NICE National Institute for Health and Care Excellence

Estimating Return on Investment of Tobacco Control: NICE Tobacco ROI Tool version 3.0

A tool to estimate the return on investment of local and sub-national tobacco control programmes

USER GUIDE

Version 3.0

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LeLan Solutions

Contents

Introduction

On behalf of the National Institute for Health and Clinical Excellence (NICE), the Health Economics Research Group (HERG), Brunel University has produced this tool with an aim to help decision making in tobacco control at local and sub-national levels. This is an extension of an earlier tool, known as NICE Tobacco ROI Tool. The development of such a tool dates back to 2010 when HERG developed the Tobacco Control Economic Toolkit[1] on behalf of FRESH North East, Tobacco Free Futures and Smokefree South West to build the business case for tobacco control at local levels.

Although considered very useful in estimating both the economic impact of tobacco in local and sub-national levels and return on investment (ROI) of any intervention package, the previous ROI Tool was not applicable to wider tobacco control interventions, particularly interventions targeted at pregnant women and those adult smokers who are currently unwilling to make quit attempts. The current tool, the Tobacco Control ROI Tool version 3.0, fills in this important gap.

The purpose of the ROI tool is to support commissioners and policy makers in their investment decisions by enabling them to explore the costs and impact of different tobacco control measures. In particular, it aims to help users to review their current investment in tobacco control and to answer questions like those listed below (not exhaustive):

- Is my current tobacco control programme implemented at local/sub-national level a good investment? In other words, what is the ROI of my current 'package' of interventions? Can I make any economic argument for investing or disinvesting in my current package of tobacco control?
- Can I maximise the ROI of my current tobacco control package by changing allocation (i.e. changing the proportion of smokers taking up specific interventions) and/or types of interventions? What would be the additional costs and additional benefits of doing so? Would this new package provide reasonable a ROI?
- If I scale up my current tobacco control programme, how much more would I need to invest? How would it compare with the additional benefits that my scaling up would provide?
- I am thinking about implementing a novel intervention. What would be its ROI?
- I am more interested in costs and benefits to the local economy. How can I evaluate whether I get any productivity gains by continuing to invest in my current package, by scaling up or by changing allocations and/or types of interventions in my local/subnational tobacco control package?
- I am more interested in costs and benefits to health and social care. How can I evaluate whether I get any savings to the NHS or Social Services by continuing to invest in my current package, by scaling up or by changing allocations and/or types of interventions in my local/subnational tobacco control package?
- I am more interested in health outcomes because I value them in their own right. How do I know how many hospitalisations, primary care visits, passive smoking exposures, etc. that my investment package would avert?
- Do I know at what point in time my investment package actually pays for itself and start to make money to my local economy?
- How do I confirm the lack of uncertainty around the ROI estimates for my current package of tobacco control interventions so that I can build a sound business case for my investment?

[1] Building the Economic Case for Tobacco Control (www.brunel.ac.uk/herg/research-programme/building-the-economic-case-for-tobacco-control)

Who should/can use this tool?

The tool has a user-friendly interface and accompanying technical and user guides. This means that anyone who is interested in tobacco control, e.g. service commissioners, public health professionals, advocacy organisations, academics and researchers, etc. can use this tool to analyse the ROI of tobacco control interventions in the selected local area.

What to expect from Tobacco ROI version 3.0 tool?

- A portfolio of tobacco control interventions (referred to as a 'package' of interventions in this tool) can be evaluated for its economic returns in different payback timescales. This means, you can mix and match different interventions and see which intervention portfolio (or package) provides you with the best 'value for money', compared with 'no-services' or any other specified package.

- The tool has been pre-loaded with default values which are based on the best available evidence. These are assumed to represent the current situation at each location in terms of both smoking behaviours in the population and the current allocation of smokers to different interventions. As such, in the first instance you can run the analysis without making amendments to the default values to view an estimate of your location's current service provision. (Note that the list of interventions included in the tool is not exhaustive but represents those for which the best evidence on cost and effectiveness is available; additional interventions not included by default can be defined via the Custom Intervention functionality.)

- Because four payback timescales (2, 5, 10 years and lifetime) are included, this tool allows you to see how the payback, known technically as return on investment or ROI for short, changes over time.

- Informed by NICE's recent work on what information is more likely to be sought while making commissioning decisions[2], a number of economic metrics (or indicators showing 'value for money') are included in the tool. They are: incremental cost effectiveness ratios (ICER), net present value (NPV), net cost-savings, benefit-cost ratios, cost per death avoided, cost per life year gained. In addition to economic metrics, a population indicator showing the avoided burden of disease due to intervention (i.e. QALYs gained per 1000 population) is also included. A full definition of these metrics is available in Appendix I.

- A total of 28 local tobacco control interventions are included (See Appendix II for details). 12 of these interventions are offered by NHS Stop Smoking Services. Other interventions cover sub-populations : pregnant women and adult smokers currently unwilling to make quit attempts.

- The tool has a user-interface that allows users very easy access to select their own locality-specific data and obtain the outputs (i.e. information on the payback of their intervention package) in a meaningful way.

- The tool allows the users to estimate the impact of their chosen 'package' of interventions when implemented alongside a sub-national tobacco control programme. Sub-national programmes are defined as collective activities, coordinated and implemented at sub-national levels, to help promote increased cessation and prevent uptake of smoking (refer to accompanying Technical Report for details, available here).

- In order to ensure the ease of use and to keep the run-time as short as possible, the outputs produced by the tool are presented as point estimates (i.e. uncertainties around the estimated impact are not reported). However, for advanced users, the tool offers a functionality to evaluate uncertainty using a probabilistic sensitivity analysis, known as PSA. For further details on PSA, see accompanying technical report, available here . A guide as to how this can be implemented is described in relevant section below.

[2] Supporting investment in public health: review of methods for assessing cost effectiveness, cost impact and return on investment, proof of concept report. (www.**nice**.org.uk/media/664/AC/cost_impact_proof_of_concept.pdf)

How is the Tobacco ROI tool developed?

Microsoft Excel 2007- has been used as the platform to develop this tool. It is pre-populated with local-authority (LA) level data on population statistics and smoking prevalence using data from the Integrated Household Survey (Office of National Statistics). This constitutes the default data on the basis that it is held to be the most accurate national source of evidence on both population and smoking prevalence.

As the aim is to make this tool an interactive tool for use by commissioners and planners, the tool offers an option to overwrite many of the default parameters to reflect local circumstances. These include local prevalence estimates, costs of interventions, effectiveness of interventions, wage rates and absenteeism associated with smoking and the underlying quit rate. *However, it is important to note that these amendments by the users are recommended only if the users believe that their data is more robust than what is already in the tool.* This is because the default data used in the tool come from a substantial review of existing literature.

The tool assumes that there exists an underlying 'background' quit rate occurring due to social norm changes and self-motivation amongst current smokers to quit, assisted or unassisted. The assumed default background quit rate is 2%[3]. Note that 'background quit rate' refers to 'overall quit rate', and not the rate that is applicable to only those smokers who quit unassisted.

The tool is based on a Markov-based economic model in which a cohort of relevant population (e.g. current adult smokers) is followed over their lifetime[4]. In each cycle (a year), the smokers can quit, relapse or die. They may develop one or more of the following five conditions: lung cancer, myocardial infraction (MI), coronary heart disease (CHD), chronic obstructive pulmonary disease (COPD) and Stroke. A proportion of the smokers receive interventions to help them quit and as the result of such intervention they may or may not quit successfully. In each cycle, the cohort's health care resource use, productivity losses, quality of life, exposure to passive smoking and absenteeism from work are tracked. A full description of the method is provided in the accompanying technical report, available here .

Downloading and saving the Tobacco ROI tool

You can download the tool from the NICE webpage by going to www.nice.org.uk/ROItobacco

When prompted, hit the 'save' button and choose a location on your hard-drive and save it.

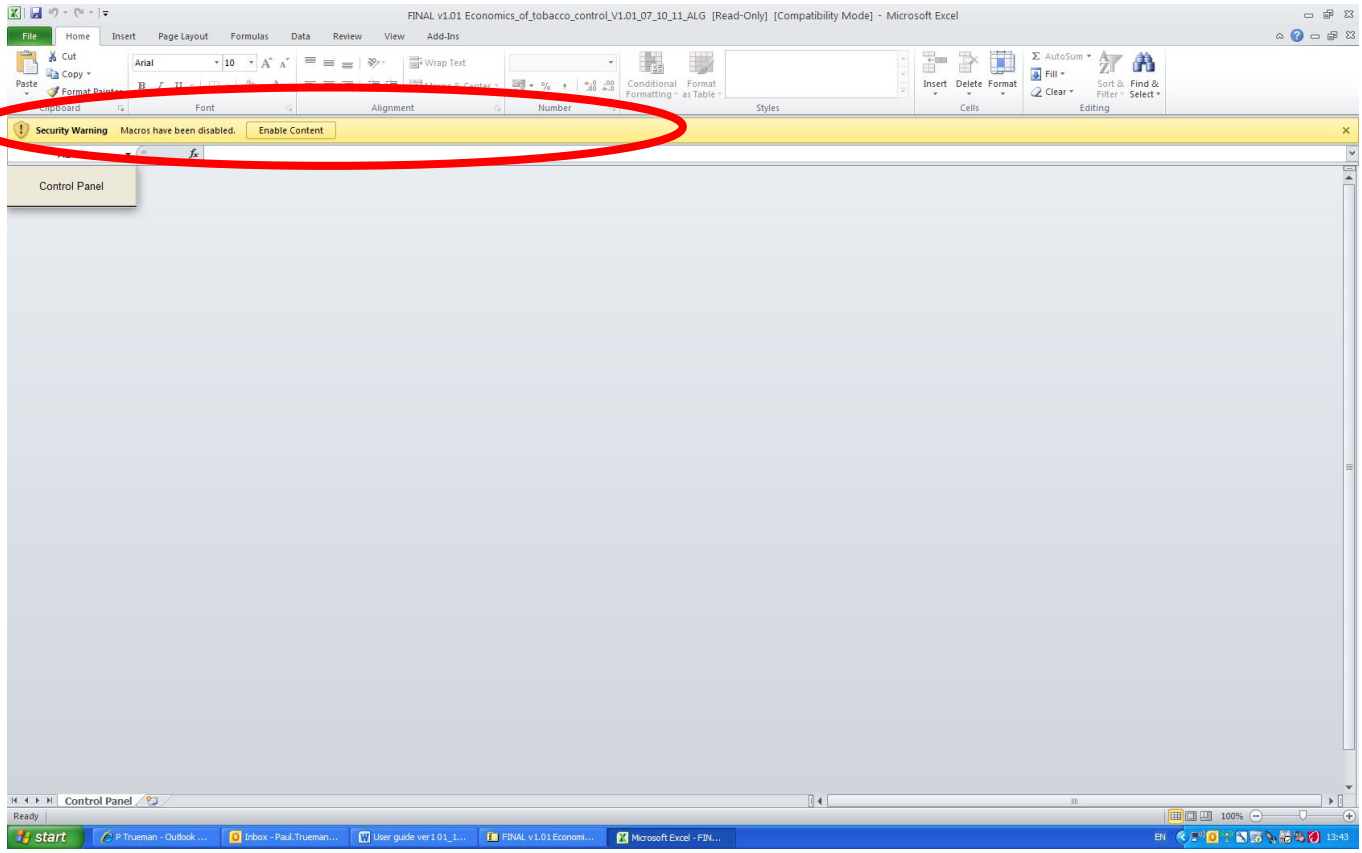
It is strongly recommended that before you save the tool on to your hard-drive, you create a new folder (e.g. My Tobacco ROI) and save the tool in this folder. Once you run the tool and ask it to export your results, the data will be saved in the folder where the tool resides. Therefore, it is very important to know in advance the location of your tool and the results you want to save.

[3] West R (2006) Background smoking cessation rates in England (www.smokinginengland.info/Ref/paper2.pdf)
[4] Note that this model predicts the impact of interventions based on the intervention cost and effectiveness at the first year only (i.e. when interventions are offered). It is not possible within this simple framework to offer interventions over the lifetime of smokers.

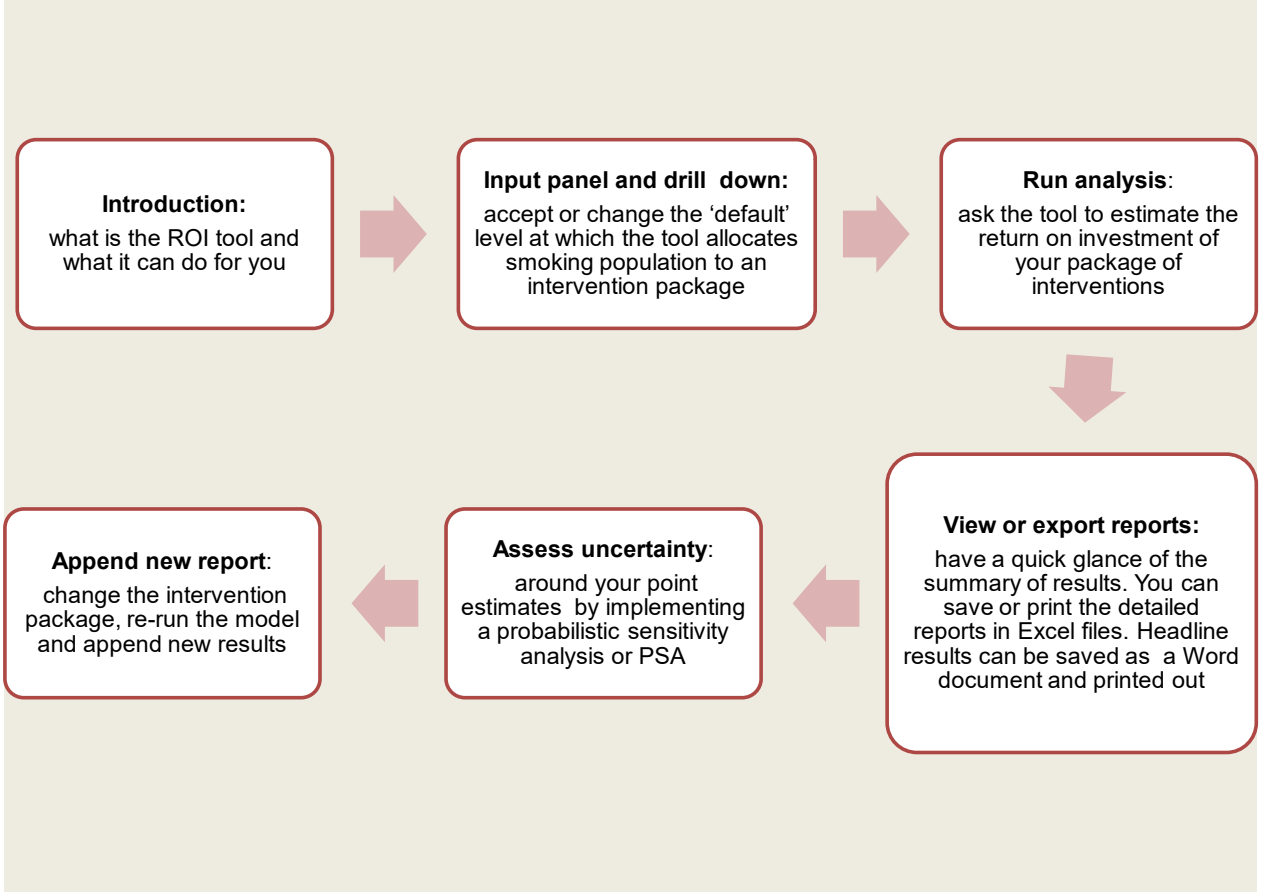
Opening the tool

When you open the folder where you have saved the tool, you will see that it is a Microsoft Excel file with the name “NICETobaccoROIToolv3.xlsm”. The tool is built in Microsoft Excel to ensure that it is easily accessible for potential users.

