling sessions led by the research assistant Costs: ➢ Pre-paid cell phone: £30 (See Lavez) ➢ Hotline: assume participants ring once on average=£2.22. National Audit Office (2002) ➢ Assuming that the telephone counselling lasts for 20 mins and the wage to be equivalent to a social work assistant's wage, £22 ph = £58.64. Source Netten &Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Walsh et al (in Carr and Ebbert et al 2007)	Dental interventions: Oral cancer screening + advice to stop; Photo of oral disfigurement due to smoking; self help guide; counselling; Nicotine gum; Develop plan; 2 follow-up calls Control: Usual Care	£75.29	12m quit, Treatment 60/171, C. Control 30/189	Resources: ➢ Oral cancer screening + advice to stop ➢ Photo of oral disfigurement due to smoking ➢ self help guide ➢ 15 min counselling ➢ Nicotine gum ➢ Develop plan ➢ 2 follow-up calls Cost: ➢ GP cost: Assume GP cost (£25/10mins), 10 mins more than usual examination = £25.00. Source Netten & Curtis (2006) ➢ Photo of oral disfigurement due to smoking: Assume negligible cost: £0.00 ➢ Self help guide: £5.95. Source MIDIRS Survey (2007) ➢ Assume social work assistant cost (£22ph) + 10 mins each = £5.50. Source Netten & Curtis (2006) ➢ Assume cost of one NRT: £20.51. Source http://www.dh.gov.uk/en/Policyandguidance/Medicinespharmacyandindustry/Prescriptions/NHScosts/index.htm ➢ Assume social work assistant cost (£22ph), takes 30 mins = £11.00. Source Netten & Curtis (2006) ➢ Assume social work assistant cost (£22ph) + 10 mins each = £7.33. Source Netten & Curtis (2006)

Author and Year	Intervention	Incremental Cost per participant (2007)	Effect Data	Comment
Zhu et al, 1996 quoted in Lichtenstein et al, 1996	Comparison 1: 6 proactive telephone counselling calls + self-help materials v 1 proactive telephone counselling calls + self-help materials. Comparison 2: 6 proactive telephone counselling calls + self-help materials v self-help materials	Comparison 1: £37.45. Comparison 2: £44.94	Comparison 1: 12m quit, treatment 26.7%, control (1 call) 19.8%. Comparison 2: treatment 26.7%, control (written materials alone) 14.7%	Comparison 1 incremental costing includes: ➢ 6 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes. ➢ 1 proactive phone call. Assumes call conducted by a nurse and that call last 15 minutes. ➢ Self-help materials. Assumes equivalent in cost to a booklet. Comparison 2 incremental costing includes: ➢ 6 proactive phone calls. Assumes calls conducted by a nurse and that calls last 15 minutes ➢ Self-help material. Assumes equivalent in cost to a booklet. Costs: ➢ GP nurse: £29.96 per hour - Source: Netten & Curtis (2006) ➢ Booklet: £5.95 - Source: MIDIRS (2007)

9.0 Appendix three: summary of models employed with each effect study

Study	Economic model applied
An et al 2006	Change in quit rates
Bains et al 1998	Change in quit rates
Bauer et al 2006	Change in quit rates
Bentz et al 2006	Change in use of quitline
Blenkinsopp et al 2003	Change in quit rates
Campbell et al 1998	Change in quit rates
Carr & Ebbert 2007	Change in quit rates
Hall et al 2003	Change in quit rates
Hall et al 2007	Change in quit rates
Harding et al 2004	Change in quit rates
Hennrikus et al 2002	Change in quit rates
Lazev et al 2004	Change in quit rates
Lichenstein et al 1996	Change in quit rates
Milch et al 2004	Change in quit rates
Murray et al 2007	Change in quit rates
Needleman et al 2006	Change in quit rates
Owens & Springett 2007	Change in quit rates
Perry et al 2005	Change in quit rates
Prochaska et al 2001	Change in quit rates
Springett et al 2007	Change in quit rates
Vidrine et al 2006	Change in quit rates

