Health Inequalities Tool for Scotland

Modelling the impact of interventions on health inequalities

User Guide

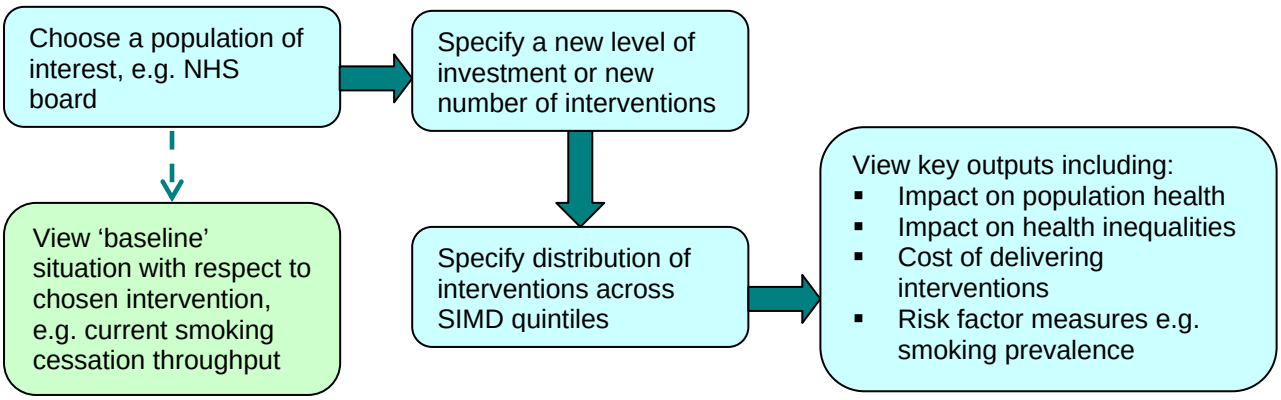
Overview

The Health Inequalities Tool for Scotland (HITS) intervention tools are intended to model the potential impact of selected interventions to reduce health inequalities. The tool comprises three separate spreadsheets, each of which allows users to model one of the following interventions:

- NHS Smoking cessation interventions
- Alcohol brief interventions
- Counterweight (an intervention programme to reduce BMI)

HITS models are based on intervention activity, and effectiveness, for a one year period. The user specifies: the population of interest; baseline throughput (number currently receiving the intervention); and 'modelled' throughput or investment. Modelled results are compared with the baseline so that disinvestment or increased throughput can be studied. The outputs compare scenarios in terms of delivery costs, health outcomes and intermediate outcomes. Figure 1 gives an overview :

Figure 1 User modelling process



This user guide is part of a suite of outputs. It is essential that users read the following materials in advance of using the intervention tools in order to fully understand the limitations of the work and the assumptions behind the models. This is necessary to facilitate the appropriate interpretation of modelled results.

1. User Guide
2. HITS Commentary (which provides illustrative results and discusses the interpretation of findings in the context of the health inequalities challenge facing Scotland)
3. Cost briefing
4. The 'introduction' worksheet of the model in question
5. The 'assumptions and notes' worksheet of the model in question

User inputs

Users are required to enter data in three stages; illustrated below by screen shots from the model, with explanatory notes.

(i) Population to model

Users have the option of modelling the population of Scotland, NHS boards, local authorities or Community Health (& Care) Partnerships.

User input 1: population

(ii) Current activity

Users specify the number of interventions currently delivered annually in their chosen population, and the current cost per intervention. A separate "cost briefing" is available to assist with the latter input. Together these inputs specify the baseline scenario.

User input 2: current activity	
Baseline throughput	
Cost per intervention (£)	

(iii) Model data

Users specify a scenario to be modelled and compared with the baseline scenario. First, either 'throughput' or 'investment' is selected as the parameter to model, and the throughput number of budget is entered in the last cell (throughput is used in the illustration below). Both approaches provide information used to determine the number of interventions delivered under the modelled scenario. A cost per intervention is entered, which may or may not be equal to the baseline cost. The life expectancy gap comparator can be either the least deprived quintile or the local area average (for Scotland this is the national average). 'SIMD distribution' specifies whether and how the intervention is targeted to specific SIMD groups (see additional note below).

User input 3: model data	
Parameter to model	**Throughput**
Cost per intervention (£)	
Life expectancy gap comparator	
SIMD Distribution	
Throughput no.	

Model Outcomes

Each tool aims to report outcomes reflecting three areas: (i) mortality – as described by life expectancy and number of deaths prevented; (ii) morbidity – described by hospital admissions, and: (iii) risk factor measures. The primary outcome which is reported for all spreadsheet tools is life expectancy; this provides a key high level outcome, which tends to have relatively robust data to inform calculations. Reporting of other outcomes is dependent on data availability and therefore varies by tool; for example, the impact on hospital admissions cannot be reported for all tools, and each tool reports the impact on risk factors differently. The 'Charts' worksheet contains a visual comparison of the number and SIMD distribution of successful interventions under baseline and modelled scenarios.

