

# A guide to WELLBEING ECONOMIC EVALUATION



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## 1. Overview

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The What Works Centre for Wellbeing (the Centre) aims to produce high quality, accessible evidence syntheses for decision makers in government, charities, business and the community.

Information on ‘what works’ for wellbeing is not enough by itself. To know where best to focus our time and investment, we need to know where options are applicable, how they can be implemented and **how much they cost**. Putting resources into one option means that we miss out on the benefits which could be achieved through a different choice. Decision makers need to know how **much benefit can be achieved per £** and for whom, in order to decide where best to spend their budgets.

This guide is a discussion document setting out proposed methods for economic evaluation of wellbeing programmes. The audience is primarily the Academic teams which make up the Centre, to document our evolving shared approach. It is intended that it will be amended on an iterative basis as methodologies and source data develop.

Our Handbook for Wellbeing Measurement (forthcoming) presents these issues and the approach in a more accessible manner, for other audiences.

### The cost effectiveness approach

A recognised method to help decision makers is to calculate **cost effectiveness**: that is, in this context, the monetary cost per unit improvement in wellbeing. This approach requires standardised measures of wellbeing appropriate to the situation being assessed.

**The extent of the economic evaluation should be appropriate to the decision to be taken** - i.e. there is no need to model the benefits over 50 years for a one-off singing workshop! However, detailed analysis may well be appropriate for larger investment decisions, or system-wide changes.

### Measuring benefits

There are many different ways to measure wellbeing but it is useful to have a common measure when comparing a range of activities across diverse areas. The Centre recommends that life satisfaction years are initially used as this single holistic measure or “common currency”. This guide presents a method of translating different measures of wellbeing into Life Satisfaction on a 0-10 scale. This translation should be viewed with caution, since many significant assumptions are required.

Life satisfaction will not always be the most appropriate measure of wellbeing benefit. It may not be sensitive enough to capture the impact of a project geared towards improving a specific aspect of wellbeing or the desired effect may be “in the moment” rather than longer term. In such cases, costs should be presented relative to the most suitable measures which should always be justified.

### Measuring Costs

Analysis should consider **full economic costs** - i.e. not just the direct financial cost of the intervention but also indirect costs associated with delivery and evaluation plus ancillary costs (such as lost time for participants) and other resources employed. Where published estimates are used to calculate costs they should be from a consistent source (in this document UK national figures are used).

Where a project leads to **reduced costs** (e.g. reduced absenteeism, reduced healthcare costs), these should be included in the cost effectiveness as **negative costs**.

## The Details

As per accepted practice, costs and benefits should be calculated **compared to the next best alternative**. In some cases, this may be current practice.

**Equity analysis:** The breakdown of cost and benefit impacts on different groups should be clearly presented, to understand the equity implications.

**Taking a society-wide perspective.** Costs should include all costs to society. Similarly, wellbeing benefits should include those accruing to all and not just the intended beneficiaries. Wellbeing transcends organisational and sectoral boundaries - taking a narrow view of cost effectiveness can lead to bad decisions. A society-wide perspective provides a more complete picture and allows decision makers to see where costs and benefits really lie. Adopting such an approach is essential in complex modern societies where the health, social care, educational, criminal justice and other systems are inextricably linked.

**Alongside a narrower, budget-holder perspective:** In reality, decision-makers and budget holders will also need to know specific costs and benefits accruing in their defined area of responsibility. This analysis should be additional, alongside the overall societal view.

In line with the Department of Health and the rationale set out in the Treasury Green Book, we are proposing a discount rate of 1.5% for wellbeing impacts and 3.5% for non-wellbeing impacts.

## Sound easy?

Cost effectiveness analysis using wellbeing as the measure of benefit is relatively new and precise information on which to base calculations is often missing. The approach laid out below can be viewed as 'best current practice', which will be updated with more practical examples and more detail as this emerges.

However, it is usually possible to make estimates where specific data is not available.

- Costs may be missing but they can be *estimated*, based on resource information available.
- Benefits may not be expressed in terms of life satisfaction but translation mapping can be used to create a "common currency".
- Life satisfaction may not be the most appropriate measure of wellbeing but costs can be expressed compared to the suitable measure which was used.
- Evaluations may only show the immediate impact on wellbeing of an intervention. Care must be taken not to extrapolate benefits unless there is sound evidence to indicate that would be valid.

The results of wellbeing cost effectiveness analysis should always be presented with a degree of caution which reflects the uncertainties in the data. Sensitivity testing should be undertaken and shown so that decision makers can assess the degree of risk associated with adopting a particular course of action.

The approach of the What Works Centre for Wellbeing is iterative and collaborative and we invite your feedback. Any comments or questions on this guide should be addressed to [sara.maclennan@whatworkswellbeing.org](mailto:sara.maclennan@whatworkswellbeing.org)

## 2. Introduction

As part of its remit of providing evidence-based research for decision makers in government, charity, and business, the What Works Centre for Wellbeing (the Centre) is producing a number of economic evaluations of policy interventions. This document provides guidance on the methods and reporting procedures that should be followed when producing economic evaluations for the Centre.