Double click the icon. If you look at the extension in the filename above (.xlsm), you will notice that the tool includes ‘macros’. Therefore, you will have to enable content prior to starting the tool. This can be done by clicking the button (“Enable content”) in the header, as shown in the highlighted are in the screenshot below. Then hit “Control Panel”.

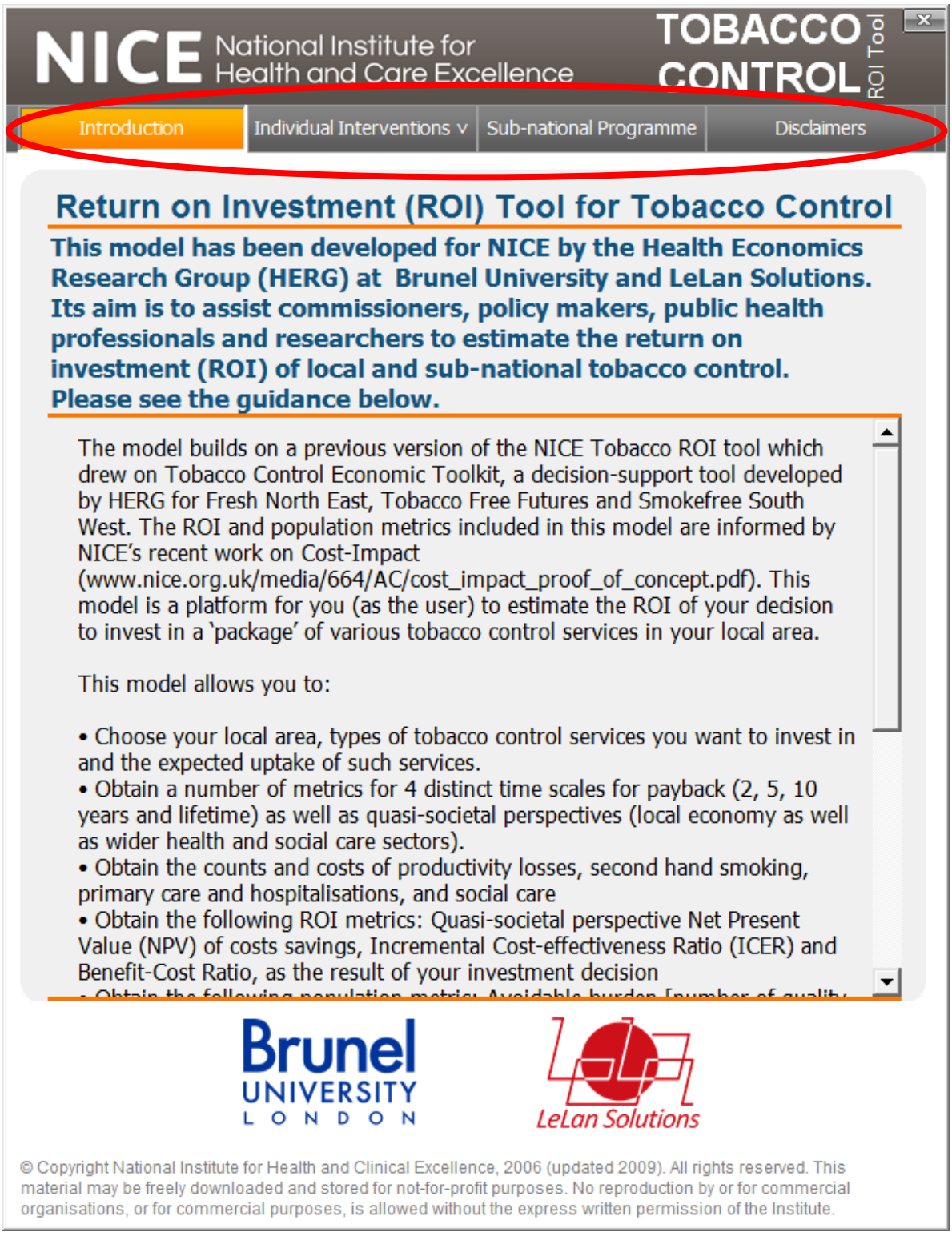


The ROI Tool at a glance



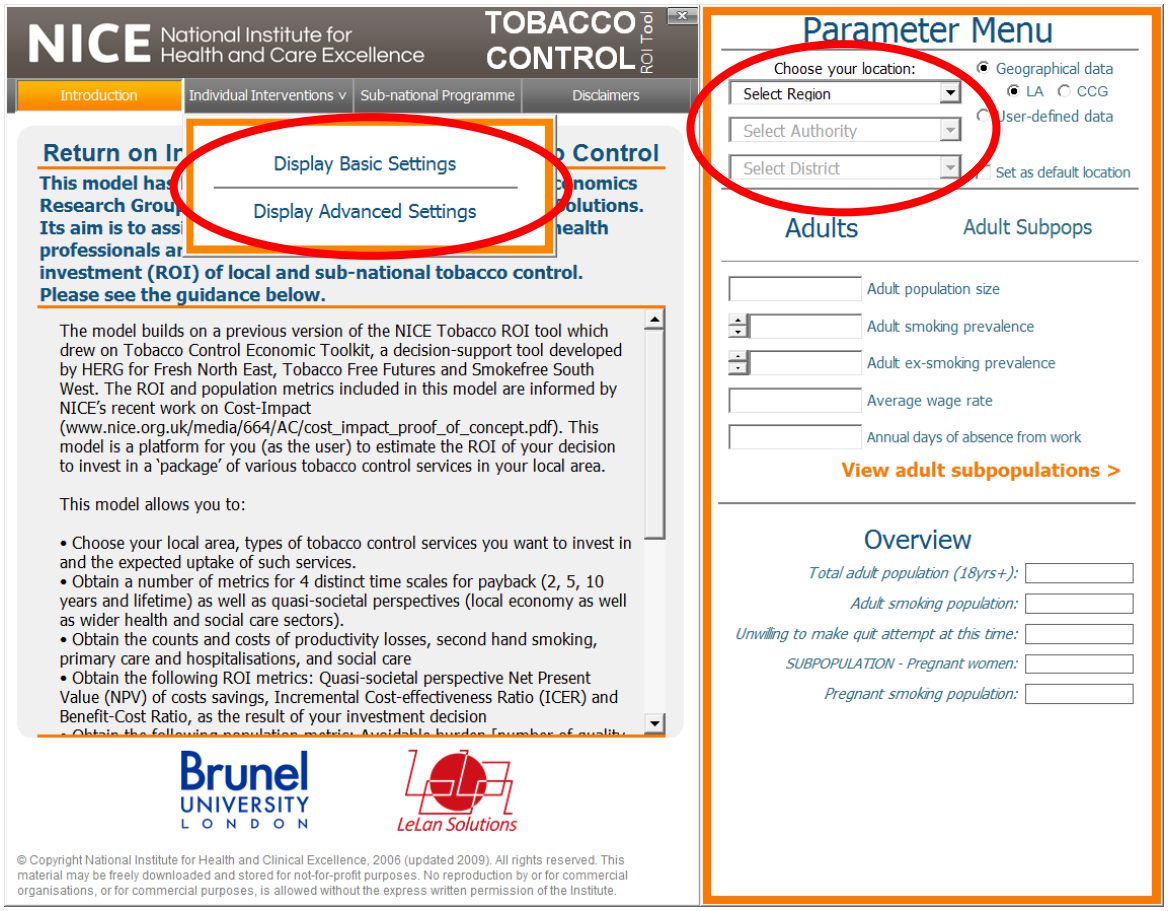
Introduction page

The pop-up box has sheet tabs (highlighted in the figure below) which take the user to introduction, interventions and disclaimers. The first tab on the pop-up box is the introduction page. This provides an overview of the tool as well as details on how this should be cited.



Input panel

When interventions (individual or population-based) tab is clicked, you will see an expanded menu. You can choose to display basic settings or advanced settings at this stage.



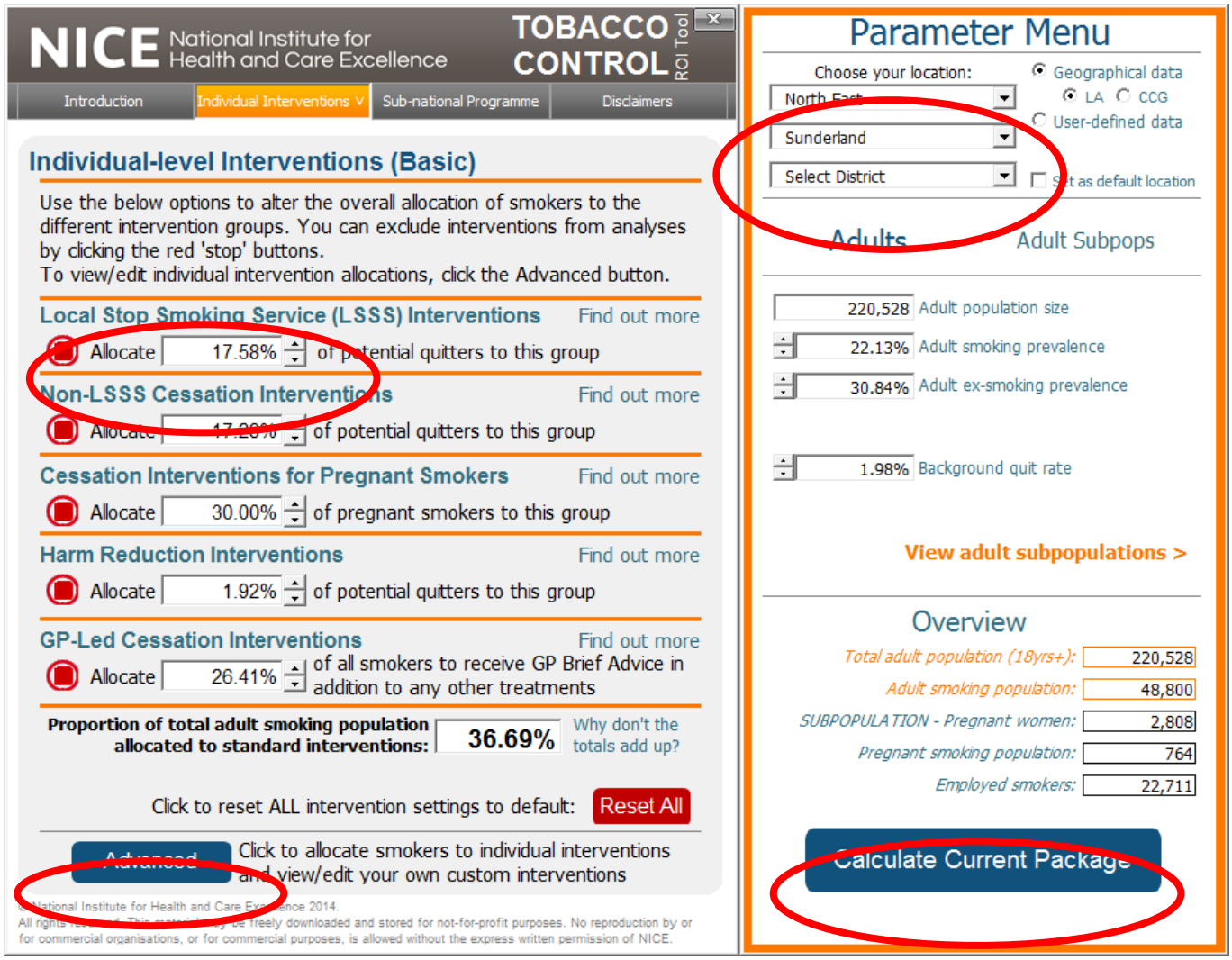
For example, click on "Display Basic Settings" and the Parameter Menu panel appears where you can choose your area of interest. Below this are the summary statistics of your chosen area. The left-hand side shows summary statistics of default allocation to services.

You can choose from two geographical data: Local Authority (LA) or Clinical Commissioning Group (CCG) or you can choose to input your own data (user-defined). Note that the default data on CCG category is still under testing and may not align with the population data stored under LA option. Selecting a location will cause the "Run Analysis" button to appear at the bottom of the Parameter Menu panel.