It should be noted that these tools do not report all relevant outcomes, and alternative measures may also be considered important for planning and decision-making.

Key considerations

Health inequalities
Health inequalities are described by comparisons between the most deprived SIMD quintile (MDQ) and a comparator population. For all populations, the categorisation of SIMD at Scotland level is applied to the local population. This means that the most deprived quintile for a health board, for example, is defined as the population living in that health board area who are living in datazones defined as being among the most deprived 20% in Scotland. The proportion of the local population captured by this definition will vary, i.e. it will not be one fifth of the local population.

Data sources, calculations and assumptions
For modelling purposes, it is necessary to make a number of assumptions about how the available information applies to the scenario being modelled. These are detailed in a worksheet within each tool. All data sources and calculations are clearly presented within the tool. Data come from routine administrative data collected in Scotland and from the scientific literature. The most robust data available, as identified and appraised by the HITS project team, have been used to inform the tools. However, these data are often limited in robustness and applicability, and significant gaps exist. The assumptions underlying the tools and the boundaries of data availability and quality are important limitations of this work and consideration of both is crucial to interpretation of the outputs.

'Baseline' scenarios
Many interventions that may by used to improve population health or tackle health inequalities are not necessarily new, and may already be being implemented within the population of interest, to a greater or lesser extent. Accordingly, it is not always appropriate to model the impact of interventions as if they were being introduced for the first time: it may be more useful to allow modelling of changes in levels of intervention activity and / or targeting strategy. The Health Inequalities Tools for Scotland do this by comparing the impact of modelled scenarios with a pre-specified baseline scenario reflecting current practice. If the modelled scenario represents disinvestment (i.e. fewer interventions being carried out) negative impacts on health outcomes may be observed.

Targeting interventions
A key factor in using downstream interventions to address health inequalities is the targeting of interventions by deprivation. The tools allow users to specify whether they wish to target the intervention, and to which SIMD deprivation quintiles. The success or otherwise of targeting will depend on the intervention, the population, and the strategy used, and it may not be possible to achieve 'perfect' targeting. For example, delivering interventions through a GP practice in a deprived area will be only partially successful in targeting the most deprived quintile, since not all patients will actually be in this group. To study this issue, the tool allows users to model 'partial' targeting, although it should be noted that the partially successful distributions used are illustrative and not evidence-based . It also allows users to specify the anticipated SIMD distribution of an intervention: to do this, select 'user–specified' distribution then navigate to the 'SIMD distribution' worksheet and enter the relevant data.

Costs
The health inequalities tools for Scotland allow modelling of the costs required to deliver the interventions. No attempt is made to quantify cost savings that may arise from successful interventions; e.g. reduced prescription costs, fewer hospital visits, wider social costs etc. Accordingly these tools should not be considered to provide a full cost / benefit analysis, but rather to provide guidance on the investment required to achieve an anticipated level of change in specific health outcomes. A short paper outlining current 'best estimates' of costs at a national level is available to help inform the parameters that users choose for modelling purposes (if no robust local data are available).

Populations
The spreadsheets facilitate modelling of the impact of interventions for a range of geographies; namely Scotland as a whole, NHS boards, local authorities and Community Health (& Care) Partnerships. For geographies that do not include populations from the most deprived SIMD quintile the tools are not able to model certain outcomes and scenarios and error messages will appear in the affected cells within the worksheet.

For all sub-national geographies models are based on the application of national rates (e.g. mortality) to local populations. This is considered sufficient for modelling purposes but means that the data within the model will only approximate actual local figures and will not reflect geographical variations. For example, the baseline life expectancy may differ from local estimates since it is based on the age, sex and SIMD distribution of the population rather than local death statistics. The primary purpose of this approach is to avoid any issues of disclosure, and it has a negligible effect on the modelled impact of interventions (e.g. change in life expectancy). Similarly, for hospital admissions, local data on the overall number is used, but the number in each population sub-group is modelled based on national distributions; for this reason the baseline number of admissions in the most deprived quintile is not presented.

Recruitment rates

The model outputs include an estimate of the recruitment rate required to achieve the specified throughput. This shows the maximum proportion of the eligible population that would need to undergo the intervention for any age/SIMD group, which is a key consideration for implementing an intervention. The estimate is colour coded to indicate challenging or possibly unfeasible recruitment rates. The tool enables users to model recruitment rates of over 100%, and so close attention should be paid to the recruitment rate to ensure the modelled scenario is feasible, or at least interpreted correctly. Similarly, an error against the recruitment rate indicates that an unfeasible scenario is being modelled.