Methods guides set out appropriate methods for the conduct of economic evaluations. By doing so, they ensure that minimum quality standards are met and that consistent and transparent approaches are followed. The use of a methods guide helps researchers to produce evaluations with comparable results. This supports policy makers in making informed and consistent decisions.

The guide described here sets out methods which should be adopted in the first instance: the reference base case analysis. It details further analyses which should be conducted to assess the robustness of base case results. It also sets out what should be done in instances where the base case methods are not feasible or desirable, paying particular attention to circumstances where available data are limited.

This guide draws heavily on well-regarded methods guides produced by the National Institute for Health and Care Excellence (NICE)<sup>1</sup> and the Bill and Melinda Gates Foundation.<sup>2</sup> To aid understanding, this guide makes use of two example interventions to show how the methods might apply in practice. The first example is Silver Song Club, a singing group offered to senior citizens; the second is Housing First, a housing service designed to reduce long-term homelessness. These are explained in further detail in Table 1.

**Table 1: Example Interventions**

Intervention	Description
Silver Song Club	Silver Song Club is a singing group for older persons comprising weekly singing lessons and communal singing sessions. There is evidence that it improves health related quality of life through improved mental health. <sup>3</sup>
Housing First	Housing First is an intervention in which long-term homeless people are given intensive, open-ended support and immediate access to permanent housing which is not conditional on treatment adherence or remaining abstinent. It is distinguished from 'Continuum of Care' models in which service users are graduated up to permanent housing only after displaying 'housing readiness'. Evidence shows Housing First improves housing stability and can reduce visits to A&E and contacts with the criminal justice system.

The methods described here apply equally to economic evaluations conducted on behalf of government, charity, community or business sectors. The overarching goal in the development of this guide has been to produce methods which are compatible with open, fair and transparent decision making.

<sup>1</sup> <https://www.nice.org.uk/process/pmg9/resources/guide-to-the-methods-of-technology-appraisal-2013-pdf-2007975843781>

<sup>2</sup> <https://www.nice.org.uk/Media/Default/About/what-we-do/NICE-International/projects/Gates-Reference-case-what-it-is-how-to-use-it.pdf>

<sup>3</sup> Couton et al. The British Journal of Psychiatry (2015) 207, 250–255. doi: 10.1192/bjp.bp.113.129908

### 3. Initial Scoping

Prior to conducting the economic evaluation, the scope of the decision(s) the evaluation will inform should be well understood. Where possible, dialogue with stakeholders should be made on the purpose of the evaluation, including discussion on its timeliness, usefulness and relevance.

The dialogue should elicit ‘insider’ knowledge which will help with the conduct of the evaluation – for instance, on the intricacies of the wider policy environment (including legal obligations), the specifics of the intervention and the idiosyncrasies of the population it may be delivered to. Taking a ‘wellbeing’ perspective necessitates a very broad consideration of outcomes, so capturing the full picture is likely to require discussion across sectors.

Conducted alongside preliminary scoping of the available evidence, the discussion will help identify the costs and benefits of the intervention to be captured in the evaluation. Further, it will inform how much time and resource should be devoted to carrying out the evaluation. This should be commensurate with the size of the decision and the added benefit the economic evaluation is likely to provide.

Taking the Housing First example, homelessness charities in the field identify a lack of good evidence on its long-term and indirect costs as holding back wider implementation. They also note that Housing First is likely to take a slightly different form in the UK to that followed in the United States, where the bulk of evidence is from. Understanding this would inform the design of an economic evaluation of Housing First.

## 4. Stages of economic evaluation

### 4.1 Type of Economic Evaluation

#### Reference Base Case Analysis:

- Economic evaluations should be in the form of a cost-effectiveness analysis.
- Supplementary cost-consequence analyses should be conducted where the intervention has multiple benefits which are not adequately captured in a single wellbeing measure.

Cost-effectiveness analysis (CEA) is a type of economic evaluation in which costs are presented in monetary terms, while benefits are measured in a different unit. The unit of measurement should be appropriate for the decision problem and consistent with the goals of the What Works Centre for Wellbeing. This is likely to be life satisfaction years, although other outcomes may be appropriate in certain circumstances (described in further detail in Section 3.5).

The use of separate units of measurement for costs and benefits distinguishes CEA from cost-benefit analysis (CBA), where both costs and benefits are expressed in monetary terms. CEA is adopted here as the What Works Centre for Wellbeing has the explicit aim of promoting policies which maximise



society's wellbeing. Further, for most interventions evaluated by the Centre, monetary values for benefits are neither readily observable (e.g. of increased autonomy in Housing First) nor can be reliably estimated using revealed or stated preference methods. Researchers who wish to include monetary estimates of benefit (including by following the "Life Satisfaction Approach"<sup>4</sup>) should do so in additional analyses to the base case CEA analysis.

In some instances, data on wellbeing consequences of an intervention may not be available nor may be an appropriate measure of benefit (e.g. intermediate outcomes such as crime rates or educational attainment may be more relevant). In this case, another measure may be used and the reason for not using wellbeing should be explicitly justified in the report (see Section 3.5). Supplementary cost-consequence analyses – where a list of benefits rather than a single benefit is reported – should be carried out where additional benefits are found which are not adequately captured by the life satisfaction measure and which may be of interest to decision makers. Again, the inclusion of the different benefits should be explicitly justified.