First run

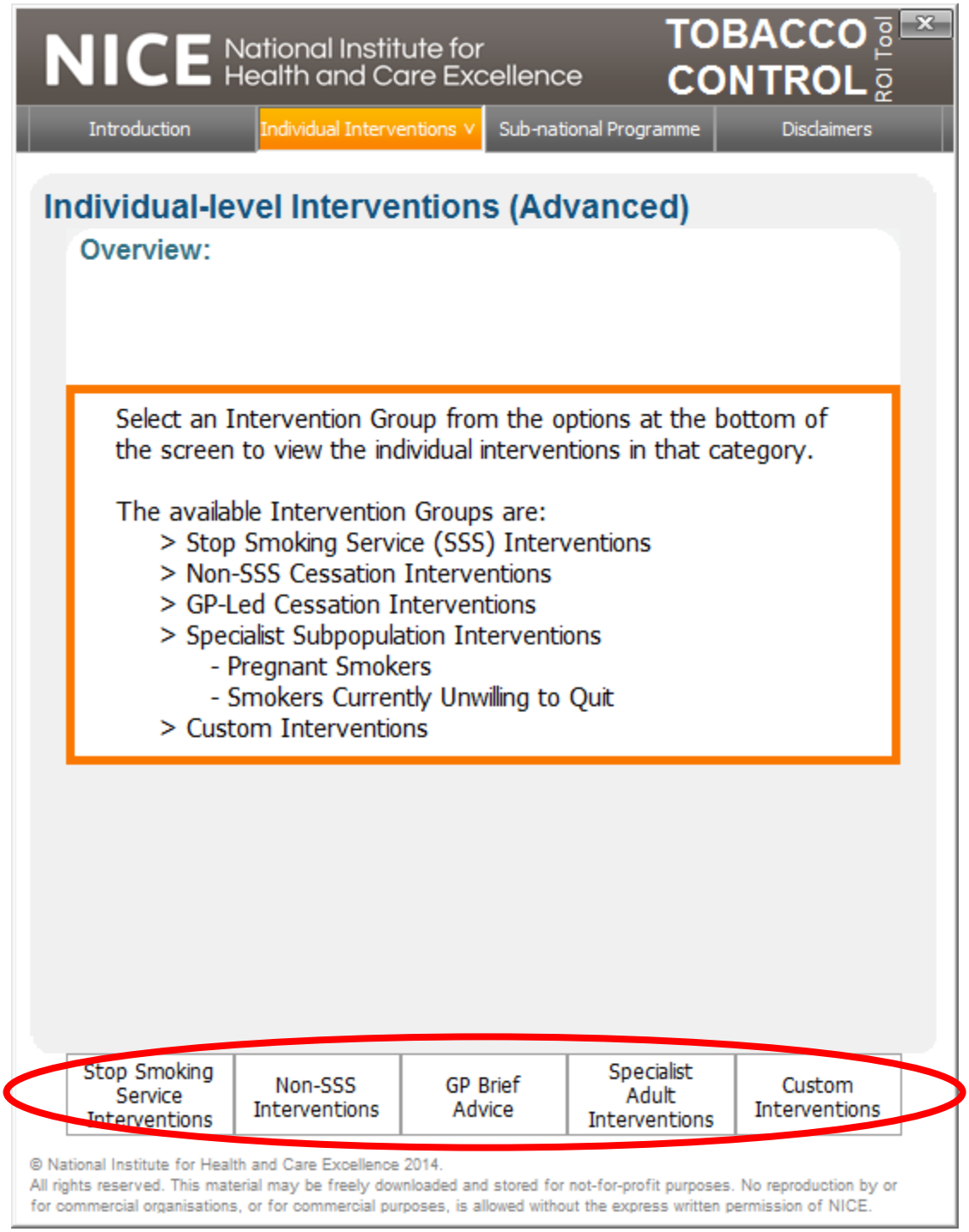
Once you have selected your location of interest, the tool will pre-populate all parameters (including smoking prevalence and allocation of smokers to different interventions) based on the best available evidence. In the first instance, it is recommended that you run the analysis at this stage (by clicking the "Calculate Current Package" button) without making any further selections or amendments. This will produce results based on the assumed current situation at your location (Current Package) and will allow you to adjust this level of service provision to view the differential impact of an alternative level of provision (Alternative Package).

You can skip to page 16 of this guide for details on how to interpret the results displayed in this tool or continue to page 9 if you intend to make immediate adjustments to the interventions being provided.

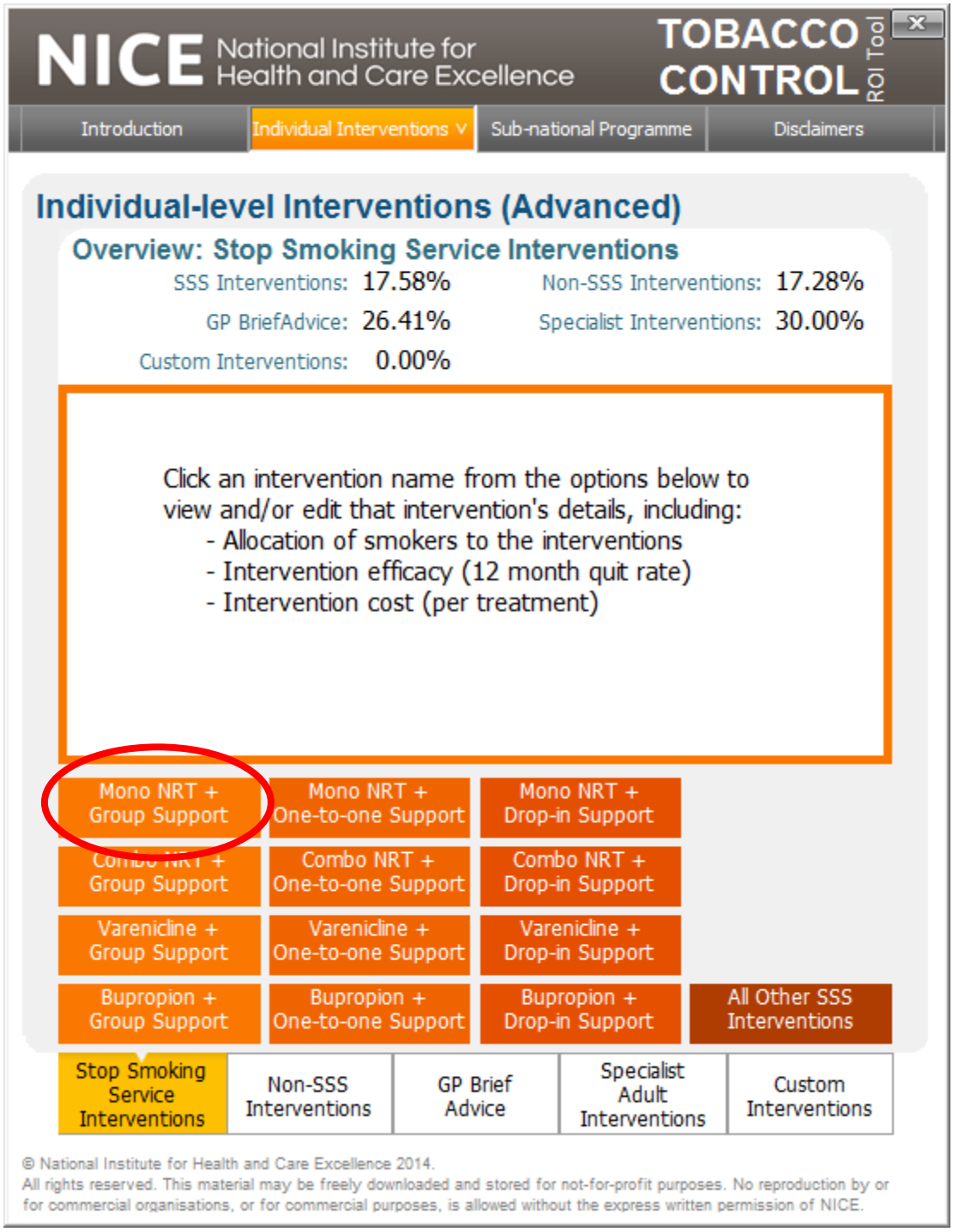


Drill down interventions

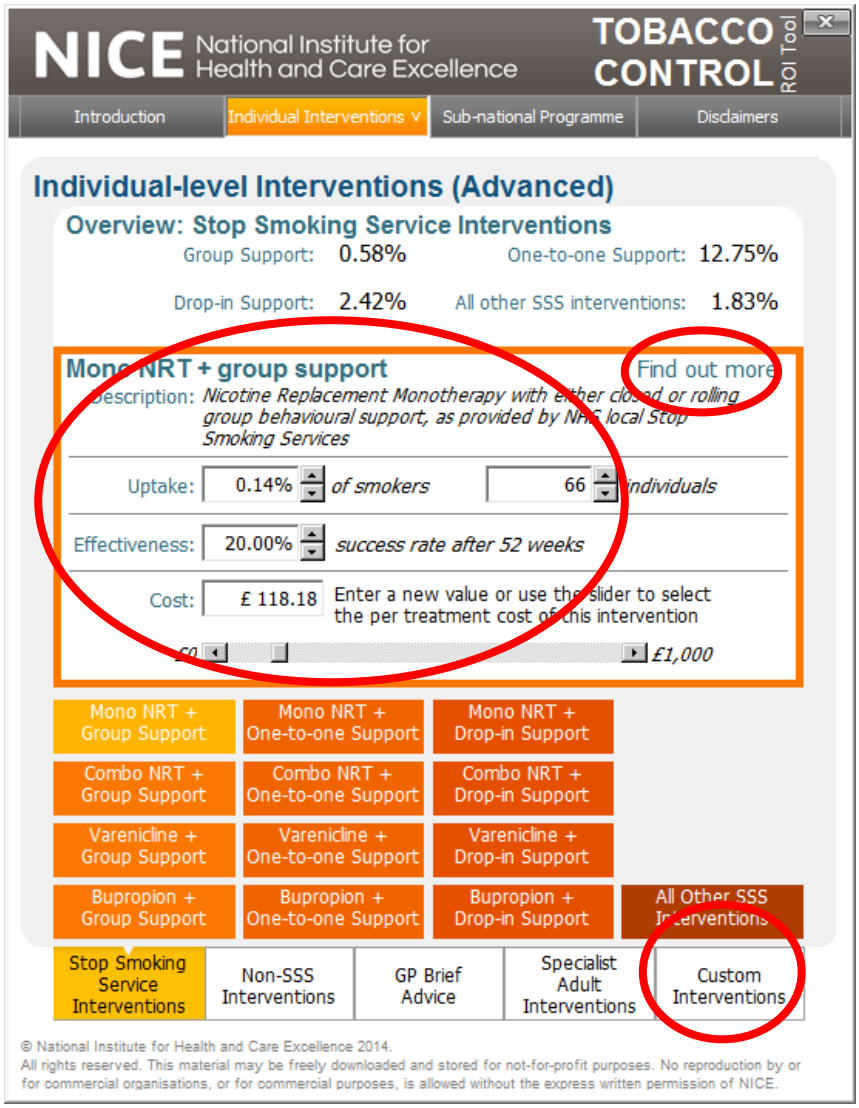
You can click on “Advanced” menu to change default allocation and other parameters. Note however that the default values are based on best evidence available and unless you believe you have better data specific to your local area, it is not advisable to chance such parameter values. When you click on “Drill Down”, the following menu appears:



You will then need to click the service category (red circle). For example, clicking on Stop Smoking Service Interventions will return the following screen:



This screen will list all interventions included under this category. You can now point and click any intervention in the orange cells to drill down. For example, click on the first cell and it will return the following screen:



You can change the input values by using drop-down menus next to them or by writing in the new figures in the respective fields. For uptake, you can change either % or actual number– changing one will update the other automatically.

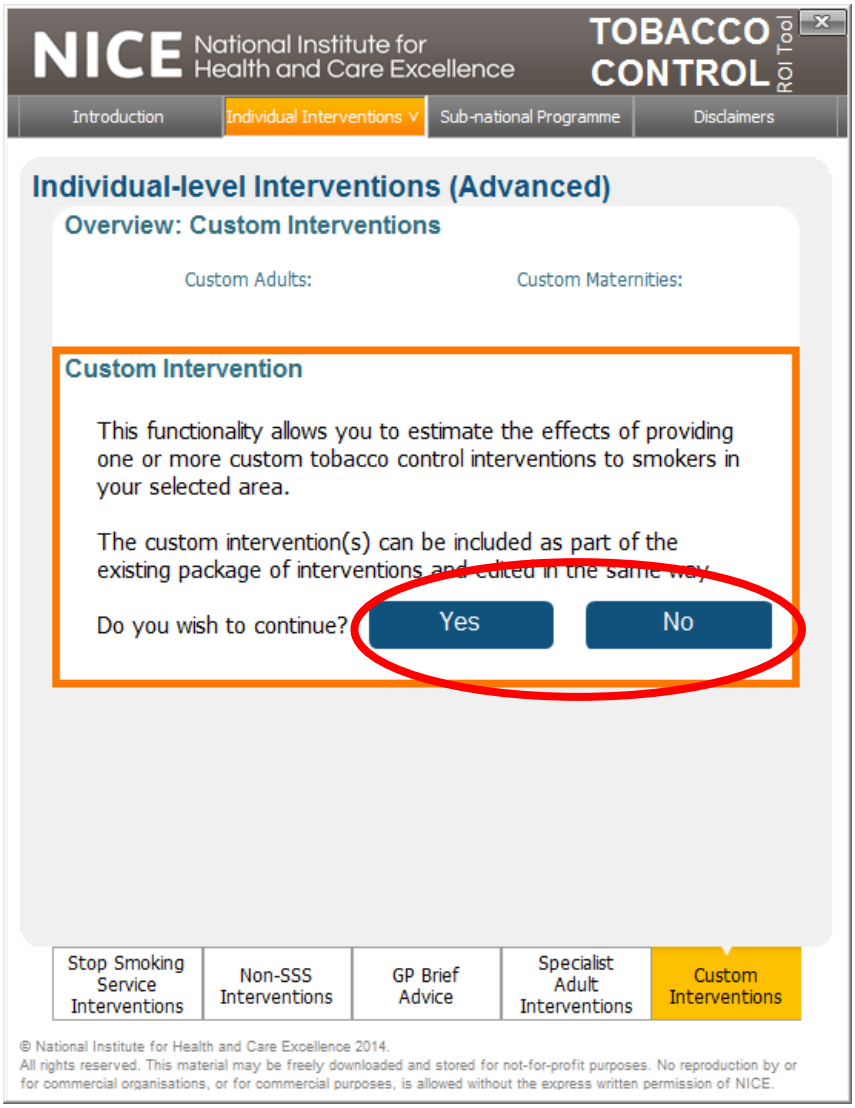
In case you are unsure about what this intervention is all about or want to know more, do not forget to click on "Find out more" link (small red circle above).

