



Public Health
Research Consortium

Final Report

**Assessing the Challenges
of Applying Standard
Methods of Economic
Evaluation to Public
Health Interventions**

Assessing the Challenges of Applying Standard Methods of Economic Evaluation to Public Health Interventions

By

**Michael Drummond¹
Helen Weatherly¹,
Karl Claxton^{1,2}
Richard Cookson³
Brian Ferguson⁴
Christine Godfrey^{1,5}
Nigel Rice¹
Mark Sculpher¹
Amanda Sowden⁶**

1. Centre for Health Economics, University of York
2. Department of Economics and Related Studies, University of York
3. Department of Social Policy, University of York
4. Yorkshire and Humber Public Health Observatory
5. Department of Health Sciences, University of York
6. Centre for Reviews and Dissemination, University of York

Contact details: Professor Michael Drummond, Centre for Health Economics, University of York, Heslington, York, YO10 5DD

Email address: md18@york.ac.uk

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* Invited but unable to attend

Executive Summary

Background: The second Wanless Report highlighted the need to consider the cost-effectiveness of public health interventions. The generation of good quality evidence on cost-effectiveness is essential if those commissioning services are to make informed decisions. Public health interventions comprise a wide range, from screening and immunizations through to the promotion of healthy eating, physical activity and well-being. The range of commissioners of such services is also quite broad, including practice based commissioners, primary care trusts, local authorities, PCT commissioning hubs and specialist commissioners. Therefore, the effective communication of cost-effectiveness evidence is also of critical importance.

Methods for assessing the cost-effectiveness of health care treatments and programmes, known collectively as ‘economic evaluations’, have existed for several years. However, these have been applied mainly to more narrowly defined ‘clinical’ interventions, such as drugs, devices or medical procedures. In addition, the methods for the evaluation of screening and immunization programmes are fairly well developed.

The prime motivation for this project was the thought that the evaluation of many public health interventions raises additional methodological challenges, because these interventions generate very broad costs and benefits and are often directed at populations or communities rather than specific individuals. In addition, a particular feature of many public health interventions is a concern with health inequalities. Standard economic evaluation methods focus on efficiency (i.e. the maximization of health gain) rather than on equity (i.e. the distribution of health gain) and accordingly, the evaluation of public health interventions, needs to pay more attention to equity considerations.

Aims: The aims of the project were to undertake a methodology review of the literature on the economic evaluation of public health interventions, to identify the main methodological challenges and to suggest how these might be addressed.

Methods: Existing reviews of the literature were considered in order to specify the main methodological challenges. A methodology review of empirical studies undertaken from 2000 to 2005 was then conducted, in order to identify whether they provided any useful insights in addressing these challenges. The empirical studies were identified using the NHS Economic Evaluation Database (NHS EED), which contains structured abstracts of economic evaluations and is based on a broad search of the relevant literature sources.

The methodologies used in the empirical studies were documented and interesting methodological approaches identified. These were then used by members of the team, in conjunction with the relevant theoretical literature, in formulating suggestions for how the methodological challenges might be addressed.

Key Findings: Four main methodological challenges were identified: attributing outcomes to interventions; measuring and valuing outcomes; incorporating equity considerations and identifying intersectoral costs and consequences.

In total, 1,264 NHS EED abstracts were identified through a search focusing on the public health areas mentioned in 'Choosing Health'. The areas considered were accidents, alcohol, ante natal and post natal visiting, drug use, HIV/Aids, low birth weight, obesity and physical activity, sexually transmitted infections, smoking, teenage pregnancy and youth suicide prevention. After screening the abstracts, in order to confirm that they were full economic evaluations and to exclude those relating to screening and treatment interventions, 154 abstracts were retained for detailed review.

Although the review of existing empirical studies showed that economic evaluation had been applied in a wide range of public health areas, the current literature provided relatively few insights as to how to address the four methodological challenges. In particular, very few studies considered costs and consequences outside the health sector and the measures of outcome were normally confined to various measures of health gain. The majority of studies did not attempt to value the improvements in health, although 27% of studies valued health states, expressing the outcomes in

quality-adjusted life-years (QALYs) or disability-adjusted life-years (DALYs). Equity considerations were rarely mentioned and never addressed formally.

Conclusions: Despite the lack of insights provided by existing studies, consideration of the theoretical and empirical literature suggests a number of ways forward.

Attribution of Outcomes

Where possible, analysts should seek to conduct randomised controlled trials of public health interventions, as a source of evidence on relative effectiveness. Bearing in mind the need for extrapolation of outcomes beyond the end of the trial, the outcomes measured should match those available in longer term observational studies. Where RCTs cannot be undertaken, or are currently absent, natural experiments and non-experimental data should be used to fill gaps in the evidence base. In economic evaluations all relevant evidence should be considered, including the synthesis of evidence from studies of different experimental and non-experimental designs. Further research should be conducted into the methods of achieving this. More use should be made of techniques that have been developed to analyse non-experimental data, such as propensity scores, difference in differences techniques, time series analyses of natural experiments, and, where appropriate, more sophisticated econometric modelling and structural simulation modelling.

Measuring and Valuing Outcomes

There should be more debate about the theoretical and value propositions underlying the various forms of economic evaluation, and their appropriateness for assessing public health interventions. In all cases a cost-consequences analysis should be performed, prior to proceeding to the valuation of the various outcomes of public health interventions. Research should be conducted into the practicalities of applying the intersectoral compensation test approach. Research should also continue both into the development of a more generic measure of wellbeing, that could be applied in the evaluation of a wide range of public sector interventions, and sector-specific generic measures of outcome.

Equity Considerations

Pilot studies should be conducted of health inequality impact assessment for selected public health interventions, chosen on the basis that there exist detailed individual-level data on equity-related subgroups. In situations where the most cost-effective option is likely to be judged inequitable, either on the grounds of health inequality impact or procedural justice, estimates should be made of the opportunity cost of not selecting that option, in terms of aggregate health gain forgone or additional resources used. Primary research should be conducted on the effectiveness of interventions designed to tackle health inequality, combining knowledge and tools from social epidemiology and econometrics. Further research should be conducted on equity weighting, focusing on equity considerations and contexts relevant to public health, as opposed to health care more generally. In particular research is warranted on equity considerations relating to socio-economic status, the degree of voluntariness or personal responsibility for health risk, the value of treating current ill-health versus preventing future health risk and the aspects of health inequality that the general public is most concerned about.

Intersectoral Costs and Consequences

The intersectoral impacts of public health interventions should be quantified (or at the very least described qualitatively), in a cost-consequences analysis, in the way that makes the most sense for each sector. Ideally each sector would use a well-understood generic measure of outcome, in reference to which the shadow price of the budget constraint in the sector could be expressed. Although public sector decision makers are mostly concerned with the impacts of interventions on public sector budgets, there should be more consideration of impacts on the voluntary sector and private individuals, since taking this broader view may be required to assess more fully the effectiveness of programmes and to identify the equity implications arising from implementation. In evaluating public health interventions, an analysis should be conducted of the costs and consequences by beneficiary group. These groups could be defined in terms of health status, socio-economic status or other characteristics, depending on policy relevance. Finally research should be conducted to assess

whether a general equilibrium approach is more suitable for the evaluation of public health interventions having a wide range of intersectoral costs and consequences.

Section 1: Introduction

1.1 Background to the project

The second Wanless Report highlighted the need to consider the cost-effectiveness of public health interventions.⁽¹⁾ The generation of good quality evidence on cost-effectiveness is essential if those commissioning services are to make informed decisions. Public health interventions comprise a wide range, from screening and immunizations through to the promotion of healthy eating, physical activity and wellbeing. The range of commissioners of such services is also quite broad, including practice based commissioners, primary care trusts, local authorities, Primary Care Trust (PCT) commissioning hubs and specialist commissioners. Therefore, the effective communication of cost-effectiveness evidence is also of critical importance.

Methods for assessing the cost-effectiveness of health care treatments and programmes, known collectively as ‘economic evaluations’, have existed for several years. However, these have been applied mainly to more narrowly defined ‘clinical’ interventions, such as drugs, devices or medical procedures. In addition, the methods for the evaluation of screening and immunization programmes are fairly well developed.

The prime motivation for this project was the thought that the evaluation of many public health interventions raises additional methodological challenges, because these interventions generate very broad costs and benefits and are often directed at populations or communities rather than specific individuals. In addition, a particular feature of many public health interventions is a concern with health inequalities. Standard economic evaluation methods focus on efficiency (i.e. the maximization of health gain) rather than on equity (i.e. the distribution of health gain) and accordingly, the evaluation of public health interventions needs to pay more attention to equity considerations. In particular, it was initially considered that methodological challenges existed in four main areas (i) intersectoral costs and consequences (ii) attribution of outcomes (iii) measuring and valuing outcomes and (iv) equity considerations.

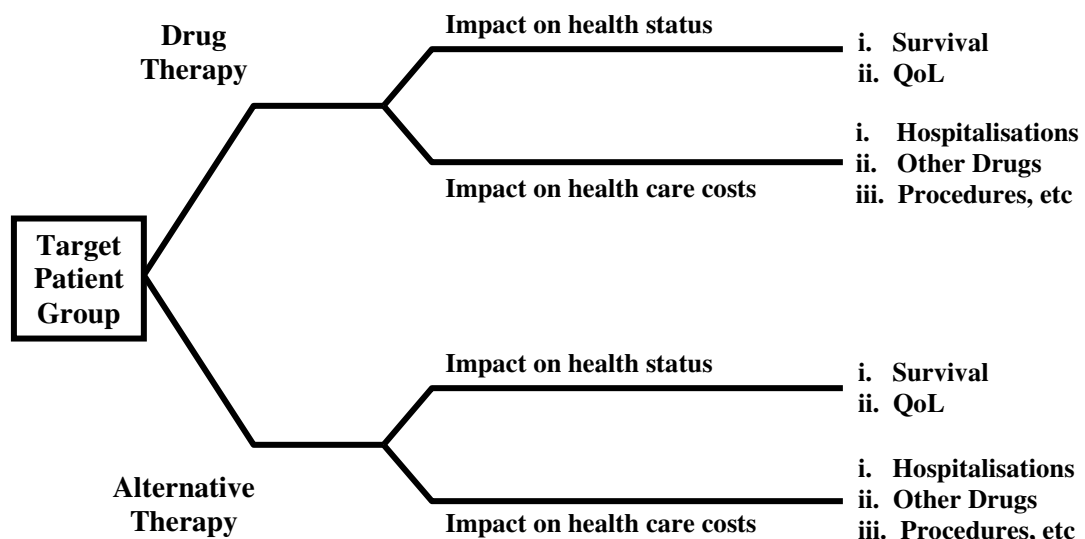
This is not to say that other methodological issues in economic evaluation are not important in the assessment of public health interventions. Key issues include the framing of the question (including the selection of alternatives), choosing the discount rate for health benefits and the characterisation of uncertainty. However, despite their importance, these issues are no more of a challenge in the evaluation of public health interventions than they are for more narrowly defined, clinical interventions.

1.2 Economic evaluation of health care programmes

1.2.1 The Basics of Economic Evaluation

The basic components of economic evaluation are shown in Figure 1. In this example a new drug is being compared with existing practice, which could be an older drug, a non-pharmacological intervention or, in the case of ‘breakthrough’ drug, no active therapy.

Figure 1: Basic Components of Economic Evaluation



In considering the costs and consequences, the two drugs themselves will have acquisition costs, but the economic costs and consequences will be much broader.

For example, if the new drug is more efficacious than current therapy, there may be savings in other healthcare costs, such as hospitalisations. Alternatively, if the new drug has a better side-effect profile, fewer drugs and procedures will be consumed in dealing with adverse events.

Because the comparison of treatments in an economic evaluation requires data on efficacy, the economic study usually builds on clinical assessments obtained from clinical trials. Sometimes economic evaluations are conducted alongside, or concurrently with, a given clinical trial. These are called *trial-based* studies. However, economic evaluations are often undertaken based on a synthesis of data from a range of sources. If, additionally, they make use of decision-analytic or epidemiological models, they are called *modelling* studies. An important methodological feature of these studies is whether the assessments of clinical efficacy used in the model come from a systematic review of the relevant clinical literature. If the clinical data used in the economic evaluation do not accurately reflect the clinical evidence as a whole, the results of the economic study may be biased.

Finally, the consideration of costs in Figure 1 was restricted to healthcare costs. However, some economic evaluations adopt a broader societal perspective and consider costs falling on other government budgets, the patient and their family, or the broader economy, through patients or their carers being able to return to work if the treatment is sufficiently successful. This is particularly the case for public health interventions.

In situations where the two treatment options being considered are identical from a clinical perspective (e.g. a comparison of a generic drug with a branded version of the same compound), the economic evaluation reduces to a comparison of costs only. However, such instances are extremely rare and usually the difference in costs needs to be compared with an appropriate measure of the difference in consequences.⁽²⁾

1.2.2 Types of Economic Evaluation

The main forms of economic evaluation are shown in Table 1. In the first form, *cost-effectiveness analysis (CEA)*, the consequences are measured in the most obvious

natural units of *effects*. The choice of units of measurement depends on the clinical field being studied. For example, in life-saving therapy, such as treatments for chronic renal failure, the most appropriate effectiveness measure would be years of life gained. On the other hand, in a field such as asthma, the most appropriate measure may be 'asthma-free days' or 'symptom-free days'.

Table 1: Types of Economic Evaluation

	<u>Measure of Costs</u>	<u>Measure of Consequences</u>
Cost-effectiveness analysis	Money	Natural units (e.g. life-years gained)
Cost-utility analysis	Money	Health status (e.g. quality-adjusted life-years gained)
Cost-benefit analysis	Money	Money

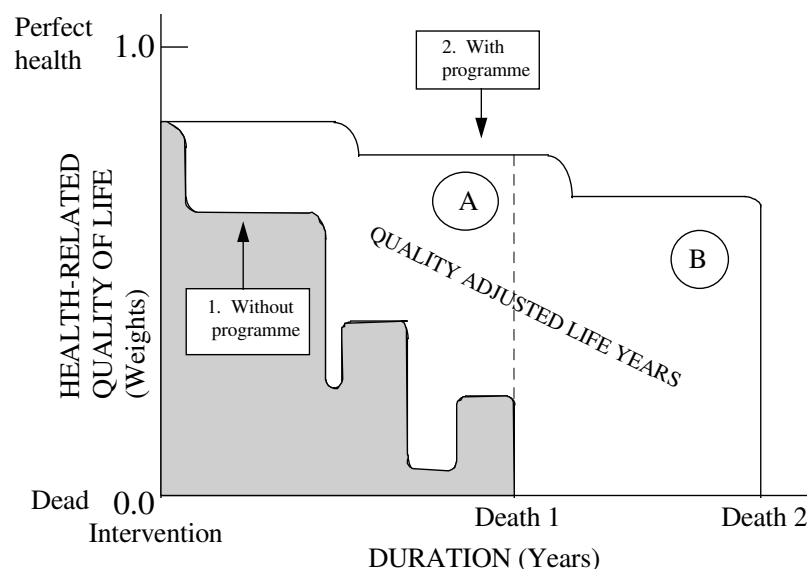
However, such studies leave us with important issues of interpretation. For example, if one treatment is superior in some measures of outcome and inferior in others, how would one outcome be valued relative to another? One way around this would be to turn the problem back to the decision-maker by just presenting the range of different consequences and asking him or her to give an overall assessment. Such studies are sometimes called *cost-consequences analyses* and are also known as the *balance sheet approach*.

Alternatively, the various consequences could be combined in a single generic measure of health improvement. In another form of evaluation, *cost-utility analysis* (*CUA*), states of health are valued relative to one another through the use of health state preference values or health *utilities*. Then the superiority of one treatment over another can be expressed in terms of the quality-adjusted life-years (or QALYs) gained. Alternatives to the QALY exist, most notably the Disability Adjusted Life-Year, or DALY. However, the QALY is the most widely used measure and is currently the approach favoured by National Institute for Health and Clinical Excellence in the UK.

In the conventional approach to QALYs the quality-adjustment weight for each health state is multiplied by the time in the state and then summed to calculate the number of quality-adjusted life years. The advantage of the QALY as a measure of health output is that it can simultaneously capture gains from reduced morbidity (quality gains) and reduced mortality (quantity gains), and integrate these into a single measure. A simple example is displayed in Figure 2 below, in which outcomes are assumed to occur with certainty. Without the health intervention an individual's health-related quality of life would deteriorate according to the lower curve and the individual

would die at time Death 1. With the health intervention the individual would deteriorate more slowly, live longer, and die at time Death 2. The area between the two curves is the number of QALYs gained by the intervention. For instruction purposes the area can be divided into two parts, A and B, as shown. Then part A is the amount of QALY gained due to quality improvements (i.e. the quality gain during the time that the person would have otherwise been alive anyhow), and part B is the amount of QALY gained due to quantity improvements (i.e. the amount of life extension, but adjusted by the quality of that life extension).

Figure 2: QALYs Gained from an Intervention



Source: (3)

The use of a generic measure of outcome, like the QALY, enables us to compare the value for money of interventions in different fields of health care. The concept of the QALY is also quite useful when changes in quality of life are being traded with survival. For example, a new cancer drug may be more toxic than existing therapy, thereby reducing the patient's quality of life during treatment, but may produce gains in additional survival.

Finally, in a *cost-benefit analysis (CBA)*, the various consequences may be valued, relative to one another, in monetary terms. In principle CBA is the broadest form of economic evaluation, since all costs and consequences are expressed in the same unit (i.e. money). Therefore we can assess whether the total costs of an intervention are justified by its total benefits. This contrasts with CEA and CUA, where the assessment of value for money requires some judgement of what the unit of benefit (e.g. a life-year or QALY) is worth to society.

1.3 Guidelines for economic evaluation

The general methods of economic evaluation in health care have been well specified.⁽³⁾ However, now that economic evaluation is used routinely in making decisions about the reimbursement of health technologies, it has become necessary to be more specific about the methodologies to be employed. This is accomplished by issuing formal guidelines for economic evaluation that enable those arguing for reimbursement of a technology to submit economic evidence within a coherent and consistent framework.⁽⁴⁾

Twenty eight (28) guidelines from 23 countries or territories were reviewed by Tarn and Smith (2004).⁽⁵⁾ They identified 32 features for each guideline for comparative purposes. These included basic information on the background to the document and its authors, the scope of the study, the methods for estimating costs and benefits, the allowance for uncertainty and the presentation of results. The conclusion from this, and other reviews of published guidelines (4), is that while there is considerable agreement on the main methods of economic evaluation, there is still some disagreement on specific methodological issues.

One of the most recent, and most comprehensive, sets of guidelines for economic evaluation is that issued by NICE in the UK.⁽⁶⁾ These represent state-of-the-art methods and may pose challenges for those preparing NICE submissions. They are presented in terms of a 'reference case' that set out the range of methodologies deemed most appropriate when undertaking an economic evaluation.

Table 2: Summary of the NICE Reference Case

	Reference case
Defining the decision problem	The scope developed by the Institute
Comparator	Alternative therapies routinely used in the NHS
Perspective on costs	NHS and PSS
Perspective on outcomes	All health effects on individuals
Types of economic evaluation	Cost-effectiveness analysis
Synthesis of evidence on outcomes	Based on a systematic review
Measure of health benefits	Quality-adjusted Life Years (QALYs)
Description of health states for calculation of QALYs	Health states described using a standardised and validated generic instrument
Methods of preference elicitation for health state valuation	Choice-based method, for example, time trade-off, standard gamble (not rating scale)
Source of preference data	Representative sample of the public
Discount rate	An annual rate of 3.5% on both costs and health effects
Equity position	An additional QALY has the same weight regardless of the other characteristics of the individuals receiving the health benefit

(6)

The NICE reference case is summarised in Table 2. In particular it should be noted that the perspective on cost is fairly restrictive, including only NHS and Personal Social Services costs. Also, the prescribed measure of health benefit is the quality-adjusted life-year (QALY). Each QALY gained is assumed to have the same weight regardless of the other characteristics of the individuals receiving the health benefit (e.g. their age, socio-economic status, or severity of their health condition).

Until recently the vast majority of technologies appraised by NICE and other national health technology agencies have been drugs, devices or medical procedures. Therefore, there is little or no experience of using the same methodological standards to evaluate public health programmes. NICE has now begun this task, through its Centre for Public Health Excellence. Because of the considerations highlighted above, the NICE guidelines for the appraisal of *public health interventions* differ slightly from the standard reference case outlined in Table 2. First, the perspective on costs has been broadened to encompass all costs falling on the public sector, recognising the broader, intersectoral, nature of most public health interventions. Secondly, although the QALY remains the primary measure of health outcome, it can be supplemented by a ‘cost-consequence’ approach in order to take account of the complexity and multidimensional character of public health interventions. This allows explicit consideration of multiple, non-health related and/or outcomes that are

difficult to quantify. It also means that issues such as equity and distribution, which are key to public health policy, can be used to inform the analysis.(7)

1.4 Reviews of economic evaluation in public health

There have been several reviews of economic evaluation in public health in the last five years. These are discussed briefly here, focusing on the insights they give into the main methodological challenges.

1.4.1 Wanless Reports

1.4.1.1 York Health Economics Consortium Literature Review, 2003

In 2003, the York Health Economics Consortium (YHEC), University of York, undertook a 13 week long project to review the evidence on how to invest most cost-effectively in public health interventions.(8) The work was commissioned by HM Treasury as part of the Wanless Report and was undertaken to inform the Wanless 2004 review.

There were four key parts to the YHEC review. These were; (i) to review the different types of economic evaluation for assessing the cost-effectiveness of public health interventions, including the strengths and weaknesses of each (ii) to assess the evidence on the cost-effectiveness of different public health interventions, within and across disease areas (iii) to assess the barriers to undertaking economic evaluations of public health interventions and lessons arising from the report and finally (iv) to explore the gaps in research in the area.

YHEC reviewed the methods employed to undertake cost minimisation, cost-effectiveness, cost-utility and cost-benefit analyses. They explored the options as to who might value outcomes (e.g. by patients, doctors, other health professionals, non-clinical experts or the general public). Additionally they explored the different techniques available for valuing preferences. They examined the revealed preference technique whereby the consumption patterns of individuals were compared before and

after the change in their health. Also, they compared the use of standard gamble, time trade-off, visual analogue scale and person trade-off techniques for use in quality adjust different health states in CUAs. In terms of costs, the authors briefly reviewed how to cost resource use and what types of resources to cost. They noted that costs associated with public health interventions may occur beyond the health care sector.

YHEC identified ten key methodological components to assess when conducting an economic evaluation of a public health evaluation comprising the (i) aims and scope (ii) perspective (iii) time horizon (iv) comparators (v) effectiveness data (vi) benefit/outcome measures (vii) sub-group analysis (viii) incremental analysis of costs and benefits (ix) sensitivity analysis and (x) generalisability.

The authors argued that amongst analysts there is a preference for undertaking evaluations from a societal perspective, noting that this enables the evaluations to capture costs falling on all different sectors of the economy and those falling on the individual. Therefore they recommended conducting economic evaluations based on the societal perspective. It was recommended that for interventions with costs and/or effects extending beyond a year, costs and effects should be discounted to their present value. The review suggested that future costs are typically discounted at a rate of 5% per year, and future benefits at 3% per year¹. Also, the review suggested that cost and effectiveness data should be estimated over the same time period. To extend results beyond the length of follow-up in trials, the review recommended using modelling techniques to extrapolate data over a longer time horizon.

In addition, the review suggested that where appropriate, several realistic comparators should be included in evaluations, including a do-nothing option. To obtain estimates of effect the authors recommended the use of RCT data. They cautioned against using effectiveness estimates based on data pooled from different types of study design and in different countries, patients and settings. They suggested that if data were obtained from non-randomised sources, the source and the reliability of the data should be explicitly stated. The authors stated that the QALY is the preferred

¹The rationale behind these discounting rates is not clear

outcome measure. The recommended that analysts should fully describe how they calculate any QALY estimates.

For large scale public health interventions, YHEC recommended that efforts should be made to analyse the degree of costs and effectiveness in various relevant sub-groups, that incremental cost-effectiveness ratios (ICERs²) be reported and that analyses should be subjected to full sensitivity analysis, particularly for parameters associated with high uncertainty or variability to enhance the generalisability of findings.

The YHEC review also explored the cost-effectiveness evidence base in nine public health areas (i) accidents (ii) alcohol (iii) breastfeeding (iv) cancer (v) cholesterol and blood pressure (vi) coronary heart disease (CHD), diabetes and stroke (vii) mental health and suicide (viii) physical activity, obesity and diet and (ix) smoking. Economic evaluations were identified following searches applied to the NHS Economic Evaluation Database (NHS EED) and Office of Health Economics Economic Evaluation Database (OHE EED). Additionally, MEDLINE was searched to obtain more recent evaluations that had not yet been included on the NHS EED and OHE EED databases. Other sources that were searched included CRD Effective Health Care Bulletins, the Health Development Agency website and the National Research Register. The titles were screened to include those that were relevant to the objectives of the research and in countries with similar characteristics to those in Britain and those that were relatively recently undertaken. Where possible, full copies of the articles were obtained, otherwise study abstracts were obtained.

The search identified over 10,000 titles which, once screened, were reduced to about 360 titles. Based on the nine interventions identified above, 201 studies were found, not all of which were full economic evaluations. Based on the review, the authors observed some barriers and challenges that may be encountered in undertaking economic evaluations of public health interventions, including methodological weakness, poor data availability and lack of funding. Specific points mentioned were;

² An expression of the additional cost of health gain associated with an intervention relative to an appropriate comparator

- A substantial shortage of economic evaluations of public health interventions and even fewer methodologically sound economic evaluations
- Not all evaluations are undertaken from a societal perspective
- Ensuring that the time horizons of public health interventions continue over the life time of the patient
- Difficulties in comparing the cost-effectiveness of public health interventions of, for example, education campaigns aimed at encouraging lifestyle changes with screening and treatment options along a care pathway
- The need for a common currency to compare the effectiveness of different public health interventions
- Issues relating to further development of QALYs and other outcome measures to ensure that they are measured and valued consistently
- The lack of availability of sound population-based data, hence the problems in identifying the likely effects of interventions on the overall health of a population. Where available, access to this type of data is severely restricted due to ethical considerations
- The cost of conducting primary research into public health interventions, especially if long follow-up periods are required. Added to this, the need to recruit a large number of people to allow for high expected drop-out rates over the duration of the study
- The difficulty in obtaining unbiased estimates of effect
- Difficulties in comparing the costs and effects of interventions with a specific health focus with those directed towards wider determinants of public health
- Challenges of transferring results from other countries to the UK setting.

The authors draw a number of lessons arising from the review. They suggest that the methodologies underpinning economic evaluations require considerable improvement. They argue that some public health interventions may adversely affect health inequalities, whereas promoting health equality may be a key aim of many public health interventions. The authors are concerned about how to deal with potential externalities arising from certain forms of preferred behaviour, either by individuals or companies. They suggest that legislation is an option to help reduce negative externalities and that legislative change should be subjected to rigorous economic

evaluations too. Finally, they suggest that caution is required in using data from one country and applying it to another, and that only relevant data should be included when pooling data.

A number of gaps in the research base are identified within the YHEC review, in particular that there should be;

- Research to improve the measurement and valuation of suitable outcomes
- Economic evaluations of public health interventions based on sound methodological criteria and taking a societal perspective
- To identify priorities for research, for example by (i) using cost-of-illness studies to identify where societal costs are highest and therefore where benefits may be greatest and (ii) by focusing on areas expected to have the greatest impact on reducing health inequalities
- The use of modelling techniques where there is a considerable amount of effectiveness data currently available

Finally, the authors argue that further literature reviews in the area are unlikely to contribute much to the knowledge base, due to the limitations associated with many published economic evaluations.

1.4.1.2 Wanless 2002; 2004

In 2002 the report ‘Securing our Future Health: Taking a Long-Term View’ sought to identify the resources required to provide a high-quality NHS to 2022.⁽⁹⁾ The report found that health outcomes in the UK had fallen behind, relative to other comparable countries. It was hypothesised that this was mainly due to lower UK health care spend per head of population, which resulted in a reduced capacity to deliver health care. To close the gap, the report recommended an increase in total expenditure on health care and the wider determinants of health, particularly over the shorter term. This recommendation was built on the premise that the successful implementation of public health programmes could reduce the long-term costs of health care treatment, the underlying rationale being that a reduction in use of health care may be achieved by enhancing the promotion of good health and disease prevention. The report also recommended that it is essential to make effective use of available resources and it strongly supported the role of the National Institute of Health and Clinical Excellence

(NICE) in assessing the effectiveness and cost-effectiveness of health care interventions.

To forecast the resources that are required to close the gap, three scenarios were developed, including a 'fully engaged' scenario in which *'levels of public engagement in relation to their health are high: life expectancy increases go beyond current forecasts, health status improves dramatically and people are confident in the health system, and demand high quality care. The health service is responsive to high rates of technology uptake, particularly in relation to disease prevention. Use of resources is more efficient.'* The report 'Securing Good Health for the Whole Population' considered the consistency of current policy in England with the public health aspects of the fully engaged scenario.(1) The report focused on the cost-effectiveness of actions for improving the health of the whole population and for reducing health inequalities.

To consider the methodological implications of assessing the cost-effectiveness of public health interventions, the authors of the report reviewed a standard checklist for the conduct of good quality economic evaluations and the NICE reference case.(3) Both were found to offer a transparent, rigorous and systematic evaluation framework and a practical way forward for the evaluation of public health interventions. At the same time, the report acknowledged that research in the public health arena can be technically difficult and requires further development.

The report supported the use of evidence-based practice in public health. In general it found little evidence on the cost-effectiveness of public health interventions and even less evidence on associated health inequalities. The report suggested that economic evaluations of public health interventions do not differ conceptually from the evaluation of other health care interventions. However, there are practical difficulties that it should be possible to overcome and that there is *'an urgent need to develop an appropriate practical framework for evaluating public health interventions.'* It was argued that evaluations of public health interventions can be more challenging and costly to perform than evaluations of other health care interventions and that there is little incentive for industry funding of such research. Nevertheless, it was argued that the cost-effectiveness evidence base of public health interventions should be

developed further. To make more efficient use of the economic evaluations of public health interventions that are undertaken, it was suggested that consistent analytic approaches to evaluation be applied, thus enabling decision makers to compare different types of public health care interventions and to compare public health care and other health care interventions.

Attribution of outcomes: The 2004 report found that a number of practical challenges may arise in the evaluation of public health interventions which can undermine analysts' ability to obtain true estimates of effect. Examples of these challenges included those encountered in randomising groups to interventions, in finding suitable control groups, avoiding self-selection problems, controlling for the influence of other variables and in separating treatment effects from counterfactual effects. Such challenges were not found to be unique to public health interventions, the suggestion being that methods used for evaluations of other health care interventions may offer analysts techniques to remedy these challenges.