## 4.2 The Decision Problem

### Reference Base Case:

- Decision problem should be stated in PICO format.
- Comparators should include feasible alternatives, including 'best practice', 'current practice' and, if applicable, 'do nothing'

The decision problem the economic evaluation seeks to inform should be stated explicitly using the PICO (Population, Intervention, Comparator, Outcome) format. The comparators should include feasible alternatives, including active interventions that are thought to represent 'best practice' or good value for money, in addition to current practice. Where no obvious comparator exists a 'do nothing' comparator might be appropriate (for example, in an economic evaluation of supporting singing groups).

Where another intervention exists which is not current practice but which may be both feasible and desirable to implement, this can be included, where possible, as another comparator in the economic evaluation.

A 'do nothing' option should be included where current practice may be cost-ineffective and where disinvestment is possible. A new intervention may appear cost effective relative to existing provision, but may be cost-ineffective relative to no provision whatsoever.

Consideration should be also given to whether a 'whole pathway' modelling approach is appropriate. This is where the complete network of services in a given area is modelled. A whole pathway approach offers opportunities to assess what is the best set of intervention to implement, but is resource intensive to carry out.

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<sup>4</sup> See here for more information:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/209107/greenbook\\_valuation\\_techniques.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209107/greenbook_valuation_techniques.pdf)

### 4.3 Perspective

#### Reference Base Case:

- Societal perspective should be used, including net costs and wellbeing benefits to all persons and bodies directly and indirectly impacted by the intervention within the UK.
- Net costs and benefits should also be presented from the perspective of each decision maker (including individual government departments).

Taking a wider perspective forces a ‘holistic’ view of all beneficiaries and costs, to understand where there may be gains wider than one single budget holder.

The economic evaluation should take a societal perspective, considering costs and benefits to all persons and groups within the UK. This includes those directly affected by the intervention, such as participants, as well as those indirectly affected. For instance, an increase in Silver Song Club participants’ wellbeing may have a small impact on neighbours and friends through their increased wellbeing. A change in a mother’s mental health may have a significant (indirect) impact on a child’s wellbeing. These indirect wellbeing impacts may also be due to changes (for example) in crime or trust, or caring responsibilities. Where information is available, the wellbeing impacts on these other groups should also be estimated and added to the total wellbeing impacts.

In practice, estimating benefits and costs for all affected groups may be unfeasible, particularly in instances where impacts are diffuse. Attention should be paid to benefit and costs which are likely to have a material impact on the decision problem – in other words, to those with differences of sufficient size between intervention and comparators that their exclusion would likely lead to a substantial bias in the cost-effectiveness estimate.

Benefits and costs may be modelled where good evidence exists (see Section 3.11). Explicit mention of important benefits or costs which have not been included in the economic evaluation and justification for their exclusion should be given in the evaluation report.

**The analysis should also provide results from other perspectives.** Decision-makers will also want to identify the costs and benefits falling directly within their responsibilities. For example, an employer may only be interested in the net costs falling to them against the wellbeing benefits of employees. A certain department may have to make the case of the costs and benefits within their remit.

Different perspectives may also be wider than an individual budget holder and may include for example a whole CCG, the NHS, or a local authority. Housing First, for example, has impacts across several government departments, and an economic evaluation of Housing First using these different perspectives may assist cross-departmental collaboration.

For governmental evaluations, the reference base case should also include an analysis taking a governmental perspective for costs – that is, the evaluation should consider all costs incurred, both directly and indirectly, to the UK Government, at both national and local levels and including the NHS.



## 4.4 Time Horizon

### Reference Base Case:

- The time horizon should be of sufficient length to capture materially important differences in costs and benefits between interventions.

The time horizon should be sufficiently long to capture all important differences in costs and benefits between the intervention and its comparators. This should include costs and benefits both directly and indirectly related to the intervention (for instance, improved wellbeing from the singing group may lead to reduced health needs in the future), but should exclude unrelated costs in additional life years where the intervention improves survival (e.g. greater pension entitlements due to living longer, treatment costs from subsequently developed cancer) (see Section 3.7). Analyses that limit the time horizon to periods shorter than the impact of the intervention will not provide an accurate estimate of benefits and costs.

The appropriate time horizon will differ between evaluations. For instance, Housing First is likely to have long term impacts on recipients' service use, wellbeing and mortality rates, while the Silver Song Club is more likely to have only a short-term effect. The time horizon adopted should be justified in the report. It should be based on the best available evidence, which, in some cases, may be expert opinion.

Long-term estimates are likely to be less accurate than short-term estimates. This is both due to the likely unavailability of good quality long-term data and to the possibility of significant policy changes being enacted which substantially effect future outcomes. For instance, the relative cost of Housing First will be lower if housing benefit entitlements rise. To take account of this, supplementary analyses should be conducted which vary the time horizon to periods in which the evidence is strongest or which account for possible policy changes. An example of a latter analysis would be to assess the cost-effectiveness of Housing First over a plausible range of housing benefit entitlements.

In some circumstances, by necessity, the time period used will be shorter than the likely period of effect (for instance, in situations where long term data isn't available). Where this is the case, this must be stated in the report, along with a discussion of whether, in what direction and to what extent the cost-effectiveness estimates are likely to be biased.