You can repeat this process to drill down any intervention listed in the tool.

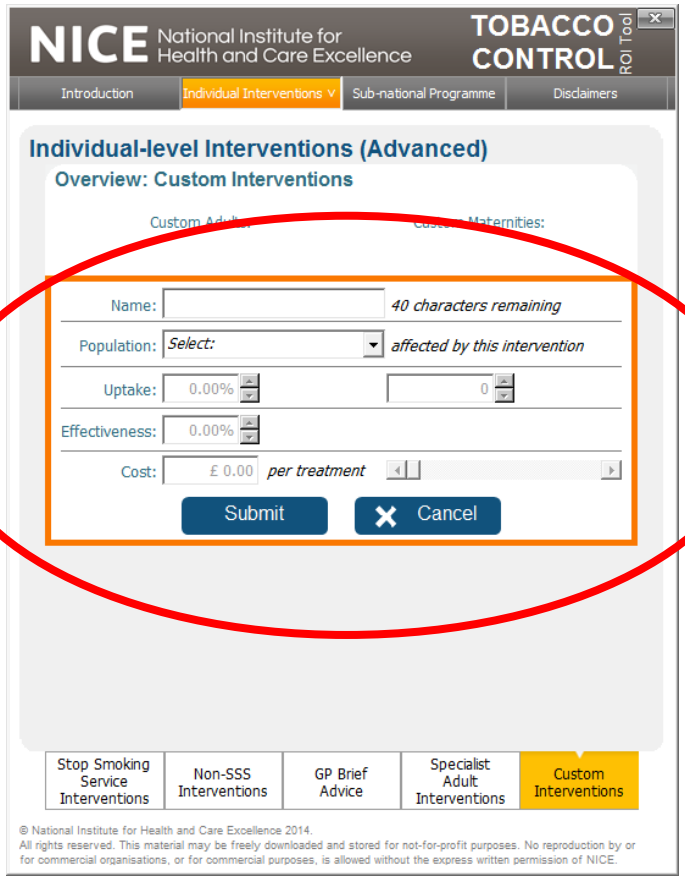
Custom intervention

In your tobacco control package, you may want to add one or more new interventions that are not already listed in the tool. You can do this by using the 'custom intervention' available in the tool.

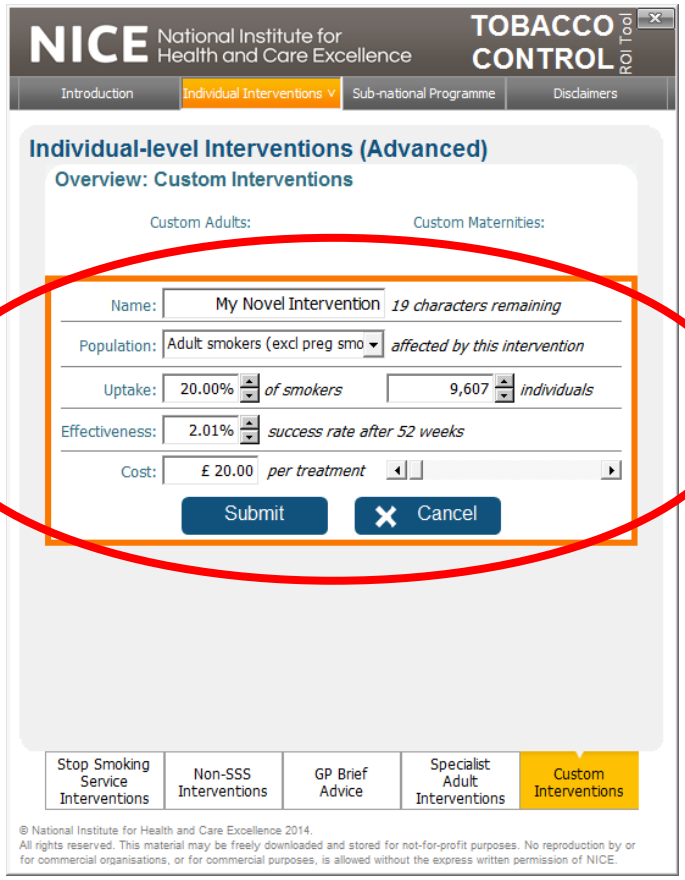
Click on "Custom Interventions" button in the Advanced menu (see above- bottom-right circle). The following screen appears:



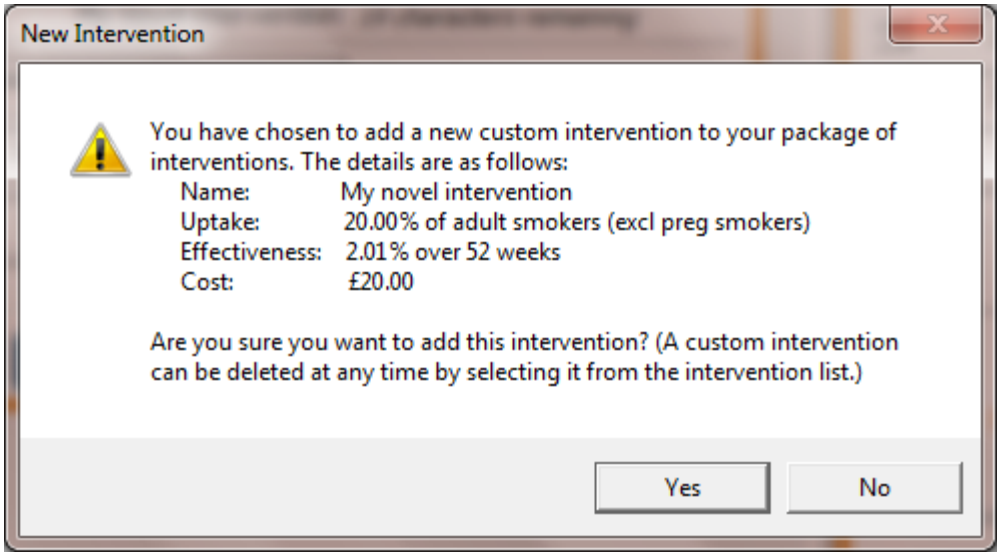
Click No if you do not want to add an intervention. Click yes if you want to continue, in which case the following screen appears.



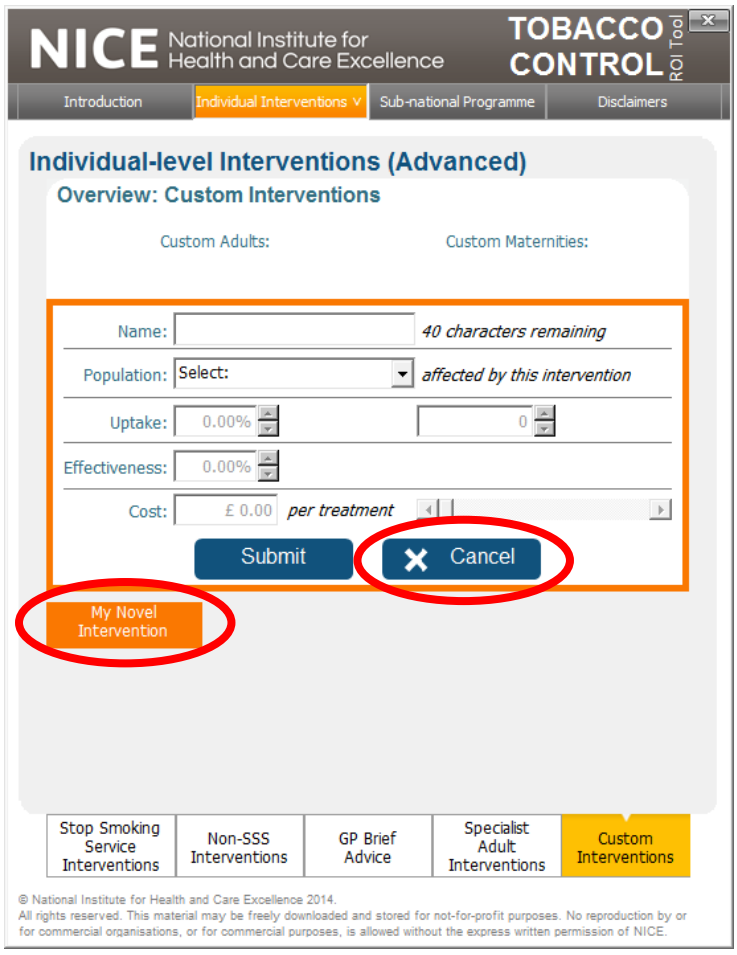
You can now input your intervention details. For example:



Now hitting “submit” button will return the following pop-up screen:

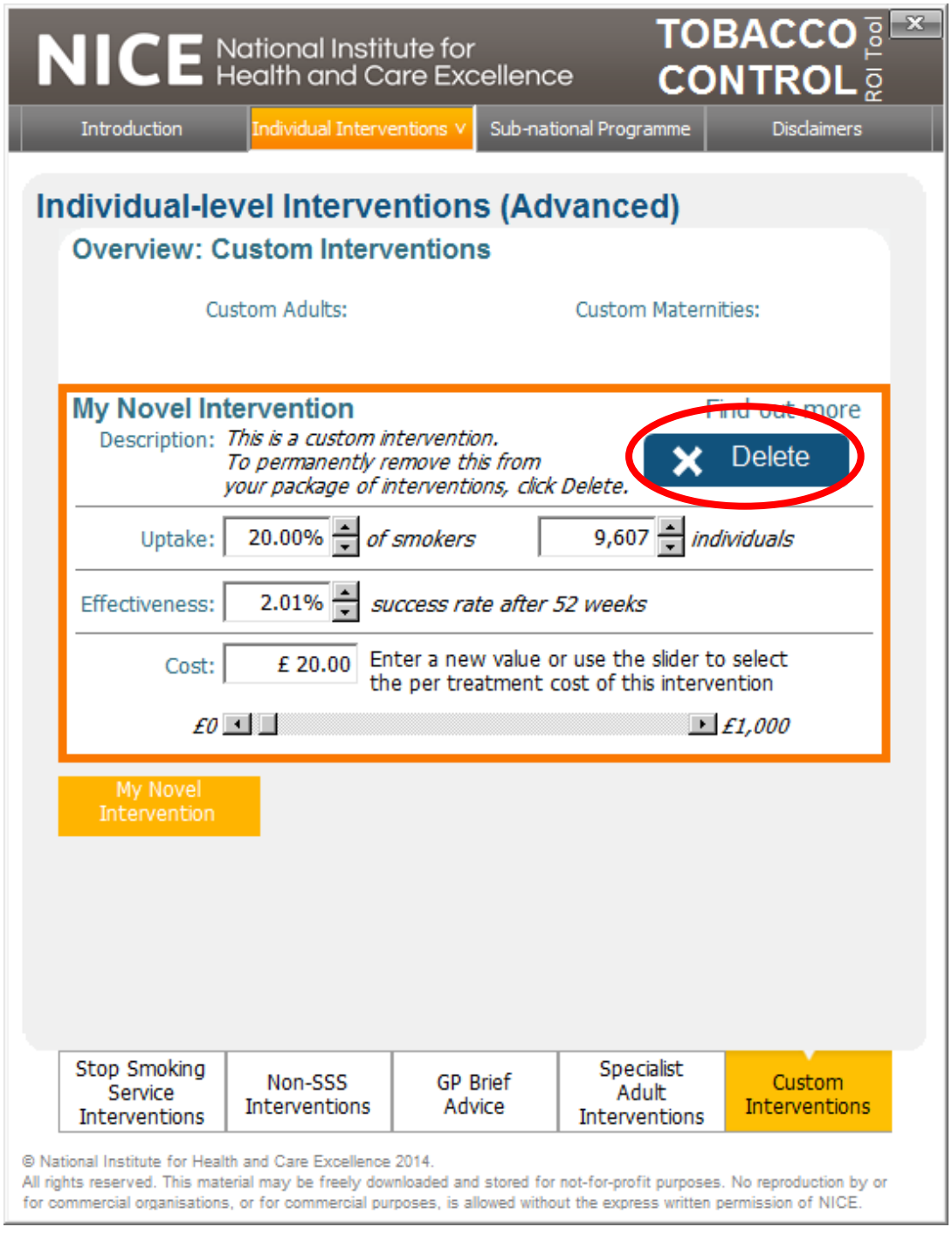


If you are happy with the numbers, click on Yes; if not, click on No and it will take you to the previous screen. After clicking on Yes, it will add your new intervention to the list of tobacco control package you want to evaluate under Custom Interventions group (see below).



You can repeat this process to add more interventions.