10.0 Appendix 4: ICER of quitline

Source	Treatment	Counterfactual	Population	Method	ICER
Flack et al (2006)	Quitline + call back service	Quitline		Base year 2001	£/person - £15; £/12m quit - £264
Flack et al (2006)	Quitline	Do nothing		Base year 2002	£/12m quit - £781 - £1,011; £/LYG - £231 - £298

11.0 Appendix 5: Value of a quit per quitter (Life Years Gained)

Author	Details of method	LYG
Woolacott et al 2003	PREVENT MODEL, 0% relapse rate, spontaneous quit rate 1%	0.28
Woolacott et al 2003	PREVENT MODEL, 0% relapse rate, spontaneous quit rate 1%	0.33
Woolacott et al 2003	HECOS model (similar to PREVENT), no discount, follow up: 20 years	0.4
Woolacott et al 2003	Using life expectancy data from a number of sources, relapse rate of 45%, LYS per lifetime quitter for men, 65-69 yr old	0.47
Woolacott et al 2003	PREVENT MODEL, 0% relapse rate, spontaneous quit rate 1%	0.49
Woolacott et al 2003	PREVENT MODEL, 0% relapse rate, spontaneous quit rate 1%, 6% DR:	0.5
Woolacott et al 2003	American Cancer Society 25-state Cancer Prevention Study, 55-69 yr, women	0.55
Woolacott et al 2003	American Cancer Society 25-state Cancer Prevention Study, 35-44 yr, women	0.57
Woolacott et al 2003	American Cancer Society 25-state Cancer Prevention Study, 45-54 yr, women	0.64
Woolacott et al 2003	US-based life expectancy data, relapse rate of 10%, 4% DR, women 35-44 yrs:	0.7
Woolacott et al 2003	US study estimate LYS per 12m quitter	0.8
Woolacott et al 2003	American Cancer Society 25-state Cancer Prevention Study, 55-69 yr, men	0.82
Woolacott et al 2003	PREVENT model and a DR of 1.5%	0.99
Woolacott et al 2003	American Cancer Society 25-state Cancer Prevention Study, 35-44 yr, men	1.03
Woolacott et al 2003	40 yr follow-up, quit 55-64 yr old, low risk smokers	1.08
Woolacott et al	American Cancer Society 25-state Cancer Prevention Study, 45-54 yr, men	1.09

2003		
Woolacott et al 2003	US-based life expectancy data, relapse rate of 10%, 4% DR, women 45-54 yrs:	1.1
Woolacott et al 2003	Life expectancy data from a number of sources, relapse rate of 45%, LYS per lifetime quitter for men, 25-29 yr old	1.31
Woolacott et al 2003	Life expectancy data from a number of sources, relapse rate of 45%, LYS per lifetime quitter for women, 65-69 yr old	1.41
Woolacott et al 2003	Life expectancy data from a number of sources, relapse rate of 45%, LYS per lifetime quitter for women, 25-29 yr old	1.43
Woolacott et al 2003	Results of the Healthy People 2000 Years of Healthy Life research project	1.46
Woolacott et al 2003	Life expectancy data, relapse rate of 10%, 4% DR, men 35-44 yrs:	1.5
Woolacott et al 2003	PREVENT model and a DR of 0%	1.54
Woolacott et al 2003	40 yr follow-up, quit 45-54 yr old, low risk smokers	1.55
Woolacott et al 2003	40 yr follow-up, quit <35 yr old, low risk smokers	1.69
Woolacott et al 2003	40 yr follow-up, quit 35-44 yr old, low risk smokers	1.94
Woolacott et al 2003	PREVENT MODEL, 0% relapse rate, spontaneous quit rate 1%, 0% DR:	2
Woolacott et al 2003	Life expectancy data, relapse rate of 10%, 4% DR, men 45-54 yrs:	2
Woolacott et al 2003	Life expectancy data, relapse rate of 10%, 4% DR, women >55yrs yrs	2.1
Woolacott et al 2003	Life expectancy data, relapse rate of 10%, 4% DR, men >55 yrs	2.4