Two mechanisms for gathering evidence were discussed including (i) the systematic review and synthesis of existing evidence and (ii) the use of primary research to design, test and evaluate public health interventions. It was reported that it is not always possible to undertake Randomised Controlled Trials (RCTs) or to use controlled studies to obtain unbiased estimates of effect, due to ethical considerations and practical constraints such as cost and feasibility. In considering the use of alternative study designs, the report noted that some analysts do not consider non-experimental studies to be scientifically rigorous enough. However, it was suggested that *'the pursuit of the ideal should no longer be allowed to be used as an excuse for inaction, rather promising approaches should be piloted with evaluation a condition of funding.'* The report recommended the use of natural experiments, observational datasets and use of primary care data systems. It reinforced the value of data collected to monitor population health and acknowledged the need for adequate resources to implement data collection.

Other considerations, raised in the report, were the need to identify appropriate time frames for evaluations and to consider what constitutes a successful outcome. On the one hand it was recognised that some outcomes are a poor indicator of long-term

health (e.g. four week smoking cessation). On the other hand, it was recognised that time lags may occur between the implementation of an intervention and the accrual of benefits. Furthermore, it may be difficult to keep track of individuals in the community over such long time-frames. Modelling techniques were recommended to aid the transferability of results to real populations or sub-groups and to assess population health at the national and local level. To facilitate the evaluation process, the report recommended enhancing collaboration between academics and those public health professionals who deliver care.

One aspect which the report suggested may act as a barrier to the evaluation of public health interventions is the legislation which protects the use of data. The report argued that a balance needs to be struck between individual confidentiality and public health research requirements.

Measuring and valuing outcomes: From a review of existing studies of public health interventions, the 2004 report found that evaluations tend to be based on process outcomes, or short term outcomes, rather than longer term outcomes. It recommended that, as for the evaluation of health care interventions more generally, modelling may be used to extrapolate health outcomes (and costs) beyond the trial follow-up period, drawing on epidemiological data and expert opinion as well as data from experimental, quasi-experimental and observational studies. Also, it recommended the use of sensitivity analysis to test the robustness of results to data incorporated within models.

In terms of measuring and valuing outcomes, the report found that public health targets are frequently based on what *can* be measured rather than what *should* be measured. Taking the four week smoking cessation example used above, smoking targets may focus on four week quit rate of smokers registered with smoking cessation services as a key outcome. This is likely to be an insufficient record of success in reducing smoking prevalence in an area, however, since the target does not take into account those who quit smoking through other means and does not provide an accurate reflection of trends in smoking prevalence in a locality. The report suggested that organisational level data, for example collected at PCT and Strategic Health Authority (SHA) level, could be gathered to gain a better picture of progress

towards smoking reduction. It also voiced a concern that the use of targets can have a distorting effect on activity at the local level.

The report examined the appropriateness of different economic evaluation methods for the evaluation of public health interventions. It suggested that further development of outcome measures is required for use in effectiveness and cost-effectiveness analyses, based on a consideration of what constitutes successful outcomes. It highlighted the advantages of using generic measures of health outcomes, such as the Quality Adjusted Life Year (QALY) used in CUA, so that different health care programmes can be compared. It was suggested that CEA and CUA were easier to undertake than CBA. However, it was argued that the results of CUA were more difficult to interpret, with ambiguous implied welfare effects. The report suggested that CBA was useful for comparing interventions across sectors and for interventions where non-health outcomes are important.

Equity considerations: In examining the current evidence base, the 2004 report found that it was particularly weak in relation to the impact of public health interventions on health inequalities. Since the most disadvantaged sections of the community are least likely to access services, less is known about what works for these individuals. At the same time, in reviewing the wider determinants of health, the report found that social class, as measured by income, education or occupation is a robust predictor of health outcomes, thus supporting the need to focus on greater understanding of health inequalities. The report suggested that there is a wealth of ad hoc data and routine information collected on the wider determinants of health that could be used to better effect. Examples of such data include measures of deprivation, housing, education, crime, social care, accidents and air quality.

The 2004 report argued that health inequalities have become more important over time and that some public health interventions may have widened the socio-economic gradient. For instance, there is some evidence to suggest that public health interventions that target the population at the individual level (e.g. some smoking cessation programmes) may have higher uptake rates and effectiveness among higher socio-economic groups.⁽¹⁰⁾ The report recommends strengthening the analysis of

health inequalities, particularly in terms of examining the impact of public health interventions on different population groups or settings.

Barriers to appropriate decision making, some of which may have equity (and intersectoral) implications, were discussed in the report. The importance of including positive and negative externalities associated with public health interventions was noted, since their exclusion could undermine the impact on the system as a whole. The report stated that distributional effects of public health interventions should be aligned with social equity objectives. However, it was not discussed as to whether this should be incorporated in economic analyses.

The report recognised that there can be efficiency-equity trade-offs and suggested that these trade-offs need to be made transparent. Another point to consider was the impact of interventions on individual liberty (and choice) and the need to balance this against society's concern for improving the health of the population. In terms of implementation, the general public's choices about whether or not to engage in preventative health activities or other use of health care, could be undermined by information failures and social context failures. However, these are almost never incorporated explicitly within traditional economic evaluations and it is a matter of debate as to whether they should be included.

In examining the traditional economic evaluation framework, the 2004 report found that economic evaluation decision rules, whether based on cost-effectiveness thresholds or league tables, do not always inherently incorporate equity considerations. However, it can be argued that economic evaluations do incorporate a notion of equity in the sense that, based on QALY analysis recommended in the NICE reference case, health benefits include general population valuations and also that a QALY is of equal value, no matter who receives it. If the objective of the health care system is to maximise total health gain this may be at odds with those public health interventions that improve general health but also increase the gap between the health of the better off and the worst off.

The 2004 report also suggested that from a societal perspective, the future health gains of public health interventions with intergenerational implications may be valued highly and therefore discounting the benefits at the same rate may be inappropriate.

Intersectoral costs and consequences: The 2004 report noted that health and wellbeing is influenced by characteristics of individuals, their behaviour and wider aspects of health, such as community, socio-economic and cultural factors, as well as health care provision. It argued that the responsibility for public health lies with individuals and across a range of sectors of the economy. The methodological challenges that are associated with incorporating intersectoral implications within evaluations were not discussed in any detail. However, it was recognised that in undertaking evaluations of public health interventions, the health care system or the public sector generally may focus on their own budgets. At the same time it was recognised that some public health interventions may result in costs and consequences falling on the patient. The report suggested that analysts typically favour the societal perspective, which would incorporate the costs and consequences across all sectors of the economy. More weight was given in the report to the implementation issues associated with intersectoral effects. It was suggested, for instance, that more partnerships across sectors, and at different levels within sectors, be forged in the delivery of public health interventions. Targets which align objectives across sectors could be implemented, for example between the Planning and Priorities Framework for the NHS and the Comprehensive Performance Assessment for local government.

1.4.2 Welsh Review

Following on from the Wanless reports (1);(9), the Welsh Assembly Government Health Promotion Division was commissioned to undertake the most comprehensive systematic review of the methodological approaches that have been used in the economic evaluation of public health interventions worldwide to date.(11) The Welsh review built on previous, narrower reviews in the area (e.g. (12); (13) (14) and acknowledged the ongoing work of the Campbell Collaboration (<http://www.campbellcollaboration.org/>) and the Cochrane Collaboration

(<http://www.cochrane.org/>) in incorporating economic analysis into systematic reviews of public health interventions, amongst other interventions.

To undertake the review, a protocol was devised, consistent with NHS CRD principles.⁽¹⁵⁾ Economic evaluations were included in the review if they examined interventions for altering individual behaviours and lifestyles, controlling and preventing infectious disease, tackling the broader determinants of health or secondary prevention. As well as including studies where standard full economic evaluation techniques were applied (i.e. cost-effectiveness, cost-consequence, cost-utility and cost-benefit analysis and cost-minimisation studies), the authors included relevant econometric studies (e.g. for assessing the impact on cigarette consumption and alcohol consumption of changes in excise duty). Typically these studies reported changes at the margin, for example, marginal changes in consumption patterns rather than impacts on final health related outcomes and did not necessarily analyse the cost of introducing a fiscal instrument. Therefore, they do not constitute full economic evaluations. A number of cost of illness studies were identified which were included in the review for information but were excluded from the overall analysis since they omitted outcomes data. No judgement was made about the quality of the economic evaluations that were included in the review map. Methodological papers which discussed ways in which economic evaluation techniques applied to public health interventions might be improved were reviewed but, not incorporated in the overall analysis.

The search strategy was inclusive and was not limited to specific public health interventions or specific geographical boundaries. No language restrictions were placed on searches and some searches of relevant databases were conducted in French, Spanish and German. Based on Cochrane Health Promotion and Public Health Group guidance, a broad range of bibliographic databases were searched in their entirety: some databases were set up in the mid 1960s. However, some limitations were inbuilt within the searches, for instance, no systematic attempt was made to search developing country databases. The full list of the databases that were searched is reported in the review.⁽¹¹⁾ Other approaches included hand-searching and snowballing. Details of all the papers that were included in the review were entered into a relational database, Microsoft® Access, using methods developed by the

Evidence for Policy and Practice Information Co-ordinating Centre (EPPI-Centre) at the Institute of Education, London.

Abstracts retrieved from the searches were filtered by one reviewer and checked independently by a second reviewer. If abstracts were missing, the paper was rejected, with the exception of references retrieved from EconLit, in which case a judgement was based on the title of the paper and/or the full paper if retrieved.

Standard bibliographic data were reported on the country of where the first study author was located, the country to which the study related, the economic evaluation methodology, the public health area addressed (including animals, drugs/alcohol, food safety, health promotion, HIV/AIDS, housing/regeneration, injury prevention, mental health, nutrition/obesity, pollution/toxicity, general public health, regulation, screening, secondary prevention, smoking, STDs, other, terrorism/disasters, tuberculosis and vaccination programmes), the evaluation methodology and the time period for each study was stored on the database.

7,154 unique references were identified based on the electronic search strategy. Once the abstracts were checked for relevance, the number of references housed on the database was reduced to 1,796 references. Studies related to the following WHO regions; 50% of the studies were conducted in North America, 25% in Europe, 9% in the Western Pacific and 10% in no specific region. The remaining studies (6%) were conducted in Africa, the East Mediterranean, South & Central America or South-East Asia. The author was based in North America in over the half of the studies (n=53).

The type of economic evaluation used for the analysis was recorded, based on what the authors of the study stated. Forty-eight percent of studies were termed CEA, 20% of studies were termed CCA and 12% included multiple methods. CMA, CBA and CUA and econometric based studies accounted for the remaining studies.

Screening programmes accounted for 35% of the public health interventions evaluated. Study settings included the community/local, accounting for 34% of the studies, medical (26%) and the workplace (22%). Population groups studied included the general population (33%), children up to age 18 (23%) and women (18%). In terms

of study design, 11% of studies were based on RCTs and the majority of all studies included some form of statistical modelling.

The review concluded that the complete range of available economic evaluation techniques have been applied to public health interventions and that the number of economic evaluations being conducted has tended to increase over time. The authors stated that the nature of public health interventions '*necessarily must place much greater emphasis on the importance and use of qualitative methods to identify factors which can provide information not only on if something works, but in what setting and context*'. Citing Rychetnik et al (16), they suggested that if a public health intervention was found to be relatively ineffective, this could be because it really was ineffective or due to being badly implemented or implemented in a setting and/or context which induced failure.

A finding of the review was that whilst most public health areas have been examined using economic evaluation techniques, the number of comparable studies is limited and, if quality criteria were applied, the number would reduce further. The information provided by the review was not synthesised across comparable studies and the authors suggested that in many public health areas it is not currently possible to make any judgement about the cost-effectiveness of public health interventions. However, the review provides a platform on which to build, for example in particular public health areas such as smoking cessation it may be possible to synthesise the available evidence to quantify its cost-effectiveness and associated uncertainty estimates.

Attribution of outcomes: The authors considered the importance of obtaining unbiased estimates associated with public health interventions. They suggested that it might not always be possible to obtain experimental data to evaluate such interventions. However, they were positive about the use of economic evaluation as a method to evaluate public health interventions. They recommended that the evaluation of public health interventions requires partnership between public health professionals in the design and conduct of cost-effectiveness studies.

Measuring and valuing outcomes: The authors discussed which type of economic evaluation approach should be used to evaluate public health interventions. They contrasted the Hunter (17) approach to measuring and valuing outcomes, which questions the narrowness and feasibility of creating a single index measure to reflect outcomes associated with public health interventions, with approaches from analysts who have successfully applied the QALY approach to public health interventions, such as the analysis of air pollution regulation by Hubbell, (2002).(18) The authors recommended that different frameworks for evaluating public health interventions need to be developed which encompass broader social values than perhaps have been identified as part of traditional CUAs. They cite Jan's work (19), which suggests possibilities for a more holistic (also called ecological) approach to the evaluation of some health care programmes. For example, for the evaluation of indigenous health programmes, notions of cultural appropriateness may have a strong influence over the effectiveness and acceptability of programmes. The review found that few studies have used the CBA approach to valuing outcomes and the authors acknowledge the conceptual and practical problems associated with CBA.

Beyond a call for analysts to improve the methods to be applied within new studies, McDaid and Needle suggest that more use could be made of currently available data by synthesising the results of existing studies.(11) They recommend that economic evaluations of public health interventions be classified in bibliographic databases in a way that improves the retrieval of relevant bibliographic references.

Intersectoral costs and consequences: No explicit mention was made of possible intersectoral effects associated with public health interventions. However, the authors searched beyond healthcare specific bibliographic databases to include databases such as 'Geobase', International Bibliography of the Social Sciences (IBSS) and 'Public Administration and Information Service' (PAIS).

1.4.3 Australian Report

In 2003 the Australian Report 'Returns on Investment in Public Health: An Epidemiological and Economic Analysis' estimated the financial return of investment

to society and to the government in five public health areas comprising public health programmes to (i) reduce tobacco consumption, (ii) coronary heart disease (CHD), (iii) HIV/AIDS, (iv) measles and Hib-related diseases and (v) road trauma.(20) Estimates were based on the effects of each public health programme from 1970, marking the approximate start of the programmes, except for the HIV/AIDS programmes where the evaluations start in the mid-1980s, and the Hib protection programmes where the evaluations start in the early 1990s. Outcomes were projected to the year 2010, with the exception of immunisation programmes, where outcomes were projected to 2003.

Table 3: Examples of Links in the Evaluation of Public Health Programmes

Public health programme	Behavioural objectives	Health objectives	Indicative behavioural & health outcomes	Economic analysis
Anti-smoking promotions, regulations, prices	Reduced tobacco consumption	Reduced lung cancer, heart disease, strokes, bronchitis, other cancers	Programmes achieved behaviour & health changes	Compare programme cost with health benefits
Lifestyle programmes, improved diet, more exercise	Reduced body mass, lower cholesterol, lower blood pressure, increased exercise	Reduced heart disease, strokes, diabetes, & other disease	Some behavioural changes & some unchanged behaviours, improved health outcomes	Compare programme cost with health benefits
HIV/AIDS educational, needle/syringe exchange programmes	Safe sex, use of clean needles	Reduced HIV-AIDS diseases	Programmes achieved behaviour & health changes	Compare programme cost with health benefits
Various immunisations (measles and Hib)	Increased participation in vaccinations	Reduced diseases	Reduced incidence of measles & Hib-diseases	Compare programme cost with health benefits for selected vaccination programmes
Programmes to reduce road accidents (regulations & penalties)	Wearing seat belts, lower speed, less drinking & driving	Lower road injuries	Programmes achieved behavioural & health changes	Compare programme cost with health benefits

To assess cost-effectiveness, a number of methodological steps were undertaken, of which the main ones are reported in Table 3. The interventions associated with each

public health programme were identified, the effects of the interventions on individual behaviour were estimated and further estimates were required as to whether these behavioural changes translated into changes in health outcomes. Substantial use was made of econometric analysis. Mortality and morbidity across the Australian population was calculated with and without the implementation of the various public health programmes. Savings in health care expenditure associated with improved health benefits of the programmes were calculated using data on health care expenditure per disease data. Estimates for only 1993 to 1994 were available so these were projected back to earlier years and forwards to 2010, in proportion to the estimated morbidity changes. Any additional health care requirements due to increased longevity were not included, since it was assumed that valuation of longevity accounted for this.

To value improved health, disability-adjusted life year (DALY) estimates were used to estimate the reduction in DALYs associated with different diseases relevant to each public health programme.⁽²¹⁾ DALYs were converted to monetary values by estimating the value of a healthy year. The authors assumed a value of life of Aus \$1 million and an equivalent value of Aus \$60,000 for a healthy year.

The cost of each programme was based on the Australian Institute of Health and Welfare estimates. Costs and benefits were discounted at a rate of 5% per year to the estimated start of the programme. Figures were reported in 2000 Australian dollars. A cost-benefit estimate for each programme was reported in monetary terms as a net present value (NPV). NPV was calculated by subtracting the discounted costs from the discounted benefits. Various one-way sensitivity analyses were undertaken including varying the discount rate from 0% to 3% and 7%, and varying the health benefits attributable to the programmes. The report acknowledged that there were a number of constraints associated with the analysis. These are examined in relation to the four methodological considerations below.

Attribution of outcomes: A survey approach was taken, identifying data from the literature as well as information stored in databases. Limited data were available and much use was made of observational data and this was supplemented by expert and author-based opinion. The report commented upon the issue of causality, stating lack

of data as one barrier to estimating plausible relationships between public health interventions and health outcomes. For example, it is unclear which of the public health programmes might reduce CHD, since some promote healthy lifestyles generally.

In order to make a number of links in the analysis and to infer causal relationships, several constraints were encountered. Frequently, to undertake the analysis, links had to be made between the impacts of public health interventions on behaviour or risk factor changes and furthermore these had to be linked to final health outcomes. To estimate the impact of public health interventions on behaviour, data were needed on behaviour changes with and without the interventions. Four complications were identified in making this link (i) the relationships between risk factors and mortality and morbidity may be non-linear (ii) the relationships between risk factors and health conditions may be interdependent and not independently additive (iii) there may be long time lags between changes in behaviour and changes in health and (iv) there may be other by-products associated with behaviour change, not all of which will be positive in terms of overall health. The report found that more challenges were experienced in obtaining unbiased estimates of effect due to the complex, multi-variate social environment and the difficulty of identifying the impacts of specific variables whilst controlling others. There may be concurrent changes in environmental conditions impacting on health outcomes, aside from the public health interventions and problems were encountered in assessing what would have happened without the implementation of a programme.

Measuring and valuing outcomes: The health outcomes associated with the public health programmes were measured using DALYs lost. As mentioned above, in order to convert DALYs into economic benefits, a dollar value per DALY was calculated using what the authors believed to be conservative estimates of willingness to pay for human life. Savings in health care expenditures were included as a benefit in the analysis. Only one year of data was available and therefore estimates were projected backwards to the beginning of the evaluation period, and forwards to 2010. Unit costs of treatment were assumed to remain constant over time. No additional methodological considerations relating to measuring and valuing outcomes were discussed, apart from those that link in with the attribution of outcomes above.

Equity considerations: Where possible, the analyses considered the impacts of the public health interventions on different sub-groups of the population, for example, the socio-economic inequalities in CHD. However, equity considerations were not specifically discussed as part of the methods, or addressed within the analysis.

Intersectoral costs and consequences: To undertake the five economic evaluations, the authors of the report had to decide which interventions could be classed as public health interventions. Some interventions to regulate or influence behaviour were included, such as tobacco taxes, but the authors acknowledged that the inclusion criteria were arbitrary. They noted that the boundaries between public health programmes and other government actions are often blurred and that the size, diversity and imprecise nature of public health programmes often present practical issues for evaluation. For example, due to the diverse nature of public health programmes, some were administered outside of health care agencies. The division of responsibility for delivering public health programmes may be multi-level involving central government (the Commonwealth) and regional government (the States and the Territories). Also, within a single level of government, different programmes may be delivered through different agencies. Therefore, with potential complications for identifying the full costs and outcomes associated with the programmes.

Section 2: Methods

2.1 General approach

Given the preliminary review of the background literature above, it was felt that the way forward was as follows;

- (i) To specify the main (additional) methodological challenges in the economic evaluation of public health interventions
- (ii) To undertake a methodology review of empirical studies undertaken between 2000 and 2005 to identify whether they provide any useful insights in addressing these challenges
- (iii) To make suggestions for ways forward in respect of each of the challenges, based on the review of the literature and the discussions in an expert workshop, held in York on 16th June, 2006.

2.2 Specifying the methodological challenges

The consideration of existing reviews confirmed that there were four main methodological challenges in economic evaluation: attributing outcomes to interventions, measuring and valuing outcomes and incorporating equity considerations and identifying intersectoral costs and consequences. These are discussed in turn below:

2.2.1 Attributing outcomes to interventions

Being concerned with the evaluation of medical technologies directed at identified groups of individuals, most published guidelines, including the current NICE reference case, indicate a preference for evidence from randomised controlled trials comparing the relevant alternatives. Modelling is recommended where patients participating in trials do not match typical NHS patients, where intermediate outcomes are used, where relevant comparators have not been used, or where long-term costs and benefits extend beyond the trial period.

Since there are likely to be fewer controlled trials of public health programmes, other approaches for obtaining an unbiased estimate of the intervention effect need to be adopted (e.g. observational studies and natural experiments). In addition, modelling is likely to be as important, or even more important, in the case of public health programmes, since the measured outcomes are often short-term and only indicators of future mortality and morbidity. Hence, methods for the appropriate extrapolation of short-term outcomes need to be combined with evidence from other sources.

2.2.2 Measuring and valuing outcomes

Economic evaluation requires estimation of long-term outcomes, with health outcomes measured in quality-adjusted life-years (QALYs). Estimation of QALYs requires both projections of long-term outcomes (mentioned above), and the classification and valuation of health outcomes.

Other outcomes may be relevant to some public health programmes, including the effects that interventions may have on individuals not directly targeted by the programme, reassurance and the creation of an informed public. Some such outcomes may be possible to incorporate within the QALY framework, others not. Therefore it will be important to explore which other outcome measurement and valuation methods are valid.

2.2.3 Incorporating equity considerations

Although these are recognised in many published guidelines, the central tenet is that the value of a QALY is the same no matter who receives it. Impacts on equity may be much more important for public health programmes. Indeed, one of the main objectives of some programmes will be to reduce health inequalities. Therefore, consideration needs to be given as to how to handle the trade off between a policy objective of maximising health gain and one of reducing health inequalities. Using case-studies of actual economic evaluations of public health interventions may provide insights into the ways of addressing this trade-off. One approach involves weighting these two policy objectives based on the preferences of a relevant sample of respondents (e.g. policy makers, the public). These weights will reflect the

maximum reduction in aggregate health gain respondents would be willing to accept in return for a given reduction in health inequalities. A second approach would be to quantify the opportunity cost of adopting an intervention, which reduces health inequalities, in terms of health gain (or vice versa). Various ways of analysing the cost-effectiveness of programmes, whilst recognising these potentially conflicting objectives, need to be compared and their usefulness for decision making considered.

2.2.4 Identifying intersectoral costs and consequences

The impacts of public health interventions are often wide-ranging. Certainly, costs and benefits can fall on many parts of the public sector. There may also be impacts on individuals' private costs and ripple effects within the economy at large.

Expenditure in some sectors may reduce expenditures in others; for example, more investment in speed cameras, or improvements in housing, could reduce illness and injuries, with consequent reductions in health care utilization.

2.3 Review of methods in existing empirical studies

2.3.1 Review methods

2.3.1.1 Selection of studies

A sample of published economic evaluations of public health interventions were identified using the NHS Economic Evaluation Database (NHS EED). The NHS EED database is funded by the Department of Health for England and is available free of charge on the following website <http://www.york.ac.uk>. It was developed to assist decision-makers by systematically identifying, describing and evaluating health care treatments and technologies, including public health interventions. The database was used to obtain public health economic evaluations since the titles included on the database are identified on the basis of a broad search strategy (see Appendix 3). Also the database provides useful structured abstracts, which makes the assessment of methods more efficient and, for this study, it was possible to consult full copies of the papers as they are available within the Centre for Reviews and Dissemination (CRD), University of York. The database was searched for abstracts of papers published

between 2000 and 2005, since these are more likely to reflect state-of-the art methods in the economic evaluation of public health interventions to date.

Studies were selected according to eleven areas of public health were identified in the 'Choosing Health' (2004) White Paper.(22) The public health areas comprised accidents, alcohol, ante natal and post natal visiting, drug use, HIV/Aids, low birth weight, obesity and physical activity, sexually transmitted infections, smoking, teenage pregnancy and youth suicide prevention. As such, evaluations of public health interventions to prevent or minimise the effects of illnesses and risk factors associated with disease were included in the review. However, no explicit definition of public health interventions was applied and the key aim of this review was to explore the methodological considerations associated with evaluating public health interventions by way of examples of published economic evaluations.

The NHS EED was searched using search terms identified for the NICE Evidence Briefings (<http://www.nice.org.uk/>; see Appendix 4). The search strategy was rather sensitive, aiming to capture a broad sweep of studies rather than being precise (i.e. omitting irrelevant studies). The task of searching for public health interventions was complex because public health studies are not necessarily labelled as such. Originally, based on 'Choosing Health' (2004) (22), twelve public health areas were identified, that is (i) accidents (ii) alcohol abuse (iii) ante and post natal visiting (iv) drug abuse (v) HIV/AIDS (vi) low birth weight (vii) obesity and physical activity (viii) sexually transmitted infections (ix) smoking (x) teenage pregnancy (xi) youth suicide prevention and (xii) health impact assessment. Some amendments were made; prevention and treatment of obesity interventions were combined with physical activity interventions since many duplicate records were identified across these two public health areas. Health impact assessments were excluded from the review because the intervention is not well defined and it is difficult to devise a search strategy that identifies relevant papers whilst excluding irrelevant ones.

Once references to the studies were retrieved and downloaded to an Endnote (Endnote 9) file, they were screened for duplicate records and irrelevant records (i.e. those evaluating clinical interventions). The Endnote file was further screened by two reviewers in order to omit studies that did not include full economic evaluations.

2.3.1.2 Data extraction

A data extraction template was developed (see Table 4) to guide the examination of methods used to undertake the public health economic evaluations obtained from the searches. The template was designed around, and limited to, the economic evaluation methods that are identified within the NHS EED abstract template (<http://www.york.ac.uk/inst/crd/nhsdfaq.htm>) and focused on the four methodological challenges identified above. It is worth noting that there are links and overlaps between the four methodological challenges and therefore some of the aspects of the methods are relevant to more than one challenge. To a large extent the review depended on the information provided in the NHS EED abstracts. However it was possible to check some information by consulting the original paper.

Table 4: Template for Extracting Data from NHS EED Abstracts of Public Health Economic Evaluations

1	NHS EED ID number	2	First author
3	Year of publication	4	Journal title
5	Public health areas <ul style="list-style-type: none"> • Accidents • Alcohol • Ante and post natal visiting • Drug use • HIV/AIDS • Low birth weight • Obesity & physical activity • Sexually transmitted diseases • Smoking • Teenage pregnancy • Youth suicide prevention 	6	Intervention evaluated
7	Controls used Control 1 Control 2 Control 3 Control 4	8	Target group <ul style="list-style-type: none"> • General population • Working age • Children • Women • Older people • Ethnic minority • Men
9	Country of evaluation	10	Region of evaluation <ul style="list-style-type: none"> • Africa • Europe • International • North America • South/Central America • South East Asia

			<ul style="list-style-type: none"> Western Pacific
11	Setting <ul style="list-style-type: none"> Community/local General population Home Medical Military Prison/detention School Transport Workplace 	12	Location of first author <ul style="list-style-type: none"> List country
13	Study type <ul style="list-style-type: none"> Randomised Non-randomised Review 	14	Sample size per group (mean)
15	Multiple centres <ul style="list-style-type: none"> Yes/No 	16	<ul style="list-style-type: none"> Intention-to-treat analysis Treatment completers only
17	Whether extrapolation undertaken	18	Methods of extrapolation
19	Length of follow-up	20	Length of study
21	Economic evaluation methods (stated and actual) <ul style="list-style-type: none"> CBA CCA CEA CUA 	22	Outcome used <ul style="list-style-type: none"> Outcome 1 Outcome 2 Outcome 3 Outcome 4
23	Equity considerations <ul style="list-style-type: none"> Any mention of equity considerations and if so what 	24	Perspective as stated <ul style="list-style-type: none"> Societal Health service, health care payer, third party payer Hospital, local health department, provider Government Patient Multiple Not stated
25	Costs <ul style="list-style-type: none"> Health care Criminal justice Defence Education Employment Environment Individual out of pocket Law enforcement Private Social care Transport Voluntary sector 	26	If productivity changes evaluated as a cost, describe method used

For full details on the data extracted for each study see Appendices 5 to 7.

Background data (points 1 to 12 in Table 4) were obtained for each study. The reference to each study was noted, in order to identify the study and to specify which

journals published the studies. The type of public health intervention being evaluated was noted, alongside the intervention/s with which it was being compared. This was undertaken for reader interest and because it was anticipated that different types of public health interventions may require different types of study design and or data collection to evaluate them. This is revisited below. The group of participants targeted by the public health interventions was noted in order to give an indication of the focus of the analysis. To contextualise the studies, information was extracted on the country/countries that the economic evaluation related to, the corresponding World Health Organisation (WHO) region and the country in which the first author was located.

To assess how analysts attempted to obtain unbiased estimates of effect, data were extracted on a number of aspects of study design (points 13 to 20 in Table 4). RCTs are considered to be the gold standard study design for the evaluation of effectiveness of medical treatments and health care technologies. However, for the evaluation of complex health interventions³ with multiple components, and interventions with a broader impact, use of RCTs is less well accepted in practice, primarily because of ethical considerations, or the cost and complexity of such studies. RCTs involve the investigator assigning participants to the intervention or control group using a random allocation technique. Non-randomised studies usually involve the investigator trying to match the characteristics of the control group/s with those of the intervention group. Examples of non-randomised comparisons include controlled observational studies such as case-control studies. The link between the intervention and the control group might be prospective or retrospective. For all study designs, the aim is to determine the relative effectiveness of the technologies being compared. Therefore, differences in outcomes should relate to the differences in the technologies used, all other factors (known and unknown) should be equally distributed and therefore, in effect, be held constant across groups.

³ Complex interventions in health care comprise a number of separate elements which seem essential to the proper functioning of the intervention although the 'active ingredient' of the intervention that is effective is difficult to specify. 23. Medical Research Council. A framework for development and evaluation of RCTs for complex interventions to improve health
Medical Research Council; 2000.

Reviews were the third type of study design noted as part of the data extraction. Reviews use secondary data, collected for other purposes, and they attempt to synthesise findings across studies based on a narrative summary and/or by using a statistical model. Reviews can include published and non-published literature, expert and author based opinion and/or use of databases and panel datasets. Studies evaluating certain illnesses or risk factors for disease are more likely to be based on non-randomised or review-based studies, such as interventions targeted at certain illnesses or risk factors. This is because it is clearly not ethically possible to randomise subjects to risk factors for the disease. Modelling studies are more likely to be conducted where illness is chronic and, by definition, having a long term illness, outcome and cost trajectory.