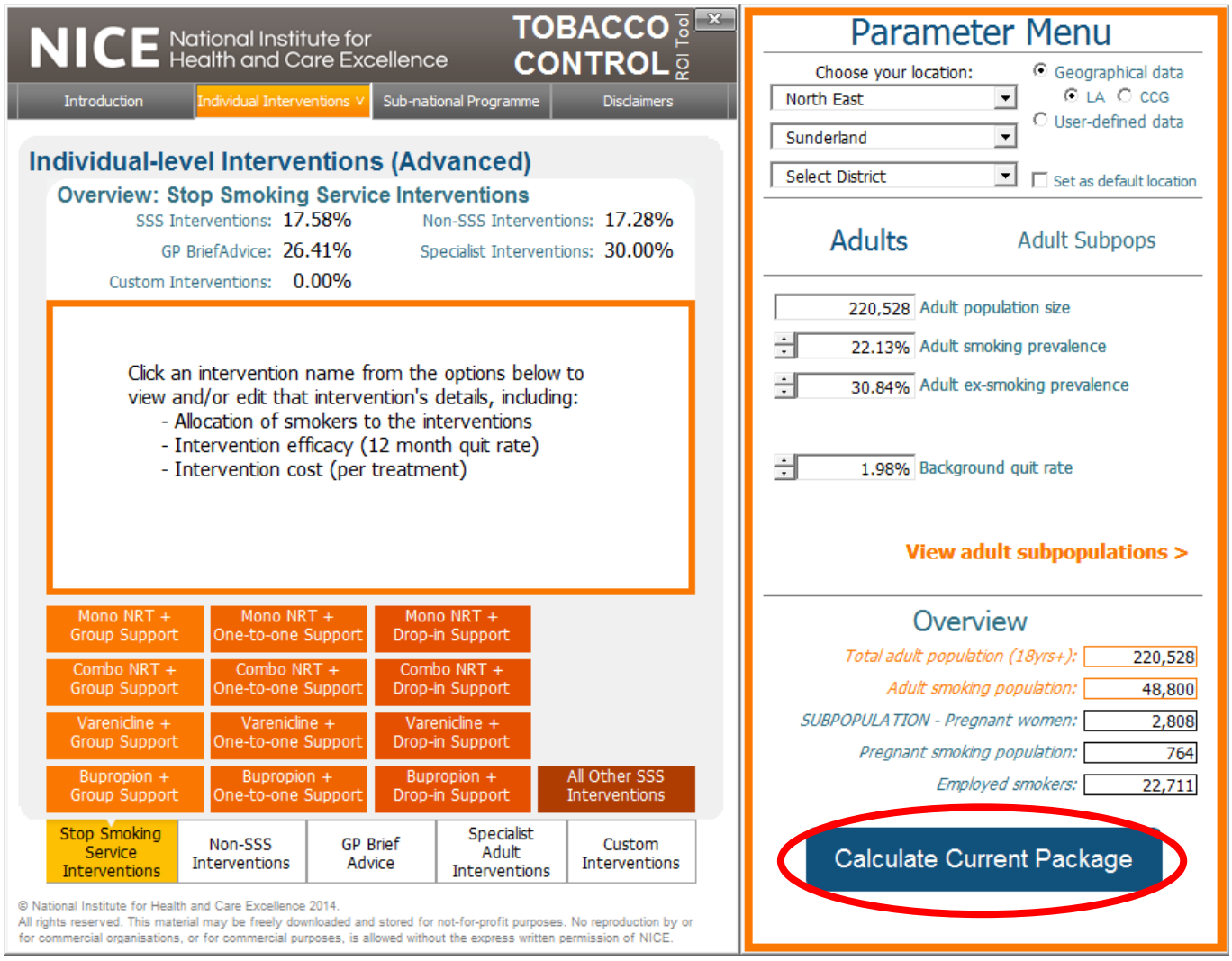
If you change your mind and want to remove this intervention, click on the orange button showing your intervention (see above). This will bring up the following screen:



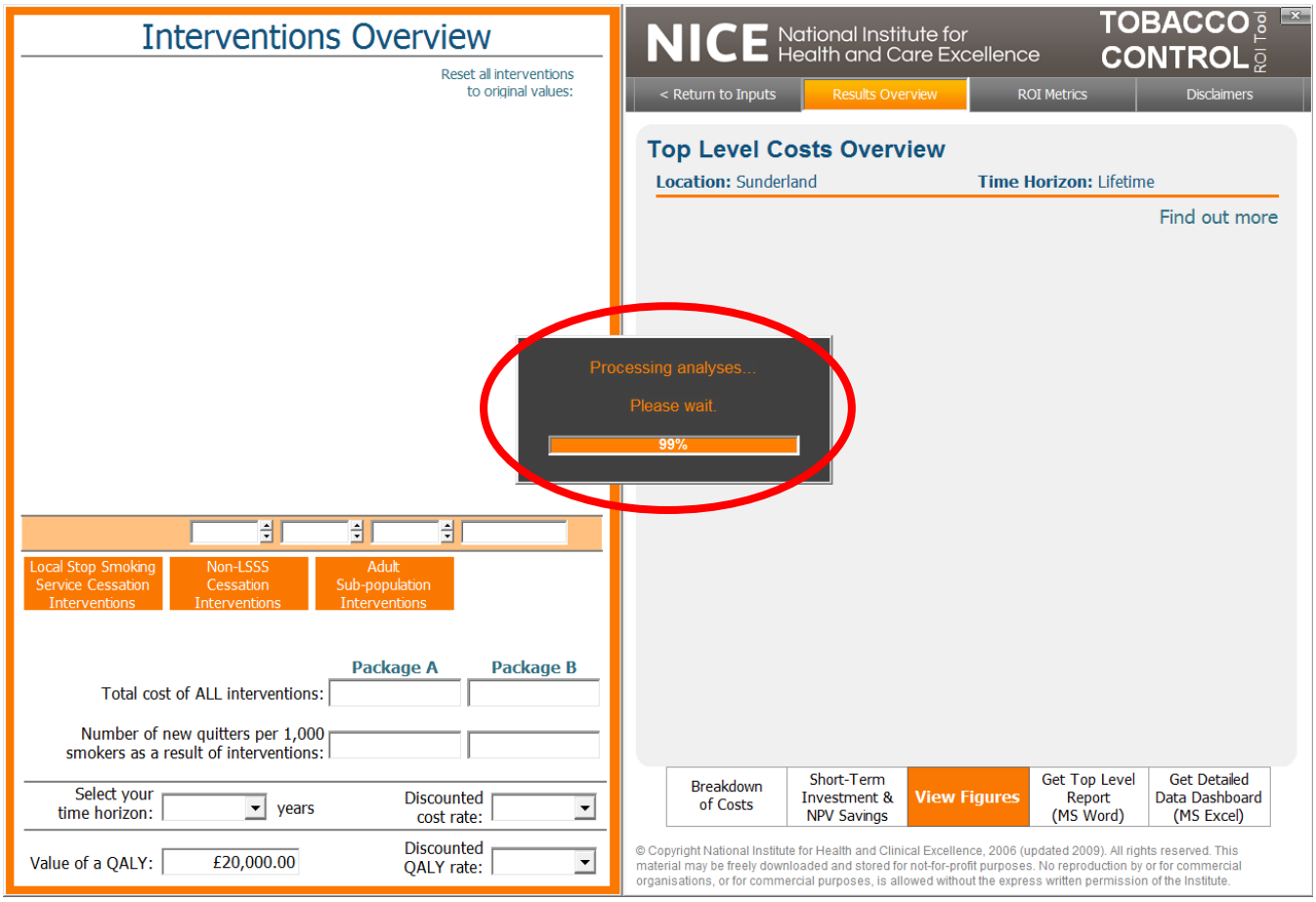
Hit “Delete” button. A pop-up window asking to verify that you indeed want to delete this intervention from your analysis shows up. Hit Yes on this window to delete the intervention.

Running the analysis for your area

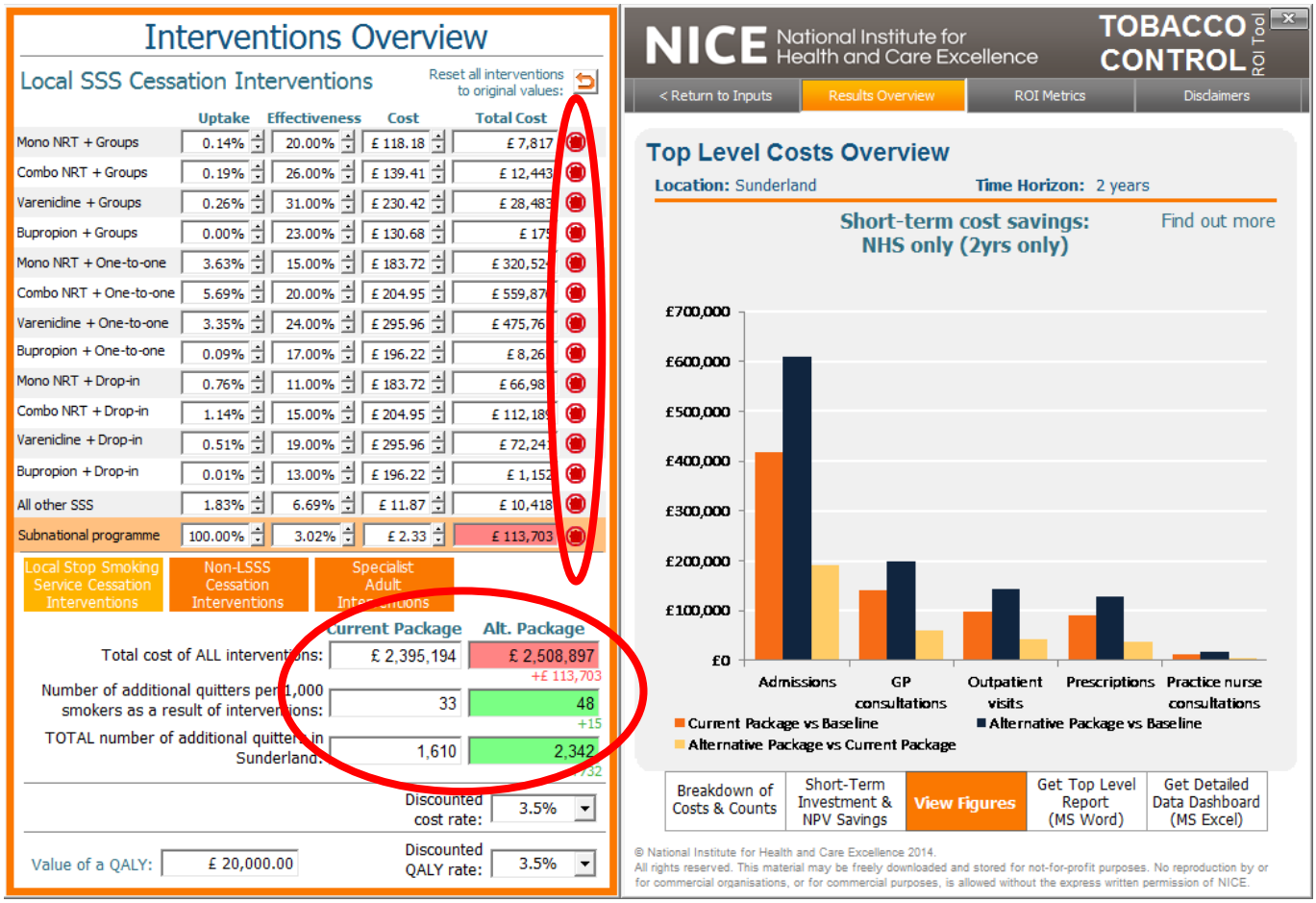
Once you are happy either with the default input data or your changes (drill down from Advanced menu), you can run the analysis. Just hit "Calculate Current Package" button in input panel.



This will bring up a progress bar and depending on the speed of your machine, it takes up to half a minute for the tool to analyse the data and return the outputs.



Once the analysis is complete, the following screen appears:



On the left hand panel, it shows all interventions that are included in the analysis and associated input values used to generate the results. Below the intervention list, the total cost of implementing the package and the expected number of quitter that this package will generate in the defined time period are shown (red circle above). You can change this time period by clicking on the drop down menu below such figures.

By default, all listed interventions are included in the ROI analysis and this is called the “Current Package”. You can see a red button next to each intervention. If you click on this button, this selects the intervention out from your ROI analysis. This is a helpful function in the tool as you may want to drop an intervention to see how much effect it would make in the ROI of your new package. If you drop one or more intervention, the new intervention package is called the “Alternative Package”.

Therefore, the results are grouped in 3 different scenarios:

Baseline – no interventions are in place

Current Package – your current package of interventions (i.e. the investment package created based on the current practice in local area and is *default* in the tool).

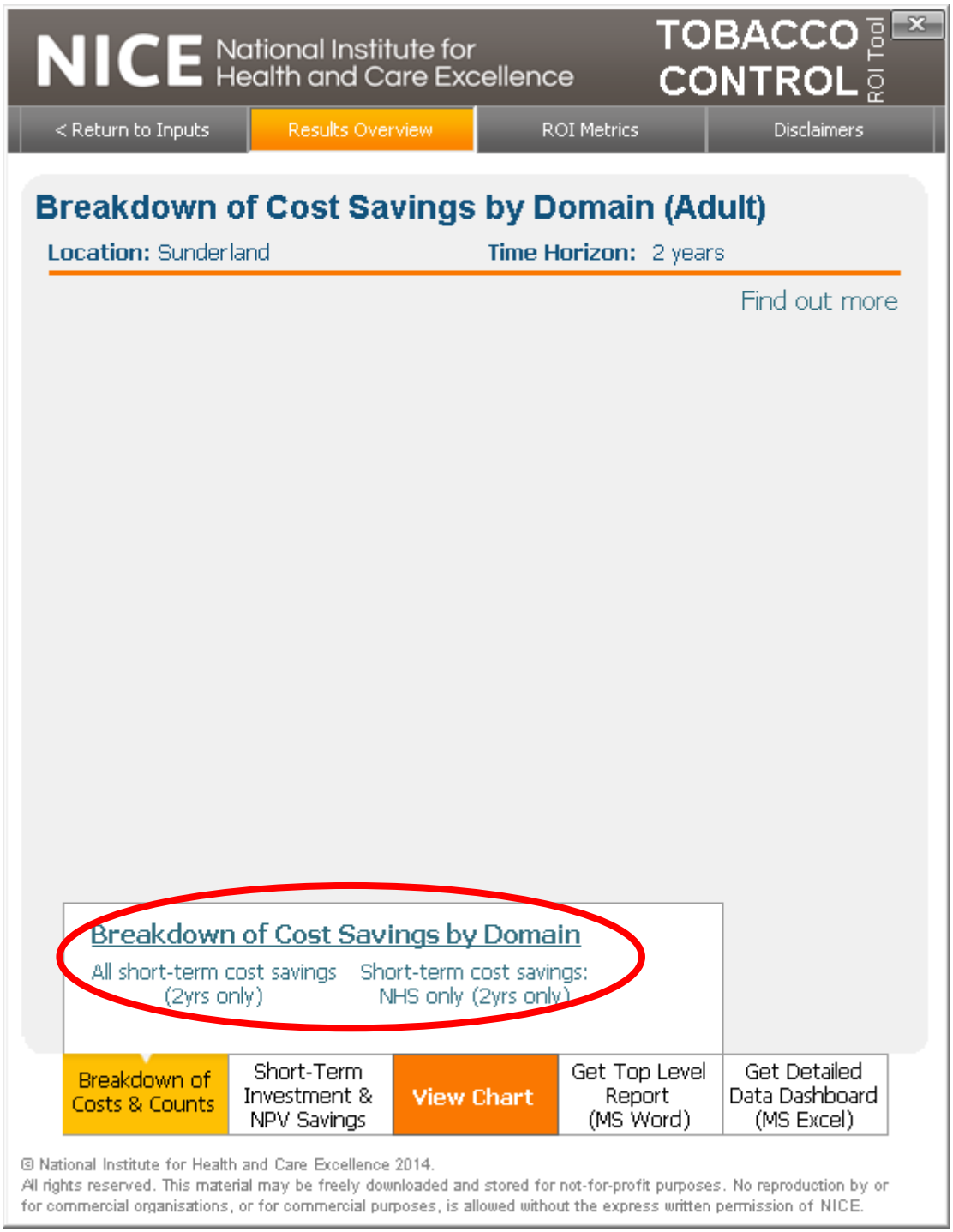
Alternative Package – a new intervention package created by users by selecting out a listed intervention, changing population, changing input parameter values or adding a new intervention. By default, the Alternative Package assumes the additional effect of running the Current Package together with the subnational programme.