## 4.5 Measuring and Valuing Benefits

### Reference Base Case:

- Where relevant, benefits should be measured using life satisfaction years. Some alternative measures can be translated into life satisfaction, with caution.
- Other measures of wellbeing may be more relevant in some circumstances.

There are many different ways to measure wellbeing but it is useful to have a common measure when comparing a range of activities across diverse areas. The Centre recommends that life satisfaction years are initially used as this single holistic measure or “common currency”. Benefits should be estimated for all beneficiaries, direct and indirect.

Life satisfaction years are calculated by multiplying a person’s life satisfaction score by the time spent in that state (thus capturing duration of benefit). Life satisfaction years should be measured on a 0-10 scale, with 10 being equal to one year spent in maximum life satisfaction and 0 equal to one year spent at minimum life satisfaction. Life satisfaction may not have been measured on this scale (for instance, some life satisfaction questions use a 1-7 scale) but can be transformed on to it after the fact.

The life satisfaction years measure makes two significant simplifications. First, it assumes that increases in life satisfaction are equally valued at all points up its scale, i.e. assuming that a change from 3 to 4 is equal to a change from 9 to 10, which we currently cannot prove. Second, it assumes that a life satisfaction score of 0 is equivalent in value to death. Ideally, a wellbeing-adjusted life year measure (akin to the QALY used by NICE) would be used which captures both the relative value of points on the life satisfaction scale and the trade-off between quantity and quality of life. However, at present, no such measure exists. Using life satisfaction years should be viewed as exploratory. In the event of a measure being developed, this guidance will be updated.

In some circumstances, life satisfaction scores may not have been collected from beneficiaries. Where this is the case, life satisfaction may be estimated by mapping from another measure of benefit which has been collected (e.g. happiness or anxiety). The mapping function chosen should be formulated statistically using data sets containing both the life satisfaction and the other measure. Existing functions may be used or created *de novo* but should be fully described and justified with demonstration of how well the function fits the data.

Where it is not possible to create a mapping function which fits the group, existing estimates of ‘translation’ or rates of change can be used to translate from one quality of life measure to life satisfaction. Table 2 displays the unconditional correlation coefficients between life satisfaction and a group of quality of life measures, derived from surveys of the UK population, from Mukuria et al (2016)<sup>5</sup>. Layard (2016) has extrapolated these to calculate the rates of change (or ‘translations’) for some of the wellbeing measures where this *may* be appropriate. This translation should be applied and presented with caution. More detail on this is provided in the What Works Centre for Wellbeing Common Currency paper.<sup>6</sup>

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<sup>5</sup> Mukuria, C., Rowen, D., Peasgood, T. and Brazier, J. (2016). An empirical comparison of well-being measures used in UK. Research Interim Report RR0027: University of Sheffield and the University of York

<sup>6</sup> Layard, 2016. Measuring Wellbeing and Cost-Effectiveness Analysis: Using Subjective Wellbeing. Available here: <https://whatworkswellbeing.files.wordpress.com/2016/08/common-currency-measuring-wellbeing-series-1-dec-2016v2.pdf>

**Table 2: Correlations between Quality of Life measures**

Quality of Life Measure		Health improvement and Patient Outcomes		Multi Instrument Comparison		South Yorkshire Cohort over 65		Understanding Society	
Name	Range	r	dLS/dX	r	dLS/dX	r	dLS/dX	r	dLS/dX
<b>Wellbeing</b>									
Worthwhile (ONS)	0 - 10	0.8	0.8	0.77	0.84	0.75	0.75		
Happy (ONS)	0 - 10	0.84	0.84	0.76	0.75	0.8	0.72		
Anxious (ONS)	0 - 10	0.6	0.53	0.32	0.3	0.5	0.35		
WB-VAS	0 - 10	0.82	0.49			0.74	0.07		
GHQ	0 - 36							-0.49	-0.21
GHQ positive	0 - 18							-0.4	-0.42
GHQ negative	0 - 18							-0.48	-0.3
<b>Health</b>									
EQ-5D- 5L	(-0.6) - 1	0.63		0.39		0.44			
SF-6D (SF-12)	0.3 - 1	0.72		0.51				0.36	
SF-6D (SF-36)	0.3 - 1			0.48					
WEMWBS	14 - 70					0.68	0.13		
SWEMWBS	7 – 35					0.66	0.26	0.5	0.25
ICECAP-0	0 - 1					0.63	8.77		
ICECAP-A	0 - 1			0.65	9.71				
EQ-VAS	0 - 10	0.7	0.8			0.59	0.6		

- i. Source: Layard (2016), from Mukuria, C., Rowen, D., Peasgood, T. and Brazier, J. (2016). An empirical comparison of well-being measures used in UK. Research Interim Report RR0027: University of Sheffield and the University of York
- ii. r = Spearman's Correlation Coefficient
- iii. dLS/dX = Change in life satisfaction associated with a one unit change in the quality of life measure. Life Satisfaction is measured on a 0-10 scale.
- iv. Scales Abbreviations: WB-VAS – Wellbeing Visual Analogue Scale; GHQ – General Health Questionnaire; EQ-5D-5L – EuroQol 5 Dimension (5 Level Version); SF-6D (SF-12/36) – Short Form 6 Dimension, derived from Short Form 12 (36); (S-)WEMWBS – (Shortened) Warwick Edinburgh Mental Well-Being Scale; ICECAP-O(A) – Investigation Choice Experiments Capability Measure for Older People (Adults).