Additional methodological components, most of which relate to the use of primary data, include the sample size, whether or not the studies are multi-centre or single-centre, whether or not the analysis was undertaken on an intention-to-treat basis or treatment completers only, whether data were extrapolated beyond the follow-up period and if so, the methods applied to undertake the extrapolation. Data may be analysed based on inferential and/or Bayesian statistics. Assuming all other things are equal, use of a larger sample size is preferred to the use of a smaller sample size. However, sample size is a particular concern in inferential statistics. Such studies may use a sample size powered to detect a statistically significant difference in outcomes (and/or costs) and this will be calculated at the design stage of the study. Bayesian approaches use probabilistic analysis and the size of the sample has less relevance. In both cases, the quality of the data is vitally important. The use of bad data cannot be rectified at the analysis stage.

Information was recorded as to whether the interventions were carried out in a single site or multiple sites, since there may be variation in the delivery and effects of interventions across centres. Therefore the analysis should reflect this. For example, in a health education programme delivered in schools, there may be variation in outcomes at the level of the school and at the level of the students within schools. It was also recorded as to whether analyses were based on intention-to-treat, in which case all participants are followed up and analysed within group, or treatment completers only, in which case those lost to follow-up are excluded from the analysis.

Typically intention-to-treat analysis is considered to be the analysis of choice, since there may be reasons why individuals are lost to follow-up that should be identified in the outcome estimates. Put another way, if those who are lost to follow-up are omitted from the analysis there may be something particular to that group of individuals which, if considered, would alter the estimates of effect.

Another aspect of the methodology that was explored in relation to the attribution of effects was whether studies extrapolated outcomes (and resource use and costs) over time and if so, what methods were used for extrapolation. Many public health interventions may be expected to impact on outcomes over considerable periods of time, such as, the use of statins to prevent or reduce cholesterol and the risk of coronary heart disease. However, it can be costly and resource intensive to follow patients up long term. For most randomised trials it might be expected that participants are followed up for a few weeks or at most a few months and that observational data are then used to extrapolate outcomes beyond the follow up period of the trial. In non-randomised studies, the analyst determines allocation to the intervention and the comparison and therefore the allocation is not random. Controls may be matched and the analysis adjusted to account for any known between group differences. For model based reviews, statistical techniques may be used to extend the analysis of outcomes beyond any trial-based analysis; for example, by using epidemiological models such as survival analysis and/or decision analytic approaches such as Monte Carlo Markov Chains (MCMC).

The challenge of measuring and valuing outcomes of public health interventions was assessed based on (i) the type of economic evaluation chosen and (ii) the type of outcomes applied. These relate to points 21 and 22 in Table 4. If the decision maker were to decide on the preferred economic evaluation technique, this would indicate which outcome type to measure and value. Types of economic evaluation include cost-benefit analysis (CBA), cost-consequences analysis (CCA), cost-effectiveness analysis (CEA) and cost-utility analysis (CUA). Further descriptions of each of these are provided in Section 1. However, in brief, CBA includes all costs and outcomes measured in monetary terms; CCA includes multiple outcomes that are not synthesised with costs; CEA includes a primary outcome measure, based on a natural unit (e.g. life years gained), which is synthesised with costs in an incremental cost-

effectiveness ratio (ICER) and CUA includes an outcome which incorporates individuals' valuations of health states. Typically CUA uses an outcome measure such as the Quality Adjusted Life Year (QALY) and this is also synthesised with costs in an ICER.

Data were extracted on up to four outcomes from each study. It was not always clear what the primary outcome was, and some studies reported five or more outcomes. Therefore the decision as to which outcomes to note was based on those more relevant to health economics outcomes. For example, final outcomes and generic health related quality of life instruments were given priority. These fields provide an illustration of the outcomes of interest in relation to the public health interventions being evaluated. Some argue that evaluations should focus more on process or intermediate outcomes, noting, for example, that the context in which interventions are delivered can influence their effectiveness. It may be anticipated that the context in which public health interventions are delivered, such as a health education programme, may have a larger impact on effectiveness than the context in which a medical intervention such as a drug treatment is evaluated. In a number of public health interventions, effectiveness is influenced by the degree to which the participant engages with the intervention. For example, a health promotion programme may aim to change peoples' behaviour and lifestyle choices. On the other hand, a patient may be more likely to comply with a clinical intervention prescribed by their doctor.

In terms of equity (see point 23 in Table 4), currently the NHS EED template does not devote a specific field to this and therefore such considerations were unlikely to be reported in a systematic way. However, if any informal equity considerations were made these were noted.

To assess how analysts attempted to incorporate the impact of intersectoral costs and consequences associated with public health interventions in their analyses, data were extracted on the perspective of the analysis, the types of resource use costed and the outcomes for assessment. This latter point was incorporated within the measurement and valuation of outcomes. See points 24 to 26 in Table 4. The societal perspective is the broadest perspective and includes the outcomes and costs associated with the interventions falling on all public sectors, the private sector, the voluntary sector and

the out of pocket costs, such as travel costs borne by individuals affected by the interventions. The incorporation of productivity losses, that is the impact of time off work by the patient or their family, may be identified as indirect costs as for the NICE reference case, or as disbenefits in the outcome measure, such as the QALY, in the Washington Panel guidelines (Gold et al, 1998). NHS EED abstractors tend to state that studies which do not include productivity losses do not really represent the societal perspective and this reflects the NICE reference case recommendations. However, if the study were conducted based on the Washington Panel reference case then it may yet reflect the societal perspective, but the productivity losses would be identified in the QALY. At times NHS EED abstracts report multiple perspectives for the analysis. If so, the broadest perspective was noted. It was assumed that the narrowest perspective was that of the individual, through to the health care perspective, with the societal perspective being the broadest perspective.

In terms of resource use and costs, data were extracted on the types of costs that were calculated by sector. This included costs relating to the health sector, education, criminal justice, law enforcement, environment, employment, social care, defence, transport, the voluntary sector and the private sector. Additionally, data were extracted on the costs falling on the individual and their family/friends in accessing the intervention, such as out-of-pocket costs.

2.4 Expert Workshop

A workshop was held in York on 16th June 2006, bringing together members of the research team and experts in the fields of economic evaluation and public health. After a brief report on the results of the literature review, in depth discussions were held on each of the four methodological challenges. In each case, a designated research team member summarised the discussion and produced the first draft of the options and suggestions given in Section 4 below.

Section 3: Methodology Review of Empirical Studies

3.1 Review background

This section reports the results of the methodology review of empirical studies and provides a more detailed review of three economic evaluations of public health areas interventions of particular interest. It also reviews a willingness to pay (WTP) study of a public health intervention. Finally, it presents a discussion of the main findings from the review in the context of the key methodological challenges and makes several comparisons with the McDaid and Needle mapping study described in Section 1.(11)

The results of the review provide an illustrative sample of some of the methods used to analyse public health interventions. However, it should be noted that the review was not intended to be comprehensive. Typically the NHS EED abstracts were used to obtain information for the review, rather than resorting to the full paper, and therefore the review tends to reflect the information presented in the abstracts. In some cases, however, the original article was consulted.

3.2 Results

Full results of individual studies are provided according to whether the economic evaluation was based on a randomised study, a non-randomised study or a review and are shown in Appendices 5 to 7. This section reviews the public health economic evaluations at an aggregate level in order to explore the methods that were used to obtain unbiased estimates of effect, to measure and value outcomes, equity considerations and intersectoral costs and consequences. In exploring the applied literature, the aim was to identify what can be learned about how the four methodological challenges were addressed within the economic evaluations.

3.2.1 Overview

3.2.1.1 Public health areas

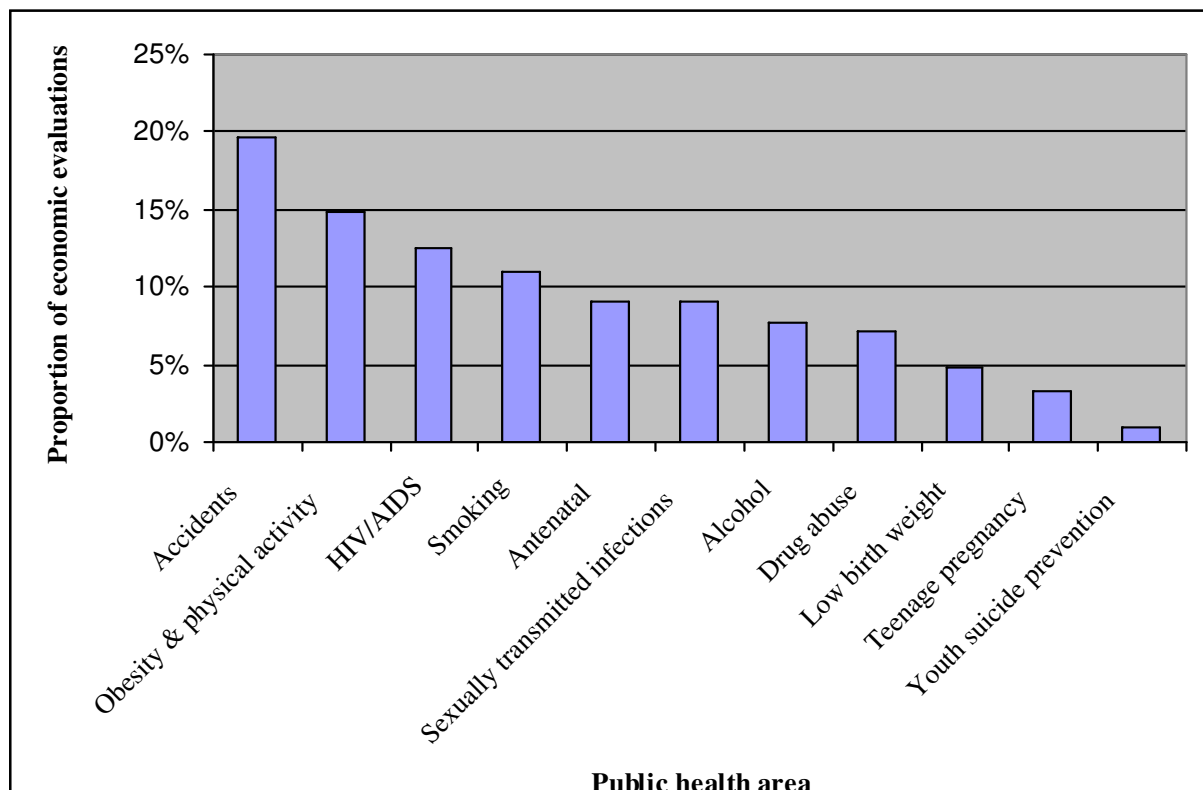
Table 5: NHS EED Abstracts

Public health area		Records retrieved	Records retained after exclusions
1	Accidents	243	88
2	Obesity & Physical activity	121+217=338	27+26=53
3	Ante and post natal visiting	72	46
4	STIs	56	46
5	Low birth weight	83	31
6	Smoking	90	29
7	HIV/Aids	225	27
8	Drug use	63	22
9	Alcohol	76	18
10	Teenage pregnancy	15	13
11	Youth suicide prevention	3	3
Total number of abstracts		1,264	376
Total number of unique abstracts			330
Total number of full economic evaluations			291
Total number of full economic evaluations of public health interventions			154

Initially a total of 1,264 NHS EED abstracts were identified through a sensitive literature search, focusing on the above public health areas (see Table 5) and not restricting the searches to particular public health interventions or issues. The information scientist who undertook the searches sifted the results and rejected 888 NHS EED abstracts, judging that the studies did not relate to public health interventions. The rejected records were typically economic evaluations of surgical, drug and other treatments. Three hundred and seventy-six NHS EED abstracts relevant to public health were then assessed by the health economist. After excluding duplicate abstracts, 330 unique NHS EED abstracts were analysed.

Once the reviewer screened the 330 abstracts it was found that 39 abstracts did not relate to full economic evaluations, and the exclusion of these left 291 abstracts. Following the exclusion of evaluations of treatment and screening interventions, 154 NHS EED abstracts were left for review.

Figure 3: Proportion of Studies by Public Health Area



The proportion of economic evaluations accounted for by the eleven public health areas is reported in Figure 3. Based on the search of NHS EED, studies were most commonly identified as part of the ‘accidents’ search. This could be because there are more economic evaluations of interventions to prevent or mediate the effects of accidents held on the NHS EED database. It could also be because the search strategy was better at identifying such studies. A fifth of the studies evaluated interventions to prevent or mediate accidents (n=41, 20%). Examples of studies identified under the accidents heading included care programmes provided at home (24); (25), home safety (26); (27) and legislation to prevent road accidents.(28); (29)

Economic evaluations of interventions focusing on minimising or preventing obesity and/or use of physical activity to promote health were the next most commonly found type of study (n=31, 15%). Examples of obesity and physical activity evaluations included weight loss programmes (30), educational programmes to prevent and/or treat obesity (31); (32) and educational programmes to prevent and/or treat illnesses such as heart disease and type 2 diabetes.(33); (34)

HIV/AIDS studies accounted for 12% (n=26) of the studies and included evaluations of education-based prevention programmes (35), HIV counselling and testing programmes (36); (37) and opportunistic use of infection prophylaxis strategies.(38)

Smoking cessation and prevention programmes accounted for 11% (n=23) of the studies and included legislative action (39), counselling and/or advice for smokers (40); (41) and school based anti-tobacco programmes.(42)

Evaluations of antenatal and postnatal care services accounted for 9% (n=19) studies each. They included evaluations of care for high-risk, pregnant teenagers (43) and use of community postnatal support workers in the community.(44); (45).

Programmes aimed at reducing the number of sexually transmitted infections (STI) also accounted for 9% (n=19) of the studies in the review. STI programmes included a video based group intervention encouraging safe sexual behaviours.(46)

Eight percent (n=16) of studies evaluated interventions to prevent and treat alcohol abuse. Examples of such programmes included interventions to treat alcohol abuse directly, such as a community level, mail based intervention to motivate recovery in people with a drinking problem (47) and indirectly as part of support services such as those offered to families with children in a high level of need.(48)

Drug abuse interventions accounted for 7% (n=15) of the interventions that were evaluated and examples include counselling for homeless people who are substance abusers (47) and a syringe exchange programme for injecting drug users.(47)

Interventions to prevent low birth weight accounted for 5% (n=10) of the studies evaluated and included a prenatal care programme.(49) Interventions to reduce the number of teenage pregnancies comprised 3% (n=7) of the evaluations and included a school based programme to encourage safer choices in terms of sexual activity.(50)

Finally, one percent (n=2) of the studies evaluated youth suicide prevention interventions comprising a programme for Native Americans (51) and a brief

cognitive behavioural treatment in patients who presented with deliberate self harm.(52)

One-hundred and nine studies were identified through one search, 66 studies were identified through two searches and 36 studies were identified through three searches. An example of an economic evaluation which was identified through three searches is a CEA/CUA which examined two state-of-the-art sexual risk reduction interventions for the prevention of human immunodeficiency virus (HIV) in high-risk men and women.(53) The study was identified through searches for HIV/AIDs, sexually transmitted infections and teenage pregnancy public health areas, reflecting the breadth of public health issues that economic evaluation covered.

3.2.1.2 Location

Studies were obtained from a broad range of different journals (n=108) ranging from academic journals (e.g. Medical Decision Making and Journal of Epidemiology and Community Health) to practitioner journals (e.g. Family Practice) and some journals focusing on the broader determinants of health (e.g. Accident Analysis and Prevention and the Canadian Journal of Public Health) (see Appendix 8).

Table 6: Location of the First Author of the Studies

Country	Number of studies	%
US	99	64
UK	23	15
Canada	12	8
New Zealand, Australia,	3	2
Netherlands, Switzerland, South Africa	2	1
Bangladesh, China, Israel, Italy, Japan, Mexico, Norway, Sweden	1	1

The studies that were collected for review were published in the following years; 27 in the year 2000, 37 in 2001, 34 in 2002, 29 in 2003, 24 in the 2004 and 3 in 2005. The low number in 2005 is a result of the time lag in producing abstracts for the NHS EED.

To put the studies in some context, the location of the first author of the studies was recorded (see Table 6). One hundred and eleven (72%) of the economic evaluations were conducted by analysts in North America. Twenty-three (15%) studies were conducted by analysts located in the UK.

Table 7: Region of Evaluation, based on WHO Classifications

WHO region	Number	%
North America	103	67%
Europe	29	19%
Africa	7	5%
Western Pacific	6	4%
South-East Asia	4	3%
No specific region, East Mediterranean	2	1%
South/Central America	1	1%

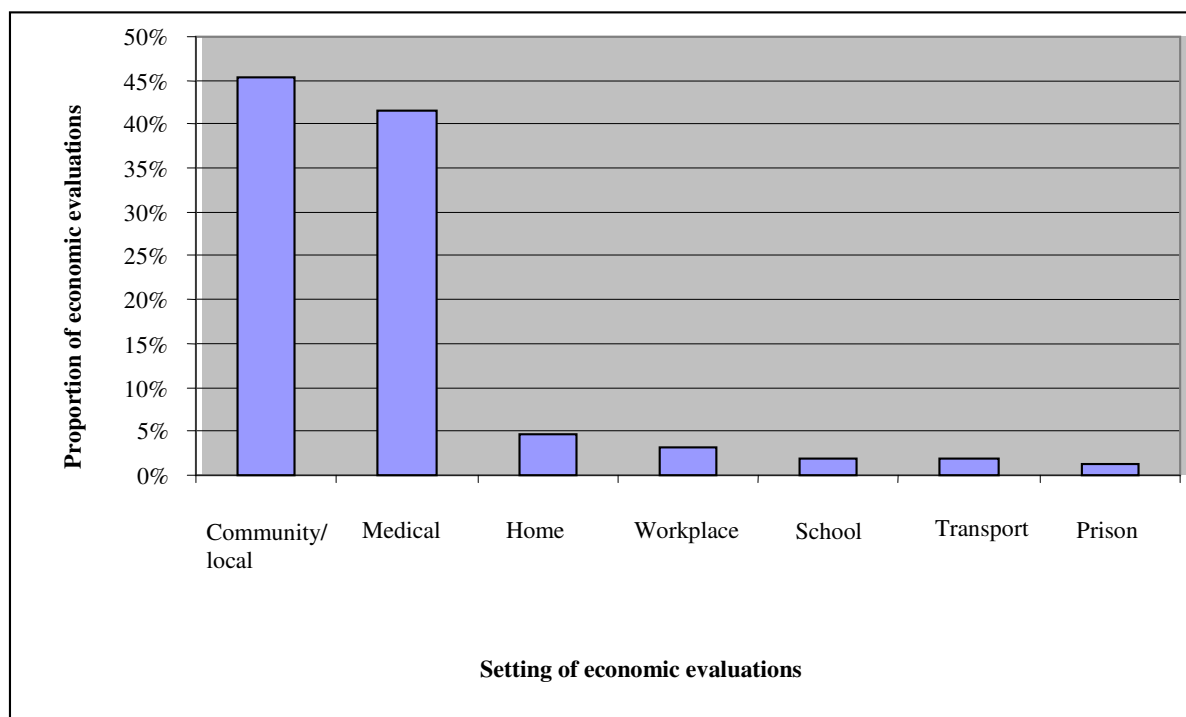
Another way of assessing the context of the studies was to record the region in which they were conducted. In 14 (9%) studies, the region where the study was conducted differed from the region in which the analyst was located. For example, Hutton (2003)(54) worked at the Swiss Centre for International Health in Basel, Switzerland. However, the economic evaluation was undertaken in Chad, Africa. Table 7 reports the number of studies undertaken by World Health Organisation (WHO) region. Over two-thirds (n=103, 67%) of the studies evaluated interventions in North America. Almost a fifth (n=29, 19%) of studies evaluated interventions in Europe. At least one economic evaluation had been undertaken of a public health intervention in every WHO region.

Table 8: Country Evaluation relates to

Country of evaluation	Number	%
US	94	61
UK	23	15
Canada	10	6
Australia, New Zealand, South Africa	3	2
Israel, Multiple countries	2	1
Bangladesh, Chad, China, India, Italy, Japan, Kenya, Mexico, Netherlands, Norway, Seychelles, Sweden, Switzerland, Zambia	1	1

The countries to which the economic evaluations related are specified in Table 8. The majority of the studies evaluated interventions that were implemented in the US (n=94, 61%). Over a fifth evaluated interventions implemented in the UK (n=23, 15%). Three studies (2%) related to Australia, three to New Zealand and three to South Africa. Two studies (1%) related to Israel and two studies related to multiple countries. A single economic evaluation was found assessing interventions implemented in one of each of the countries listed in the bottom row of Table 8. The majority of the studies therefore related to countries in the developed world. Whilst NHS EED includes abstracts (in English) of some papers written in foreign languages, the focus is on studies written in the English language.

Figure 4: Economic Evaluation Setting



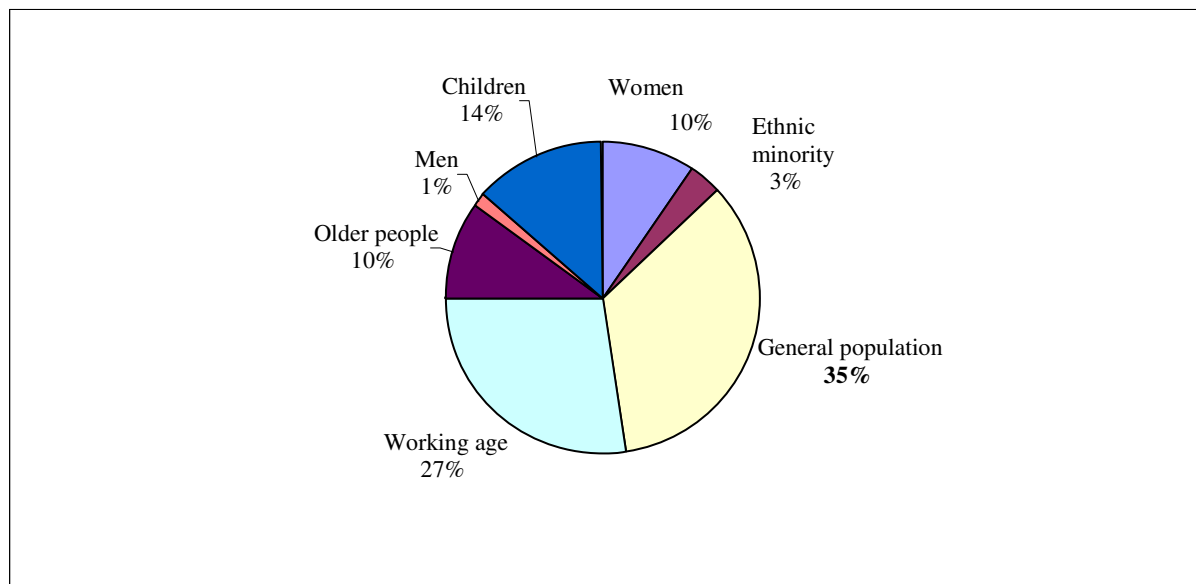
Public health interventions can be delivered in a variety of settings. Figure 4 reports on the settings in which the interventions were delivered. Seventy (45%) of the interventions were delivered in a community/local setting. A similar number of studies evaluated interventions delivered in a medical setting, including at the primary care and secondary care level (n=64, 42%). A small number of studies evaluated

interventions delivered in the home (n=7, 5%), workplace (n=5, 3%), school and transport settings (n=3, 2% each) or prison/detention (n=2, 1%) centre settings.

3.2.1.3 Population sub-groups

Public health interventions may be designed for the general population or they may be targeted on specific groups of people as reported in Figure 5.

Figure 5: Target Groups



The general population was the most common target of the public health interventions (n=53, 35%), followed by those of working age (n=42, 27%), children (n=21, 14%), older people (n=16, 10%), women (n=15, 10%), ethnic minority groups (n=5, 3%) and men (n=2, 1%).

3.2.2 Attribution of effects

In assessing the relative effectiveness of interventions being compared, analysts aim to obtain unbiased estimates of effect. Components of the design and analysis of an evaluation contribute to this and a number of these are identified within the NHS EED abstracts.

The study design used to evaluate the different types of interventions has different implications for how data are collected and analysed. Therefore, part of this section is presented by type of study design. The three categories comprised (i) randomised, (ii) non-randomised or (iii) review and synthesis-based studies: category (iii) including modelling studies. In practice, a study could be based on an RCT, yet also use non-randomised data and data collected from a review in order to extrapolate beyond the confines of the trial. Studies were categorised based on the primary study design, in line with the way in which they were categorised in NHS EED.

3.2.2.1 Randomised controlled studies

Fifty-eight (38%) studies were based on Randomised Controlled Trials (RCTs). Examples of RCT based economic evaluations of public health interventions included a CUA of the use of aquatic exercise compared with usual care for patients with osteoarthritis (55) and a CEA of an adult drug court programme, consisting of a form of coerced treatment for criminal offenders addicted to illicit drugs, compared with usual care.(56)

Nine (16%) of the RCTs also used some form of modelling, a few aspects of which are explored here. In four studies, methods were used to extend the length of the study, beyond the length of follow-up in the trial, for the expected lifetime of the patient. Three studies used epidemiological modelling.(57); (58); (34) Raftery et al (58) evaluated a nurse led secondary prevention clinic for coronary heart disease in primary care, using a Kaplan-Meier curves to estimate expected survival, whilst the mean length of patient follow-up within the trial was only 4.7 years. Given the chronic nature of the patients' heart condition, the analysts wanted to explore the potential longer term impact on patient mortality and whether or not the effects of the intervention would persist over time. Georgiou et al (57) evaluated a moderate exercise training programme to reduce the risk of chronic heart failure. They used hazard ratios to extrapolate data for an additional ten years beyond the patient follow-up data. Trento (34) used a prediction model to assess cardiovascular risk. The fourth study used life tables to calculate life expectancy and QALYs for the number of years lived beyond the two years of follow-up in the clinical study.(59)

Of the remaining seven RCTs including some form of modelling, two were based on decision analytic methods (50);(60), three used regression analyses (52); (55, 61) and two NHS EED abstracts did not state the modelling technique that was applied.(62); (46) Of those evaluations including decision analyses, one used a Bernoulli model of HIV transmission to translate the increase of condoms used into cases of HIV and other STIs averted (50) and the other used decision analysis to undertake a two-stage model to determine the expected number of adult overweight cases.(60) In terms of regression analyses, Patrick et al 2001 used a multivariate general linear model to assess whether there were significant differences in the means of certain outcome variables.(52, 55) The covariates used in the model were the difference scores for age, gender and a number of medical conditions. Byford et al (2003) used ordinary least-squares regression on the adjusted analyses to compare the costs of the two interventions being examined.(52) Zarkin et al, 2001 used an algorithm to allocate the resource use time associated with the interventions being compared.(61)

Another aspect of study design recorded was sample size. Across the 58 RCTs, the mean sample size per group was 862 and the median sample size was 150. The sample size of the groups was not available for three studies. Thirty-two studies were based on multi-centre trials and twenty-four were based on single-centre trials. Details were not stated for the remaining two studies. Some studies were nested RCTs; for example, Pyne et al (63) included patients who were nested within primary care clinics. A random effects model was used to test for the variation in outcomes at the level of the clinic and at the level of the individual.

Twenty-eight (48%) of the RCTs were based on intention-to-treat analysis, whilst the remainder (n=12, 21%) were based on treatment completers or complete cases, or the form of analysis applied was not clear (n=18, 31%). The length of follow-up covered by the RCTs was 16 months on average (median=12) for those studies where an exact length of follow-up was specified (n=54, 93%). For the remaining four studies either the length of follow-up was not stated (n=3) or it was the lifetime of the patient (n=1). From the information in the NHS EED abstracts, seven RCTs extrapolated data beyond the length of the trial, typically for the life-time of the individual.

3.2.2.2 Non-Randomised studies

Forty-eight (31%) studies were based on non-randomised study designs. One study was intended to be based on an RCT; however, some participants declined the intervention to which they were randomised and were therefore allocated to the intervention of their choice.(64). In another study, within a single centre, members of the control group were matched to members of the intervention group, based on various socio-demographic characteristics.(65)

Across the non-randomised studies, the mean sample size per group was 2,902 and the median sample size was 200. The sample size of the groups was not available for four studies. Twenty-one (44%) of the non-randomised studies appeared to be multi-centre, 25 (52%) single-centre and in two (4%) studies this was not clear. Thirteen (27%) of the non-randomised studies were reported to be based on intention-to-treat analysis whilst the remainder (n=9, 19%) were based on treatment completers only or this was unclear or not applicable (n=26, 54%). The length of follow-up of 31 of these studies was an average of 29 months (median=12). For 16 studies the length of follow-up was either not stated, not clear, or cross-sectional data were used with no follow-up of subjects. In the remaining study, the length of follow-up lasted until the time that people were discharged from a care home, although this was not quantified. Data were not extrapolated for the remaining 38 studies. The remaining ten non-randomised studies used extrapolation techniques including decision models (n=5), a life table (n=1), a regression model (n=1; for example a multi-nomial logit model to estimate the post acute care discharge location.(66)) No details were provided for two studies.

3.2.2.3 Review studies

Forty-eight (31%) studies were based on reviews and 45 included a model, the majority of which were based on decision analytic techniques (n=35, 73%), two (4%) of which were based on regression analyses. The decision analytic technique that was used was unclear in 11 (23%) studies. Some studies used regression techniques, for example, a structured equation model (67) and a linear regression model.(68) The structured equation model (67) was used to evaluate the effectiveness of a programme to prevent HIV and sexually transmitted infections among high-risk urban women.

Structural equation modelling is a statistical technique for building and testing statistical models which are often causal models. It is an extension of the general linear model and it can be used to simultaneously estimate relationships between multiple independent, dependent and latent (unobserved) variables. For the remaining three studies, it was not stated in the NHS EED abstracts that a model was used and it could be that data were synthesised in a narrative way. All studies involved some form of extrapolation on the basis that the economic evaluations were based on multiple sources of data. The timeframe of the evaluations varied from 5 months to 60 years. For a number of studies the timeframe was the lifetime of the cohort and was not quantified in the NHS EED abstract. For seven studies the length of the evaluation was unclear.