12.0 Appendix 6: Value of a quit per quitter (Quality Adjusted Life Years)

Author	Data	QALY
Woolacott et al 2003	results of the Healthy People 2000 Years of Healthy Life research project: QALYs/12m quitter	0.45
Woolacott et al 2003	Results of the Healthy People 2000 Years of Healthy Life research project, assuming lifetime relapse of 35% (QALYs/lifetime quitter)	0.69
Woolacott et al 2003	40 yr follow-up, quit 55-64 yr old, low risk smokers	0.99
Woolacott et al 2003	QALYs/12m quitter	1.08
Woolacott et al 2003	Results of the Healthy People 2000 Years of Healthy Life research project: QALYs/12m quitter	1.29
Woolacott et al 2003	Results of the Healthy People 2000 Years of Healthy Life research project: QALYs/12m quitter	1.55
Woolacott et al 2003	QALYs/long-term quitter	1.97
Woolacott et al 2003	Results of the Healthy People 2000 Years of Healthy Life research project, assuming lifetime relapse of 35% (QALYs/lifetime quitter)	1.98
Woolacott et al 2003	40 yr follow-up, quit 45-54 yr old, low risk smokers	2.14
Woolacott et al 2003	40 yr follow-up, quit <35 yr old, low risk smokers	2.22
Woolacott et al 2003	Results of the Healthy People 2000 Years of Healthy Life research project, assuming lifetime relapse of 35% (QALYs/lifetime quitter)	2.38
Woolacott et al 2003	40 yr follow-up, quit 35-44 yr old, low risk smokers	2.58

13.0 Appendix 7: Selection of value of quit for inclusion in model

Author	Year	Population	Value of a quit
Altman et al	1987a	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Altman et al	1987b	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
An et al	2006	Gender: Males and Females; Age: 18-65+;	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Andrews	1999	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Bauer et al	2006a	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Bauer et al	2006b	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Bentz et al.	2006	Treatment: Telephone counseling to QUITLINE callers; Gender: Males and Females; Age, mean: 40.8	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Campbell et al	1998	Gender: Male; Age, mean: 66.1	Low risk smokers; 55-64: 0.99; Source: Woolacott (2003)
Chapman et al	1993	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Cummings et al	1990	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Curry et al	1996	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
DeBusk et al	1994	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Elder et al	1987a	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott

Author	Year	Population	Value of a quit
			(2003)
Elder et al	1987b	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Elder et al	1991	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Fortmann and Killen	1995	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Gansky	2002	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Gansky	2005	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Hall et al	2007	Gender: Female; Age, mean: 39	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hall et al	2003a	Gender: Female; Age, mean: 42.7	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hall et al	2003b	Gender: Female; Age, mean: 42.7	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Harding et al.	2004	Gender: Males; Age, mean: 37.1	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hennrikus et al	2002a	Gender: Females; Age, mean: 36	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hennrikus et al	2002b	Gender: Females; Age, mean: 36	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hennrikus et al	2002c	Gender: Females; Age, mean: 37	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hennrikus et al	2002d	Gender: Females; Age, mean: 37	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hennrikus et al	2002e	Gender: Females; Age, mean: 38	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Hennrikus et al	2002f	Gender: Females; Age, mean: 39	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
King et al	1987	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Korhonen et al	1992	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott

Author	Year	Population	Value of a quit
			(2003)
Korhonen et al	1993	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lando et al	1990	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lando et al	1991	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lando et al	1992	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lando et al	1994a	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lando et al	1994b	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lazev et al	2004	Gender: Males and Females; Age, mean: 41	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Lefebvre et al	1990a	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lefebvre et al	1990b	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Lefebvre et al	1990	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Leinweber et al.	1994	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Milch et al.	2004a	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Milch et al.	2004b	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)