Where no dataset exists to create a mapping function, another measure of benefit can be used. In cases where it is unethical to collect life satisfaction data directly (for example, for interventions directed at vulnerable populations), expert or informed peer values may be elicited or another measure of benefit used.

Life satisfaction years may not always be an appropriate measure of benefit. For example, when assessing a program that involves only very small changes on a small target population and for which the intervention effect on life satisfaction is hence extremely small and dominated by random error between the experiment group and the control group, it can be better to focus on a particular outcome that is measured at a finer level and that captures the effects of the intervention. For instance, interventions that favour one type of cultural activity at a community centre over another can probably be better evaluated by asking people how happy they were with the specific experiences rather than their satisfaction with life. The former should show a difference if there is a large effect, whilst the latter may not be affected enough to see reflected in the data. Justification for the measure should be made. This evidence should be derived from a synthesis of peer-reviewed literature. Stakeholder engagement will support an in depth understanding of the benefits that are not fully captured. Other measures of quality of life should be considered in the first instance.

#### 4.6 Equity Considerations

Reference Base Case:

- Equity implications should be described and presented in the report but not formally incorporated into the base case analysis.

The equity implications of the intervention's implementation should be discussed explicitly in the economic evaluation but should not be directly included in the analysis using, for instance, equity weights applied to the benefits for particular groups. The discussion and presentation of results should include detailed description of the groups affected, and may include estimates of their quality of life.

This exercise is particularly useful in the absence of a measure of wellbeing adjusted life years which does not assume changes in life satisfaction are equally valued at all points up the scale.

#### 4.7 Resource Use and Costs

Reference Base Case:

- Full economic costs should be calculated and resource use shown.
- Costs should be estimated using UK figures, and, where relevant, split by decision-making unit or budget holder.
- Cost reductions should be included as negative costs.

All major sources of societal costs should be captured in the evaluation, including all resource use directly and indirectly related to the intervention and including economic costs such as changes in productivity<sup>7</sup>. This should also include resources diverted to the intervention from other uses – for instance, staff who are also employed for other purposes – and include shares of central resources and capital costs. Reduced costs should be incorporated in the analysis as negative costs (for instance, savings to the NHS or improved productivity for business).

Particular attention should be paid to costs which are likely to have a material impact on the decision problem i.e. in many cases, small costs or benefits will not affect the decision and the work involved to calculate these may not be justified.

Costs which are incurred in additional years of life which are unrelated to the intervention should not be included. The exclusion of these costs is based on equity concerns: groups with existing high need are likely to cost more in extra life years than lower need groups. In the absence of equity weighting (see Section 4.6), the exclusion of unrelated costs, though resulting in a partial analysis, is justified in not penalising disadvantaged groups.

Costs should be presented from a societal perspective and also from the perspectives of different decision-making units, if relevant to the decision problem. This may include the perspective of: local authority or government department, a business or employer, a charity or community group.

Resource use should be estimated using data from settings similar to the UK (i.e. where the intervention itself and important aspects of the surrounding environment are comparable). However, evidence on the cost of this resource use should ideally come from published UK figures. This may include micro-costing studies from the UK which may have been conducted as part of the economic evaluation itself. Resources may be costed using appropriate proxies where relevant information is not available.

The resource use and cost data should be identified in a transparent manner and should be described and justified in the evaluation report. Precise figures may be withheld if there is an issue of commercial sensitivity. Where several alternative sources are available, a justification for the costs chosen should be provided and discrepancies between the sources explained. Where appropriate, sensitivity analysis should also be used to assess the impact of using alternative data sources on results.

For governmental evaluations, the economic evaluation should include an estimate of costs relating to all resources under the control of the UK government, both local and national and including the NHS. Changes in tax revenue should be included (with increased tax revenues lowering costs) and should also be split out, by type of tax, as separate entries in final reporting (e.g. changes in VAT receipts, income tax receipts). Costs should also be split by government department. This will help decision makers understand where costs are likely fall within government, can assist cross-department collaboration and help decision-making where the opportunity cost of spending is different between departments.

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<sup>7</sup> See Department of Health guide on policy appraisal (Appendix 7, p40) for a discussion of how to estimate a value of time. Valuing time raises a number of issues, including the equity implications if paid work is valued more highly than non-paid time; human capital vs. friction cost methods; and potential for double counting of the value of time through the QoL measure.

The Drummond blue book, *Methods for the Economic Evaluation of Health Care Programmes*, provides an overview of these challenges on p84-88.

The cost of running an evaluation should be reported, but presented separately from total costs and should not be included as part of the cost effectiveness calculation (and therefore the decision-problem) unless they are expected to be an ongoing part of routine use of the intervention. E.g. QI, monitoring, or auditing costs should be included, but not basic evaluation of the intervention. Costs related to developing the intervention should not be included unless these costs will be replicated were the intervention implemented more widely (for instance, if the intervention needs adapting to local context).