Reviewing detailed results for your area

You can view the results in a number of different ways:

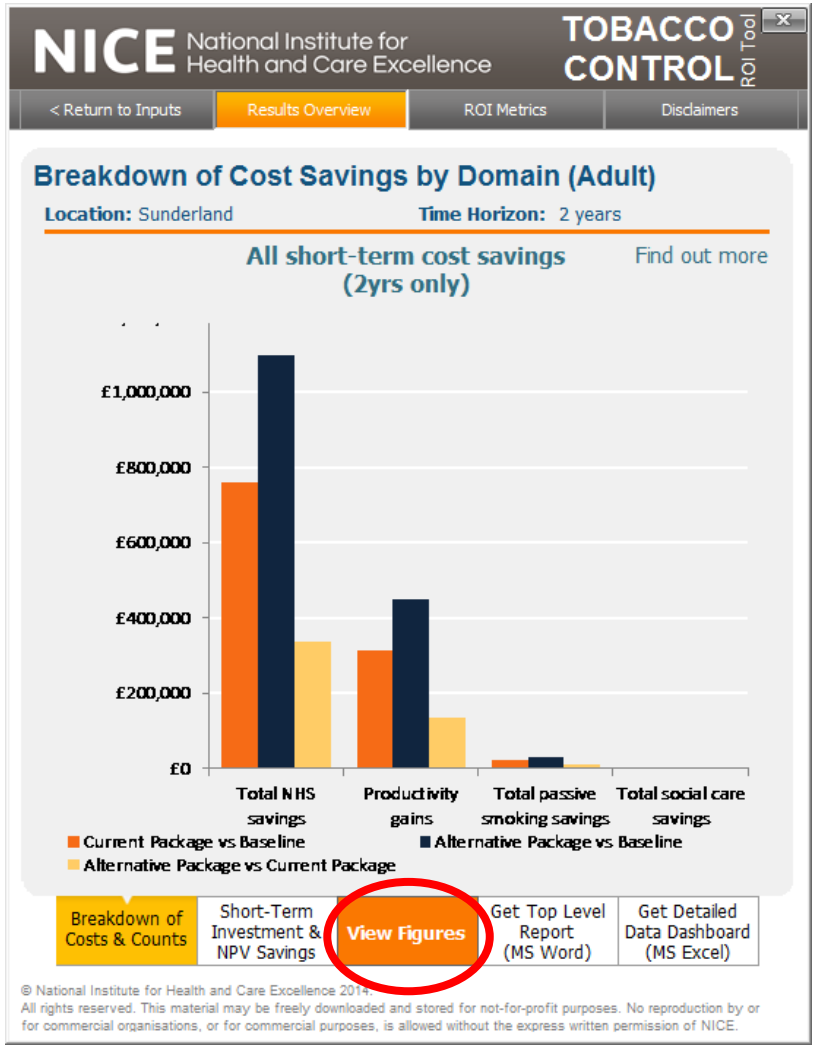
1. *Results Overview*

   By default, the Results Section opens with the Results Overview pane. At the bottom you will see a number of buttons that will provide results in various forms. For example, if you click on the "Breakdown of Costs", the following sub-menu will appear on the top of the panel:



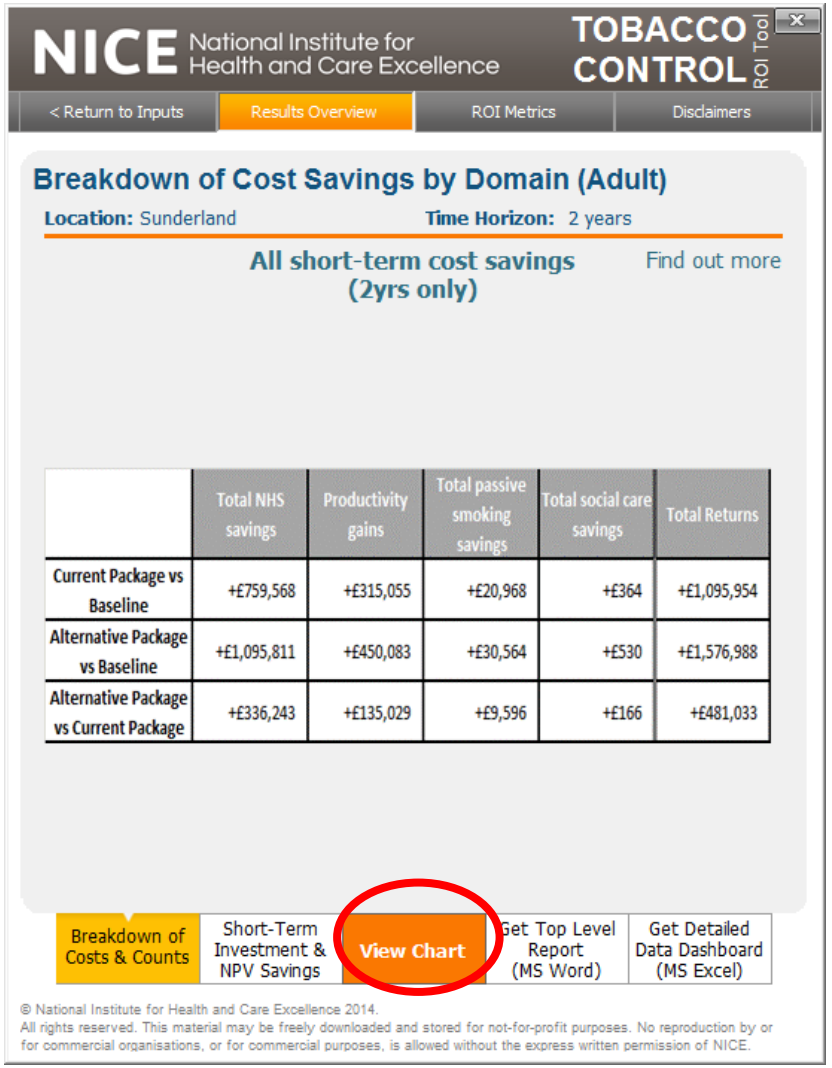
This will provide you with options to see whether you want the tool to display expected savings of your intervention package from the quasi-societal perspectives (includes costs to local economy and wider healthcare sector) or from the NHS perspective only.

If you click on the "All short-term cost savings", the below graph will show up on this panel:



These are the "potential" (gross) savings that your investment package could deliver in the next 2 years.

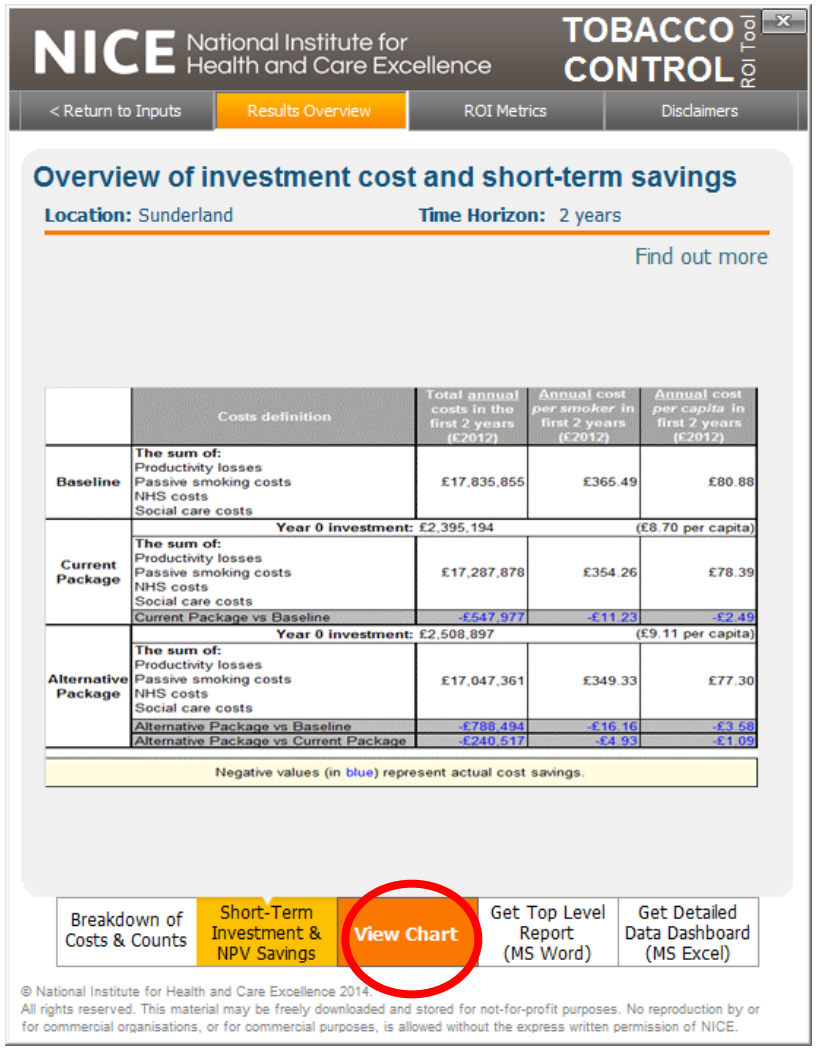
Click on "View Figures" button and it will show the actual figures that are behind the relevant graph, as shown below:



	Total NHS savings	Productivity gains	Total passive smoking savings	Total social care savings	Total Returns
Current Package vs Baseline	+£759,568	+£315,055	+£20,968	+£364	+£1,095,954
Alternative Package vs Baseline	+£1,095,811	+£450,083	+£30,564	+£530	+£1,576,988
Alternative Package vs Current Package	+£336,243	+£135,029	+£9,596	+£166	+£481,033

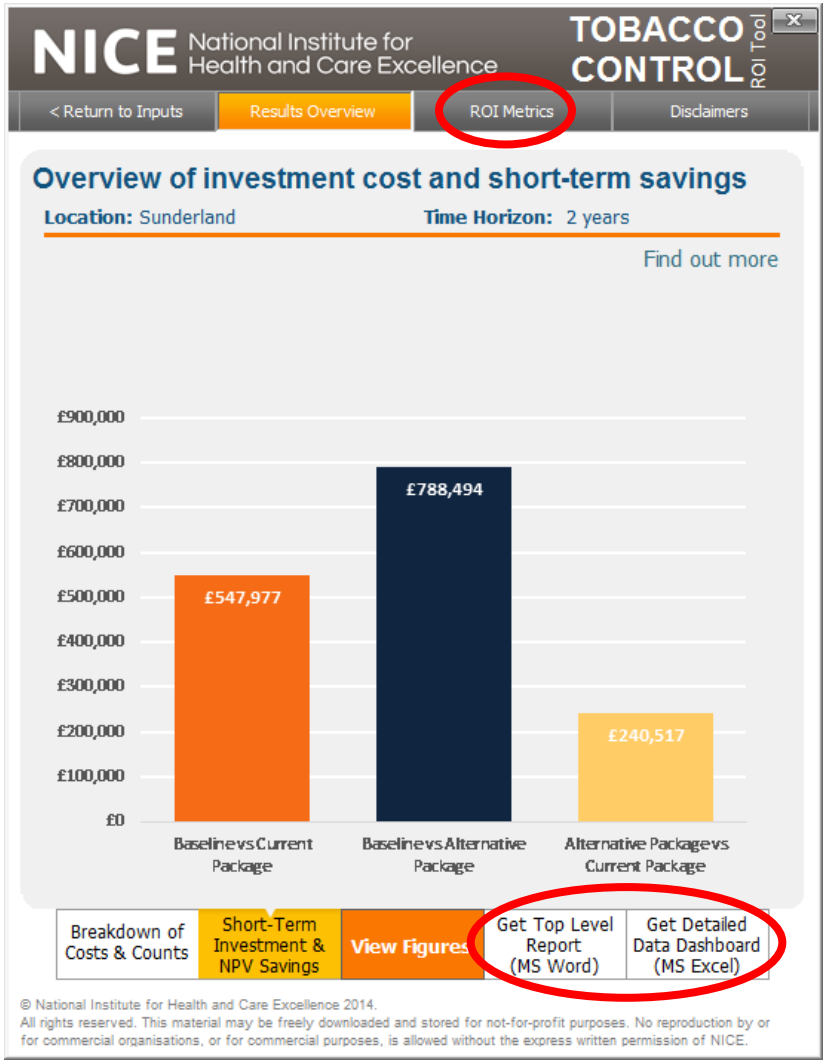
Click on "Short-term Investment and NPV savings" and it will show the "net" savings, i.e. savings when the cost of implementing your package is included in the analysis.

Similarly, you can select to view the figures for the Short-Term Investment and NPV Savings:



	Costs definition	Total annual costs in the first 2 years (£2012)	Annual cost per smoker in first 2 years (£2012)	Annual cost per capita in first 2 years (£2012)
Baseline	The sum of: Productivity losses, Passive smoking costs, NHS costs, Social care costs	£17,835,855	£365.49	£80.88
	Year 0 investment: £2,395,194			(£8.70 per capita)
Current Package	The sum of: Productivity losses, Passive smoking costs, NHS costs, Social care costs	£17,287,878	£354.26	£78.39
	Current Package vs Baseline	-£547,977	-£11.23	-£2.49
	Year 0 investment: £2,508,897			(£9.11 per capita)
Alternative Package	The sum of: Productivity losses, Passive smoking costs, NHS costs, Social care costs	£17,047,361	£349.33	£77.30
	Alternative Package vs Baseline	-£788,494	-£16.16	-£3.68
	Alternative Package vs Current Package	-£240,517	-£4.93	-£1.09

You can revert to the graph view by clicking the "View Chart" button. Note: the graph represents the difference between packages, not the net values displayed in the table.