Author	Year	Population	Value of a quit
Murray et al.	2007	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Ockene et al	1994	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Ockene et al	1992	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Owens & Springett	2007	Gender: Males and Females;	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Prochaska et al	1993	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Prochaska et al.	2001	Gender: Male; Age, mean: 41.5	Low risk smokers; 35-44: 2.58 Source: Woolacott (2003)
Rimer et al	1994a	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Rimer et al	1994b	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Roberts et al	1993	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Stevens	1995	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Taylor et al	1990	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Tilgren et al	2002	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Turner et al	2001	Gender: Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Vidrine et al	2006	Gender: Males and Females; Age, mean: 42.6	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott

Author	Year	Population	Value of a quit
			(2003)
Walsh	1999	Gender: Males and Females; Age: Adults	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Zhu et al	1996a	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)
Zhu et al	1999b	Males and Females	Low risk smokers; <35: 2.22 QALY; 35-44: 2.58; 45-54: 2.14; 55-64: 0.99; Source: Woolacott (2003)

14.0 Appendix 8: Selection of ICERs for inclusion in model

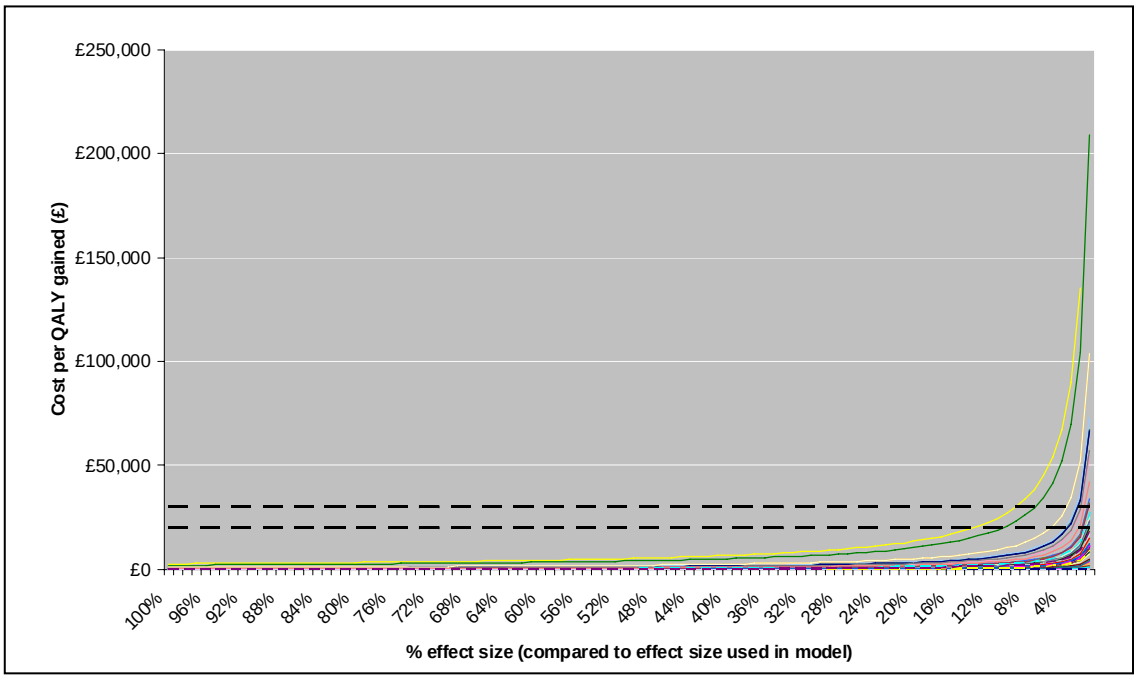
Author	Year	Population characteristics	ICER (quality grades in parentheses if given in source document)
Bentz et al	2006	Gender: Males and Females; Age, mean: 40.8	£/12m quit: £781 - £1,011 (Source: Flack et al, 2006)

15.0 Appendix 9: Sensitivity analysis 1

15.1 Testing the impact of effect size on cost per QALY gained

Figure 9 demonstrates how cost per QALY gained estimates change as the effect of an intervention is reduced. It shows that the effect estimates used in the model would have to reduce by at least c94% before any of the cost per QALY gained for any of the interventions passes the £30,000 per QALY cost-effectiveness threshold.