Timescales

The health inequalities tools for Scotland are static arithmetical models; they report intervention activity in one year and the resulting health outcomes for a single hypothetical subsequent year. In practice, where the health behaviour change that occurs as a result of the intervention is sustained, health benefits (and return on investment) will continue to accrue over multiple years. However, the tools do not model a time lag between intervention and benefit nor a deterioration of the effect of the intervention over time. In reality, both these assumptions are very optimistic, and so simply summing the outcomes reported by the model is likely to overestimate the long term impacts.

Setting the tools within a broader context for tackling health inequalities

The interventions being modelled have been chosen because of the relatively high level of interest in these areas and the availability of data to inform modelling. They represent only a small subset of all interventions with potential for tackling inequalities. Initiatives operating further ‘upstream’ and those that are less reliant on action being taken by individuals (i.e. individual ‘agency’) may offer considerable advantages. Nonetheless it is hoped that these tools will contribute to tackling health inequalities in Scotland by enabling better understanding of outcomes based on current evidence.

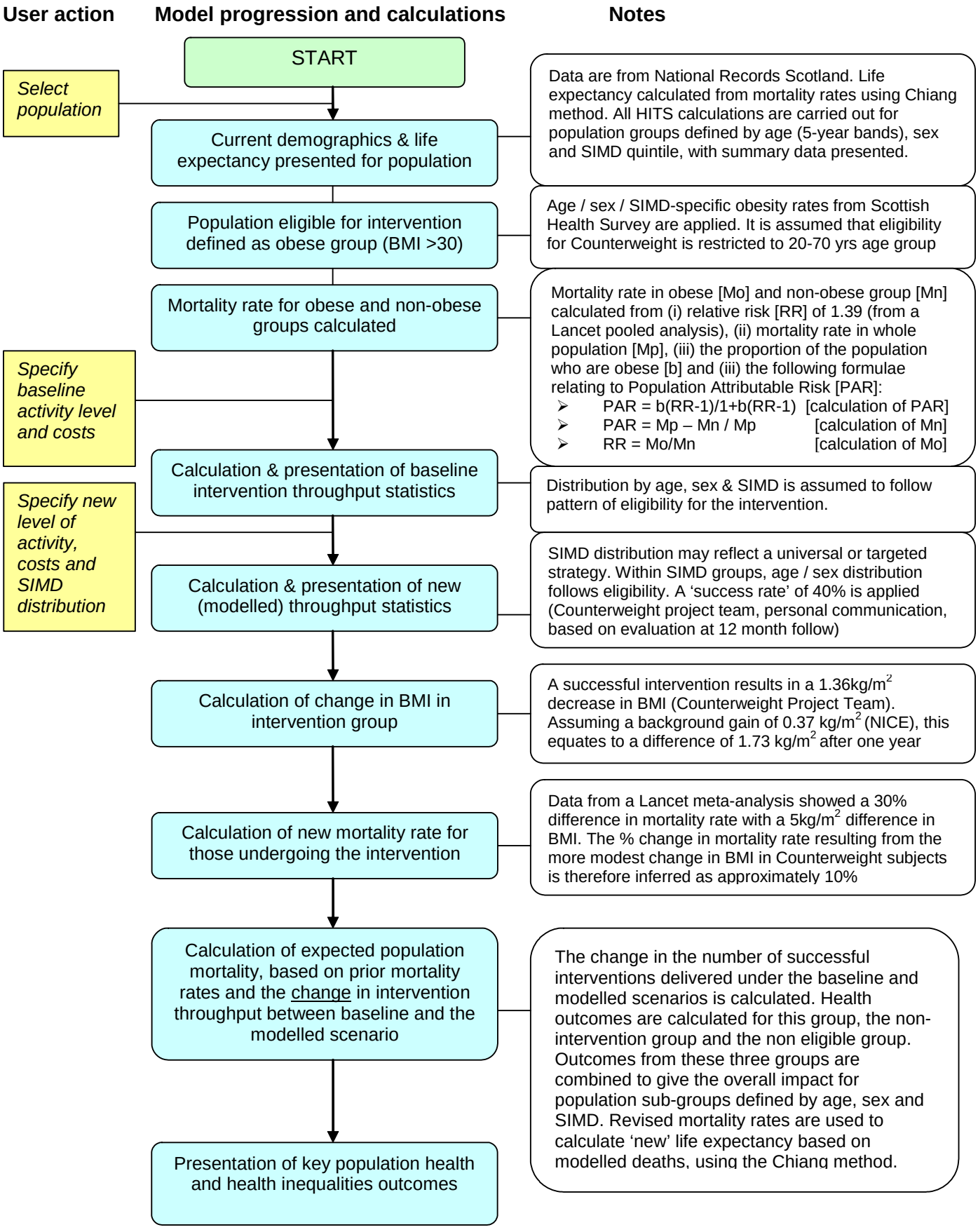
Amending the tool

By default, only standard user input cells can be altered by the user; the worksheets are protected and other cells are ‘locked’. This is to avoid calculations etc. being changed inadvertently. However, the worksheets are not password protected, and users may access and alter calculations and assumptions for their own modelling purposes simply by un-protecting the sheet in question (in Excel, go to ‘tools’ > ‘protection’ > ‘unprotect sheet’). Likewise, users may view calculations and notes on data sources (embedded within orange-shaded cells), but will need to unprotect the worksheet first.