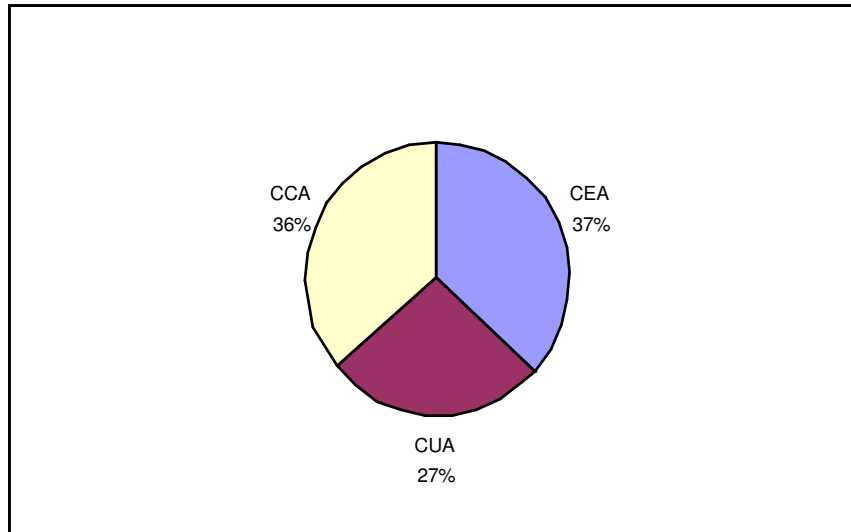
Examples of review-based economic evaluations of public health interventions included a decision analytic model that was undertaken to assess the cost-effectiveness of HIV counselling and testing for soon-to-be-released inmates of US prisons as compared to no counselling and testing.(37) Another study used a decision analytic model to assess the cost-effectiveness of a community educational campaign to influence farmers to retrofit their tractors with a rollover protective structure (ROPS) to protect tractor operators from injury in the event of an overturn.(69) This intervention was compared with a "no ROPS programme".

3.2.3 Measuring and valuing outcomes

To assess the outcomes that were measured and valued in the different evaluations, the types of economic evaluation undertaken were examined. Also, up to four outcomes associated with each study were noted as a way of illustrating the types of outcomes used to evaluate public health interventions.

3.2.3.1 Types of economic evaluation

Figure 6: Types of Economic Evaluation



Of the evaluations that were reviewed, similar numbers of CEA and CCA studies were conducted (i.e. CEA, n=57, 37%; CCA, n=56, 36% respectively). A sizeable number of CUA studies (n=41, 27%) were also conducted. Four studies (3%) claimed to be CBA. However, on further inspection, three (2%) were CCA and one (1%) was a CUA. Two of the studies claiming to be a CBA converted the value of a statistical life into monetary values. For example, one study converted various impacts of a nitrogen dioxide control policy (e.g. incidence of respiratory conditions in adults and workers) into costs (70) and subtracted this from the cost of implementing the policy. This study was reclassified as a CCA study.

The 57 CEA studies which measured outcomes in natural units (and synthesised costs and outcomes), used a wide range of outcomes such as the number of falls prevented (71) and number of pounds of body weight lost.(46) The 56 CCA studies incorporated similar outcomes as compared to those included in the CEA. However outcomes were not synthesised with costs. Of the 41 CUA studies that were conducted, 35 estimated QALYs (88%) and the remainder estimated DALYs (n=5, 12%).

3.2.3.2 Types of outcomes included in the economic evaluations

A broad range of outcomes were included in the evaluations of the public health interventions. As stated above, 41 CUA studies were found, including QALY or DALY outcomes. These are generic outcome measures, allowing comparisons to be made across all health care interventions. In addition they are preference-based, that is they incorporated some notion of value.

Non-preference based, generic outcome measures were included in some evaluations used such as life years gained, the quality of wellbeing scale (QWB) and the Short Form 36 (SF-36). A few studies included disease-specific outcome measures, such as a diabetic quality of life scale, and the number of HIV infections averted. No studies included broader generic, preference-based outcomes which could be used interchangeably across different interventions and sectors in the economy.

3.2.4 Equity considerations

The NHS EED abstract template does not include a field to discuss equity considerations. Nonetheless, equity issues are of particular importance within the public health agenda. None of the outcomes included in the economic evaluations were equity weighted. For the 35 (23%) studies that included QALYs, this means that the QALYs were summed, implying equal weighting no matter to whom the benefits accrue.

3.2.5 Intersectoral costs and consequences

To observe the implications of the public health interventions in terms of their intersectoral costs and consequences, data were extracted on the study perspective/s and the types of resource use costed.

3.2.5.1 Study perspective

The perspective chosen for the analysis influences the types of costs and consequences for inclusion within the evaluation. Providing a perspective for the analysis can also place the study in a particular decision making context. The perspective/s adopted in the economic evaluations included in the review are reported in Table 9. The perspective that was recorded was that stated in the NHS EED abstract. It was not possible to verify this information, although the perspective chosen can, to some extent, be inferred from the costs and consequences included in the analysis. One reason why it was difficult to verify these on the basis of the NHS EED abstracts is because authors may omit those costs which they believe are equal across interventions.

Table 9: Study Perspective

Study perspective	Number	%
Health service, health care payer, third party payer	50	32
Societal	48	31
Hospital, local health department, provider	12	8
Government	2	1
Patient	1	1
Multiple	4	3
Not stated	37	24

About a third of the evaluations were stated to be undertaken from the health service payer or provider (n=50, 32%). Almost as many studies were undertaken from the societal perspective (n=48, 23%). However, this may be an overestimate. Twenty-three (48%) of the studies undertaken from the societal perspective were QALY-based and of these 19 (83%) were undertaken by a first author located in the US. It might be supposed that these analysts followed the Washington Panel recommendations, which suggest that productivity gains, typically included within analyses from the societal perspective, be included in the QALY rather than estimated separately. Within the UK, however, a CUA conducted from the societal perspective might be expected to include productivity gains as a separate item. Only 5 out of the 19 (26%) US based QALY studies that were undertaken from the societal perspective included productivity changes as a cost. In over a fifth of the studies (n=37, 24%) the study perspective was not reported in the NHS EED abstract. This could be because the author did not state a perspective or that the perspective was not stated clearly.

3.2.5.2 Types of resource use costed

Table 10: Costs Falling on Different Sectors

Types of costs	Number	%
Health care	154	100
Productivity losses	23	15
Out of pocket	14	9
Social care	6	4
Criminal justice	6	4
Voluntary	5	3
Education	4	3
Law enforcement	4	3
Private	3	2
Housing	3	2
Employment	2	1
Environment	1	1
Transport	1	1

A better indication of the consideration of intersectoral costs and consequences can be gleaned from the types of resource used costed. Table 10 reports the types of costs that were included in the economic evaluations. Costs in nine areas of the public sectors were included, plus out-of-pocket costs (for example travel costs, falling on the patient and/or their family and friends in order for them to receive the interventions), and private and voluntary sector costs. In applying these categories it was not always possible to be certain about who was paying the cost of the intervention involved and/or who was providing the service. For example, social care services may be paid for by the social care and/or by the health service sector, and provided by the social care, health service or private sector. It was not always clear from the NHS EED abstracts whether ‘resource use stated’ related to the payer or the provider.

Health care costs were included in all the studies (n=154, 100%). Twenty-three (15%) of the evaluations included two or more types of costs. Of the 23 studies including productivity changes, 18 (78%) were based on the human capital approach, typically estimated using gross earnings of those in employment or by imputing an equivalent value for those not in paid employment. The method used to cost productivity changes was unclear for the remaining five (12%) studies.

3.3 Case Studies

Three economic evaluations were reviewed in more detail. The studies were chosen as they provide an example of a CCA, a CUA and a CEA and are based on a non-randomised study and a randomised study and a review. Additionally a willingness to pay study used to elicit monetary valuations of a public health intervention was also reviewed, since no full CBAs were obtained from the NHS EED search.

3.3.1 An example of a CCA based on a retrospective cohort study

Brown M. *Costs and benefits of enforcing housing policies to prevent childhood lead poisoning. Medical Decision Making. 2002; 22:482-492 (72)*

Overview: Brown et al (72) examined the impact of two housing policy strategies for the prevention of childhood lead contamination through the removal and control of lead paint hazards. The authors compared a strict enforcement strategy versus a limited enforcement of lead poisoning prevention housing policies in preventing additional cases of childhood blood lead elevation. The study was identified in the ‘accident’ search of the NHS EED database. The intervention was implemented in the community and it related to the U.S, where the study analysts were located.

Attribution of effects: The economic evaluation was based on a retrospective cohort study. The study examined the addresses of all lead-poisoned children (BPb equal to or greater than 25 µg/dL) identified between 1992 and 1993 in two adjacent, urban areas (one where prevention of lead contamination was strictly enforced, the other where the enforcement was more limited) in north-eastern US. Families from 138 different addresses were considered, 33 in the strict enforcement group and 105 in the limited enforcement group. The authors assessed the baseline comparability of the two groups in terms of age and the condition of the housing stock, widespread public education about the dangers of lead and nearly universal screening of preschool children. They argued that, in these respects, the two groups were similar. They stated that a comprehensive inspection of the interior and exterior of the child’s home,

as well as common areas for multifamily dwelling, had been undertaken across both groups. However, for the strict enforcement strategy, various enforcement strategies were applicable, such as permanent removal or coverage of lead-based paint on all accessible surfaces to a height of five feet and on all window surfaces that were subject to impact. For full details see Brown et al, 2002.(72) The limited enforcement strategy did not ensure the abatement of residential lead hazards. It was assumed that either the lead abatement policy was strictly enforced in all units of the building following the identification of a lead-poisoned child, or it was not. To control for potential individual and population-based confounders, including the condition of the exterior of the accommodation and the number of preschool children living in the building, adjusted odds ratios were calculated.

The authors developed a decision tree model to calculate the short term costs associated with BPb or greater than or equal to 10 µg/dL in one or more additional children identified subsequent to the initial case of lead poisoning. Also they calculated the long term costs associated with decreased unemployment and lower occupational status associated with loss of IQ points as a result of lead exposure over the lifetime of the individual.

Based on the cohort data, the authors state that the identification of additional children with elevated BPb was not correlated with the length of time between the index case of lead poisoning and identification of additional cases. Therefore the authors used this data to extrapolate to a ten year time horizon, assuming that the rate of new cases of elevated BPb levels in years six to ten was the same as those from years one to five.

Measuring and valuing outcomes: A CCA was undertaken and the measure of benefit used in the economic analysis was the additional case/s of BPb or greater than or equal to 10 µg/dL at an address during the ten years following identification and referral for enforcement of the housing code of a building where a child with a BPb or greater than or equal to 25 µg/dL resided.

The cost estimates were adjusted based on the probability that the BPb was within a certain range. The mean BPb of children who did not have elevated BPb was 5 µg/dL. In children with BPb elevation, the probability of mild, moderate or severe lead

poisoning varied by enforcement status (i.e. 11.5 µg/dL, 13.8 µg/dL and 25.5 µg/dL respectively). Children were classified as mildly, moderately or severely lead poisoned (i.e. 10 to 15 µg/dL, 15 to 24 µg/dL or equal to or greater than 25.5 µg/dL respectively).

Equity considerations: The study did not consider the equity implications associated with the interventions. However, in including the productivity losses associated with time off school and decreased unemployment and lower occupational status associated with loss of IQ points as a result of lead exposure, the authors mentioned that there has been criticism for biasing against groups with low or no incomes, including children.

Intersectoral costs and consequences: A societal perspective was adopted in the study. Health care costs were calculated (including treatment and monitoring), as were special education costs due to BPb elevation and housing sector costs. These estimates were obtained based on Centers for Disease Control and Prevention (CDC) recommendations and the published literature. Additionally, the cost of lead inspection and abatement was calculated. The latter included the cost of removing lead hazards and the cost of relocation, including the costs of food of the families whilst undertaking the work. Costs resulting from future lost productivity, due to impaired IQ and the increased school drop out rate associated with reduced IQ, were also included in the analysis, based on the human capital approach. The authors noted that no account was taken of the increased property values resulting from improved maintenance practices, the costs or disbenefits to families associated with raising children with lead poisoning, or the broader costs to society. Also, they note that there may be health effects such as hypertension and birth outcomes for the lead poisoned children, which were not included in the analyses.

3.3.2 An example of a CUA based on a randomised controlled study

Byford S, Knapp M, Greenshields J, et al. Cost-effectiveness of brief cognitive behaviour therapy versus treatment as usual in recurrent deliberate self-harm: a decision-making approach. Psychological Medicine 2003; 33: 977-986 (52)

Overview: In a study of patients with a history of recurrent deliberative self-harm, Byford et al (52) examined manual-assisted cognitive behaviour therapy (MACT) based on up to seven treatment sessions of cognitive-behaviour therapy (CBT) with a trained therapist over three months, with treatment as usual (TAU). TAU involved meeting with another designated therapist and the offer of standard treatment, including problem-solving, psychotherapy, general practitioner or voluntary group referral, and short-term counselling. It was acknowledged that TAU treatment varied depending on geographical area. Patients for inclusion in the study were aged 16 to 65 years old and did not require inpatient psychiatric treatment. People with a psychotic disorder, bipolar disorder, or who had been diagnosed with drug or alcohol dependence were not included in the study.

The study was obtained from the ‘youth suicide prevention’ search of the NHS EED database. The intervention was implemented in a health care setting and it related to the UK, where the study analysts were located.

Attribution of effects: The economic evaluation was based on a multi-centre randomised study. Randomisation was used to obtain an unbiased estimate of the benefit of attending at least one treatment session. Randomisation was stratified by centre and by baseline parasuicide risk score. Individuals were followed up at six and 12 months.

Of the 480 patients initially randomised to the two kinds of treatment, complete resource data were available for 397 patients, 197 in MACT and 200 in TAU. In addition, there were 493 patients who were eligible, but not randomised, because they presented at the accident and emergency department when a research worker was not available. Of the 197 patients who were randomised to MACT, 5 had no record of receiving the MACT booklet and 90 of the patients who did receive the booklet did not attend any treatment sessions. The authors undertook a complete case analysis rather than an intention to treat analysis. The study collected information on the baseline characteristics of the two comparator groups and conducted statistical analysis which suggested that there were significant differences between those included in the economic evaluation and those who were missing. However, the

authors state that there were no differences in missing data overall. Logistic proportional hazards or normal errors regression were used to adjust for baseline characteristics.

Measuring and valuing outcomes: A CUA was undertaken using QALYs. Also, a CEA was undertaken, with the measure of benefits being the proportion of patients who experienced an episode of self-harm during the 12 month follow-up period.

Equity considerations: The study did not consider the equity implications associated with the interventions.

Intersectoral costs and consequences: The NHS EED abstract reported that a societal perspective was adopted in the study. However, the authors state that '*a broad economic perspective was taken, including that of all service-providing sectors and productivity losses resulting from time off work due to illness*'. Costs falling on the following sectors were calculated; hospital services, social services, voluntary sector services, community accommodation and the criminal justice system. The costs also covered accommodation and living expenses. Costs resulting from lost productivity, due to time off work were also included and were based on the human capital approach.

3.3.3 An example of a CEA based on a review

Kopjar B, Wickizer T. Age gradient in the cost-effectiveness of bicycle helmets. Preventive Medicine. 2000; 30, 401-406 (73)

Overview: Kopjar & Wickizer (73) examined the five year effects of wearing bicycle helmets on reducing the risk of head injuries to cyclists. The authors compared the costs and effects of wearing a properly fitted, protective, hard shell bicycle helmet to a no use of bicycle helmet control group. The study was identified in the 'obesity and physical activity' search as well as the 'accident' search of the NHS EED database. The intervention was implemented in the community and it related to Norway, where the study analysts were located.

Attribution of effects: The economic evaluation was based on a review of the literature and included author based assumptions. The study population was a hypothetical cyclist population in Norway, aged between 3 years and 70 years. It was reported that some of the effectiveness evidence was derived from a national database, (the Norwegian National Injury Sample Register) which collects information about all cases of injuries occurring in a defined population of 41 communities. This recorded 1,775 cases of upper head injuries to bicycle riders occurring from 1990 to 1996. In addition, another 4 case-control studies were used to derive information regarding the protective effect of helmets.

Wearing a protective bicycle helmet was the only method considered for reducing the number of head injuries, compared with not using a helmet. In practice, many other policies are often implemented, such as increasing road safety education, or the design of better and safer cycle paths.

A simple probability model was developed to predict the expected number of head injuries averted, and the costs/savings associated with this reduction. The number of cyclists required to wear a bicycle helmet for five years in order to prevent one head injury was calculated to give an estimate of number needed to treat (NNT).

In other studies it has been found that wearing a bicycle helmet may have significant effects upon the behaviour of a cyclist, and therefore change the probability of receiving injuries to parts of the body other than the head. A further consideration is the assumption that helmets are 70% effective in reducing head injuries. It was assumed that this was consistent for all age groups. However, many studies have shown that helmets are significantly more effective for young children. This would further strengthen the authors' claim that helmet wearing was more cost effective for young children. However, it was also assumed that the lifetime of a helmet (5 years) was the same for all age groups. It may be the case that children, due to the growth in size of their heads, may have to replace their helmets more frequently, thus incurring higher costs.

Measuring and valuing outcomes: A CEA was undertaken and the measure of benefit used in the economic analysis was head injury avoided. The study analysed the absolute risk reduction (of head injuries) associated with use of bicycle helmets among persons aged 3 to 70 years old. Two types of head injury were accounted for; those that resulted in an emergency room visit and those that resulted in a hospitalisation.

Deaths averted were not considered as a measure of benefit, due to the low number of deaths per year as a result of bicycle accident related head injuries (usually 4 or 5 each year in Norway) and because the authors considered the effectiveness of bicycle helmets in preventing death is unknown. The measure of benefit did not capture possible effects in terms of the severity of any injuries sustained: it may be that wearing a bicycle helmet also lessens the extent of the damage.

Equity considerations: The study did not consider the equity implications associated with the interventions. However, the authors conducted an age-stratified analysis. They found that the risk of head injury was highest among children aged 5 to 16. This translated into greater cost-effectiveness for the use of bicycle safety helmets in this age group, based on a greater risk reduction.

Intersectoral costs and consequences: A health service perspective was adopted in the study and the cost of acute medical treatment was calculated, based on the

DRG-based payment system, as well as outpatient costs, based on fee-for-service charges. The age-specific average cost of acute medical treatment for bicycle related head injuries was calculated. The reimbursement system divides inpatients into two age categories (less than or equal to 17 years of age and 18 years and older) and two diagnostic categories (traumatic brain injury and brain concussion). Twenty-seven percent of cases were classified as multiple injuries to different body parts. The authors assumed that injuries to body parts other than the upper head cannot be avoided by use of bicycle helmets therefore these individuals were re-categorised as if they had only an injury to the upper head. The cost of purchasing the helmet was also considered in the study and the average cost of a helmet was used. Some costs appear not to have been included in the study. These include the side-effects resulting from people choosing to stop cycling, the education required in order to advise people on the correct method of wearing a properly fitted helmet and the costs associated with promoting the use of bicycle helmets. The authors pointed out that they did not have the estimates for long-term costs and these should also be included in future analyses.

3.3.4 An example of a Willingness to Pay (WTP) study for use in a CBA

Shackley P, Dixon S. Using contingent valuation to elicit public preferences for water fluoridation. Applied Economics. 2000; 32, 777-787 (74)

Overview: Shackley and Dixon (74) evaluated the disbenefits to individuals, in monetary terms, of a water fluoridation programme. The study is innovative in the sense that it is rare to find contingent valuation studies which allows respondents to express a negative value. In addition to valuing the benefits if individuals favoured water fluoridation, the authors aimed to quantify the magnitude of disbenefits losers from a fluoridation programme being introduced. They tested two approaches; (i) peoples willingness to accept (WTA) compensation and (ii) losers willing to pay (WTP) to prevent their water being fluoridated.

The study did not include the calculation of costs associated with water fluoridation and therefore it is not a full economic evaluation. The study was chosen for review since no full CBA studies of public health interventions were obtained from the NHS EED searches.

Attribution of effects: Not applicable.

Measuring and valuing outcomes: The authors undertook a contingent valuation willingness to pay (WTP) survey to elicit public preferences for water fluoridation. Quota sampling, based on age and sex was used to obtain the sample. A total 100 interviews were carried out in four areas of Sheffield, each area having different socio-demographic characteristics. Four groups of WTP/WTa were identified including (i) WTP of those in favour of fluoridation, (ii) WTa of those opposed, (iii) WTP of those opposed and (iv) combined WTa and WTP of those opposed. There were 39 individuals in three of the four areas who refused to participate. In the remaining area it was not known how many people refused to participate.

A questionnaire was developed to explore the feasibility of using monetary values to represent the benefits of an intervention with health care implications. The questionnaire was undertaken as a series of face to face interviews and it was designed to take no more than 20 minutes to administer. It was emphasised that the valuation exercise was purely hypothetical. Respondents were given a description of fluoridation and its effects and asked if they would be in favour of fluoride being added to drinking water in Sheffield. If respondents were in favour, they were asked if they would be willing to contribute each year for fluoridation to go ahead and if so they were asked about their maximum WTP using a payment card. These respondents were asked to state the reasons why they were WTP. For respondents who were not WTP, half the questionnaires asked about their willingness to accept (WTa) compensation, following the implementation of a fluoridation programme. The other half of the questionnaires asked about respondents WTP to prevent their water being fluoridated. Finally, they were all asked for some socio-demographic information.

It was found that the intensity of preferences was greater for those opposed to water fluoridation, and for those who opposed mean WTa was 2.6 times greater than mean WTP of those against. It was not possible to assess net benefit due to the different types of questions addressed to those who opposed water fluoridation.

The authors used a number of different regression techniques to analyse the data including ordinary least squares, with WTP and log WTP as the dependent variable; Tobit with WTP and log WTP as the dependent variable; and grouped data with WTP as the dependent variable. Various socio-demographic characteristics were used as the independent predictor variables. Regression analysis was undertaken on WTP data only, as the number of WTA responses was too small. Tests of misspecification were performed.

Of the 100 respondents, 62 were in favour of water fluoridation, 31 were opposed, two were indifferent and five were unsure. Sixteen of those in favour of fluoridation were classified as 'protests', rationalising their decision by saying things like 'I pay water rates already'. Of the 31 respondents opposing water fluoridation, 16 were classified as protests, nine relating to WTP questions and seven relating to WTA questions. Besides the protests, another eight respondents were excluded from the analysis because they did not know if they would be WTP or WTA compensation. Therefore a total of 53 responses were analysed, 40 relating to those in favour and 13 opposed to water fluoridation. Of the 40 in favour, ten gave zero values and of the 13 opposed, two gave zero values.

Equity considerations: The authors did not discuss equity considerations explicitly. However, the authors found that respondents with higher incomes in general had a higher WTP than respondents with lower incomes. Also older individuals were more likely to pay less. This was in line with author expectation, since older individuals are less likely to benefit from water fluoridation. Contrary to author expectation, those individuals with dependent children were more likely to pay less.

Intersectoral costs and consequences: The cost of not implementing a water fluoridation programme was not calculated since the focus of the study was to focus on the disbenefits associated with implementing such a programme. However, it could be envisaged that there may be costs falling on the individual in terms of corrective dentistry if adding fluoride to water did cause small white patches and discolouration of the teeth.

3.4 Discussion

3.4.1 Overview

The literature review of 154 economic evaluations illustrates that a considerable number of published economic evaluations have been undertaken across a broad spectrum of public health interventions. However, the economic evaluation of public health interventions is comparatively rare when judged alongside economic evaluations of other health care interventions. No overall judgement was made about the quality of the studies included in the review, rather the purpose was to explore how analysts dealt with each of the four core methodological challenges. Therefore, on the basis of this review, it is not possible to make any statement about the actual value for money of the public health interventions that have been evaluated. Neither was that our intention.

3.4.2 Attribution of effects

Studies were assessed in terms of the techniques used to obtain unbiased estimates of effect. More studies were based on a randomised study than a non-randomised study or a review (n=58 (38%); n=48 (31%); n=48 (31%) respectively). The randomised study design was used to evaluate a whole host of different public health interventions such as exercise training programmes, telephone based counselling, cognitive behavioural therapy programmes, and health promotion programmes in a range of different settings, such as in the community or within schools. This illustrates the diverse set of interventions which it is possible to evaluate based on the RCT.

Equal numbers of evaluations were undertaken based on either a non-randomised study or a review of studies (n=48, 31%). Analysts adopted a range of techniques in an attempt to establish the effectiveness of interventions, including regression analyses to adjust for known differences in baseline characteristics and instrumental variables to adjust for selection bias. For many of the non-randomised studies, however, it was likely that there may be differences across the groups being evaluated,

apart from the intervention being applied, which may explain the differences in the effects estimated.

Randomised studies tended to be based on smaller sample sizes than non-randomised studies (median = 150 vs. 200; mean = 862 vs. 2,902 respectively). Across the randomised and non-randomised studies, interventions were frequently evaluated in multiple centres (n=52, 49%) as compared with single centres (n=50, 47%). It was not clear how many centres the intervention was evaluated in four studies, n=4, 4%). It is possible that there may be centre-specific characteristics that influence outcomes. In Pyne et al, it was noted that a random effects model was used, in which depressed patients were nested within practices, to separate out effects at different levels of the analysis by testing for interclass correlation.(63) RCT based studies were more likely to be based on intention-to-treat analysis, the preferred form of analysis, than non-randomised studies (n=28, 48% vs. 13, 27% respectively). In terms of length of follow-up across the different types of study design, randomised studies tended to be shorter than non-randomised studies (median months = 12 vs. 12; mean = 16 vs. 29 respectively). Across these two study designs, data extrapolation was undertaken in 21 (20%) evaluations. For the review-based studies the length of evaluation was rarely quantified within the NHS EED abstracts. However, many of the studies extrapolated data over the lifetime of the subjects.

3.4.3 Measuring and valuing outcomes

CEA was found to be the most common type of economic evaluation conducted in the current review and in the McDaid and Needle draft review (37% vs. 48% of the studies, respectively).(11) In the current review, 73% of all the studies were either CEA or CCA and similarly in the McDaid and Needle review 70% of all studies were CEA or CCA. In the current review CUAs accounted for 27% of the studies reviewed, whereas in the McDaid and Needle review a smaller proportion (10%) of studies were labelled as CUA. None of the studies in the current review were CBA. In contrast, McDaid and Needle found that 7% of studies were based on CBA. It is worth noting that across the two reviews a different approach was adopted to categorising studies. Studies included in the current review were classified on the basis of the author's classification and were then checked according to the outcomes actually incorporated

in the analysis. As noted above, four CBA studies were then reclassified to CEA, CUA or CCA studies. McDaid and Needle classified studies for inclusion in their review based primarily on author classification alone, although studies were reclassified if it was clear from the abstract that the author's classification was incorrect.

Finally, a broad range of outcomes were measured and valued in the studies included in this review, reflecting the range of impacts that public health interventions can have on different target groups.

3.4.3 Equity considerations

Equity was not considered formally as part of the NHS EED template and no mention was made informally within the abstracts as to how equity had or had not been incorporated within the analyses.

3.4.4 Intersectoral costs and consequences

Almost a third (n=48, 31%) of studies were reportedly undertaken from the societal perspective. Based on the NHS EED abstracts it can be difficult to check this. The large majority of public health interventions may be expected to have intersectoral implications in terms of costs and outcomes. The perspective of many evaluations in terms of costs was quite narrow, possibly reflecting the interests of the funder of the study.

Section 4: Methods Challenges: Options and Suggestions

4.1 Attribution of outcomes

4.1.1 Current practice

Determining the effects of interventions is an integral part of economic evaluation methodology. Which individual outcomes are measured, and the range of individual and social effects included, are related to the problem of attribution but are covered in detail in other parts of this report. The focus of this section involves the determination of effect estimates that could be used within economic evaluations of public health interventions and the range around those effect parameters that could be used within an economic model.

In this section the issues arising from deriving effects attributable to a full range of public health interventions are explored. This applies to evidence from single studies, but also on the methods used to synthesise evidence on effects from a number of studies. Checklists derived for critical appraisals of single studies or systematic reviews within the literature suggest a hierarchy of evidence which places experimental data, particularly good quality randomised controlled trials above non experimental data. Such checklists are used to assess the potential bias of studies, but can lead to the dismissal of evidence from non-experimental data.

The strict application of evidence criteria based on clinical guidance for use in economic evaluations of public health interventions would cause a number of problems. While some individually focussed, face-to-face public health interventions may be suitable for evaluation through randomised controlled designs, some other community based interventions could not be evaluated in this way. Systematic reviews of such interventions, with exclusion criteria based on only accepting randomised experimental design evidence, would not yield any parameter estimates that could be used in economic evaluations. Instead the most common outcome would be that there was insufficient research evidence available. Other methods such as narrative review summaries are not particularly helpful for economic modellers who need some empirical estimates.

This is clearly not just an issue for economists, but for all those trying to determine the evidence base for public health interventions. However, these issues also arise in other areas of public sector interventions such as crime and social welfare. There are many on-going initiatives to devise appropriate checklists to critically appraise other experimental and non-experimental methods, for example by the Campbell initiative and some Cochrane review groups (Campbell Collaboration <http://www.campbellcollaboration.org/> and the Cochrane Collaboration <http://www.cochrane.org/> respectively). Similarly the Government Social Research Unit has devised guidance notes for social experiments across different sectors.(75) It is not within the remit of this project to consider all these developments in depth. However, economics also has a long tradition of analysing non-experimental data and some of the techniques which may be applicable and used for assessing the effects of public health interventions are examined below.

4.1.2 Methodological issues

4.1.2.1 Primary studies

As suggested above there is some potential scope for randomised controlled trials of some types of public health interventions. The more focussed on the individual, the simpler the intervention and the more likely that effects are limited in number and occur in a relatively short time period, the easier standard randomised controlled trials are to apply. It is also possible to devise evaluative designs including randomisation for some community interventions, although this was deemed politically unacceptable in the U.K. for the “Sure-Start” programme (76) and the IBSEN project (which is an evaluation of the individual budgets pilot projects)

<http://www.york.ac.uk/inst/spru/research/summs/ibsen.html>.

A number of issues remain in assessing attributed effects, even if robust evaluation designs are employed. With individual interventions, such as smoking cessation programmes, there can be considerable delay between the behavioural outcomes (e.g. quit or not over some time period) and the impact on quality and length of life. For

smoking considerable epidemiological research literature exists to predict impacts on the quantity of life. This involves assumptions about relapse in behaviour as well as expected life years gained, see Godfrey et al., 2005.(77) Fewer studies have included the additional impact on *quality* of life across the remaining life span and this involves gathering additional data, see Parrott et al.(78)

Smoking behaviour and consequences have been subject to considerable research, but other behaviours are more complex and have a weaker research base. There may also be a wide range of outcomes and effects to consider. Direct examples are immunization programmes, where an intervention may not only reduce the incidence of disease in an intervention group, but may also lower the incidence of disease among other individuals in contact with the intervention group but not inoculated. While the evidence is mixed, such social network effects may impact on other behaviours such as smoking, drinking and illicit drug use.(79) Public health interventions may also have a wide range of other external impacts as considered in the section on intersectoral costs and consequences below. If these effects are also included in an economic evaluation, there is not only an increased number of effects to measure, but some may be rare and hard to capture.

More public health interventions are complex and are developed on the community level. Within some community programmes it is not as easy to directly identify the affected individuals as it is individually allocated research designs. This is often compounded by the fact that public health programmes sometimes consist of multiple interventions. Petticrew et al (80) point out that many UK interventions such as New Deal for Communities, Healthy Living Centres, Social Inclusion Partnerships, Health Action Zones, and Education Action Zones overlapped both geographically and temporally.