Researchers should be also clearly state if the intervention is cost-saving or not and should provide a range of relevant estimates if the intervention is subject to significant economies of scale.

Table 3 displays costs which could be collected as part of economic evaluations of Housing First and Silver Song Club.

**Table 3: Example Intervention Costs**

Intervention	Cost
Silver Song Club	<p>Direct Costs: Hall space Wages of group leader Songbooks/other club materials...</p> <p>Associated Costs: Cost of transport to venue Cost of carers' time to accompany participants to venue...</p> <p>Indirect Costs: <u>Reduced costs</u> to the NHS through reduced health needs (e.g. GP visits, outpatient appointments, inpatient admissions)...</p>
Housing First	<p>Direct Costs: Housing costs (e.g. costs of permanent tenancy, emergency and transitional accommodation) Cost of intensive case management (e.g. caseworkers wages, cost of 24/7 emergency call centre, caseworker travel costs) Share of central resources (e.g. share human resources for Housing First support workers)...</p> <p>Indirect Costs: Costs to the NHS through changed use of health services (e.g. substance misuse treatment, GP visits, A&amp;E admissions, mental health inpatient admissions) <u>Reduced costs</u> to the criminal justice system (e.g. court cases, jail bookings, prison stays) Reduced economic costs of crime...</p>



## 4.8 Discounting

### Reference Base Case:

- Monetary impacts should be discounted at 3.5% per annum.
- Wellbeing impacts should be discounted at 1.5% per annum.
- Sensitivity analysis using other discount rates should be carried out.

Monetised costs and benefits (i.e. non-wellbeing impacts which are added to calculate net costs) should be discounted at 3.5% per annum in the base case analysis in line with HM Treasury rules. The Treasury prescribes a declining discount rate of 3.5% for the first 30 years, 3.0% for the years 31 to 75, 2.5% from year 76 to 125, and 2.0% from year 126 to year 200. This is based on the Social Time Preference Rate (STPR), which is composed of:

- The rate at which individuals discount future consumption over present consumption, on the assumption that no change in per capita consumption is expected, is comprised of their pure time preference and perception of catastrophic risk
- An additional element, if per capita consumption is expected to grow over time, reflecting the fact that these circumstances imply future consumption will be plentiful relative to the current position and thus have lower marginal utility. This effect is represented by the product of the annual growth in per capita consumption and the elasticity of marginal utility of consumption with respect to utility.

As economic evaluations for the What Works Centre for Wellbeing will use a direct measure of wellbeing, the additional element of the STPR relating to declining marginal utility of consumption (equal to 2%) should not apply. Thus, in the base case scenario, wellbeing benefits and costs should be discounted at 1.5%.

This is consistent with the Department of Health guidance, which recommends discounting health impacts (benefits and costs) at 1.5% and non-health impacts at 3.5%. NICE recommend a 3.5% analysis for both health effects and costs. Alternative approaches to discount rates should be tested in sensitivity analysis.

## 4.9 Evidence Synthesis

### Reference Base Case:

- The evidence selection process should be transparent and justified.
- Evidence should be critically appraised using published or transparent checklists.
- Meta-analysis should be used where multiple sources of sufficient quality are identified and it is appropriate to do so.

The economic evaluation will be most valid and informative where it is built on the best available evidence and on unbiased, relevant data. The studies used in the evaluation should be described and critically appraised for their quality using the What Works Centre checklist.<sup>8</sup> The identification and selection of evidence should be transparent and justified with explicit inclusion and exclusion criteria set out. Ideally, systematic review methods should be followed. However, this may not always be possible given time constraints. In this case, the reason for not conducting systematic reviews should be stated explicitly and the potential problems with the evidence base outlined.

The evaluation evidence is most likely to be valid where it is drawn from randomised-controlled trials (RCTs) that directly compare the different interventions. Where such evidence is not available, non-RCT data may be used but potential biases such be documented and explored (for example, by conducting supplementary scenario analyses). Alternative sources of evidence may include expert opinion.

Where multiple relevant studies of sufficient quality exist, these should be pooled in pairwise meta-analysis where it is appropriate to do so. Heterogeneity across studies should be taken into account in the analysis.

Network meta-analysis may be used where no pairwise comparisons of the different interventions exist.

## 4.10 Modelling

### Reference Base Case:

- Modelling should be used where direct long-term data is not available (and long-term consequences are expected) or final outcomes have not been estimated.

In many instances, complete data on the total costs and benefits of a policy intervention will not have been collected in a single, well-designed trial. For example, trials may have finished before the long-term effects have been observed, and all relevant outcomes in the short term may not have been collected or intermediate rather than final outcomes may have been measured. In these cases, modelling should be used to estimate costs and benefits.

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<sup>8</sup> <https://whatworkswellbeing.files.wordpress.com/2017/04/wwcw-methods-guide-mar-2017.pdf>

A model is a mathematical representation of a system and can be used to make predictions about that system. For the purpose of economic evaluation, this could be predicting the costs and benefits of particular policy interventions. Models are created by combining data from various sources to define the elements of a system and the relationships within it. For instance, a cost-effectiveness model of Housing First may estimate long term addiction rates and associated costs using short term data on participation in substance misuse treatment, while a model of the Silver Song Club may use intermediate data on dementia symptoms to predict long term changes in functional decline.