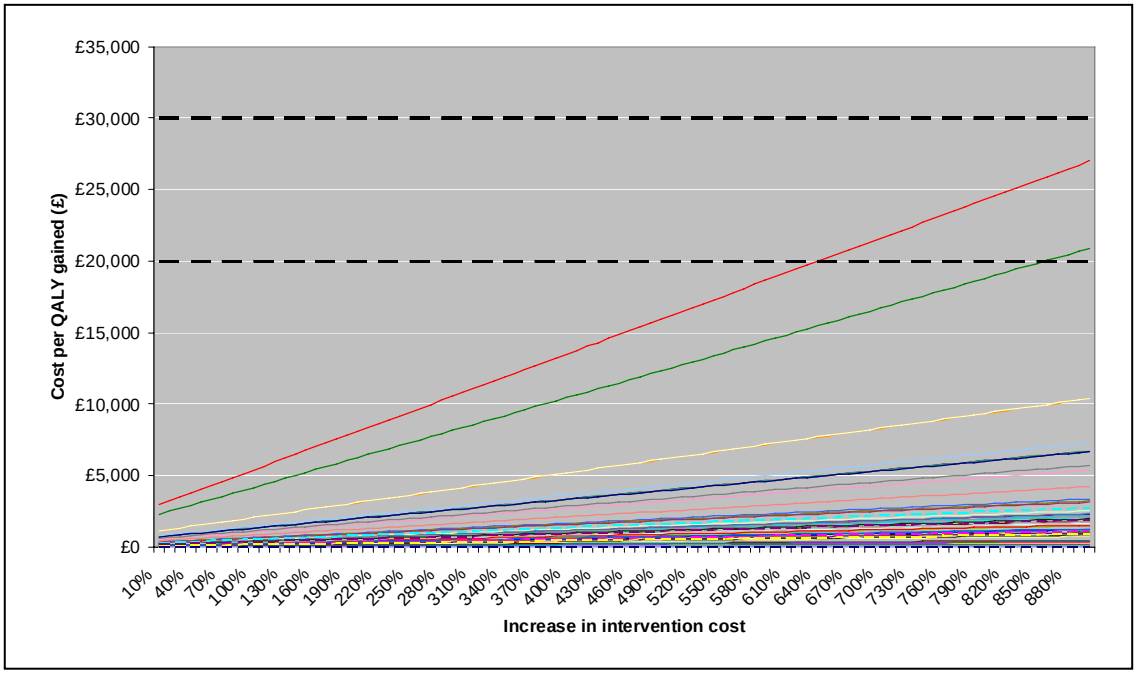
Figure 9: Cost per QALY gained as effect is varied



15.2 Testing the impact of intervention cost on cost per QALY gained

Figure 10 demonstrates how cost per QALY gained estimates change as the cost of an intervention is increased. It shows that the cost per QALY estimates fail to go above the £30,000 cost-effectiveness threshold even when intervention costs are increased by 900%.