Natural experiments and the use of non-experimental data can be used to fill some gaps in the public health evidence base. In some cases the combination of experimental and non-experimental methods can be informative. One example is the so-called ‘worms’ paper by Miguel and Kremer.(81) They consider a de-worming programme undertaken in Kenya, taking advantage of the fact that only some students in selected areas were de-wormed, in an initiative with phased implementation. This

allowed the authors to analyse the variation in outcomes during the programme's existence. Their findings that school-based health interventions affect school attendance, educational attainment, social outcomes and development overall, are considered an important development in the analysis of non-experimental data. The authors describe how previous experimental studies showed weak evidence of a positive causal link between children's de-worming treatment and physical growth and educational outcomes, leading to an influential review, published in the *British Medical Journal* (82) recommend that countries should not invest in mass de-worming programmes. The conjunction of randomisation at school-level (as opposed to individual-level) combined with the application of rigorous non-experimental estimation approaches provided Miguel and Kremer with results that challenged those published in the *BMJ*.

Although randomisation across schools made it possible to identify both the overall programme effect and cross-school externalities experimentally, it was necessary to rely on non-experimental methods to decompose the effect on treated schools into a direct effect and a within-school externality effect. It became clear that in previous studies the differences in health and educational outcomes had been understated due to the presence of local treatment externalities. Improved health and school participation, for example, were identified among both treated and untreated children, thus masking any improvements obtained through comparing treatment and control groups. According to the authors' estimates, the benefits of the programme for the overall economy more than justified fully subsidised treatment, therefore contradicting policy recommendations based on experimental assessments of the programme's impact and cost-effectiveness ratios.

4.1.2.2 Data synthesis

As the smoking and worm examples indicate, many economic evaluations of public health interventions will involve the synthesis of evidence from a number of different sources. For some areas there will be a range of evidence available potentially from different experimental and non-experimental designs. Guidance exists for the synthesis of data from systematic reviews with techniques such as meta-analyses and meta-regressions. Combining data from various different sources and designs does

present new methodological challenges. Ades and Sutton (2006) present a recent review of these challenges and their paper contains more detailed analyses of techniques that provide the way forward for more systematic assessment of available evidence.⁽⁸³⁾ They discuss a range of issues, including combining evidence from different sources on a single parameter, mixed and indirect comparisons, modelling using more than one outcome and evidence synthesis for surrogate outcomes. All these issues are pertinent for assessing public health interventions. They also discuss the choice between best available evidence (very little being available for many public health interventions) and all available evidence. The conclusions from this article stress the need to check for consistency when using the statistical techniques suggested and also the need not only for a lack of bias in estimates of effects, but also a lack of bias in the assessments of uncertainty.

From the economics literature there are also lessons to be drawn which may further complicate evidence synthesis of some parameters. It may be expected that the analysis of effects from some public health interventions will not yield the same parameter estimate of attributable effects independent of country, culture and time. For example, price and taxation effects will vary across a number of factors. Synthesising the “effects” are further complicated in that many econometric studies use different types of data (e.g. time series; cross sectional or mixtures) and different models. Even within studies using the same data sets, a number of issues arise about the interpretation of effects and attribution. See the debate between Gruber and Grossman in the *Journal of Health Economics*, March 2006. Systematic reviewing and data synthesis is not well established in the economic literature. Gallet and List (2003) provide an interesting starting point in attempting to systematically synthesise results and in investigating the factors influencing effects in their review of price and advertising effects for cigarette consumption.⁽⁸⁴⁾ These techniques will be developed further in a forthcoming PHRC project which aims to systematically review and synthesise the literature around economic influences on young peoples’ smoking behaviour.

4.1.3 Ways forward

Economists, particularly in the field of labour economics, have several techniques which could be applied to the analysis of non-experimental data. These include various matching techniques such as propensity scores, difference-in-differences techniques, time series analyses of natural experiments, more sophisticated econometric modelling and structural simulation modelling. Blundell and Costa Dias review a number of these non-experimental methods for use in evaluating social programmes. (85) A key issue is that such evaluation methods address is the construction of the counterfactual; that is, the estimation of the outcome had participants not participated in the programme under study. Blundell and Costa Dias suggest that the choice of evaluation method depends on the combination of data available and the policy parameter of interest. They present the example of the study of training programmes. Where data on local labour market characteristics and previous work experience were available, they found that an approach that used propensity score matching combined with the difference-in-difference technique, was quite robust. The approach allowed matching on pre-programme ‘shocks’ (that is events that would have happened in the absence of the programme) and the use of good local pre-programme labour market data allowed the comparator group to be ‘placed’ in the same labour market.

Different methods may have different advantages and disadvantages depending on the evaluation question. There is a considerable amount of economic literature that could be employed to provide attributable effects for public health interventions. Some evidence could be obtained from econometric studies and the consistent application of rigorous econometric methodology is required.(86) This includes:

- clear theoretical and estimation economic model construction
- new models being tested against past models
- application of robust statistical procedures to assess the validity of empirical results
- routine data deposit of raw data to allow comparisons of models

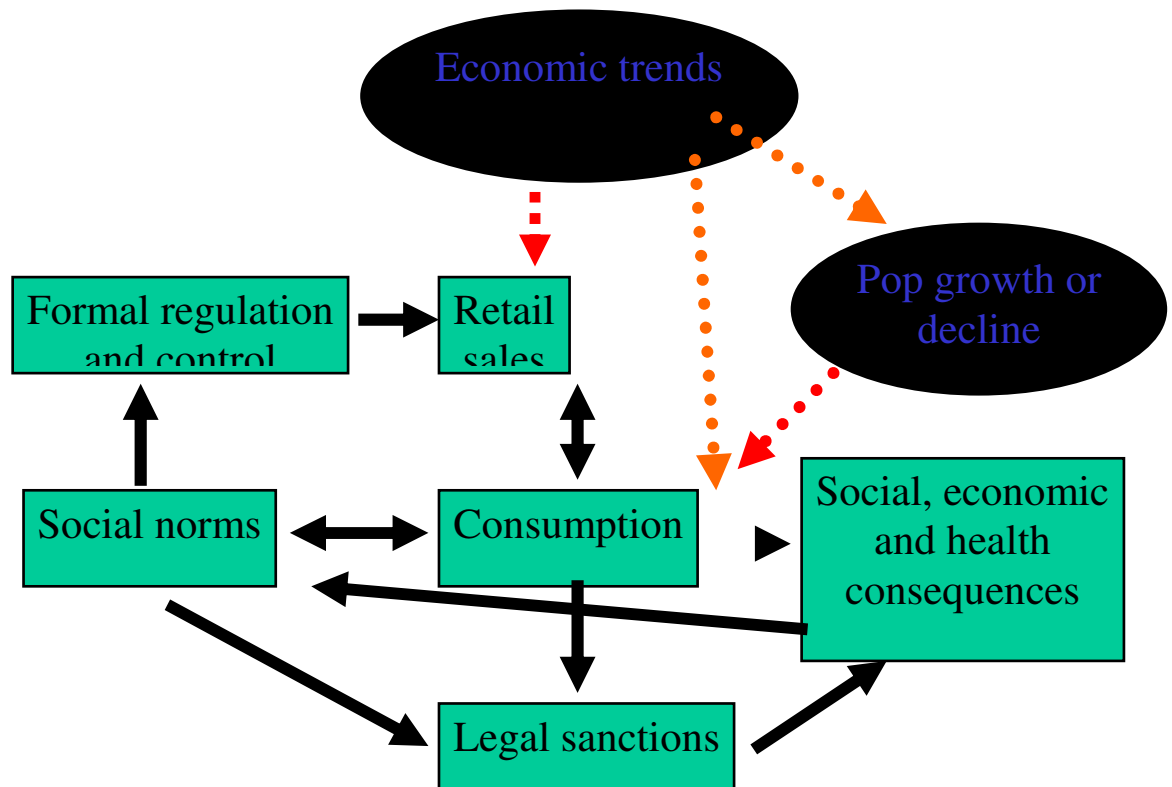
Fuller simulation models, such as that devised by Holder (1998) (87) in Figure 7, allow for more extensive interactions between economic factors, their impact on

public health problems and interactions between social norms and “policy sentiment”: the policy sentiment helping determining whether some legislative and other public health control proposals have general public support. Also, by building and estimating more complex simulation programmes, more realistic estimates of population impacts (rather than individual intervention impacts) can be made.

There is also a need to develop methods of data synthesis to parameters from non-experimental data designs and apply the lessons and techniques set out in Ades and Sutton (2006).(83)

Figure 7: Simulation Model Framework

(87)



4.2 Measuring and valuing outcomes

4.2.1 Background

Public health is a nebulous term, incorporating wide determinants of health such as poverty, education and employment. The types of consequences that are relevant to public health interventions tend to be broader in scope than the consequences associated with standard health care interventions. Also, many of the costs and consequences may occur outside the health care sector. This may impact on the choice of outcomes that it is relevant to measure and value, and subsequently on the economic evaluation decision rules applied to compare the outcomes and costs of alternative interventions. Different economic evaluation techniques use different methods to measure and value the consequences of health care interventions, reflecting different notions of efficiency. In practice, there are few jurisdictions which offer formal guidelines as to the approach which analysts should take when undertaking economic evaluations of public health interventions. As mentioned in Section 1, NICE currently advises CUA, but also allows CCA as a possible option. At present it is unclear as to what the most appropriate type of economic evaluation methodology is when judging the value for money of public health interventions. The aim of this section is to review existing guidance for measuring and valuing outcomes associated with public health interventions, to describe the methods that are available for measuring and valuing outcomes, to describe the decision rules associated with different economic evaluation methods and to examine the advantages and disadvantages of each.

4.2.2 Guidance for measuring and valuing outcomes

To explore the methods available for measuring and valuing outcomes of public health interventions it may help to begin by reviewing existing methodological guidance. The National Institute for Health and Clinical Excellence (NICE) reference case provides an example of formal guidance for the evaluation of health care interventions. It is recommended that all health effects on individuals are

included, expressed in terms of quality-adjusted life years (QALYs) and without any adjustment for equity.(3) The use of a standardised and validated generic instrument is recommended to quantify the effects of interventions in terms of health-related quality of life (HRQoL). To value people's HRQoL, expressed as utilities, it is recommended that the preferences of the general public are elicited using a choice-based method of valuation, such as the time trade-off or standard gamble technique. The utility values are then multiplied by the time spent in the particular health state to generate QALYs.

A benefit of using QALYs is that it is possible to make direct comparisons across interventions whether they focus on public health interventions or other health care interventions. However, it might be argued that the QALY framework does not sufficiently capture all outcomes relevant to public health interventions, since it focuses on health outcomes alone. Even if health is the outcome of interest, some question whether QALYs are sufficient to capture all dimensions of health relevant to public health interventions. If health is not the only consideration it would be necessary to identify what other outcomes are important and, in order to create a single index to consider how these might be combined with health focused outcomes. Non-health outcomes which may be relevant to public health interventions include the effects that interventions can have on individuals not directly targeted by the programme (i.e. externalities associated with interventions), reassurance value and the creation of an informed public. Some interventions may also increase community cohesion and the perception of an area as 'being a good place to live'. Interventions could also have negative effects. In examining the effects of implementing a water fluoridation programme, Shackley and Dixon (2000) (74) suggest that outcomes which may need to be considered include the issue of disbenefits generated by violations to freedom of choice. This has been raised by Sen, 1988 as a general issue in economics.(88)

Since the merger of the Health Development Agency with NICE (2006) and the recommendations of the Wanless Report (1), NICE's Centre for Public Health Excellence (CPHE) has produced 'Methods for the development of NICE public

health guidance'. In addition to the CUA based QALY approach recommended as part of the reference case, the CPHE suggests the use of a cost-consequence analysis (CCA) approach in which multiple outcomes may be reported in a disaggregated way. An underlying rationale is that the approach may provide additional relevant information; for example, analysts may report multiple, non-health related and/or difficult to quantify factors. The CPHE suggest that the inclusion of additional outcomes may help communicate decisions to stakeholders and the public, and may help to modify decisions based solely on a cost per QALY evaluation. However, they do not comment on how decision makers are supposed to use CCA. This suggests that the decision maker may be left to apply their own decision making criteria and it is not at all clear that this process will be transparent, or applied in a systematic way across interventions.

As with all decision-making process, other considerations may be brought to bear by NICE's committees in reaching the final decision. The Reference Case, and the analyses that accompany it, represent one important input to the decision, but only one.

4.2.3 Methods for measuring and valuing outcomes

Three main approaches exist for measuring and valuing outcomes and these are reported in Table 11. Each approach is based on a particular value position. Cost-benefit analysis (CBA) values the outcomes associated with interventions in monetary units. It is based on welfare economic theory, which incorporates the value judgement that the social welfare objective function should comprise individuals' welfare and that individuals are the best judges of their own welfare. It is also underpinned by a belief that pre-intervention income distribution is appropriate and that either resources are allocated by the forces of a competitive market that is in equilibrium, or that distortions exist in the market but that these can be corrected for by using shadow prices. The shadow price is the value/cost to society represented by the marginally displaced activity.

In principle, in the CBA approach any outcomes can be monetised, including broad outcomes that may be associated with public health interventions. Methods for valuing outcomes in monetary units comprise revealed preference techniques, based on consumer behaviour, and stated preference techniques based on willingness to pay (WTP) techniques such as contingent valuation and choice experiments. Non-health outcomes relevant to public health interventions may be incorporated within the analyses. For example, Donaldson et al (1996) used WTP to monetise the reassurance value to the public associated with avoiding food-borne risk.(89)

Table 11: Measurement of Consequences in Economic Evaluation

Type of economic evaluation	Value position	Identification of consequences	Measurement & valuation of consequences
CBA	Welfarist	Single or multiple outcomes, not necessarily common to both alternatives	Monetary units based on individual compensation
CEA	Extra-welfarist	Single outcomes of interest, common to both alternatives, but achieved to different degrees	Natural units (e.g. life-years gained, disability days saved, points of blood pressure reduction etc)
CUA within the CEA umbrella		Single or multiple outcomes, not necessarily common to both alternatives	Healthy years typically measured as quality-adjusted life-years (QALYs)
CCA	Objective facts presented. No explicit theoretical rationale	Single or multiple outcomes of interest, common to both alternatives, but achieved to different degrees	Natural units (e.g. life-years gained, disability days saved, points of blood pressure reduction etc)

Cost-effectiveness analysis (CEA) includes single outcomes of interest as measured in natural effects or physical units, such as head injuries avoided or life years gained. It can be performed across any alternative interventions that have a common outcome of interest. Cost-utility analysis (CUA) is a form of CEA. Here the health states associated with outcomes are valued relative to one another, based on health state preference scores or utility weights. The quantity of life years in a given health state is then adjusted for the quality of those years, based on the utility weights. The QALYs are then reported as a single index. The utility weights are calculated based on either non-choice or choice-based methods of preference

elicitation. To establish the utility weights a decision has to be made about whose preferences count. For instance, they can be valued using the preferences of a representative sample of the public, as recommended in the NICE reference case. Dolan and Kahneman (2006) have suggested that the use of QALYs may be undermined as the public may not appreciate what life would really be like in the health states they describe and value, given that they may have little/no experience of living in the particular health state.⁽⁹⁰⁾ In addition, they suggest that such preferences may generally fail to appreciate future changes in preferences and well-being.

Both CEA and CUA are underpinned by extra-welfarist theory, in which the objective function is to maximise health although non-utility aspects of decision making may be included in the social welfare function.

In applying CEA or CUA, the decision-maker needs to take a view on the maximum threshold of societal willingness-to-pay for a life-year or QALY, that is deemed to be 'cost-effective'. In the UK, NICE currently applies a threshold range of £20,000 to £30,000 per QALY.⁽⁹¹⁾

Within health economics there has been gathering interest in developing a generic measure of outcome which can be used to compare interventions across different sectors of the economy, including interventions that do not have a health component and/or those that include attributes beyond health. Some single indices of wellbeing exist, such as the general wellbeing section of the Lancashire Quality of Life profile ⁽⁹²⁾; ⁽⁹³⁾. However, this measure does not include a valuation component.

More recently, there has been interest in the development of a measure of subjective wellbeing, thus broadening the outcome measure of interest beyond health. Dolan et al (2006) have undertaken a review of research on the influences on personal well-being and its application to policy making.⁽⁹⁰⁾ They examined several indices of wellbeing including income and life satisfaction questions and found that some, such as income, offered an incomplete picture of individual wellbeing. A number

of questions remain about which measure of wellbeing could/should be used to inform public policy and about how to interpret such data.

Within the economics field more generally, a number of concepts and elements of wellbeing have been examined, including Sen's capability approach⁴ (94) and Layard's work on happiness (Layard, 2005)(95).(96)

Cost-consequences analysis (CCA), also known as the balance sheet approach, includes the assessment of multiple outcomes, which are left disaggregated and which are not synthesised with costs. The outcomes are not combined in a single index and some outcomes may be positive, others negative. Therefore the trade-offs between positive and negative outcomes associated with interventions are undertaken outside of the analysis process itself. CCA is not underpinned by a standardised valuation position and instead relies on the decision maker to apply their own decision rules to the evidence.

4.2.4 Economic evaluation decision rules

In order to undertake a full economic evaluation, an incremental analysis of the outcomes and costs associated with comparator interventions is performed. CBA, CEA/CUA and CCA, described above, offer different methods for evaluating health care interventions. Here, based on the CBA approach, the budget is endogenised and all objectives which matter to the individuals valuing the outcomes may be incorporated within the analysis (point 1a, Table 12). The benefits are valued based on individual compensation and the costs are all the shadow priced costs. In contrast, the CUA approach is based on the single objective of maximising health, subject to a single exogenous budget constraint, that is the health sector specific shadow price in terms of QALYs (point 2a, Table 12). In the case of CCA the decision analytic rules used are specific to the decision maker assessing the evidence and are therefore not examined here (point 3, Table 12).

⁴ Sen's capability approach is based on an individual's capability set in which they choose valuable activities and states of being. Cookson (2005) has offered a reinterpretation of the QALY as an application of the capability approach.

Table 12: Decision Rules associated with Difference Types of Economic Evaluation (based on Claxton et al, 2006)

Type of economic evaluation	Decision rules under partial evaluation
CBA	<p>1a. If the decision maker sets the budget & allocates the resources, implement the new intervention if there is net present value;</p> $\Delta C / \Delta B < 1 \quad \text{or} \quad \Delta B - \Delta C > 0$ <p>1b. If the budget & resources are allocated exogenously, implement the new intervention if expected benefits exceed the benefits which are displaced elsewhere in the health care system;</p> $\Delta C^H / \Delta B < \gamma$
CEA/CUA	<p>Implement the new intervention if there is positive net benefit</p> <p>2a. If the decision maker sets the budget & allocates the resources;</p> $\Delta C / \Delta H < \lambda' \quad \text{or} \quad \Delta H * \lambda' - \Delta C > 0$ <p>2b. If the budget & resources are allocated exogenously;</p> $\Delta C^H / \Delta H < \lambda \quad \text{or} \quad \Delta H * \lambda - \Delta C^H > 0$
CCA	<p>3. Implement the new intervention if the decision maker judges the intervention more positively than the other interventions</p>

C = cost, B = benefit, H = health gain, λ = social value of benefit, λ' = social value of health gain, γ = the cost benefit ratio of health care

As shown in Table 12, CBA and CEA both require monetary valuation of health outcomes. However they are underpinned by different value positions. The outcomes in CBA are valued based on individual compensation, whereas in CEA they are based on the social value of health. In practice, the valuation of health may be equivalent across CBA and CEA if health gain is related to utility, if the social value of the health gain is related to income and risk aversion and all future costs are included. If the budget and resources are allocated exogenously, as is likely to be the case in the public health arena, the value of the costs and benefits which may be displaced within and outside of the health care sector need to be accounted for. Under both the CBA and CEA approaches, the new intervention is implemented if the expected benefits exceed the benefits which are displaced elsewhere in the health care system.

Claxton et al (2006) explored the use of CBA, CEA/CUA and CCA to examine whether the approaches are sufficient to inform decisions when there are multiple budget holders (with budgets set exogenously) with multiple objectives and multiple constraints, as typically faced in the public health field (points 1b, 2b and 3 respectively). For both the CBA and CEA/CUA approaches, the decision maker needs to know if the benefits offered by the new intervention exceed the benefits displaced elsewhere. If the decision maker faces an exogenous budget, it would be necessary to have an estimate of the shadow price of the budget constraint for CBA and CEA/CUA.

Based on the CEA/CUA approach, Claxton et al (2006) present a mathematical programming approach to simultaneously capture and adjust for the impact of intersectoral effects, including outcomes and costs, when budgets and resources are allocated exogenously.(97) This could incorporate a generic measure of outcome for use across sectors of the economy, for example a measure of wellbeing.(90) However, a generic measure of outcome specific to each sector, such as a severity-adjusted measure of crime for the criminal justice sector, an education outcome for the education sector, or a QALY for the health care sector, would be sufficient, as long as each could be valued according to the sector-specific shadow price. Although possible in principle, the mathematical programming approach is rejected by Claxton et al (2006) due to the magnitude of the resource requirements to inform the decision problem, the complexity of the mathematical solutions required and the complexity of the allocation problem itself.(97)

Table 13: A Simple Compensation Test (copied from Claxton et al, 2006)

	Health	Education		Decision	Compensation
1	$NB_j^H > 0$	$NB_j^E > 0$	$(NB_j^H + NB_j^E) > 0$	Accept	-
2	$NB_j^H > 0$	$NB_j^E < 0$	..	..	$(0 - NB_j^H)$ from H to E
3	$NB_j^H < 0$	$NB_j^E > 0$	..	..	$(0 - NB_j^H)$ from E to H
4	$NB_j^H < 0$	$NB_j^E < 0$	$(NB_j^H + NB_j^E) < 0$	Reject	-
5	$NB_j^H < 0$	$NB_j^E > 0$	..	..	E can't compensate H
6	$NB_j^H > 0$	$NB_j^E < 0$	..	..	H can't compensate E

As an alternative, Claxton et al offer an intersectoral compensation test, as illustrated in Table 13, using an extra-welfarist framework based on the net benefits falling on different sectors. Given exogenous objectives, the benefits within each sector can be valued using informed estimates of the shadow price for each budget constraint faced, based on the following formula;

$$NB_j = (B_j * \lambda - C_j) \quad \text{or} \quad NB = (B_j * \gamma - C_j)$$

For example, intervention j, impacting on costs and outcomes in the health (H) and education (E) sector will generate net benefit in health NB_j^H and net benefit in education NB_j^E . If $NB_j^H > 0$ and $NB_j^E > 0$ the intervention should be implemented, since the gains in H and E exceed the outcomes which will be displaced in each sector. If $NB_j^H < 0$ and $NB_j^E < 0$ the intervention should not be implemented. In situations where there are net benefit gains in one sector and net benefit losses in the other, a compensation test could be used. The intervention would be implemented if the health sector, which receives the positive net benefit (e.g. $NB_j^H > 0$ in row 2 of Table 13), can compensate the education sector, which receives the negative net benefit (e.g. $NB_j^E < 0$ in row 2 of Table 13) for the loss ($0 - NB_j^E$), and still regard the intervention to be cost-effective. In practice such compensation might not take place or it might be possible to keep a balance sheet over a set time period and to assess the balance of accounts across sectors at the end of the given financial period, in order to inform marginal changes in subsequent budget allocations between sectors.

4.2.5 Advantages and disadvantages of different economic evaluation techniques to assess public health interventions

Table 14 attempts to summarise the advantages and disadvantages of each type of economic evaluation, based on their associated valuation positions and practical feasibility. Such considerations can guide the choice of economic evaluation method to assess public health interventions.

Proponents of CBA suggest that the approach has a sound theoretical basis, consistent with traditional welfare economic theory. In terms of practical feasibility it is possible to incorporate non-health as well as health outcomes and therefore its use is not restricted to assessing health care sector impacts. No full CBA was retrieved through the NHS EED search (see Section 3). In practice, few full economic evaluations using CBA have been undertaken. The majority of those that do exist have been undertaken in developing countries. However, a number of partial evaluations of public health interventions have been undertaken, for example the use of WTP to estimate; public preferences for water fluoridation (74), the economic benefits of avoiding food-borne risk (89) and the willingness to pay for taxes to for a community-based intervention programme.(98) There has also been a large research project within the European Union (EuroWill), which has explored a number of the methodological and practical issues surrounding the estimation of individuals' willingness-to-pay for health care interventions.(99-102)

Opponents of CBA are particularly concerned that WTP valuations are conditioned by people's ability to pay. In terms of practical feasibility it is sometimes argued that stated preference WTP methods are insensitive to the magnitude of benefit, including nesting effects and scope effects and that they inflate valuations of the specific intervention that respondents are asked about, relative to interventions that they are not asked about (Cookson, 2003).(103)

More recently, discrete choice experiment (DCE) methods have been used in the health care field as a way of helping to elicit monetary benefits. The technique can be used to identify which attributes of an intervention are particularly important and of 'value' to patients and how different attributes may be traded. In doing so, it is possible to obtain an overall measure of preference based on non-health outcomes and process attributes (e.g. convenience), as well as health care specific attributes which are of value to the individual respondent. The technique has been widely used in transport and environmental economics and was recommended to the UK Treasury as a method of valuing the quality of public services.(104)

In terms of stated preferences, there is no standard questionnaire format for eliciting monetary valuations and different formats can yield different results. As described by Claxton et al (2006), a welfarist societal perspective is not sufficient to capture the decisions made in the public health arena where multiple objectives and multiple constraints are faced across sectors.(97)

Proponents of CEA/CUA uphold the extra-welfarism principles on which it is based, since outcome valuations can be based on the preferences of the general public and are not conditioned by individuals' ability to pay. CUA combines outcome values with duration to calculate quality adjusted-life years (QALYs), presented as single index metric. In terms of practical feasibility, the approach to valuation is standardised. The availability of a social tariff means that public preferences for health states are readily available, reducing the cost and time of data collection requirements. The published literature provides a considerable number of CUA evaluations of public health interventions, as indicated in section 3 and in the McDaid and Needle review (2006).(11)

Opponents of CEA/CUA argue that the value position is not consistent with welfare economic theory. Some commentators go so far as to say that only those evaluations based on this theory should be considered as true economic evaluations (Birch and Gafni, 1996).(105) In practical terms, it is argued that CUA may not capture the full breadth of outcomes pertinent to public health interventions. Additionally, the use of different valuation methods, or different respondents, may generate different valuations for the same health state. For example, McDonough and Tosteson (2007) found that in studies comparing the most widely used health state valuation instruments, the change scores (and resulting cost-effectiveness ratios) differed substantially.(106)

Proponents of CCA uphold the benefits of presenting the decision maker with a list of relevant outcomes, suggesting that the decision makers themselves are best placed to apply their own decision making criteria to the decision problem (Coast, 2004).(107) Any outcomes relevant to the interventions being compared can be

presented in a disaggregated way, making components of the decision problem transparent. As for CUA, the published literature provides a considerable number of CCA evaluations of public health interventions, as indicated in section 3 and in the McDaid and Needle review (2006).(11)

Opponents of CCA are concerned about the implicit and opaque nature by which decisions are made using CCA outputs and its lack of theoretical basis. Decision makers apply their own subjective decision rules when trading off multiple outcomes for each intervention, when comparing the multiple outcomes across interventions and when comparing outcomes and costs across multiple sectors of the economy.

Table 14: Summary of Advantages and Disadvantages associated with Different Types of Economic Evaluation

CBA	<i>Advantages</i>
Value position	Consistent with traditional welfare economics incorporating objective of maximising individual subjective utility
Practical feasibility	Broad scope of outcomes can be measured in monetary values including non-health as well as health outcomes. Non health outcomes include process utility e.g. the reassurance value associated with conducting diagnostic tests (Donaldson & Shackley, 1997)
	<i>Disadvantages</i>
Value position	WTP values may be influenced by individuals' ability to pay
Practical feasibility	WTP elicitation has been associated with issues of bias and precision; (1) insensitive to the magnitude of effect including scope effects and nesting effects (2) inflate valuations of the specific intervention that respondents are asked about, relative to interventions that respondents are not asked about (Cookson, 2003) Difficult to validate WTP since public health care is free at the point of delivery in the UK Lack of standardised elicitation process. Different question formats used can yield different results. E.g. payment card bidding approach compared to dichotomous choice take-it-or-leave-it approach. The latter gave consistently higher estimates of WTP (Ryan et al, 2004)
CEA/CUA	<i>Advantages</i>
Value position	Underpinned by extra-welfarist theory incorporating the objective of maximising health Health state preferences can be elicited using choice based preferences i.e. either standard gamble utilities or time-trade off values Can incorporate preferences of the general public behind a veil of ignorance, consistent with Rawlsian theory Life years are adjusted for the quality of those life years
Practical feasibility	Approach to valuation standardised, enhancing validity
	<i>Disadvantages</i>
Value position	Not consistent with traditional welfare economics as the objective is to maximise health rather than subjective utility
Practical feasibility	By focusing on health outcomes, the approach omits non-health outcomes Different health state valuation tools can generate different valuations for the same health state
CCA	<i>Advantages</i>
Value position	Not defined. Flexibility since decision maker can apply own decision rules
Practical feasibility	A broad scope of outcomes can be measured including non-health as well as health outcomes Outcomes are presented in a disaggregated manner so that the benefits and disbenefits associated with each intervention are reported upfront. This can aid transparency
	<i>Disadvantages</i>
Value position	No theoretical basis
Practical feasibility	Lack of transparency in terms of decision rules. Decision maker applies own subjective decision rules about the trade-offs between different outcomes and the trade-off between outcomes and costs

4.3 Equity considerations

4.3.1: Current practice

To date, economic evaluations in the health field have focussed almost exclusively on efficiency considerations (in particular, improving the sum total health of the general population) rather than equity considerations such as reducing inequalities in health. A systematic review of 424 economic evaluation studies of health care interventions published in 1987, 1992, 1995, 1996 and 1997 concluded that “Distributional effects seem to have been completely neglected in existing economic evaluations” (Sassi, Archard and Le Grand 2001).(108) Our own systematic review of 154 economic evaluation studies of public health interventions published from 2000 to 2005 comes to much the same conclusion.

Equity considerations come in many different shapes and sizes. We can distinguish three broad forms that equity considerations may take when making “hard choices” about the allocation of scarce resources in pursuit of public health objectives. First, concern to reduce a particular health inequality (e.g. inequality in quality-adjusted life expectancy between social classes). Second, concern to give priority to improving the health of a particular group (e.g. children, e.g. the severely ill). Third, concern to follow fair procedures for allocating resources (e.g. to respect individual rights and freedoms, e.g. to prohibit race discrimination).

Equity considerations may conflict with a strict cost-effectiveness goal of maximising the improvement of population health, giving rise to “equity-efficiency trade-offs”. Equity considerations may also conflict with one another, giving rise to what we might call “equity-equity trade-offs”. For example, decisions about smoking restrictions may involve trade-offs between respecting individual freedom to smoke versus reducing socio-economic health inequality. Another example: giving blanket priority to improving the health of children rather than adults may conflict with a strict goal of reducing socio-economic inequality in health – since some children are considerably wealthier and healthier than some adults.