The model developed for the economic evaluation should include all outcomes and costs that may make a material difference to the decision problem. The development of the model must be transparent and the procedures used should be explained. Full documentation and justification of structural assumptions and data inputs should be provided (see Section 4.9 on evidence synthesis). Deficiencies in the model should be stated clearly, including on omissions in the model where data are not currently available. Sensitivity analyses should also be conducted (see Section 4.11).

Quality assurance of the model should be carried out. The model may be tested for its internal and external validity by comparing its results against the data it is built upon and against other data available in the literature or expert opinion. This may include comparison against disaggregated outcomes such as the predicted incidence and prevalence of particular health problems.

## 4.11 Uncertainty

### Reference Base Case:

- Data should be inputted into the economic evaluation stochastically where possible and probabilistic sensitivity analysis conducted
- Assumptions should be explored systematically using scenario analysis
- The impact of uncertainty should be shown using Cost Effectiveness Acceptability Curves

The accuracy of the economic evaluation will necessarily be uncertain. The exercise will be built upon limited data and the appropriateness and exact applicability of that data to other situations will not be known. This uncertainty should be explored comprehensively in the report. We distinguish three types of uncertainty and the methods to follow below.

### 4.11.1 Parameter uncertainty

The sample from which data is collected will be limited in size. Estimates will therefore be subject to sampling variation. Parameter data should be inputted stochastically, where appropriate, with distributions characterised using available evidence (including covariances between parameters). Probabilistic sensitivity analysis (PSA) should then be conducted in which multiple analyses are carried out and combined using random draws from the characterised distributions in order to capture the uncertainty. Note, as distribution parameters themselves may not be known with certainty, PSA can be extended to sampling these distribution parameters too.

Conducting PSA allows for a range of estimates to be reported. This provides decision makers with information on the likelihood of an intervention being cost-effective and on the risk involved in the decision. Further, where the economic evaluation is built on a model that is non-linear, PSA results give an unbiased estimate of costs and benefits whereas using 'deterministic' mean values does not.

The distributions for the parameter data should be chosen based on the literature (e.g. by using published confidence intervals) or on expert opinion where this data is not available. Data assumptions should be documented and the evidence and rationale to support them provided. For some parameters, including stochastic distributions will not be appropriate as the parameter values may be known with certainty (for example, with drug prices or staff wage costs).

Results of the PSA should be displayed on cost-effectiveness planes and cost-effectiveness acceptability curves to show decision uncertainty visually. Further, univariate analysis where values for single parameters are changed over a range may be conducted to show which factors drive the results. Value of Information analyses should also be carried out where this is deemed worthwhile.

#### **4.11.2 Structural uncertainty**

Where modelling is used, there will be uncertainty in the validity of how the model is structured – for instance, in what elements are included in the model, and what aren't, and in how these various elements relate. Structural assumptions in the model should be documented and the evidence and rationale to support them provided. Separate sensitivity analyses should be conducted to assess the consequences of changing the structural assumptions over the range of plausible scenarios.<sup>9</sup> Particular focus should be placed on testing the consequence of model assumptions which are most tenuous or on the inclusion of particular data for which evidence is of low quality.

#### **4.11.3 Method uncertainty**

The methods set out in this reference case may not be valid in all circumstances. Separate sensitivity analyses should be conducted to assess the consequences of changing method rules where these are deemed to be inappropriate (for instance, using different outcome measure to life satisfaction years or using different discount rates). Justification for conducting these analyses should be given where this is the case.

### **4.12 Sub-group Analyses**

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<sup>9</sup> Alternatively, the analysis can proceed backwards, estimating the range of scenarios over which the intervention is cost effective and assessing whether this range includes all plausible scenarios.

Reference Base Case:

- Sub-group analyses should be performed as supplementary analyses where the intervention could realistically and ethically be provided to the subgroup.
- The subgroups should be specified in advance with a theoretical justification for the different expected cost-effectiveness across a subgroup should be given

In some instances, the intervention may give a larger benefit or could be provided at lower cost to certain groups. As a result, it may be cost-effective to provide to some people and not others. Subgroup analysis should be carried out where both data are available and where it would be possible, practically and ethically (with due consideration given to protected characteristics), to provide the intervention only to these groups.

Justification for the subgroup analysis should be given in the report, including on the practical capacity for restriction to these groups and explanation why the lower costs/higher benefits between groups result from underlying group differences rather than sampling variation due to smaller sample size. Examples of sub-group analyses that might be carried out are: providing an intervention to high need groups, or to groups with low baseline risk, or to persons located in particularly low-cost areas.

Subgroup analyses may also be useful for understanding the equity implications of implementing the intervention.

#### 4.13 Threshold

Reference Base Case:

- The opportunity cost of interventions should be used to judge their cost effectiveness via the threshold derived through data on benefits obtained by activity forgone.

In the ideal case, the results of the economic evaluation would be compared against cost-effectiveness thresholds reflecting the opportunity cost of spending for each decision maker, incorporating the consequence that the actions of each decision maker has on the opportunity costs of another. However, this information is not, as yet, available.