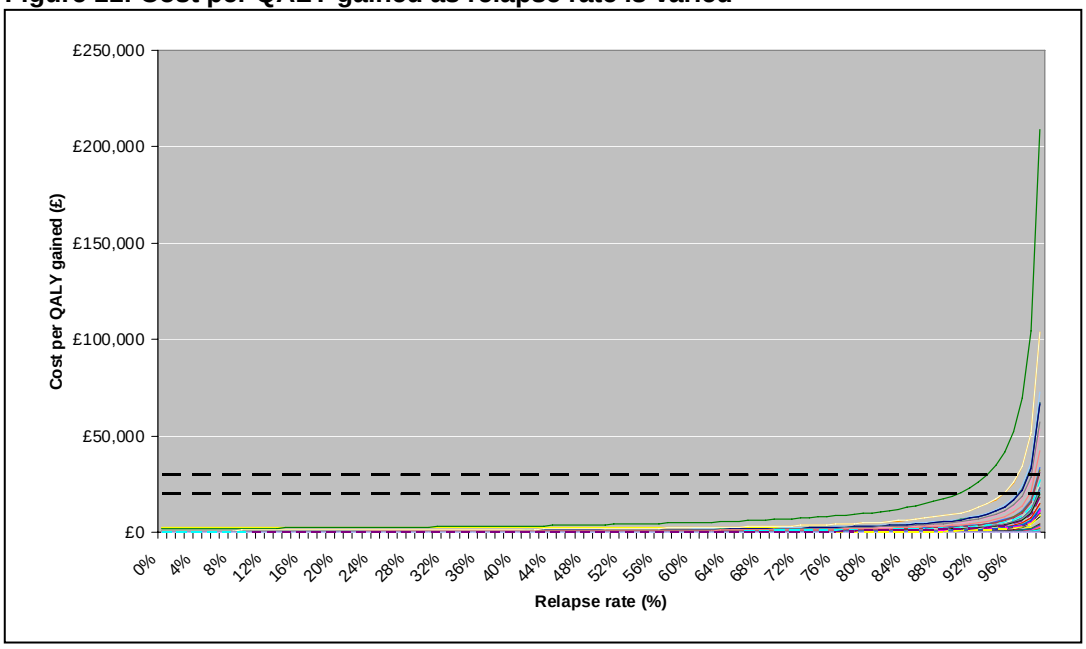
Figure 10: Cost per QALY gained as intervention cost is varied



15.3 Testing the impact of relapse rate on cost per QALY gained

Figure 11 demonstrates how cost per QALY gained estimates change as the smoking relapse rate is increased. It shows that relapse rates have to increase to c95% before the cost per QALY gained estimate for any of the interventions passes over the £30,000 cost-effectiveness threshold.

Figure 11: Cost per QALY gained as relapse rate is varied



16.0 Appendix 10: Sensitivity analysis 2

Each of the interventions analysed in this report was evaluated based on its effect on the general population. However, the NICE guidance that the analysis is designed to inform is interested in the cost-effectiveness of interventions when applied to disadvantaged groups. As the majority of the interventions prove cost-effective for the general population, assuming that interventions are less cost-effective for disadvantaged groups, this section presents the results of a sensitivity analysis to determine the increase in cost and/or the reduction in effect required for each intervention to have a cost per QALY gained of £30,000. This estimate provide a sense of the reduction in the cost-effectiveness of the intervention allowed when it is applied to disadvantaged groups while still justifying investment in the intervention.

Figure 12 summarizes the increase in cost and reduction in effect possible when the interventions are applied to disadvantaged groups, while still ensuring the intervention is cost-effective compared to a £30,000 per QALY threshold. It demonstrates that costs would have to increase by very large amounts or effects would have to reduce by very large amounts before the interventions would have a cost per QALY gained of greater than £30,000. For instance, the lowest increase in costs require to cause the cost per QALY gained to be greater than £30,000 is 450 percent for one of the interventions to recruit smokers to quit to win contests (Korhonen et al 1992). However, most of the interventions require increases in cost in the magnitude of many thousands of percent before they become cost-ineffective. A similar story is told for changes in effect. The lowest reduction in effect required to cause the cost per QALY gained to be greater than £30,000 is 81 percent, again for the intervention to recruit smokers to quit to win contests (Korhonen et al, 1992). However, most interventions require a reduction in effect of c99% before the cost per QALY gained becomes greater than £30,000.

Figure 12: Changes in cost or effect required for £30,000 per QALY gained.