In public health, concern for health inequality reduction takes on particular importance as a policy objective. Yet economic evaluations in this area still typically fail to *measure* health inequality impacts – i.e. to provide factual information about how an intervention might change existing patterns of health inequality between different population groups – let alone to *value* them – i.e. to quantify how much a particular reduction in health inequality might be worth.

There is a substantial theoretical literature on equity in health, drawing on the wider literature on equity and justice, with contributions from a number of different disciplines including economics, epidemiology, philosophy and others.(109) Some of this theoretical literature examines how different health equity considerations might be weighed up against one another, and against efficiency considerations, in a quantitative manner suitable for economic evaluation.(110-112) In addition, there is a small but growing body of methodological work in this area, which has tended to concentrate on developing methods for setting quantitative “equity weights” on health gains accruing to different people in different circumstances.(113) However, such methods remain at a developmental stage and have not yet been applied in practice.

Although economic evaluations do not explicitly address equity considerations, they do *implicitly* embody important value judgements about equity, in at least three ways. First, the selection of interventions to be evaluated may involve equity judgements. Some interventions with important health inequality impacts may not be selected for evaluation because they are too expensive or too controversial, or because the relevant health inequalities are too low on the current political agenda. Second, economic evaluations typically exclude certain costs and benefits from the analysis on equity grounds. In the health care context, for example, the equity judgement that medical treatment should not depend on the patient’s social role (e.g. the doctor with young children versus the childless tramp) precludes examination of effects on dependents and on gross national output, both of which may ultimately influence population health. Third, the definition of efficiency in terms of sum total

population health – i.e. the principle that “a QALY is a QALY”, no matter to whom it accrues – embodies a strong value judgement about equity. The conventional definition of efficiency in economics, known as “Pareto efficiency”, is a situation in which no-one can be made better off without some one else being made worse off. This conventional definition does not make a strong value judgement about equity. It does not arbitrate, for example, on whether it is worth funding an intervention that improves the health of one group by 1,000 QALYs while reducing by 900 QALYs the health of another group who would otherwise have benefited from this funding. Yet the principle of “a QALY is a QALY” embodies the value judgement that this intervention is unequivocally worth funding: it improves sum total health by 100 QALYs.

4.3.2: Methodological issues

We can identify four broad approaches to addressing equity considerations within economic evaluation:

- (i) Review of issues and background information
- (ii) Health inequality impact assessment
- (iii) Opportunity cost analysis
- (iv) Equity weighting analysis

The first approach is the most modest of the four: it does not aim to present new quantitative evidence, but merely to clarify the equity considerations at stake and to review background information that decision-makers may find helpful. For example, decision-makers may be interested to know about the existing patterns and causes of the health inequality in question, about stakeholder views on the importance of reducing this particular health inequality, and about the effects on health inequality of related interventions in other settings.

Health inequality impact assessment aims to generate new quantitative evidence about the impact the intervention is likely to have on health inequality. This may

take the form of data on how the effectiveness and/or cost-effectiveness of the intervention is likely to vary between different equity-relevant sub-groups of the population (such as socio-economic position, geographical location, ethnicity, age, gender and so on).

Such data could in principle be generated using standard evaluation methods. The key methodological difficulty lies in the paucity of primary effectiveness data on many equity-relevant characteristics: trials and other primary studies are typically designed and powered to detect average effects across the whole sample, not sub-group effects. Indeed, some important sub-groups, such as ethnic minorities, may be more difficult to enrol in such studies. Furthermore, although data on some equity-relevant individual characteristics are routinely collected and reported in primary studies, data on many other equity-relevant individual characteristics are not – in particular, socio-economic position and ethnicity. A second methodological challenge lies in the selection of “equity-relevant” characteristics to examine, from the many possible characteristics that may be of interest to decision-makers. There is a cost attached to collecting, analysing and disseminating additional sub-group data, and so hard choices have to be made about which characteristics are likely to be most important in which contexts.

A more ambitious form of health inequality impact assessment would involve simulation modelling of the magnitude of any reduction in health inequality likely to arise were the intervention to be implemented. This simulation modelling would combine data on existing patterns of health inequality with data on sub-group (cost-) effectiveness of the intervention. Simulation work of this kind would raise important methodological issues about the choice of which health inequality index to use, since different indices can generate quite different results.(114, 115)

The third approach, opportunity cost analysis, would aim to estimate the opportunity cost of a particular equity consideration in terms of population health gains (e.g. QALYs) forgone compared with the QALY maximising option. Every departure from a strict QALY maximising cost-effectiveness approach on grounds

of equity has an opportunity cost in terms of sum total QALYs forgone. The size of that opportunity cost is a test of how important that equity consideration is deemed to be. This approach can be implemented using standard methods of cost-effectiveness analysis and linear programming

<http://www.york.ac.uk/inst/che/pdf/mathprog.pdf>. One important methodological advantage of this approach is that it is flexible, and can be used to address *any* kind of equity consideration and not just concerns about reduction of health inequality. In particular, it can also address considerations of procedural justice such as anti-discrimination principles. For example, during the 1990s the UK Standing Medical Advisory Committee advised local health authorities against adopting a racially selective policy on screening for sickle cell anaemia – which is more prevalent in certain ethnic minority groups – even though this may have been the most cost-effective strategy.⁽¹⁰⁸⁾ A disadvantage, of course, is that this approach only looks at the cost of the equity consideration, not the benefit. It only *measures* the equity-efficiency trade-off that is implied by a particular decision (a factual matter); it does not *value* the trade-off that policy-makers ought to make (a moral matter). That is, it does not help the decision maker decide how large a sum total QALY sacrifice is worth making in order to pursue a particular equity consideration.

The fourth and final approach, equity weighting analysis, does aim explicitly to value health inequality reduction (or other equity concerns) and to guide the decision-maker about how much the total QALY sacrifice is worth making in order to reduce health inequality. The essential idea is to set weights on health gains (e.g. QALY gains) accruing to people with different equity-relevant characteristics, based on values elicited from a relevant stakeholder group (e.g. the general public, policy-makers). The value elicitation techniques applicable in this area are similar to those used in the health measurement and valuation literature: the basic idea is to confront respondents with “hard choices” that require explicit quantitative trade-offs between competing objectives. One major difference, however, is that value elicitation questions generally ask respondents to adopt a “citizen” or “policy-maker” perspective, involving trade-offs between the health of groups of people,

rather than an individual or consumer perspective involving trade-offs between ones' own health and/or wealth.(116)

The three main value elicitation techniques used to date are “Willingness to Pay” (WTP), “Person-Trade-Off” (PTO) and “Discrete Choice Experiment” (DCE). DCE involves a series of “hard choices” between interventions benefiting groups that vary in terms of multiple specified attributes (e.g. social class, ethnicity, smoking status, health gain, initial health etc.). Regression analysis is then used to derive the “weight” on each attribute implied by the pattern of responses. PTO involves a “hard choice” between two interventions benefiting different groups of the same size that vary by a single attribute only. The number of individuals in one group is then varied until the respondent reaches a point of “indifference” between the two interventions (i.e. values them roughly equally). The relative number of individuals left in each group is then an indication of the weight the respondent places on this attribute. Finally, the WTP approach involves eliciting individual willingness to pay amounts for interventions that benefit particular groups, which may or may not include the individual respondent.(117) These groups may vary across one attribute only (as in PTO) or across multiple attributes (as in DCE); although in the latter case it is harder to tease out the equity weight associated with each attribute.

There have been a number of studies aimed at eliciting equity weights from members of the general public. (117) Despite considerable noise and variation in the results, two consistent findings seem to emerge. First, that the public value health gains to children more highly than health gains to adults, and second, that the public value health gains to individuals currently suffering from severe illness more highly than health gains to individuals currently in relatively good health. In terms of reduction of health inequalities, early findings indicate that people think that social class inequalities are more inequitable than those by smoking status, with inequalities between the sexes somewhere in between.(118) Findings with respect to other health inequalities and other personal characteristics, such as degree of responsibility for own ill-health, tend to be more equivocal. Although quantitative

equity weights can be calculated from these data, at present the data base is not comprehensive enough to do this credibly for current policy purposes.(119)

4.3.2: Ways forward

4.3.2.1 When is explicit evaluation of equity likely to be most worthwhile?

Careful choices need to be made about when to conduct explicit economic evaluations of equity concerns, given their likely cost and methodological difficulty. In some cases, there may be no need for economic evaluation explicitly to address equity considerations. For example, if a public health intervention that targets disadvantaged individuals or communities is demonstrated to be cost-effective, then it is a fair bet that it also reduces health inequalities between advantaged and disadvantaged groups. Under these circumstances, the decision-maker may not need to know by how much health inequality is reduced, or how far the general public would value a health inequality reduction of this kind. It may simply be obvious that the intervention is a good idea, without having to undertake complex and costly exercises in reviewing the literature, assessing health inequality impacts, analysing opportunity costs and equity weighting health gains.

However, there is likely to be a pressing need for explicit approaches to addressing equity considerations when a public health intervention designed to tackle health inequality is found not to be cost-effective when judged by standard criteria. Then the difficult questions arise. By how much does this intervention reduce health inequality? How large is the sacrifice to sum total population health if this intervention is funded? How highly do the general public value this health inequality reduction in comparison to the sacrifice to population health?

Explicit evaluation of equity considerations may also be worthwhile in relation to screening and health promotion programmes, and other preventive public health interventions whose effectiveness depends crucially on eliciting some positive

action or behaviour change on the part of the intended beneficiaries. Although such programmes may be designed primarily to increase sum total population health, they may also have the unintended and unfortunate consequence of increasing health inequalities if take-up is lower among more disadvantaged “hard-to-reach” populations. There is considerable evidence that this is a widespread phenomenon – for example, in relation to breast and cervical cancer screening ((120); (121), immunisation for diphtheria and pertussis (65), the “Sure Start” programme for children and families in deprived areas (122), educational outcomes from the US children’s TV programme “Sesame Street” (123), anti-smoking and smoking cessation interventions (124); (125), a Canadian school-based bicycle helmet promotion (126), child abuse prevention programmes in New Zealand and Ireland (127); (128), an inner city visual screening programme for preschool children in Glasgow.(129)

Explicit evaluation may help to re-design such initiatives, so that the benefits are spread more evenly between different social groups. For example, a UK policy introduced in 1990 of explicit financial incentives for GPs to undertake screening for cervical cancer resulted in greater uptake among women in relatively advantaged communities, hence increasing health inequalities.(108) Based on their own retrospective equity analysis, Sassi and colleagues suggest that a more equitable policy would be to offer stronger financial incentives in more deprived areas, possibly financing this by increasing the screening interval to 5 years rather than 3 years.

4.3.2.2 Which approaches are likely to be most worthwhile?

Since the four approaches have so rarely been used in economic evaluation studies, let alone used to inform an actual policy decision, it is premature to make any attempt to formulate advice on which approach is likely to be most helpful in which context. Instead, what is required is a period of development and piloting of all four approaches, so that decision makers and other stakeholders can provide feedback as to which approaches are most helpful in practice. For the most part, the technical

tools required to undertake explicit equity analysis are more or less straightforward extensions of existing statistical and modelling methods of economic evaluation. For example, health economists are well accustomed to performing sub-group analysis of cost-effectiveness on non-equity characteristics; tools exist for mathematical programming analysis of opportunity cost <http://www.york.ac.uk/inst/che/pdf/mathprog.pdf> This could be used to examine how attainment of an objective, such as health maximisation, is affected by introducing or relaxing an equity constraint. A lengthy period of further technical methodological development, prior to testing in the field, may therefore not be required. Instead, at least for approaches 1-3, it may be possible and worthwhile to go directly to the “field testing” stage and to pilot some of these approaches in the context of real policy decisions, such as those faced by NICE Appraisals of Public Health Interventions, by performing equity analysis within relatively short time frames.

There may be grounds for additional methodological work, however, before piloting approach 4 in real-world cases. Most economists would agree that approaches 1-3 all have merit, and that a comprehensive economic evaluation of equity considerations would contain all three elements. However, there is some disagreement among the profession about the merits of equity weighting analysis. The problem is not a technical one: in principle, equity weighting is not more technically complicated to perform than discounting of future costs and benefits. Rather, the problem lies with (i) the quality and comprehensiveness of the evidence base for determining the magnitude of equity weights, and (ii) philosophical disagreements about the role of economic evidence to inform political decision-making.

On the philosophical point, the case for equity weighting is that transparency and consistency in public policy-making would be better served if public policy-makers were forced to be explicit about all the value judgements that go into their decision-making, including quantitative value judgements about equity-efficiency trade-offs.⁽¹¹⁹⁾ Economists have long made the case for explicitness about value

judgements concerning efficiency – in particular, value judgements about the trade offs between different dimensions of quality of life and length of life as embodied in the QALY approach. There is therefore a case for extending this same principle of explicitness to value judgements concerning equity.

However, a number of economists disagree. For example, Sassi, Archard and Le Grand (2001) distinguish “positive” versus “normative” approaches to addressing equity considerations.⁽¹⁰⁸⁾ Approaches 1-3 are “positive”; whereas the equity weighting approach is “normative” – it seeks to value equity-efficiency trade-offs (e.g. to stipulate how much total health should be sacrificed to achieve a given health inequality reduction), not just to measure them. Sassi and colleagues are pessimistic about the prospects for “normative” approaches, and argue that decision-makers should be presented with factual information about health inequality impacts and then left to make their own value judgements about how much weight to place on them. In a similar vein, Culyer (2006) distinguishes “deliberative” versus “algorithmic” approaches to making decisions.⁽¹³⁰⁾ The former aims to specify a suitable process of deliberation and consultation that will help the decision-maker to judge what weight to place on particular considerations, whereas the latter aims to specify a suitable algorithm that will explicitly determine what weight to use. Culyer advocates an “algorithmic” approach to valuing health outcomes but a “deliberative” approach to valuing equity considerations, on the grounds that equity considerations are too thoroughly context-sensitive to be adequately addressed using a pre-defined algorithm.

Even if one accepts the case against “algorithmic” approaches to equity considerations, however, there may still be an important role for equity weighting research. Data emerging from value elicitation studies aimed at generating equity weights need not necessarily be employed in an algorithmic fashion. That is, equity weight data may merely be used to help inform decision-makers about what equity considerations are generally valued most highly by the general public, while leaving plenty of room for deliberation and judgement on the part of the decision-maker about how much weight to place on these data in particular circumstances.

4.3.2.3 What methodological research is likely to be most worthwhile?

- Pilot studies of health inequality impact assessment for selected interventions, chosen on the basis that there exist detailed individual-level data on equity-relevant subgroups (e.g. some interventions for heart disease). To obtain user feedback, there may be a case for conducting such pilot studies to help inform selected real-world decisions (e.g. NICE Appraisals of Public Health Interventions).
- Pilot studies of opportunity cost analysis for selected interventions, chosen on the basis that the most cost-effective option is likely to be judged inequitable, whether on grounds of health inequality impact or on grounds of procedural justice (e.g. anti-discrimination principles).
- Primary research on the effectiveness of interventions designed to tackle health inequality that combines knowledge and tools from social epidemiology and econometrics. Social epidemiologists have gathered a large body of knowledge about the social determinants of health which emphasises factors such as the important role of stress and social cohesion as determinants of health and of health inequalities.(131, 132) They have shown that socio-economic inequalities in health are strongly mediated by stress levels. Econometricians have developed sophisticated methods for modelling the effects of interventions which could be applied to data on social determinants of health. Yet to date there has been limited research on what effect public health interventions have on stress levels. Greater links could be made between social epidemiology and health econometrics to incorporate the role of stress and social cohesion as causal factors in socio-economic inequalities, based on regression and microeconomic modelling techniques.

- Equity weighting research focusing on equity considerations and contexts central to public health, as opposed to health care. For example, further research is warranted on equity considerations relating to socio-economic position, the degree of voluntariness or personal responsibility for health risk, and the value of treating current ill-health versus preventing future health risks. Further research may also be warranted on which measures of health inequality people are most concerned with – for instance, are people concerned with inequality *per se* versus improving the position of the worst off; are they concerned with the ratio between best off and worst off versus the gap between best off and worst off.
- Equity weighting research that elicits the values of policy-makers in a variety of policy sectors and settings, preferably in a manner that can be compared with existing data on the values of the general public. If tools for addressing equity considerations are to be acceptable to policy-makers, it is important to know which inequalities policy-makers of different kinds consider the most important. In conducting such studies, it would be important to tease out how far policy-makers are concerned with reduction of socio-economic health inequalities *per se*, as opposed to the resulting cost savings in terms of reduced welfare expenditures on disadvantaged individuals.

4.4 Intersectoral costs and consequences

4.4.1 Importance of the issue

Many health policies have costs and consequences that impact on other sectors of the economy. For example, a ban on smoking in eating and drinking establishments will impact on the catering trade. A programme to encourage physical activity could impact on public transportation and recreational services.

Similarly, policies in other sectors can have impact on health. A programme to reduce the fat content in school meals may help in reducing obesity in children. A programme to reduce damp in older houses may reduce asthma in the poor. The use of speed cameras may reduce the rate of fatal and non-fatal accidents.

This suggests that there is a strong *prima facie* case for identifying intersectoral costs and consequences in the economic evaluation of public health interventions. Of course, all health interventions have spillover effects into other sectors of the economy. Effective treatment can enable the sick to return to work. However, the case for identifying intersectoral impacts is particularly strong for public health interventions. First, many of these interventions focus on promoting health and are aimed at individuals who are not necessarily ill, or focus on the community as a whole. Secondly, encouraging the adoption of healthier lifestyles confer benefits beyond the immediate impact on health. For example, encouraging a 10 year-old child to become more physically active could impact on educational achievement, relationships with peers and sporting activities.

Apart from helping us understand the true social value of public health interventions, identifying intersectoral impacts can assist in the design of, and funding of, programmes by identifying the costs and benefits to the various parties. For example, if the deployment of speed cameras were being limited by the lack of funds in the transport sector, it might make sense for the health sector to make a financial contribution. On the other hand, if a health programme to encourage physical activity were to result in an increase in gym membership, the private sector (i.e. gym owners) might have an interest in providing financial support for the programme, as might the recreational services departments of local authorities.

4.4.2 Insights from the literature

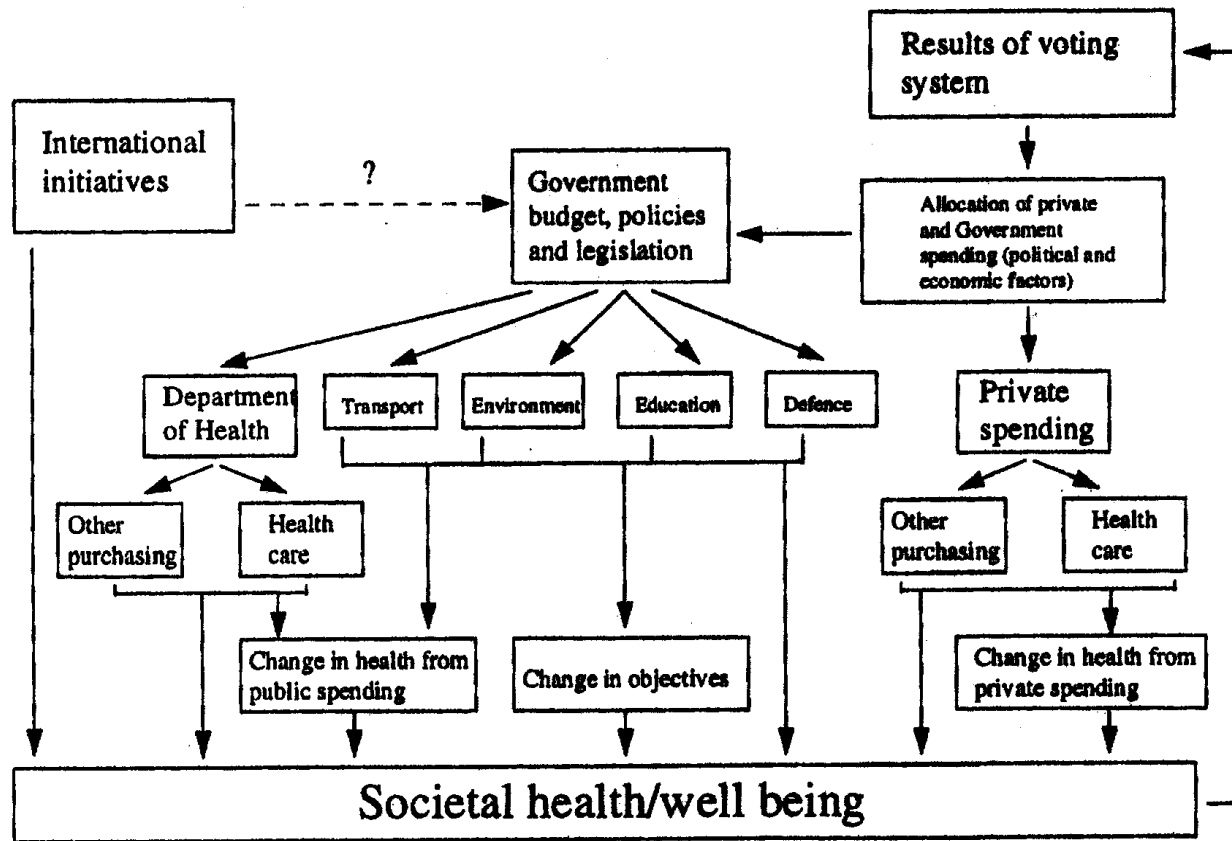
Several authors have attempted to develop frameworks for the understanding of intersectoral effects. Drummond and Stoddart (1995) suggested that it would be helpful to classify interventions in terms of the sector(s) they originate from (e.g.

health, education, transport), their outcomes (health, non-health) and their beneficiary group (e.g. the elderly, single parent families).(133)

For example, single sector interventions can have multiple (health and non-health) outcomes and be targeted at many beneficiary groups. (This would be true of many of the interventions in *Choosing Health* (22).) Alternatively, multi-sector interventions could target many beneficiary groups, yet have a single outcome of interest (e.g. reducing coronary heart disease). Finally, multi-sector interventions could have multiple outcomes, but be targeted at a single beneficiary group (e.g. programmes aimed at improving the health and welfare of low income families). Drummond and Stoddart argue that ‘the most useful contribution of economic evaluation to intersectoral decision-making is in increasing the awareness of the wide range of possibilities, rather than giving an unambiguous answer to the resource allocation problem’.(133)

Buck *et al* (1998) outline a more complicated model of the ways in which intersectoral initiatives can impact upon societal health/well being (See Figure 8).(134) This emphasises (i) the distinction between public and private spending (ii) the impact of legislation, whether arising in the Department of Health or other ministries and (iii) the role of the private and independent sectors in influencing health.

Figure 8: Model of Intersectoral Impacts on Societal Health/Wellbeing



(Buck, Drummond and Godfrey, 1998; (134))

This broad view of intersectoral initiatives raises questions about whether the partial equilibrium framework, in which economic evaluation is typically conducted, is sufficient. Certainly there are likely to be important ‘ripple effects’ of public health interventions. For example, a policy to encourage children to wear bicycle helmets may reduce serious head injuries, but may deter some children from cycling, thereby reducing the level of exercise that they take. Similarly, a policy to ban smoking in public places could have impacts on private sector businesses. However, there are few examples in the literature of economic evaluation being undertaken within a general equilibrium framework, where the whole economy is modelled. Indeed, most of the examples relate to health programmes in developing countries.⁽¹³⁵⁾ However Smith *et al* (2005) have recently explored the use of general equilibrium analysis in the context of antimicrobial resistance.⁽¹³⁶⁾ They examine the impact of policies to address antimicrobial resistance based on a macroeconomic approach using general equilibrium analysis, and a microeconomic approach to the analysis. The macroeconomic approach incorporates spill-over effects of antimicrobial resistance which are likely to result in a greater societal impact on the economy. The microeconomic approach seems to underestimate the costs and mis-specify the benefits of antimicrobial resistance as it focuses on the health care sector, thus ignoring whole sectors of the economy.

Some of the effects of public health initiatives can be inter-generational. For example, a programme to reduce substance abuse in adults could affect the health of their children. Lifestyle factors can also affect genetic inheritance. The same applies to initiatives in other sectors. For example, an increased emphasis on nuclear power could boost the economy today, but lead to an increased health risk, from radiation, in the future.

4.4.3 Empirical studies

There are few good examples, in the existing literature of studies attempting to identify and measure intersectoral effects. Rather, the existing literature is full of missed opportunities. For example, some evaluations of interventions to tackle substance abuse focus on the health benefits, to the exclusion of the impacts on crime. Other evaluations adopt the opposite approach, possibly reflecting the source of sponsorship. As mentioned earlier, this could lead to an underestimation of the societal benefits of interventions and a failure to identify the incentives that might be given (by one sector to another) to encourage socially beneficial programmes.

However, the literature review discussed in Section 3 did identify some studies of interest. First, Bledsoe *et al* (2002) evaluated the health impact of a policy implemented in another sector.(28) In July 1997, Arkansas became the first U.S. state in 14 years to repeal their adult motorcycle helmet law. In a 6-year retrospective study, they found that non-helmeted individuals had significantly more severe head injuries, significantly longer length of intensive care and significantly higher hospital charges than their helmeted counterparts. They conclude that States considering repeal of their mandatory adult helmet laws should consider the potential negative impact on their health care system and the increased morbidity associated with non helmeted motorcycle riders involved in a crash.

Kopjar and Wickizer (2000) analyzed the reduction in risk of head injuries associated with use of bicycle helmets among persons ages 3 to 70 and the cost-effectiveness of helmet use based on this estimated risk reduction.(73) They found that helmets were several times more cost-effective for children than for adults, primarily because of the higher risk of head injury among children. They concluded that programmes aimed at increasing helmet use should consider the differences in injury risk and target their efforts accordingly.

This study raises several other interesting issues. For example, the expenditure on helmets would be by private individuals, and the purchase of helmets could be influenced by helmet cost. Therefore a policy to subsidize helmets may have a

different impact from one mandating the use of helmets. In the latter case, those unable to afford helmets may just stop riding bicycles.

A third study, by Byford *et al* (2003), evaluated the cost-effectiveness of brief cognitive behaviour therapy in patients with a history of recurrent deliberate self-harm.⁽⁵²⁾ Although not strictly an evaluation of a public health programme, this study is unusual for the wide range of impacts examined. These included hospital services, community health services, social services, voluntary sector services, community accommodation, criminal justice system costs and impacts on productivity.

Table 15 clearly shows the impact, on costs, in the various sectors. In this particular case, the cognitive behavioural therapy is less costly than usual care for most items, so the issue of differential impact on sectors does not arise. However, this broad approach is required if such differential impacts, and the necessary financial incentives, are to be identified.

Finally, Brown (2002) investigated the costs and benefits of enforcing housing policies to prevent childhood lead poisoning in urban areas of the USA.⁽⁷²⁾ Two strategies were compared, strict enforcement, involving the permanent removal or coverage of lead-based paint on all accessible surfaces, versus a more limited policy, involving repair of defective paint surfaces only if the property owner agreed to undertake the work. Under strict enforcement, property owners were also made liable for damages sustained by lead-poisoned children and faced possible criminal charges.

Two adjacent urban areas employing the different strategies, but similar with respect to other factors, such as the age and condition of the housing stock and level of public education about the dangers of lead, were compared. Based on a retrospective cohort study, it was determined that strict enforcement would reduce the recurrence of children having elevated BPb.

A societal perspective was adopted for the primary analysis, including the consideration of the costs of family lead education; lead retesting, counselling and medical care costs. In addition, the costs of special education for severely lead-poisoned children and the productivity losses in the long-term were considered. Potential reductions in all these costs were compared with the costs of enforcement. These included the costs of undertaking the work, inspections and re-location of families whilst their house was being re-painted.

The author acknowledges that some costs and benefits were not considered, including the emotional or resource costs of raising children with lead poisoning or the QALYs costs as a result of childhood lead exposure. In addition, more investigation would be required of the costs and benefits to property owners willing to abate lead hazards in their buildings. For example, although householders bear the costs of lead abatement, they may gain from the reduced costs of maintenance or increased property values. An analysis such as this can help identify whether transfer payments, such as tax credits or other types of cash assistance would be justified.

4.4.4 Ways forward

Since most public health interventions have intersectoral costs and consequences, economic evaluations should investigate these, at least in qualitative terms. Ideally, the intersectoral impacts should be quantified in the way that makes the most sense for each sector.

Further progress in measurement and valuation would then depend on the view taken about the various technical and value judgements outlined in Section 4.2 above. Namely, the various costs and consequences can be presented to the decision maker, in their respective sectoral units, for consideration. Alternatively, the compensation approach, outlined in Section 4.2, could be followed. Finally, attempts could be made to value all the costs and consequences in commensurate units, such as money.

Public sector decision makers will be mostly concerned with the consequences, in terms of resource use, for their budgets, and those of other public sector decision makers. However, consideration of impacts on the voluntary sector and private individuals is important for a number of reasons. First, to the extent that private costs may affect compliance, this may need to be taken into account when assessing the effectiveness of the programme. Secondly, the estimation of costs and benefits falling on private individuals would help in the design of incentives systems involving taxes, grants or tax credits. Thirdly, estimation of private costs and benefits can help assess any equity implications of the intervention.

More generally, an analysis of costs and consequences by beneficiary group is important in assessing the equity implications of the intervention. These groups can be defined in terms of health status, socio-economic status or other characteristics, depending upon the most relevant notion of equity, as discussed in Section 4.3.

Finally, although the standard partial equilibrium approach to economic evaluations, where an intervention is assessed according to an existing set of prices and resource use in the broader economy, will probably suffice for the evaluation of most public health interventions. However, research should be conducted to assess whether a general equilibrium approach is more suitable for the evaluation of those public health interventions having a wide range of intersectoral costs and consequences.

Table 15: Six Month Total Cost per Patient (£)

	Cognitive Behavioural Therapy			Usual Care						
		(N = 209)		(N = 210)			Mean difference (MACT TAU) (95% CI)		P	Adjusted P*
	Mean	(S.D.)	Total cost %	Mean	(S.D.)	Total cost %				
Resource costs										
Hospital services	805	(1860)	12	1152	(2681)	15	-347	(-790 to 96)		
Community health services	384	(587)	6	280	(471)	4	104	(2 to 206)		
Medication	54	(95)	1	73	(194)	1	-19	(-48 to 10)		
Social services	91	(446)	1	355	(4224)	5	-264	(-841 to 314)		
Voluntary services	8	(44)	0	23	(123)	0	-15	(-33 to 3)		
Accommodation & living expenses	5326	(1460)	77	5499	(1917)	70	-173	(-500 to 154)		
Criminal justice services	54	(275)	1	167	(1079)	2	-113	(-264 to 39)		
Total resource costs	6722	(2655)	97	7548	(5501)	97	-827	(-1657 to 3)	0.05	0.03
Productivity costs	201	(718)	3	271	(893)	3	-71	(-226 to 85)	0.37	0.43
Total costs	6922	(2815)	100	7820	(5583)	100	-897	(-1747 to -48)	0.04	0.02

* Adjusted for baseline characteristics: centre, gender, age, living situation (alone v. with others), parasuicide risk score, Beck hopelessness score, personality status (no disorder v. disorder), and baseline costs.