In the absence of this information, the results should be presented using incremental cost-effectiveness ratios and using cost-effectiveness acceptability curves displaying the likelihood of the intervention being cost-effective at different threshold values. This should be done from a societal perspective and from the perspective of relevant decision makers (see earlier in Section 4). These results can then be presented to decision makers, who can decide whether the cost is acceptable.

This guidance will be updated in the event that information on opportunity costs becomes available. Recent analyses of health care data suggest that the opportunity costs of expenditure for the NHS is approximately £13,000 per QALY.<sup>10</sup> However, a similar figure has not yet been derived for a life satisfaction year (though this may be useful as a bottom estimate as life satisfaction is a more holistic measure of wellbeing). Further, this figure does not take into account the impact health spending has on other sectors and how it impacts of other decision makers' opportunity costs.

## 5. Decision making

The results of the cost effectiveness analysis should be presented including a fully incremental approach in which the additional costs and additional benefits of competing options are calculated. This approach provides information on what the cost of extra benefits achieved are. It allows decision makers to make judgements on what course of action is best *at the margin*.

Table 4 shows how including an incremental approach can provide a more helpful portrayal of benefits and costs for decision makers. Assuming a willingness-to-pay per life satisfaction year of £20,000<sup>11</sup>, the average results might be taken to show that the new intervention is cost-effective. However, the incremental results show that the cost of the extra benefits exceeds this value.

**Table 4: Incremental Perspective**

Intervention:	Do Nothing	Current Practice	New Intervention
<b>Average:</b>			
Cost	£0	£250,000	£500,000
Life Satisfaction Years	0	20	25
Cost per life satisfaction year	-	£12,500	£20,000
<b>Incremental:</b>			
Cost	-	£250,000	£250,000
Life Satisfaction Years	-	20	5
Cost per life satisfaction year	-	£12,500	£50,000

In some circumstances, decision makers want information on the initial costs of the intervention and the comparators (for instance, where immediate investments need to be made or for assessing budget impact). This should be reported as part of a separate analysis where this is the case, but should be clearly flagged as an incomplete analysis.

The economic evaluation is only one source of information useful for decision making. The cost-effectiveness estimates should therefore be presented to decision makers along with other factors relevant to the decision. This other information should include description of uncertainty and

<sup>10</sup>[https://www.york.ac.uk/media/che/documents/papers/researchpapers/CHERP81\\_methods\\_estimation\\_NICE\\_costeffectiveness\\_threshold\\_\(Nov2013\).pdf](https://www.york.ac.uk/media/che/documents/papers/researchpapers/CHERP81_methods_estimation_NICE_costeffectiveness_threshold_(Nov2013).pdf)

<sup>11</sup> Choosing a figure given the lack of agreed threshold.



discussion of equity implications and may include estimates of environmental impact, amongst other things.

Decision making should be transparent, based on the best available evidence, and have a substantive role for stakeholders. It should also draw upon expertise in order to interpret and establish the robustness and validity of findings. Multi-criteria decision analysis (MCDA) is one approach which could be used by researchers to incorporate stakeholder and expert views and bring relevant information together in a transparent and formal way.

## 6. Glossary

### Cost-benefit analysis

A type of economic evaluation in which both the costs and benefits of an intervention are expressed in monetary terms. Benefits are valued using people's observed or stated preferences.

### Cost-consequence analysis

A type of economic evaluation in which multiple benefits are listed using natural units.

### Cost-effectiveness analysis

A type of economic evaluation in which benefits are expressed in a single, non-monetary unit. Interventions are compared based on their cost per unit of benefit achieved.

### Cost-effectiveness acceptability curves

A graphical way of displaying results from probabilistic sensitivity analysis in which the likelihood of an option being cost-effective is displayed at different values of willingness-to-pay for a unit of benefit.

### Cost-effectiveness plane

A graphical way of displaying results from probabilistic sensitivity analysis in which individual runs are displayed as points on a two-axis graph, the x-axis of which is incremental costs and the y-axis is incremental benefit.

### Decision problem

A statement of the question the economic evaluation is designed to answer which relates to the decision the evaluation will inform.

### Life satisfaction approach

A method for valuing goods or services in which value is estimated as the amount of money that would be required to achieve the same observed gain or loss in life satisfaction the good or service produces.

### Multi-criteria decision analysis (MCDA)

A type of analysis in which weights are elicited for the different dimensions of costs and benefits associated with the decision options in order to calculate overall scores with which to compare individual options.

### Probabilistic sensitivity analysis

A type of analysis in which multiple iterations of an analysis are carried out using a different set of randomly sampled parameter values in each iteration. The results capture the variability in costs and benefits which may be observed.

### Scenario analysis

A type of analysis in which multiple analyses are carried out, each based on different assumptions. The results are compared to see how robust results are to the assumptions.

### Whole pathway modelling

Known as whole disease modelling in the health literature, this is a type of modelling in which the whole pathway of interventions and services related to a particular issue are modelled. For instance, a homelessness whole pathway model may include prevention services; emergency, temporary and permanent housing; crime and justice; health, outreach and support services, including community mental health, employment assistance, substance misuse treatment, and physical health services.