Intervention type	Intervention	Study	Method	Location	% increase in cost of the intervention	% reduction in effect
Client-centred approaches	Recruiting smokers from community	Harding et al, 2004	Descr. study	UK	2,900	99
	Social marketing to deliver client centred approaches to SC	Turner et al 2001	CBA	non-UK	7,000	99
	Free mobile phones for use in SC counselling	Lavez et al 2004	Obs. study	non-UK	8,500	99
		Vidrine et al 2006	RCT	non-UK	1,700	99
	Interventions at cervical screening appointments	Hall et al, 2007	RCT	UK	3,500	99
		Hall et al, 2003a	RCT	UK	158,000	99
Combined approaches	Proactive telephone counselling	Curry et al 1996 (in Lichenstein et al 1996)	Review		5,000	99
		DeBusk et al 1994 (in Lichenstein et al 1996)	Review		9,100	99

Intervention type	Intervention	Study	Method	Location	% increase in cost of the intervention	% reduction in effect
		Lando et al 1994a (in Lichenstein et al 1996)	Review		2,750	99
		Ockene et al 1991 (in Lichenstein et al 1996)	Review		7,000	99
		Ockene et al 1992	Review		23,800	99
		Rimer et al 1994b (in Lichenstein et al 1996)	Review		26,000	99
		Taylor et al 1990 (in Lichenstein et al 1996)	Review		32,500	99
		Zhu et al 1996a (in Lichenstein et al 1996)	Review		10,800	99
		Zhu et al 1996b (in Lichenstein et al 1996)	Review		15,700	99

Intervention type	Intervention	Study	Method	Location	% increase in cost of the intervention	% reduction in effect
Identifying & reaching target populations	Recruitment to Quit and Win	Tillgren et al 2000	Obs. study	non-UK	3,000	99
		Cummings et al 1990 (in Bains et al 1998)	Review		35,010	99
		Elder et al 1991 (in Bains et al 1998)	Review		39,000	99
		Elder et al 1987a (in Bains et al 1998)	Review		12,600	99
		Fortmann and Killen 1995 (in Bains et al 1998)	Review		1,700	99
		King et al 1987 (in Bains et al 1998)	Review		16,400	99
		Korhonen et al 1992 (in Bains et al 1998)	Review		450	81
		Lando et al (1991) (in Bains et al 1998)	Review		4,000	99

Intervention type	Intervention	Study	Method	Location	% increase in cost of the intervention	% reduction in effect
		Lefebvre et al 1990a (in Bains et al 1998)	Review		13,400	99
		Lefebvre et al 1990b (in Bains et al 1998)	Review		17,800	100
		Lefebvre et al 1990c (in Bains et al 1998)	Review		11,800	99
		Roberts et al 1993 (in Bains et al 1998)	Review		8,800	100
		Chapman et al, 1993	Obs. study	non-UK	35,000	100
		Milch et al 2004a	Controlled trial	non-UK	260,000	99
		Milch et al 2004b	Controlled trial	non-UK	64,000	99
		Prochaska et al 2001	RCT	non-UK	9,100	99
		Murray et al, 2007	RCT	UK	13,700	92

Intervention type	Intervention	Study	Method	Location	% increase in cost of the intervention	% reduction in effect
Improving access	Dentist-based interventions	Andrews 1999 (in Carr and Ebbert et al 2007)	Review		12,300	99
		Gansky 2001 (in Carr and Ebbert et al 2007)	Review		13,900	99
		Walsh 1999 (in Carr and Ebbert et al 2007)	Review		14,800	99
	Drop-in / rolling community based sessions	Owens and Springett, 2007	Obs. study	UK	4,700	99
Incentive Schemes	Free NRT	An et al 2006	Cohort Study	non-UK	4,900	99
		Bauer et al 2006a	Cohort Study	non-UK	110,000	100
		Bauer et al 2006b	Cohort Study	non-UK	2,750	99
	Workplace smoking cessation + incentives	Hennrikus et al 2002a	RCT	non-UK	28,500	100
		Hennrikus et al 2002b	RCT	non-UK	31,000	100

Intervention type	Intervention	Study	Method	Location	% increase in cost of the intervention	% reduction in effect
		Hennrikus et al 2002c	RCT	non-UK	19,800	100
		Hennrikus et al 2002d	RCT	non-UK	30,000	100
		Hennrikus et al 2002e	RCT	non-UK	24,800	100
		Hennrikus et al 2002f	RCT	non-UK	30,000	100