Adapted from the following source: (52)

Section 5: Conclusions and Recommendations

The objective of this project was to assess the challenges of applying standard methods of economic evaluation to public health interventions. In particular, four methodological challenges were selected for further discussion: attribution of outcomes, measuring and valuing outcomes, equity considerations and intersectoral costs and consequences.

The review of existing empirical studies showed that economic evaluation had been applied in a wide range of public health areas. However, it provided relatively few insights as to how to address the four methodological challenges. In respect of attribution of outcomes, a surprising number of studies (38%) were based on an RCT. Whilst this illustrates the diverse set of interventions that it is possible to evaluate by RCTs, it also follows from the fact that a large proportion of the interventions studied were those delivered at the individual level, usually by health practitioners. On the other hand, relatively few complex interventions, delivered at the population level, have been subjected to economic evaluation.

Where studies were based on RCTs, analysts faced the same problems, of extrapolation beyond the end of the trial, or linking intermediate endpoints to final outcomes, that are faced by those undertaking economic evaluations of more narrowly defined clinical interventions. By and large the problem was tackled in a similar fashion to evaluations of clinical interventions e.g. by using modelling and available evidence (often from epidemiological studies).

The remaining economic evaluations were based on non-randomised studies (31%) and reviews/syntheses (31%). Most of these used some type of model; for example, a decision-analytic model to synthesize data from many sources, or a regression model to adjust for characteristics known to differ between the intervention and control groups.

In respect of measuring and valuing outcomes, the vast majority of studies did not attempt any valuation, being either CEAs (37%) using disease-specific outcomes in ‘natural units’ or CCAs (36%). Twenty seven percent of the studies reviewed were CUAs, but the valuations concerned were restricted to the health outcomes (states) obtained and expressed in QALYs or DALYs, as opposed to other outcomes beyond health. None of the studies identified used monetary valuations, obtained through willingness-to-pay estimates, to value a wide range of health and other outcomes. Indeed, most of the monetary valuations in the field of health are found in free-standing willingness-to-pay studies, rather than within economic evaluations.

Equity considerations were rarely mentioned in the empirical studies reviewed, although it should be mentioned that the search was restricted by the fact that the NHS EED does not include a search field for equity. However, a similar conclusion was reached in an earlier review of economic evaluations by Sassi *et al* (2001).(108) Very occasionally, studies mentioned that private costs might prevent those with low incomes complying with some interventions, for example in the case of bicycle helmet legislation (73), or a strict enforcement of legislation to reduce lead-based paint in houses.(72) However, these impacts are not examined formally.

Finally, the consideration of intersectoral costs and consequences was limited in the studies reviewed. Although 15% of studies considered productivity costs in addition to healthcare costs, and 9% considered (patients’) out-of-pocket expenses, only around 4% of studies considered costs in any other sector. By and large, the consideration of costs appeared to be determined by the sponsorship of the study. For example, studies of interventions to reduce or prevent substance abuse rarely considered criminal justice costs if the study was funded by the healthcare sector.

Given the relative lack of insights from the current empirical literature, most of our recommendations follow from a discussion of the methodological issues, as opposed to current best practice. Since much of what we suggest has not yet been applied, many of the recommendations relate to the use of pilot studies, or the need

for further research. They are grouped under the four methodological challenges below.

Attribution of Outcomes

1. Where possible, analysts should seek to conduct RCTs of public health interventions, as a source of evidence on relative effectiveness.
2. Bearing in mind the need for extrapolation of outcomes beyond the end of the trial, the outcomes measured should match those available in longer term observational studies.
3. Where RCTs cannot be undertaken, or are currently absent, natural experiments and non-experimental data should be used to fill gaps in the evidence base.
4. In economic evaluations all relevant evidence should be considered, including the synthesis of evidence from studies of different experimental and non-experimental designs. Further research should be conducted into the methods of achieving this.
5. More use should be made of techniques that have been developed to analyse non-experimental data, such as propensity scores, difference in differences techniques, time series analyses of natural experiments and, where appropriate, more sophisticated econometric modelling and structural simulation modelling.

Measuring and Valuing Outcomes

6. There should be more debate about the theoretical and value propositions underlying the various forms of economic evaluation, and their appropriateness for assessing public health interventions.
7. In all cases a cost-consequences analysis should be performed, prior to proceeding to the valuation of the various outcomes of public health interventions.

8. Research should be conducted into the practicalities of applying the intersectoral compensation test approach, outlined in Section 4.2.4 above.
9. Research should continue into the development of willingness-to-pay approaches in public health of a more generic measure of well-being, that could be applied in the evaluation of a wide range of public sector interventions, and sector-specific generic measures of outcome.

Equity Considerations

10. Pilot studies should be conducted of health inequality impact assessment for selected public health interventions, chosen on the basis that there exist detailed individual-level data on equity-related subgroups.
11. In situations where the most cost-effective option is likely to be judged inequitable, either on the grounds of health inequality impact or procedural justice, estimates should be made of the opportunity cost of not selecting that option, in terms of aggregate health gains forgone or additional resources used.
12. Primary research should be conducted on the effectiveness of interventions designed to tackle health inequality, combining knowledge and tools from social epidemiology and econometrics.
13. Further research should be conducted on equity weighting, focusing on equity considerations and contexts relevant to public health, as opposed to health care more generally. In particular research is warranted on equity considerations relating to socio-economic status, the degree of voluntariness or personal responsibility for health risk, the value of treating current ill-health versus preventing future health risk and the aspects of health inequality that the general public is most concerned about.

Intersectoral Costs and Consequences

14. The intersectoral impacts of public health interventions should be quantified (or at the very least described qualitatively), in a cost-consequences analysis, in the way that makes the most sense for each sector. Ideally each sector would use a well-understood generic measure of outcome, in reference to which the shadow price of the budget constraint in the sector could be expressed.
15. Although public sector decision makers are mostly concerned with the impacts of interventions on public sector budgets, there should be more consideration of impacts on the voluntary sector and private individuals, since taking this broader view may be required to assess more fully the effectiveness of programmes and to identify the equity implications arising from implementation.
16. In evaluating public health interventions, an analysis should be conducted of the costs and consequences by beneficiary group. These groups could be defined in terms of health status, socio-economic status or other characteristics, depending on policy relevance.
17. Research should be conducted to assess whether a general equilibrium approach is more suitable for the evaluation of public health interventions having a wide range of intersectoral costs and consequences.

Appendices

Appendix 1: References

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Appendix 2: Glossary

Bias

There are a number of different types of bias including selection bias, performance bias, attrition bias and detection bias. Bias is the systematic error(s), affecting the validity of a study. Post hoc evaluation of bias is usually difficult/often not possible therefore analysts need to use methods to try and avoid bias in the first place.

Cost-benefit analysis

An attempt to give the consequences of the alternative interventions a monetary value. In this way, the consequences can be more easily compared with the costs of the intervention. This involves measuring individuals' "willingness to pay" for given outcomes, and can be difficult.

Cost-consequence analysis

Costs are reported separately from health effects.

Cost-effectiveness analysis

The consequences of the alternatives are measured in natural units, such as years of life gained. The consequences are not given a monetary value.

Cost-minimisation

When two alternatives are found to have equal efficacy or outcomes (consequences). Therefore, the only difference between the two is cost. This is sometimes considered to be a sub-type of cost-effectiveness analysis.

Cost-utility analysis

The consequences of alternatives are measured in 'health state preferences', which are given a weighting score. In this type of analysis, different consequences are valued in comparison with each other, and the outcomes (e.g. life-years gained) are adjusted by the weighting assigned. In this way, an attempt is made to value the quality of life associated with the outcome so that life-years gained become quality-adjusted life-years gained.

Discounting

The process of converting future pounds sterling and future health effects to their present value.

Effect size

A measure of the magnitude of a relationship between variables.

External validity/Generalisability

The extent to which the effects observed in a study are applicable outside of the study. The term can be used interchangeably with transferability.

Heterogeneity

Any kind of variability among studies in a systematic review. Heterogeneity may be *clinical* (variability in the participants, interventions and outcomes studied), *methodological* (variability in trial design and quality) or *statistical* (variability in the treatment effects being evaluated in the different trials, which is a consequence of clinical and/or methodological diversity among the studies).

Imputation

Statistical 'filling in' of missing data, making assumptions about the outcomes of participants for whom no outcome was recorded.

Incremental cost-effectiveness ratio (ICER)

An expression of the additional cost of health gain associated with an intervention relative to an appropriate comparator. Expressed as the difference in mean costs (relative to the comparator) divided by the difference in mean effects. Sometimes expressed with confidence intervals.

Intention-to-treat analysis

Units are analysed in the condition to which they were assigned initially, regardless of whether they actually received the intervention in that condition. It protects against attrition bias.

Latent variables

As opposed to observable variables, are variables that are not directly observed but are rather inferred from other variables that are observed and directly measured.

Meta-analysis

The statistical pooling of the results of related individual studies, to increase statistical power and synthesise findings.

Meta-regression

A form of meta-analysis which investigates the importance and nature of relationships between study results and study characteristics, and can be used to explore reasons for heterogeneity.

NICE

National Institute for Health and Clinical Excellence. An independent UK organisation responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health.

Non-randomised study

An experiment in which participants are not randomly assigned to interventions.

Ordinary Least Squares (OLS)

A method for estimating the coefficients in a regression model based on minimizing the residual sum of squares.

Power

The probability of correctly rejecting a false null hypothesis, usually interpreted as the probability of finding an effect when an effect exists.

Health Related Quality of life

A concept incorporating all the dimensions of health (e.g. mental, physical and social health and wellbeing) that might impact on a person's life.

Quality-adjusted life year (QALY)

An index of health gain where survival duration is weighted or adjusted by the patient's quality of life during the survival period.

Random effects model

A method of meta-analysis which estimates the effect of an intervention, assuming that variation in meta-analysis is a combination of random sampling error within studies and variation between studies.

Regression analysis

A statistical modelling technique (there are numerous types), used to estimate or predict the relative influences of more than one variable on another.

Relative risk (RR)

The ratio of risk in the intervention group, relative to the risk in the control group. A relative risk of 1 indicates no difference between the groups being compared.

Search strategy

A combination of queries or commands designed to retrieve relevant records on a specific topic from an electronic database.

Sensitivity analysis

An approach for exploring how uncertainty impacts on study results.

Standard Gamble (SG)

Respondents are presented with a choice between an intermediate health state and a gamble between full health and death. The probability of death is varied until a point of indifference is reached between the two choices.

Time trade-off (TTO)

Respondents state the length of time in full health that they consider to be equivalent to a longer period of time in poor health.

Appendix 3: NHS EED searches for published economic evaluations

Economic evaluations for inclusion within the NHS EED database are identified by searching the following databases regularly:

Current Contents-Clinical Medicine (1994 onwards)

MEDLINE (1995 onwards)

CINAHL (1995 onwards)

EMBASE (2002 onwards)

Additionally a substantial number of journals, working papers and published technology assessments are handsearched. Further details are available on the NHS EED website

<http://www.york.ac.uk/inst/crd/crddatabases.htm>

Appendix 4: Search strategy applied to NHS EED

The following search strategy was based on the search terms from the Evidence Briefings that were originally housed in the Health Development Agency website. The HDA has now merged with NICE.

Public health: economic evaluations
Search strategies
29 Nov 2005

Search of NHS EED B system.

The following limits apply to all searches:
Language: English
Publication year: 2000-2005

1. Accidents (28/11/05)

Accident* or Injur* or Fall or falls or fire or fires
Drowning or Burn or burns
smoke or packaging or poisoning or helmet*
speed or calming or seatbelt*
1 or 2 or 3 or 4

2. Alcohol

S Alcohol* or drink* or intoxica* or beer or wine or absinthe or spirits or alco(w)pops or inebriant or inebriate* or drunk*

3. Ante and post natal visiting

s family or families or parent or parents or child or children or newborn or neonat* or mother* or baby or babies
s home(w)visit* or health(w)visit* or house(w)call* or social(w)worker*
s parent* (3w)(education or class or classes or training or program* or skill or skills)
s prenatal or ante(w)natal or antenatal or post(w)natal or postnatal
s district(w)nurse* or community(w)nurs*
s s1 and (s2 or s3 or s4 or s5)

4. Drug use

S Marijuana or Cocaine or Heroin or Methadone or Solvent* or Amphetamines
S Ecstasy or Ketamine* or substance(w)abuse or LSD
S Magic(w)Mushrooms or GHB or Poppers or VSA
S Anabolic(w) steroids or MDMA or drug(w)abuse* or drug(w)misuse* or substance(w)abuse* or substance(w)misuse*
S Street(w)drugs or Drug*(w)disorder* or Substance(w)related(w)disorder*

5. HIV/AIDS

s acquired(w)immunodeficiency(w)syndrome or hiv or aids
s human(w)immunodeficiency(w)virus or acquired(w)immuno(w)deficiency(w)syndrome
s human(w)immuno(w)deficiency(w)virus

6. Obesity

s obesity or pickwickian or prader(w)willi
s weight(w)gain or weight(w)loss
s obese or overweight or body(w)mass(w)index
s weight(w)control or waist(w)hip(w)ratio or weight(w)maintenance
s skinfold(w)thickness

7. Physical activity

s physical(w)activity or exercise or aerobics or circuits
s swimming or aqua* or jogging or running or cycling
s keep(w)fit or fitness(w)class* or yoga or walking or pilates
s fitness or sport or sports or sedentary or deskbound

8. Low birth weight

s low(w)birth(w)weight or lbw or low(w)birthweight
s premature or prematurity or small(w)gestational or preterm

9. Smoking

S Smoking or tobacco or Bupropion or zyban or NICOTINE

10. STIs

s sexually(w)transmitted(w)disease* or sexually(w)transmitted(w)infection*
s chancroid or Chlamydia or lymphogranuloma(w)venereum
s gonorrhea or granuloma(w)inguinale or syphilis or condylomata(w)acuminate
s herpes(w)genitalis or gonorrhoea or std or stds of sti or stis
s venereal(w)disease*

11. Teenage pregnancy

s pregnancy(s)adolescence
s teen*(s)mother* or teen*(s)father* or teen*(s)parent*
s teen*(s)pregnan* or adolescent*(s)pregnan* or underage*(s)pregnan* or youth(s)pregnan*
s schoolchild*(s)pregnan* or school(s)pregnan*
s contracept*(s)(child* or schoolchild* or teenage*)
s family(w)planning and (child* or schoolchild* or teenage*)
s sex(w)education
s condom* and (child* or schoolchild* or teenage*)
s birth(w)control and (child* or schoolchild* or teenage*)
s family(w)planning and (child* or schoolchild* or teenage*)
s pregnancy(w)unwanted

12. Youth suicide prevention

S suicid* or selfharm or self(w)harm or parasuicid* OR self(W)cutting OR self(W)injury

Appendix 5: Completed data extraction forms for economic evaluations based on randomised studies

Alterman, 2001 (137)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Medical behavioural treatment used in conjunction with nicotine replacement therapy Low intensity group - NRT for 8 weeks, institutional videotapes & one advice & education session with a nurse practitioner	Moderate intensity - same as low intensity plus 3 brief nurse practitioner delivered advice and education sessions High intensity - same as medium plus 12 weeks of individualised, manual driven CBT	Working age	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
80	Single centre	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Abstinence rate at weeks 9, 26 and 52						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Avanats, 2004 (138)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse HIV	Harm reduction group therapy	Usual care	Working age	US	North American	Medical	
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
110	Single	No	No	NA	3	3	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Drug use assessed by twice weekly urine samples						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Bagust, 2002 (24)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Acute paediatric hospital at home	Inpatient care	Children	UK	Europe	Secondary and community	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
40	Single centre	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Readmission rate	Satisfaction survey	Satisfaction survey				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	Yes	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Productivity changes Yes/no?	Method
-	-	-	-	-	Yes	Yes	Human capital approach

Beaupre, 2004 (139)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident Obesity & physical activity	Preoperative exercise and education programme in patients with scheduled total knee arthroplasty	Usual care	Working age	Canada	North America	Community/local	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
89	Single centre	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	WOMAC quality of life score	SF-36	Knee range movement	Strength (hand held dynamometer)			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Productivity changes Yes/no?	Method
-	-	-	-	-	-	No	NA

Bhatia, 2004 (140)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	In house residual spraying as malaria control interventions	Insecticide treated nets Early diagnosis and prompt treatment	General population	India	Asia	Community/local	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
30,569	Yes	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of malaria cases averted						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Government	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Boult, 2001 (141)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Geriatric evaluation and management service	Usual care	Older people	US	North America	Home	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
284	Single	Intention-to-treat	No	NA	18	18	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Changes in functional ability						
	30 item Geriatric Depression Scale						
	Bed disability days						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Brandon, 2004 (59)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Smoking relapse prevention programme single booklet	Massed mailing - one mail out all 8 booklets at once. Repeated letters i.e. single booklet then repeated letters. Repeated mailing 8 booklets one year	Working age	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
113	Single centre	Intention-to-treat	Yes	Life Table	24	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
		24 month abstinence from smoking	7-day point prevalence abstinence				
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Brooten, 2001 (142)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal Low birth weight	Home care provided by nurse specialists	Usual care	Women	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
86.5	Single	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Infant outcomes (mortality, gestational age, birth weight in preterm and term infants)	Maternal outcomes (number and length of prenatal, delivery and postpartum hospitalisations/acute visits, biophysical profile tests)					
CCA							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

McAlister, 2004 (44)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal & prenatal Low birth weight	Comprehensive follow-up care for high risk inner city infants	Routine follow-up care	Children	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
443	Single centre	Intention-to-treat	No	NA	7.5	7.5	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of and relative risk associated with known deaths	Infants with life threatening diseases	Infants admitted for intensive care	-			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	-	-	-	No	NA

Byford, 2003 (52)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident Suicide	Brief CBT	Usual care	General population	UK	Europe	Secondary and primary	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
240	Yes	Treatment completers	Yes	Costs were compared between the 2 groups using OLS. Logistic proportional hazards or normal errors regression were used to adjust for baseline characteristics	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs	-	-	-			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	Yes	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	Yes	-	Yes	Yes	Human capital approach

Dennis, 2004 (143)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse	Motivational enhancement therapy & CBT, 6 to 7 weeks	Motivational enhancement therapy & CBT, 12 to 14 weeks. Family Support Network Adolescent Community Reinforcement Approach. Multi dimensional family therapy.	Children	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
99	Yes	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Days of cannabis abstinence over 12 months	% of adolescents in recovery at the end of the study					
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

The Diabetes Prevention Programme (144)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Lifestyle changes to prevent progression of type 2 diabetes	Metformin Placebo	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
1617	Yes	Unclear	No	NA	36	36	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs	Quality of Wellbeing Scale (QWB)					
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	Yes	NS

Finkelstein, 2002 (62)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity Smoking	CV disease risk reduction programme - well integrated screening and evaluation for women across the nation project (WISEWOMAN) - CVD screening and a minimum lifestyle intervention	CVD screening and enhanced lifestyle interventions	Working age	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
793	Yes	Treatment completers	Yes	Details not provided	12	120	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Average 10 year probability of CHD						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Fleming, 2002 (145)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	A project for the treatment of excessive alcohol based on clinician delivered brief intervention during office visits	Usual care	Working age	US	North America	Primary	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
387	Yes	Intention-to-treat	No	NA	48	48	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	7 day alcohol use	30 day binge drinking episodes	Changes in the % of heavier drinkers	Avoided services utilisation			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	Yes	Human capital approach

Fritz, 2003 (146)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Classification based physical therapy with therapy based on clinical practice guidelines	Clinical practice guidelines for patients with acute low back pain	General population	US	North America	Secondary	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
39	Yes	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Center for Epidemiological Studies Depression Scale	Fear avoidance beliefs about work	Physical impairment index	Oswestry disability score			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)					Productivity changes		
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Georgiou, 2001 (57)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	14 month exercise training programme	Usual care	Working age	US	North America	Community	US
Sample size per group	Multi centre	Intention-to-treat (ITT) or Treatment Completers only (TC)	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	NS	Unclear	Yes	Survival analysis to extrapolate the data for an additional 10 years	14	134	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life Years Gained	-	-	-			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)					Productivity changes		
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Goldfield, 2001 (31)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Group and mixed family based treatment for childhood obesity	Group treatment only	Children	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
12	Single	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Reduction in standardised BMI	% overweight					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)	Productivity changes						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Haddock, 2003 (147)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse	Integrated programme of CBT combined with motivational intervention plus usual care	Usual care	Working age	UK	Europe	Community/local	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
18	Yes	Intention-to-treat	No	NA	18	18	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Global Assessment of Functioning score	Patient symptomatology using positive and negative syndrome schedule	Social functioning scale	Patient substance abuse			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)	Productivity changes						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	Yes	-			Human capital approach
					Yes	Yes	

Harrison, 2000 (148)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI HIV	Combination of measures to improve the management of STIs through workshops, follow-up visits, a pack of recommended drugs, condoms, partner notification cards and an information leaflet for the patient	Usual care	General population	South Africa	Africa	Primary	South Africa
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	Yes	Intention-to-treat	No	NA	15	15	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Patients treated correctly (given the right drug)	Patients given appropriate case management	Patients given appropriate counselling	Attitude of staff member			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Jones, 2003 (149)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol Drug abuse	Critical time intervention programme for homeless people with severe mental illness	Usual care	Working age	General population	US	North America	Medical
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
48	Single centre	Intention-to-treat	No	NA	18	18	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of non-homeless nights						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	Yes	Societal	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	No	NA

Katon, 2002 (150)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	Collaborative care for depression	Usual care	Working age	US	North America	Primary	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
136	Yes	Treatment completers	No	NA	30	30	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Symptom Check List Depression Score	Sheehan disability scale on functional impairment	Adherence to adequate antidepressant medications	-			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)					Productivity changes		
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Kenkre, 2002 (151)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Prevention of accidents among older people - educational training package	Do nothing	Older people	UK	Europe	Community/local	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
833	Yes	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	% of individuals that experienced an accident over the year	Total numbers of individuals experiencing accidents	Number (%) of individuals experiencing 1, 2, 3, 4 and 5 to 19 accidents				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

King, 2001 (152)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident Antenatal	Home visit programme to improve the safety of the home	Baseline home safety inspection	Children	Canada	North America	Community/local	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
586	Yes	Treatment completers	12	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Injuries prevented	Parental injury awareness and knowledge					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Kominski, 2001 (153)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	In depth psychogeriatric assessment and mental health care coordination by a multidisciplinary team	Usual care	Older people	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
844	Yes	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Mental health inventory anxiety and depression sub-scales	Alcohol use disorder identification test	RAND 36 item health survey short form				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Markle-Reid (154)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal & prenatal	2 year proactive public health nursing case management programme	Self directed use of health and social services	Working age	US	North America	Community	Canada
Sample size per group	Multi centre	Intention-to-treat (ITT) or Treatment Completers only (TC)	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
65	Single centre	Treatment completers	No	NA	24	24	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Social adjustment scale	University of Michigan Composite International Diagnostic Interview	Indices of coping response scales	Productivity measured in terms of social assistance			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	Yes	-	-	-	Yes
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	-	-	-	No	NA

McAlister, 2004 (155)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Telephone counselling services to assist smoking cessation. Also sent self help booklet and offered tailored counselling service	Mailed self help booklets	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
507	Single centre	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Number of smokers who managed to quit smoking over 12 months						
CEA	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Programme provider	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

McCrone, 2004 (156)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Treatment of people with chronic fatigue syndrome using CBT	Graded exercise therapy. Standard GP care plus a self help booklet	General population	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
48	Yes	Unclear	Yes	Details not provided	17	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Change in fatigue score						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	No	NA

McCrone, 2004 (157)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Computerised CBT	Usual care	Working age	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
137	Yes	Intention-to-treat	No	NA	6	6	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs	Beck Depression Index	Depression free days	Social adjustment scale			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Morrell, 2000 (45)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal & prenatal Teenage pregnancy	Community postnatal support workers in the community	Usual care	Women	UK	Europe	Community	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
312	Single centre	Intention-to-treat	No	NA	<12	<12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	SF36	Edinburgh postnatal depression scale	Feeding rates	-			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service and out of pocket costs to the women	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Productivity changes Yes/no?	Method
-	-	-	-	-	Yes	No	NA

Nieuwland, 2000 (158)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	High frequency exercise training programme	Low frequency exercise training programme	Working age	Netherlands	Europe	Medical	Netherlands
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
65	Yes	Treatment completers	1.5	NA	1.5	<12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Exercise duration	Peak workload	Peak oxygen consumption	Peak VO2 adjusted for age and gender			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA-

Parthasarathy, 2003 (159)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author	
Drug abuse Alcohol	Integrating substance abuse treatment and primary care	Independent care model	General population	US	North America	Medical	US	
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)		
327	Single	Unclear	No	NA	12	12		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4				
CCA	Inpatient utilisation per 1,000 member months	Family/social addiction severity						
Perspective (stated)	Costs (by sector)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method	
-	-	-	-	-	-	No	NA	

Patel, 2004 (160)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Training for caregivers of stroke patients	No training of caregivers	Older people	UK	Europe	Workplace	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
150	Unclear	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Patrick, 2001 (55)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Aquatic exercise	Usual care	Older people	US	North America	Community	US
Sample size per group	Multi centre	Intention-to-treat (ITT) or Treatment Completers only (TC)	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
125	Yes	Intention-to-treat	Yes	Multivariate general linear model	Life time	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs	-	-	-			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	-	-	-	No	NA

Pyne, 2003 (161)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	Enhanced care in the treatment of depression (additional training for office nurses to supplement the primary care from doctors)	Usual care	Working age	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
240	Yes	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Pyne, 2003 (63)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	Enhanced care in the treatment of depression	Usual care	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
106	Yes	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Raftery, 2005 (58)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity Smoking	Nurse led clinic	Usual care	Working age	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
672	Yes	Intention-to-treat	Yes	Kaplan Meier	56	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Not considered	-	Not considered	Not considered	Not considered	No	NA

Robertson, 2001 (162)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident Obesity & physical activity	Home based muscle strengthening exercise	Usual care	Women	New Zealand	Western Pacific	Community/local	New Zealand
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
117	Yes	Intention-to-treat	No	NA	24	24	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA		Falls prevented per 100 person years					
	Number of injurious falls						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Rosenheck, 2003 (163)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol Drug abuse		Intensive case management without access to section 8 vouchers. Standard VA homeless services - short term broker case management as provided by VA's outreach workers	Older people	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
136	Yes	ITT	No	NA	36	36	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Number of days housed in previous 90 days	Number of homeless in previous 90 days					
CEA							
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer, health service, government, societal	Yes	-	Yes	-	-	Yes	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Ruchlin, 2001 (164)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Multifactorial intervention post hip fracture - supportive patient education in hospital, high intensity strength training, an at home walking programme, contact with peer advocates who had experienced the same problem and had recovered satisfactorily	Usual care	Older people	US	North America	Home	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
90	Yes	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of patients who received strength training session	Median number of sessions received by these patients	Number of patients in the intervention group who saw the self efficacy video	number of patients who had at least one contact with a peer advocate			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)	Productivity changes						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	Yes	-	-	No	NA

Salkeld, 2000 (27)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Home hazard reduction programme	Usual care	Older people	Australia	Western Pacific	Community/local	Australia
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
265	Single	Treatment completers	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	SF36	Number, relative risk of falls prevented in one year					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Schauffler, 2001 (165)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Insurance coverage for tobacco dependence treatment - nicotine replacement therapy	Free self help kit only	Working age	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
602	Yes	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Quit rate (no smoking during the previous 7 days)	Attempts to quit (an attempt made for 1 + days during the previous 7 days)	Rate of watching video or pamphlet on self care	Rate of using bupropion			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Schnelle, 2003 (166)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident Obesity & physical activity	Functional Incident Training, exercise and incontinence intervention	Usual care	Older people	US	North America	Home	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
95	Yes	Treatment completers	no	NA	8	8	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Incidence of health outcomes e.g. respiratory, gastrointestinal	Falls & pain	Psychiatric and nutritional disturbances				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Sevick., 2000a (32)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Lifestyle exercise in sedentary adults	Structured exercise interventions	Working age	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
118	Single centre	Unclear	No	NA	24	24	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Energy expenditure in kcal per kg per day	Energy expenditure from moderate to hard activity	Hours spent sitting each week				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Sevick, 2000b (167)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Aerobic exercise training	Resistance training Education programme	Older people	US	North America	Community	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
145	Yes	Intention-to-treat	No	NA	18	18	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Self reported disability	Physical performance	Knee pain scale	Measure of pain frequency and pain intensity on ambulation and transfer			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Shanahan, 2004 (56)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse Alcohol	Adult drug court programme	Usual care	Working age	Australia	Western Pacific	Community and prison	Australia
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
250	Single centre	Treatment completers	No	NA	18	18	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Time to first drug related offence	Number of drug related offences per day	-	-			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Payer	Yes	-	Yes	Yes	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Sobell, 2002 (47)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	Community level mail intervention based on natural recovery rates - motivational enhancement/personalised feedback re drinking levels etc	2 pamphlets with information on alcohol and guidelines for low risk drinking, also by post	General population	Canada	North America	Community	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
413	Single centre	Treatment completers	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of days drinking per week	% of days drinking per week in the past year	Number of drinks per day	Number of drinks per week			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Southard, 2003 (168)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Internet based programme used by nurse case managers to provide risk factor management support, education and monitoring services to patients with CV disease	Usual care	General population	US	North America	Home	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
52	Yes	Unclear	No	NA	6	6	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Functional status using Duke Activity Status Index	Angina grade	Level of depression using Beck Depression Inventory	Dietary condition using MEDFICTS			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Steel O'Connor, 2003 (169)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal	Public health nurse follow-up programme after early obstetrical discharge - telephone follow-up	Home visit follow-up	Women	Canada	North America	Community/local	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
367	Yes	Intention-to-treat	No	NA	6	6	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Overall participation rate of mothers	Number of mothers breastfeeding their infants at 2 weeks, 4 weeks and 6 months	Cumulative % of mothers breastfeeding their infants at 2 weeks, 4 weeks and 6 months	Levels of maternal confidence related to infant care before discharge, at 2 weeks etc			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	NS

Sullivan, 2002 (170)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Educational programme	Usual care	Children	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
517	Yes	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Average number of symptom free days						
Perspective (stated)	Costs (by sector)						
Health service	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Sweat, 2001 (46)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI HIV	Video based group intervention encouraging safe sexual behaviours	Usual care	Ethnic minority	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
1,002	Single centre	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	HIV infections averted						
Perspective (stated)	Costs (by sector)						
Health care payer	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Trento, 2002 (34)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Group sessions educational programme for the management of non insulin treated type 2 diabetic patients	Usual care	Working age	Italy	Europe	Community/local	Italy
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
56	Single	Intention-to-treat	Yes	Prediction model	48	48	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA							
	Diabetic quality of life	Knowledge of diabetes	Average number of sessions attended	Measurement of weight, fasting blood glucose, haemoglobin			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Tyrer, 2004 (171)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Suicide	Manual assisted CBT	Usual care	General population	US	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
240	Yes	Intention-to-treat	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	% of patients who had repeatedly self harmed						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	NS