2. Headline Figures Report

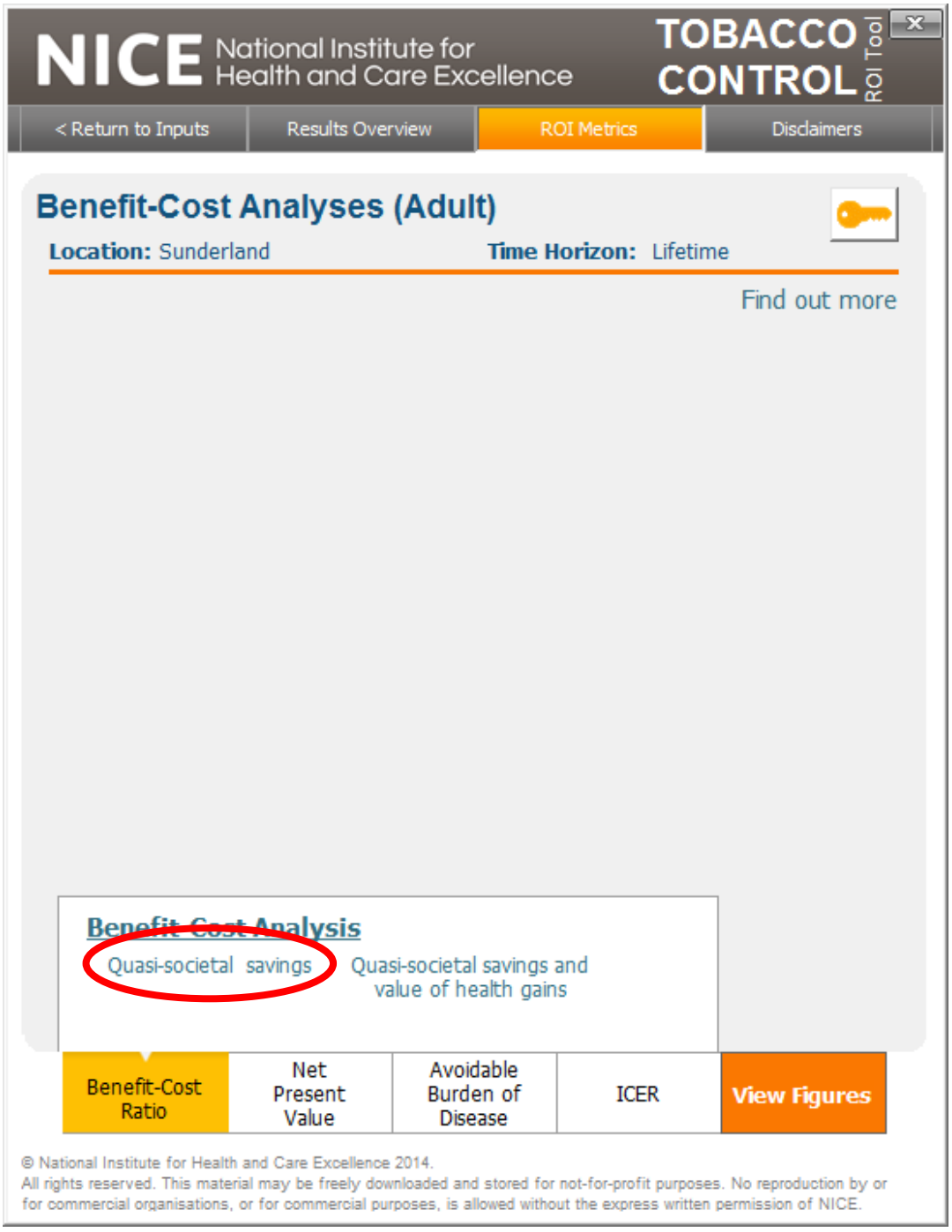
- You can get the top level narrative report of all results in MS Word format by clicking the relevant button in the Results Overview pane. See further details on page 30.

3. Data Dashboard

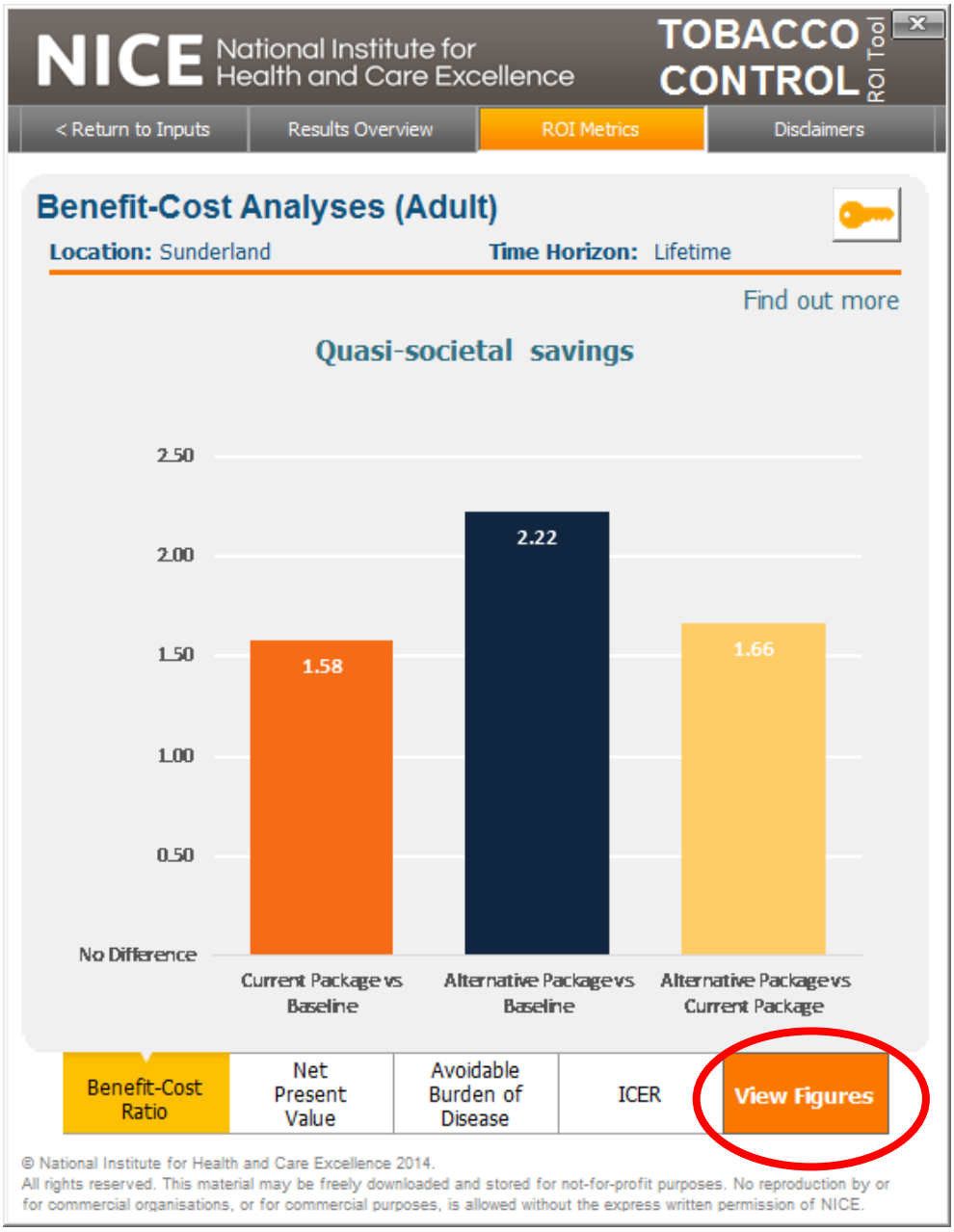
- You can get a detailed report in MS Excel format by clicking the relevant button in the Results Overview pane. See further details on page 31.

4. ROI Metrics

On the top of the main panel, a button called "ROI Metrics" is available. If you click on this button, it will take you to ROI metrics page. On the bottom of this page are several buttons offering you the option of different metrics you are interested in. If you click on one of the buttons, it will give return a sub-menu to choose whether you would like to include the value of health gains in the analysis (see below).



If you choose, say, “quasi-societal savings”, the following graph will be displayed:

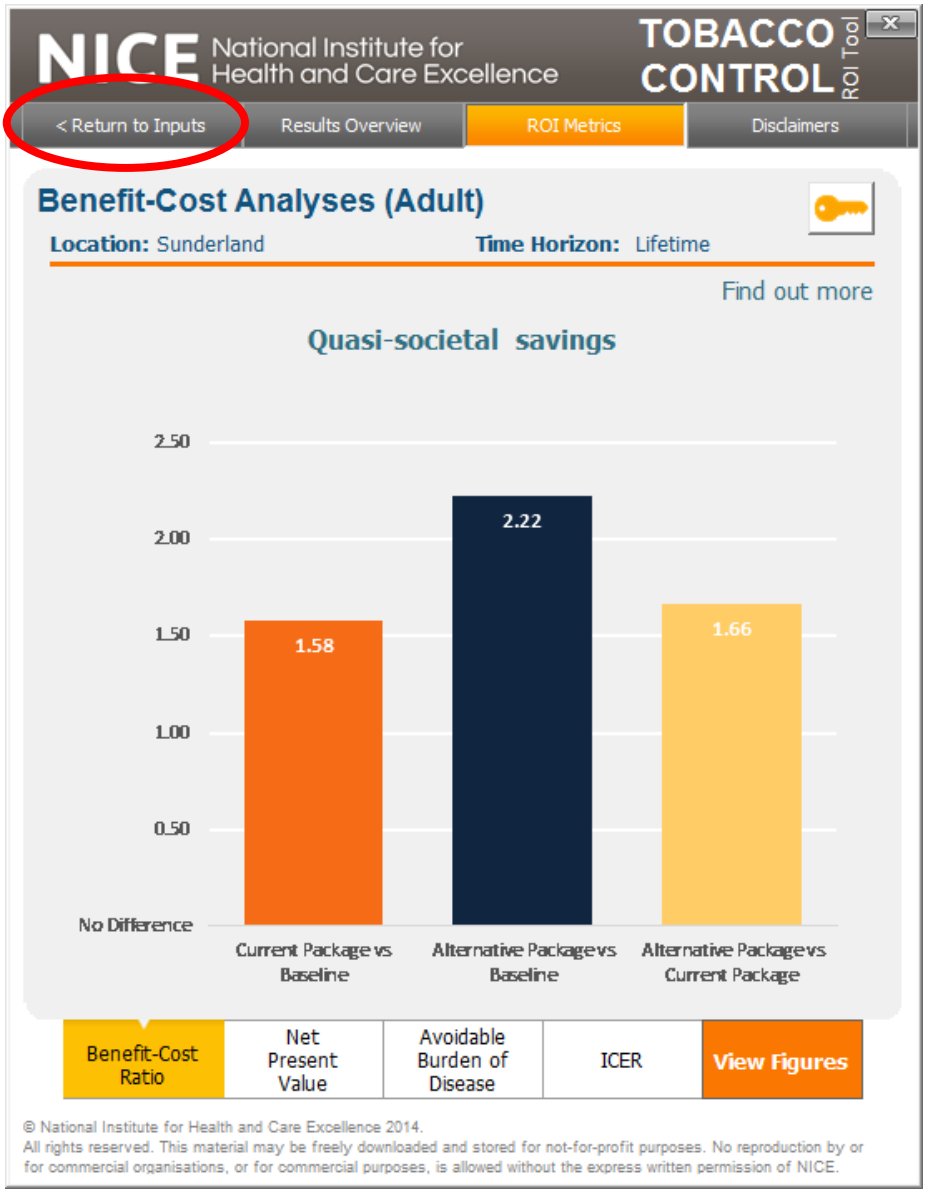


Note that the “View Figures” button gives you the actual figures used to generate such graphs.

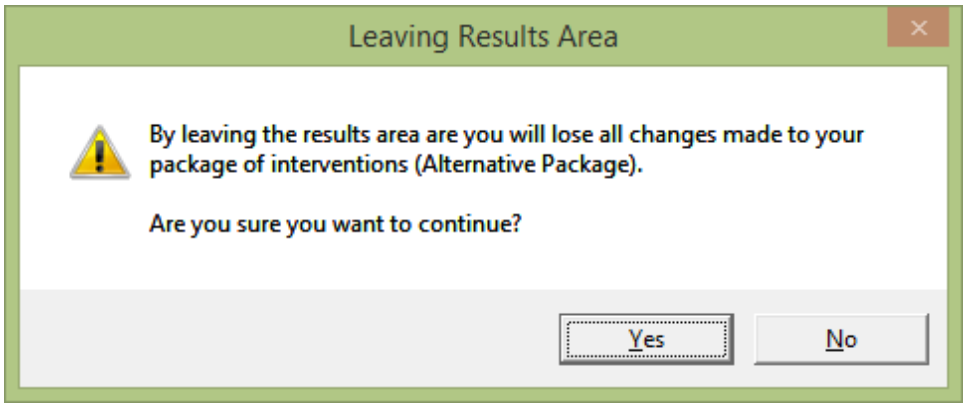
You can choose a different ROI metric, say, “Net Present Value” or “ICER” by clicking on the buttons on the bottom of the right hand side panel.