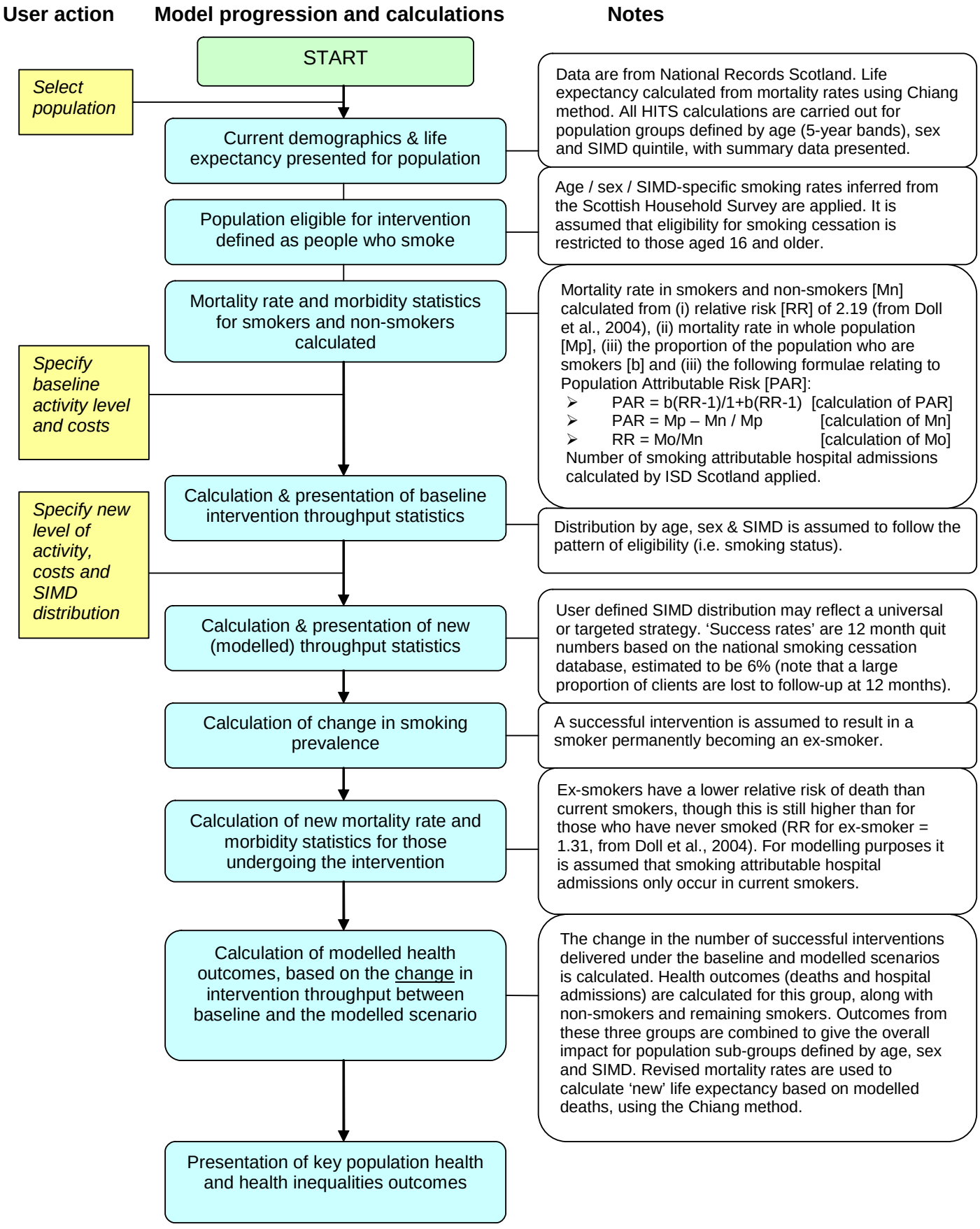
Intervention flow charts

The following flow charts provide an at-a-glance illustration of the approach and key assumptions used for modelling purposes. Full details and references are contained within the spreadsheet tools.

Counterweight flowchart



NHS Smoking Cessation Services flowchart



Alcohol Brief Interventions flowchart