Von Kock, 2001 (25)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	A programme of rehabilitation at home after early discharge for patients after stroke	Usual care	General population	Sweden	Europe	Community	Sweden
Sample size per group	Multi centre	Intention-to-treat (ITT) or Treatment Completers only (TC)	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
42	Single centre	Treatment completers	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Presence of aphasia	Reinvang aphasia test	Lindmark motor capacity	Barthel Index of daily living			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Wang, 2000 (50)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI HIV Teenage pregnancy	School based programme Safer Choices - 2 year theory based, multi-component intervention to increase condom and contraceptive use	Usual care	Children	US	North America	School	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
1839	Yes	Unclear	Yes	Bernoulli process model	7	7	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of cases of viral diseases and STIs	Pregnancy averted					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Wang, 2002 (172)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Inter-disciplinary obesity prevention programme	Usual care	Children	US	North America	School	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
602	Yes	Unclear	Yes	Decision model	24	Lifetime	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Weisner, 2000 (64)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol Drug abuse	Integrated model of medical and substance abuse care	Independent care model	Working age	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
327	Single	Treatment completers	No	NA	6	6	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Abstinence from drugs and alcohol rates						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Wylie-Rosett, 2001

(30)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Weight loss - do it yourself workbook	Expert computer system plus workbook. Staff consultation, plus computer system plus workbook	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
168	Single	Not clear	No	NA	9	9	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Changes in dietary intake and exercise	BMI	Waist measurements	Proportion of body fat			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Zarkin, 2001

(61)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse HIV STI	Enhanced intervention for people with substance abuse at risk of HIV	2 sessions of HIV prevention counselling with HIV antibody screening	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
219	Single centre	Treatment completers		An algorithm was used to allocate resource use time associated with each of the interventions	3	3	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Reduced day of drug use						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Hospital	yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Appendix 6: Completed data extraction forms for economic evaluations based on non-randomised studies

Bensussen-Walls, 2001 (43)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal. Teenage pregnancy.	Dedicated teen focused prenatal clinics - maternity and infant care centre	Dedicated teen focused prenatal clinics - group health co-operative centre	Children	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
53	Single	Treatment completers	No	NA	24	24	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of visits	Birth outcomes	Infant birth weight	Gestational age at delivery			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Berg, 2002 (173)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Diabetes Management - community based programme	Usual care	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
127	Yes	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Measures of sugar	% of patients experiencing symptoms of hypoglycaemia	% of symptoms of glycaemia experienced by patients				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Bienstock, 2001 (174)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal. Low birth weight.	Inner city hospital house staff for the management of women at risk of preterm pregnancy	Managed care organisation management	Children	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
96	Single	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Rate of recurrent preterm delivery	Gestational age for preterm deliveries	Number of prenatal visits				
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Hospital	Yes	-	-	-	-	-	-
Costs (by sector) (continued)	Productivity changes						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Bledsoe, 2002 (28)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Motorcycle helmet law for 18+ year olds	Repeal of motorcycle helmet law for 18+ year olds	Working age	US	North America	Transport	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
73	Single	ITT	No	NA	24	24	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Admissions after nonfatal motorcycle crashes	Glasgow Coma Scale	Head and neck injury scale	Injury severity score			
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)	Productivity changes						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Boath, 2003 (175)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal	Treatment of postnatal depression in a psychiatric day hospital	Standard primary care	Women	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
30	Single	Unclear	No	NA	6	6	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Recovery in treated women						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Brandt, 2002 (176)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Use of helmets by motorcyclists	No helmet	Working age	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
174	Single	ITT	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Mortality rate	Injury severity score	Abbreviated injury scale score	Length of hospital stay			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Brown, 2002 (72)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Strict strategy to enforce housing policies to prevent childhood lead poisoning in residential areas where lead poisoned children were identified	Limited strategy	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	Single	NA	Yes	Decision tree	120	120	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Probability of identifying one child with elevated BPb	CCA					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	Yes	-	Yes	-	Yes	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	NS

Chen, 2000 (66)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Post acute care - home without formal care	Home care Nursing home Rehabilitation facility	General population	US	North America	Home	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	Yes	NA	Yes	Instrumental variables to correct for selection bias. Multi-nomial logit model to estimate post acute care discharge location. OLS model to estimate cost & consequences	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Activities of daily living score						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer and Patient	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Coley, 2002 (29)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Seatbelt use for elderly motor vehicle crash victims	No seatbelt	Older people	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
241	Single	ITT	No	NA	24	24	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Sustained injuries	Injury severity score	Need for nursing home placement or rehabilitation placement	Mortality			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Collins, 2004 (177)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Musculoskeletal injury prevention programme	Usual care	Working age	US	North America	Workplace	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
1728	Yes	Unclear	No	NA	72	72	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Reduction in total workers' compensation expenses arising from injury prevention programme						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Daley, 2001

(178)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Low birth weight	Detoxification only	Methadone only. Residential rehabilitation units. Outpatient only. Residential/outpatient	Women	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
170	Yes	Treatment completers	No	NA	9	9	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Birth weight						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)					Productivity changes		
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Gilbert, 2004

(179)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Pharmacological smoking cessation therapies - physician counselling & nicotine gum	Physician counselling & nicotine patch. Physician counselling & nicotine nasal spray. Physician counselling & nicotine inhaler. Physician counselling & bupropion. Physician counselling alone	General population	Seychelles	Developing Countries	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	Yes	NA	Yes	Markov model life Table model	3	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life Years Gained						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)					Productivity changes		
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Haddix, 2001 (26)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Smoke alarm giveaway programmer, plus fire prevention information and battery replacement components	NA	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
73,301	Single	ITT	No	NA	60	60	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Total fire related costs prevented						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	Yes	-	-		Human capital approach
						Yes	

Haile, 2002 (180)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking Accident	Computerised delivery of smoking cessation advice to surgical preadmission patients	Usual care	Working age	Australia	Western Pacific	Medical	Australia
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
234	Single	Treatment completers	No	NA	9	9	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Smoking cessation						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)	Productivity changes						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Hardy, 2001 (181)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Accident and emergency based approach to assisted early discharge or avoid admission of acute hospital admissions	Usual care	Working age	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
203	Single	Treatment completers	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Length of stay	Rate of hospital admissions	Satisfaction survey				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Harrison, 2001 (182)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal Low birth weight	Healthy Beginnings Antenatal Programme - home based	Healthy Beginnings Antenatal Programme - hospital based	General population	Canada	North America	Community/local	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
228	Single	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	% of infants admitted to NICU for > 48 hours	Pregnancy complication factors					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Haumschild, 2003

(183)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Fall focused pharmaceutical intervention programme - improvement of the drug regimen	Usual care	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
200	Single	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
		Class and number of drugs taken as the drug regimen					
CCA	Patient fall rate						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Patient & health care payer	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	?	No	NA

Johnston, 2000

(184)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Remote video technology in the home health care setting plus standard home visits	Standard home visits	General population	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
178	Single	ITT	No	NA	4	4	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	% of patients experiencing a decline in functional status	% deaths	Change in patient depressive symptoms (15 item Geriatric Depression Scale				
CCA	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	-	-	Yes	No	NA

Kulaga, 2004 (185)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	Hospital clinician educators who manage patients admitted to hospital	Usual care by community based doctors	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
583	Single	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
		Satisfaction score based on a Likert scale					
CCA	Length of stay						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Hospital	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Lee, 2002 (186)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal	Infant transport system - Emergency medical team	Registered nurses team. Combined teams	Children	Canada	North America	Transport	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
433	Yes	NA	Yes	Decision tree	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Change in Transport Risk Index of Psychological Stability (TRIPS)	CEA					
CEA	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Liu, 2003 (187)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol	Collaborative care for depression	Consult liaison care	Men	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
310	Single	ITT	No	NA	6		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Total alcohol and other substance abuse abstinence rates	CEA					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Liu, 2003 (188)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI	Syndromic management of STIs	Usual care	Men	China	Asia	Community/local	China
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
203	Yes	Treatment completers	No	NA	Unclear		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of patients correctly treated for STI						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Patient	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

McCusker, 2003 (189)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	A brief emergency department visit for the management of high risk elders	Usual care	Older people	Canada	North America	Medical	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
194	Yes	Unclear	No	NA	4	4	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Proportion of patients experiencing a decline in functional status	Proportion of deaths	Change in patient depressive symptoms (15 item Geriatric Depression Scale)				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	Yes	-	-	-	Yes	No	NA

Mehta, 2002 (190)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI	Standard emergency department practice	Screen all 18 to 31 year olds and no EDP. Screen all 18 to 31 year olds by risk factor plus EDP. Screen all 18 to 31 year olds and EDP.	Working age	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	NS	Unclear	Yes	Decision tree	120	120	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Cases of gonorrhoea or chlamydia not treated	Complications					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Miller, 2002
(191)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Exercise during hemodialysis	No exercise	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
40	Single	Unclear	No	NA	6		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Blood pressure	Antihypertensive use					
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Okin, 2000
(192)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse	Clinical case management for high users of urban emergency department	Do nothing	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
106	Single	Treatment completers	No	NA	12		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Impact on psychosocial variables e.g. homelessness, alcohol abuse, drug use and having medical insurance						
CCA	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Hospital	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Peddecord, 2004 (193)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Telephone surveys to assess immunisation coverage rates	Written surveys to assess immunisation coverage rates	Children	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
561	Single	Treatment completers	No	NA	Unclear		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	% of responding parents who provided vaccination dates	Rate of completed vaccinations					
CCA	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Local health department	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Pollack, 2001 (194)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal. Smoking. Teenage pregnancy.	Sudden infant death syndrome. Smoking cessation programme during pregnancy	Do nothing	Children	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
Not clear	Yes	ITT	No	NA	Cross sectional		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of SIDs deaths averted						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)						
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Reece, 2002 (65)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal. Low birth weight. Smoking.	Infant and Parent Support Services	Usual care	Working age	US	North America	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
121	Single	ITT	No	NA	12		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of falls occurring						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Reinharz, 2000 (195)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal	Birth centre based midwifery services	Usual care (inpatient stays)	Women	Canada	North America	Medical	Canada
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
330	Yes	ITT	No	NA	11		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of falls occurring						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Richards, 2002 (196)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Nurse telephone triage for same day appointments in general practice	Usual care - fit in appointments	General population	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
3,452	Yes	ITT	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Final point of contact	Follow-up care					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Robertson, 2001 (197)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident. Obesity & physical activity.	Nurse delivered exercise programme delivered at home	Usual care	Older people	New Zealand	Western Pacific	Community/local	New Zealand
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
117	Yes	ITT	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of falls	Number of injuries	SF-12				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Robertson, 2001 (71)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident. Obesity & physical activity.	Nurse delivered exercise programme delivered at home	Usual care	Older people	New Zealand	Western Pacific	Community/local	New Zealand
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
50	Yes	ITT	No	NA	11	11	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Fall events per 100 person years						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	Yes	-	-	No	NA

Routh, 2000 (198)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV. STI	A community service point strategy providing essential health and family planning	Delivery of services from a static primary health care clinic	Women	Bangladesh	Asia	Community/local	Bangladesh
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
3,750	Yes	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	Number of births averted						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Programme provider	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Sackett, 2004 (49)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Low birth weight	Prenatal programme	Usual care	Children	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
2,338	Yes	Unclear	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	% of low birth weight infants						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Scoular, 2001 (199)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI	Enzyme linked immunoassay	Liagese chain reaction	Working age	UK	Europe	Medical	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
Not clear	Single	NA	Yes	Details not provided	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of cases of chlamydia detected						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Sikand, 2000

(200)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity & physical activity	Dietitian intervention - medical nutrition therapy administered by registered dietitians	Statin therapy	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
43	Single	ITT	No	NA	2	2	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Total cholesterol, LDL-C, high density lipoprotein cholesterol						
CCA		Triglycerides	BMI				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Statham, 2004

(48)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol. Antenatal. Drug abuse.	Family support services offered to families with children in a high level of need plus community childminding	Family support service only	Working age	UK	Europe	Community/local	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
20	Yes	Unclear	No	NA	3	10	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
	Modified version of the Family Problems Questionnaire						
CCA	General health questionnaire	Questionnaire					
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Stevens, 2002 (201)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking. Accident.	Smoking cessation programme	Do nothing	Ethnic minority	UK	Europe	Community/local	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
142	Single	Unclear	Yes	Calculations based on the published literature	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life Years Gained	Rates of quitters at one year					
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Local health authority department	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Productivity changes Yes/no?	Method
-	-	-	-	-	-	No	NA

Sweat, 2000 (202)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal. Teenage pregnancy	Voluntary HIV testing and counselling	Usual care	General population	Multiple	Africa	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
Not clear	Yes	NA	Yes	Details not provided	12	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Costs (by sector)						
	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Productivity changes Yes/no?	Method
-	-	-	-	-	-	No	NA

Toledano-Alhadeff, 2001
(203)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Antenatal	Fragile X carrier screening	Do nothing	Women	Israel	Middle East	Medical	Israel
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
14,334	NS	Unclear	Yes	Decision tree	Unclear		
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of carriers of an allele with 50 or more repeats, 55 or 200 or more repeats	Number of pregnancies & subsequent prenatal diagnosis procedures	Transmission of allele containing 50 or more repeats				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Utzinger, 2001
(204)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Implementation of a malaria control programme	Usual care	General population	Zambia	Africa	Community/local	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
6,067	Single	Treatment completers	No	NA	240	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	DALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Not stated	Unclear	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Voorhees, 2000 (70)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Impact of nitrogen dioxide control policy	Impact without nitrogen dioxide control policy	General population	Japan	Asia	Community/local	Japan
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	Yes	NA	No	NA	Unclear	Unclear	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of trips each weekday into Tokyo from other prefectures and within Tokyo	Reported nitrogen dioxide emissions in kg/year	Number of registered motor vehicles	Incidence of phlegm and sputum in adults and workers			
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	Yes	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-						Human capital approach
		Yes	-	Yes	-	Yes	

Walker, 2003 (205)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Public place defibrillators	No public place defibrillators	General population	UK	Europe	Transport	UK
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
NS	Yes	NA	Yes	Life Table	Unclear	Life time	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)							
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Weisner, 2000 (64)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse	Alcohol and drug programme	Outpatient treatment programme	Working age	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
761	Single	ITT	No	NA	21	21	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Alcohol, substance abuse abstinence rates	Addiction severity index	Symptoms Distress Checklist				
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Yokoyama, 2002 (206)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Multi-disciplinary diabetes care clinic	Usual care	General population	US	North America	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
22	Single	Unclear	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of patients achieving glycaemic control						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Yosefy, 2003 (207)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Israeli blood pressure control programme to enhance the control of modifiable risk factors among high risk hypertensive patients	Do nothing	General population	Israel	Middle East	Medical	US
Sample size per group	Multi centre	Intention-to-treat or Treatment Completers only	Extrapolation	Method of extrapolation	Length of follow-up (months)	Length of study (months)	
4,948	Yes	ITT	No	NA	12	12	
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Unclear	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

U = Unclear, NS = Not Stated, - = not reported

Appendix 7: Completed data extraction forms for economic evaluations based on reviews

Ahmad, 2005 (39)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking		Maintain legal smoke age 18. Raise legal smoke age to 19. Raise legal smoke age to 21	Working age	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Dynamic computer simulation	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs	QWB					
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Societal	Yes	-	Yes	Yes	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	Yes	Yes	No	NA

Bedimo, 2002 (208)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI HIV	Use of condom social marketing programme	Do nothing	Ethnic minority	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Bernoulli process model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Chesson, 2002 (67)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI Teenage pregnancy	WINGS Women in Group Support project - 6 session. intervention offering training in condom use and in communication skills	2 session intervention. Do nothing.	Women	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Structured equation model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs	HIV infection averted					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Chirikos, 2004 (209)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Complementary health intervention to prevent smoking relapse - repeated mailing of information	Massed mailing - one mail out all 8 booklets at once. Repeated letters i.e. single booklet then repeated letters. Minimal contact - single booklet.	General population	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Unclear, lifeTable?	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Cohen, 2004 (210)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI Alcohol	26 interventions for the prevention of HIV but 4 categories; individual interventions (counselling and testing etc)	Structural interventions e.g. condom availability, needle exchange etc.	General population	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Bernoulli process model	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of HIV infections averted						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Cromwell, 2001 (40)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	5 different counselling options to quit smoking	Do nothing	Working age	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

DiFranza, 2001 (68)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Enforcement programme to halt the sale of tobacco to youths across US	Do nothing	Children	US	North America	Education	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Linear regression model to predict the number of outlets in particular states. A steady state model was used in which all the costs and benefits associated with a single year of enforcement were applied to single high school graduating class	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life Years Gained						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	Yes	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	Yes	-	No	NA

Franzini, 2004 (211)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI Teenage pregnancy	Legislation limiting the confidentiality in the use of publicly funded reproductive health care	Legislation making use of reproductive health care confidential	Children	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Details not provided	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Number of additional pregnancies, births, abortions	Additional cases of STI					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Goldie, 2003

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Adherence interventions in persons with HIV. Bleepers, counselling, directly observed therapy	Usual care with no adherence programme	General population	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Monte Carlo Markov Chain	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Heumann, 2001

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI	Prevention referrals for high risk HIV negatives	Do nothing	General population	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Model - no details	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of HIV infections averted						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service & societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	Unclear	Unclear

Hutton, 2003 (211)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Mass media and social marketing of condoms	Peer education for high risk groups. Prevention and treatment of STIs. Antiretroviral therapy to prevent mother to child transmission. Breast feeding advice to prevent mother to child transmission. Testing of donated blood. Voluntary testing and counselling. Do nothing	General population	Chad	Africa	Medical	Switzerland
Extrapolation	Method of extrapolation	Length of evaluation					
No	NA	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of HIV infections averted						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Programme provider	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Jackson, 2003 (212)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Nucleic acid amplification testing technology for HIV, hepatitis C, hepatitis B etc	9 screening strategies in all. Serological testing as specified by the FDA.	Older people	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Markov model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Jacobs, 2003

(213)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI	Screen and defer vaccination until serological tests known	Screen and begin. Vaccinate without screening	General population	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	6					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of vaccination protections conferred						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Johnson-Masotti, 2000

(35)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Single session of one-to-one HIV/AIDs risk reduction educational programme	CBT risk reduction intervention - multi-session. Seven sessions of teaching communication strategies for disseminating HIV prevention messages to friends and acquaintances	General population	UK	Europe	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Mathematical model	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Johrie, 2002 (38)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	AIDs drug assistant programme, 33 alternative strategies, 2 main ones - opportunistic infection prophylaxis strategy	Antiretroviral strategy	General population	Canada	North America	Medical	Canada
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	State transition decision analytic model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Kopjar, 2000 (73)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident. Obesity & physical activity	Bicycle helmet	Do nothing	General population	Norway	Europe	Community/local	Norway
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Simple probability model	5					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Head injuries avoided						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Levy, 2002

(214)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	A policy to treat smoking dependence - minimal intervention or self quitting	Prescription pharmacotherapy alone. OTC pharmacotherapy. Behavioural therapy. Treatment, pharmacotherapy or behavioural therapy. OTC, pharmacotherapy or behavioural therapy in combination. No tobacco control policy	General population	UK	Europe	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Computer simulation model	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Predicted quit rate						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Programme provider	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Lowenstein, 2000

(215)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Exercise training	Do nothing	Working age	Canada	North America	Community/local	Canada
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	State transition decision analytic model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life Years Gained						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Marshall, 2002 (216)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Primary prevention strategy based on the Joint British Recommendations guidelines	Novel guidelines by authors	Working age	UK	Europe	Community/local	UK
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Mathematical model. Cardiovascular risk estimation based on the Framingham CHD risk equation	60					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of CV events prevented						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Montgomery 2003 (33)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Blood pressure lowering over the lifetime	Do nothing	Working age	UK	Europe	Medical	UK
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis using MCMC	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Mozurkewich, 2000 (217)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Low birth weight	9 strategies for the management of threatened preterm labour including tocolytics and corticosteroids	Do nothing	Children	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	<12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of cases of respiratory disease syndrome	Neonatal death					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Murray, 2003 (218)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Obesity and physical activity	Interventions to lower high systolic blood pressure - 17 interventions in all	Interventions to lower high systolic blood pressure - 17 interventions in all	General population	Switzerland	Europe	Medical	Switzerland
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	A standard multi-state modelling tool	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	DALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Myers, 2004 (69)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Rollover Protective Structure to protect tractor operators from injury in the event of an overturn	No ROPs programme	Working age	US	North America	Workplace	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	20					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of injuries averted						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

Naidoo, 2000 (219)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Consequences of meeting smoking cessation targets	Do nothing	Working age	UK	Europe	Medical	UK
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Details not provided	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Avoidance of MI	Avoidance of stroke hospitalisation	Mortality	Stroke			
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Paltiel, 2001
(220)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Valganciclovir as a pre-emptive therapy for cytomegalovirus therapy in patients with HIV in which CMV polymerase chain reaction test was conducted initially to identify candidates for pre-emptive therapy	CMV prophylaxis with valganciclovir	General population	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	MCMC simulation model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector)	(continued)						Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Payne, 2004
(221)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Fresh semen in women undergoing insemination by donor	Frozen semen	Women	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis including Markov model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector)	(continued)						Productivity changes
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Phillips, 2000 (36)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	HIV counselling and testing	Voluntary screening for HIV and no pre-test counselling	Working age	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision tree	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Pinkerton, 2002 (53)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI Teenage pregnancy	CBT for sexual risk reduction interventions	Do nothing	General population	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Bernoulli process model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
	Costs (by sector)						
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
	Costs (by sector) (continued)					Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Pinkerton, 2004

(222)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Community based post exposure prophylaxis programme	No prophylaxis	General population	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Life Table	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	No	NA

Pinkerton, 2000

(223)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI Teenage pregnancy	Intensive 1 day CBT of HIV risk reduction	Career opportunities workshop	Ethnic minority	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Mathematical model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Pinkerton, 2001 (224)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV	Small group intervention for helping mentally ill adults reduce their risk of HIV	Health promotion intervention	Working age	US	North America	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Mathematical model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Pollack, 2001 (225)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Drug abuse	Harm reduction in preventing hepatitis C among injection drug users - syringe exchange programme	Usual care	General population	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Epidemiological model - susceptible infected, random mixing mathematical model of disease spread	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Averted infection at different infection rates	Time to convergence from initial conditions of disease prevalence to endemic steady state prevalence					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Postma, 2000

(226)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI Antenatal	Expanded antenatal screening for HIV	Universal partner testing. Selective repeat screening of mothers considered to be at high risk, assuming uptake of all 3 preventative measures. Selective partner screening of those considered to be at high risk, at the same time as the mother's initial test	Children	UK	Europe	Medical	Netherlands
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life Years Gained						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Ranson, 2002

(227)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Tobacco control policies: price increases	Nicotine replacement therapy. Non-price interventions such as advertising bans & smoking restrictions in work and public places	General population	Multiple	7 regions of the world	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Simple static model	50					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	DALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Government	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	Yes	No	NA

Sahin-Hodoglugil, 2003 (228)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
STI	Syndromic management of STI	LCR or PCR. Community wide or targeted mass treatment	Women	South Africa	Africa	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	MCMC	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of women cured with treatment	Number of overtreated women					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Salinas, 2002 (229)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	Health interventions to prevent injury in the metal working industry	NS	Working age	Mexico	Central America	Workplace	Mexico
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Details not provided	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Health life years gained						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Not stated	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	Unclear	-	No	NA

Schumacher, 2002 (230)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Alcohol Drug abuse	Substance abuse treatments for homeless people - Usual care - counselling	Enhanced care - counselling, housing, work. Day treatment - counselling, work. Day treatment - counselling, housing, work.	General population	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
No	NA	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of weeks abstinent from all addictive drugs and alcohol at the completion of each phase of the study						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Programme provider	Yes	-	-	-	-	Yes	Yes
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Secker-Walker, 2005 (124)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Smoking cessation community based project	Do nothing	Women	US	North America	Community/local	UK
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Markov model life Table model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Life expectancy						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Song, 2002 (41)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	Pharmacological smoking cessation therapies - simple advice or counselling only	Advice or counselling plus nicotine replacement therapy. Advice or counselling plus bupropion sustained release. Advice or counselling plus bupropion sustained release nicotine replacement therapy and bupropion sustained release	General population	UK	Europe	Medical	UK
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision tree	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Tengs, 2001 (42)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking Accident Drug abuse	Intensive school based anti-tobacco programme	Usual care	Children	US	North America	School	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Epidemiological model, including Markov model	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	Yes	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Tran, 2002
(231)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Smoking	4 smoking cessation programme in a community pharmacy practice	Self directed quit attempt	Working age	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision tree	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Health care payer	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Trussell, 2001
(232)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Teenage pregnancy	Use of emergency contraceptive pills - after unprotected sex	Use of emergency contraceptive pills - following unprotected sex	Women	US	North America	Medical	Canada
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Details not provided	24					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CCA	Probability of preventing pregnancy with ECPs	Probability of ectopic pregnancy, included abortion, spontaneous abortion and birth of unintended pregnancies					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Varghese, 2001

(37)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV STI	HIV counselling and testing	Do nothing	Working age	US	North America	Prison/detention	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	Life time					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Number of future HIV infections prevented						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Wilkinson, 2000

(233)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
HIV Antenatal	A provincial or national programme using a short course of oral zidovudine plus infant formula feed for 4 months within a strengthened health system	Do nothing	Children	South Africa	Africa	Community/local	South Africa
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision analysis	<12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	DALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Wilson, 2001 (234)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident. Obesity & physical activity	Tai chi to prevent falls	Do nothing	Older people	US	North America	Home	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision tree	12					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Avoided mortality and morbidity converted into monetary benefits using WTP	Proportion of frequent fallers	Proportion of falls that resulted in hip fractures	Case-fatality rate for hip fracture patients within one year following the injury			
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Wolfe, 2001 (235)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Low birth weight	Strategies to prevent low birth weight associated with malaria - sulfadoxine pyrimethamine etc	Do nothing	Children	Kenya	Africa	Medical	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Decision tree	9					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	DALYs	Incidence of low birth weight					
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environment	Housing	Employment
Health service	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	No	NA

Wong, 2004 (236)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Low birth weight	Air pollution reduction based on US Clean Air Act	Status quo	Children	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	Monte Carlo one dimensional simulation model	240					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CEA	Mortality averted converted to a monetary value using the value of a statistical life	Hospitalisation	Respiratory ailments				
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environme	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	NS

Zaloshnja, 2003 (51)

Public health topic	Intervention	Control(s)	Target group	Country of evaluation	Region of evaluation	Setting	Location of author
Accident	5 injury prevention programmes for Native Americans; safety belt programme.	Street light project. Livestock control project. Drowning prevention programme. Suicide prevention programme for 15 to 19 year olds.	Ethnic minority	US	North America	Community/local	US
Extrapolation	Method of extrapolation	Length of evaluation					
Yes	NS	Unclear					
Type of economic evaluation	Outcome 1	Outcome 2	Outcome 3	Outcome 4			
CUA	QALYs						
Costs (by sector)							
Perspective (stated)	Health care	Education	Criminal justice	Law enforcement	Environmen	Housing	Employment
Societal	Yes	-	-	-	-	-	-
Costs (by sector) (continued)						Productivity changes	
Defence	Social care	Transport	Voluntary	Private	Out of pocket	Yes/no?	Method
-	-	-	-	-	-	Yes	Human capital approach

U = Unclear, NS = Not Stated, - = not reported

NB where the sample size per group differs, the sample size stated is the average sample size per group

Appendix 8: Journals containing economic evaluations of public health interventions

<p>Academic Emergency Medicine Accident Analysis and Prevention</p> <p>AIDS</p> <p>Aids and Behaviour Aids care Alcoholism: Clinical and Experimental Research American Journal of Cardiology American Journal of Emergency Medicine American Journal of Human Genetics</p> <p>American Journal of Kidney Disease</p> <p>American Journal of Managed Care American Journal of Medicine American Journal of Obstetrics and Gynecology American Journal of Preventive Medicine American Journal of Public Health American Journal of Tropical Medicine and Hygiene</p> <p>Annals of Emergency Medicine Australian and New Zealand Journal of Surgery Archives of Disease in Childhood Archives of Family Medicine Archives of General Psychiatry</p> <p>Archives of Internal Medicine Archives of Pediatrics & Adolescent Medicine Arthritis and Rheumatism Australian and New Zealand Journal of Public Health Blood Pressure</p> <p>BMC Infectious Diseases British Medical Journal British Journal of Psychiatry Canadian Journal of Public Health Cerebrovascular Diseases</p> <p>Child and Family Social Work Clinical and Experimental Research Clinical Infectious Diseases Communicable Disease and Public Health</p>	<p>Journal of Affective Disorders Journal of Agricultural Safety and Health Journal of Air and Waste Management Association Journal of Allergy and Clinical Immunology Journal of American College of Cardiology</p> <p>Journal of American Dietetic Association Journal of American Geriatrics Society Journal of Cardiopulmonary Rehabilitation Journal of Clinical Outcomes Management Journal of Consulting and Clinical Psychology Journal of Epidemiology and Community Health Journal of Evaluation in Clinical Practice</p> <p>Journal of General Internal Medicine Journal of Health System Pharmacy Journal of Hypertension</p> <p>Journal of Internal Medicine Journal of Maternal-Fetal and Neonatal Medicine Journal of Mental Health Policy and Economics Journal of Perinatal and Neonatal Nursing Journal of Personality Disorders Journal of Psychoactive Drugs Journal of Public Health Management and Practice Journal of Rheumatology Journal of Substance Abuse Treatment Journal of Trauma, Injury, Infection and Critical Care Journal of Urban Health Journal of Women's Health and Gender Based Medicine Lancet Managed Care Medical Decision Making Medical Care Medicine and Science in Sports and Exercise Mental Health Services Research Nicotine and Tobacco Research Obesity Research</p>
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Diabetes Care Diabetologica Drug Benefits Trends Emergency Medicine Journal Environmental Health Perspectives Evaluation Review Family Practice Fertility and Sterility Health Promotion International Health Services Research Injury Prevention Inquiry International Journal of Health Planning & Management International Journal of Obesity International Journal of sexually transmitted diseases and AIDs International Journal of Technology Assessment in Health Care Journal of American Medical Association Journal of Acquired Immune Deficiency Syndromes	Obstetrics and Gynecology Occupational Medicine Pediatrics Pharmacotherapy Prevention Preventive Medicine Psychiatric Services Psychological Medicine Psychology of Addictive Behaviours Public Health Nursing Public Health Reports Sexually Transmitted Diseases Social Science and Medicine South African Medical Journal Spine Tobacco Control Transfusion Tropical Medicine and International Health
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