Changing a local area and starting a fresh analysis

You can start a fresh analysis or change a new local area, by clicking on “Return to Inputs” button available on the top-left corner of the right hand results panel:



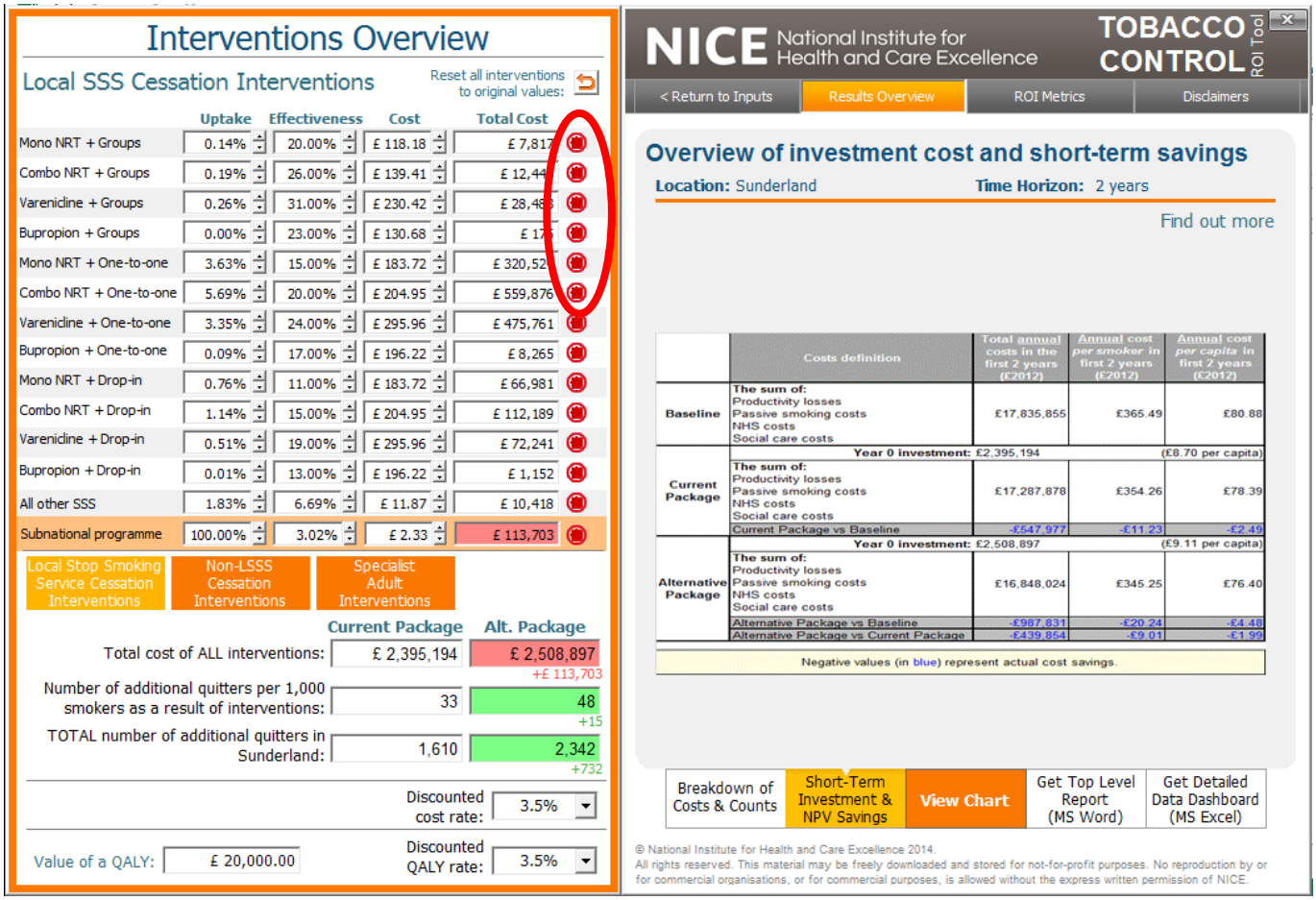
A warning message will show up for you to confirm that this choice will erase all data from the current memory to allow a fresh analysis:



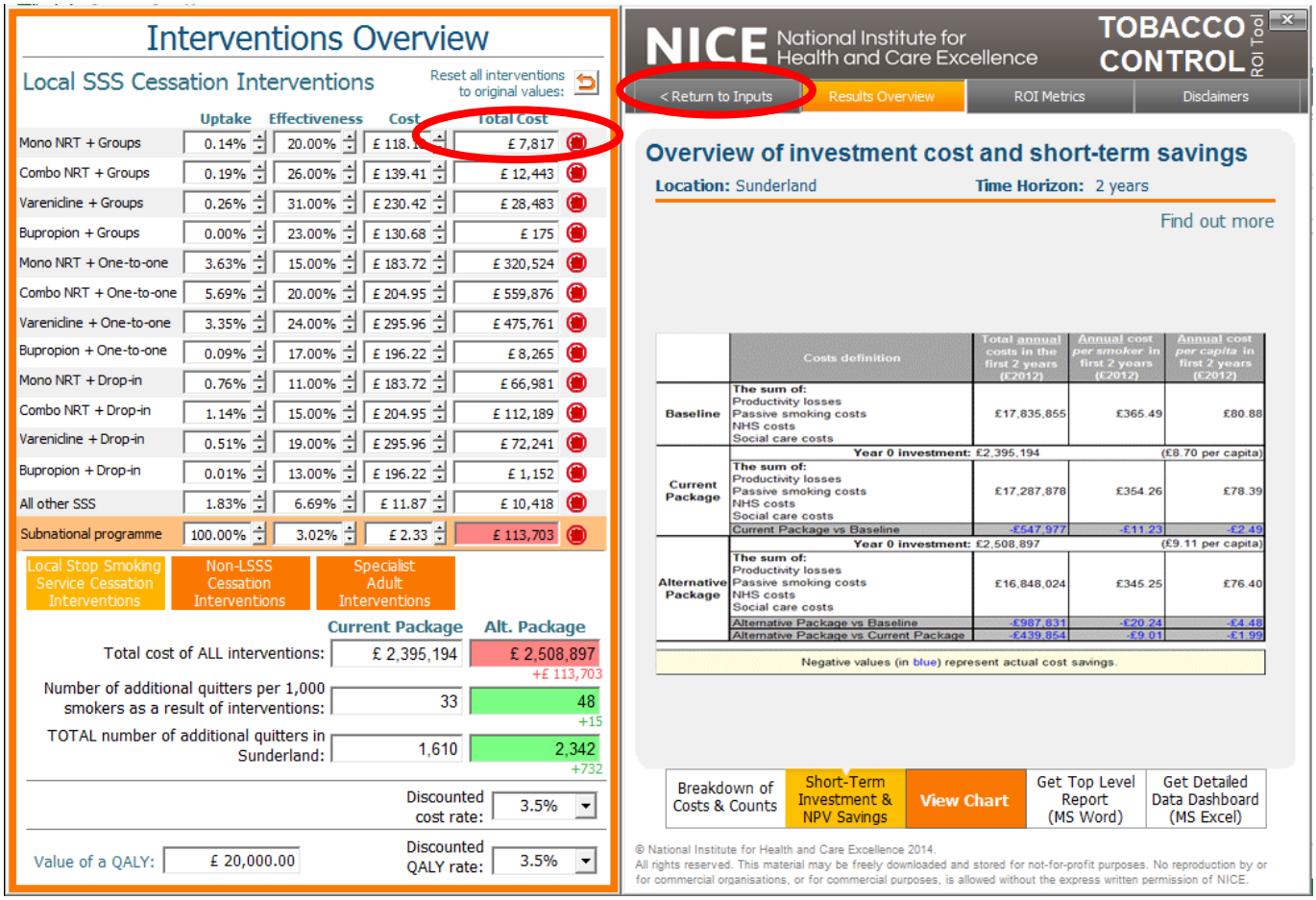
Make sure that before you decide to continue, you should have exported the Word and Excel Report for future reference on your current package. If you have not done so already, you should click NO and then return to "Results Overview" tab on the top left corner of the panel (as shown above) and look for the export buttons on the bottom right (see screenshot on p.21).

Choosing what population or intervention you can include in the analysis

You can choose population type or actual intervention to include in your analysis. To do this, you need to return to main results window and left-hand side panel called "Interventions overview"



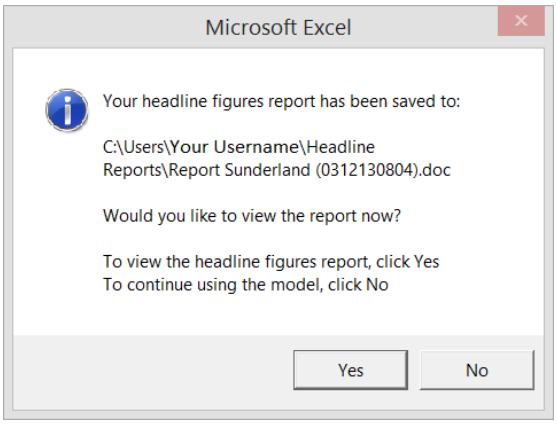
You can see the red buttons next to each intervention (red circle above). By clicking this button, you will exclude the intervention from the analysis. A green button will then appear. If you click on the green button, the intervention is back to the list to be included in the analysis (see below).



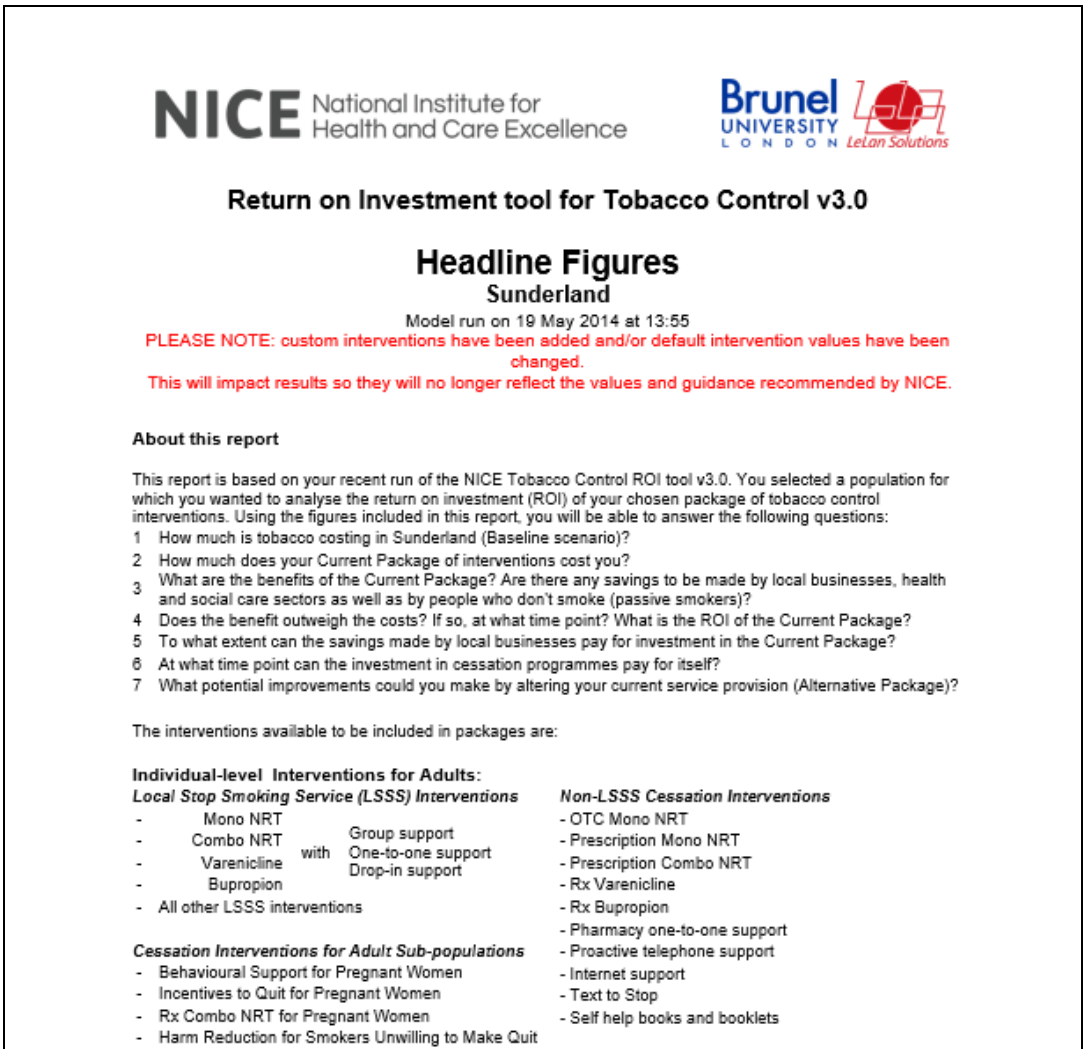
To remove a population, go to the input parameters panel (right hand side panel of the tool you get when you first open it or you can go back to it by clicking on “Return to Inputs” tab as shown above). The input parameter panel is shown below. Red button will appear next to the type of population when you click on “View adult sub-population”. Click on the red button to remove the population. As above, a green button will appear just in case you want to bring back this population to the analysis.

Generating the Headline Figures Report

By clicking the "Get Top Level Report (MS Word)" button in the Results Overview, you can generate a narrative report detailing the headline figures for your selected packages of interventions at your chosen location. On clicking the button, the tool will save your report to your local hard drive (in a folder located in the same directory as the tool) and you will be prompted to view the output directly:



Note the disclaimer that appears if one has added a custom intervention, or changed default effectiveness values.



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Return on Investment tool for Tobacco Control v3.0

Headline Figures

Sunderland

Model run on 19 May 2014 at 13:55

PLEASE NOTE: custom interventions have been added and/or default intervention values have been changed.
This will impact results so they will no longer reflect the values and guidance recommended by NICE.

About this report

This report is based on your recent run of the NICE Tobacco Control ROI tool v3.0. You selected a population for which you wanted to analyse the return on investment (ROI) of your chosen package of tobacco control interventions. Using the figures included in this report, you will be able to answer the following questions:

1 How much is tobacco costing in Sunderland (Baseline scenario)?
2 How much does your Current Package of interventions cost you?
3 What are the benefits of the Current Package? Are there any savings to be made by local businesses, health and social care sectors as well as by people who don't smoke (passive smokers)?
4 Does the benefit outweigh the costs? If so, at what time point? What is the ROI of the Current Package?
5 To what extent can the savings made by local businesses pay for investment in the Current Package?
6 At what time point can the investment in cessation programmes pay for itself?
7 What potential improvements could you make by altering your current service provision (Alternative Package)?

The interventions available to be included in packages are:

Individual-level Interventions for Adults:

Local Stop Smoking Service (LSSS) Interventions

- Mono NRT
- Combo NRT with Group support, One-to-one support, Drop-in support
- Varenicline
- Bupropion
- All other LSSS interventions

Non-LSSS Cessation Interventions

- OTC Mono NRT
- Prescription Mono NRT
- Prescription Combo NRT
- Rx Varenicline
- Rx Bupropion
- Pharmacy one-to-one support
- Proactive telephone support
- Internet support
- Text to Stop
- Self help books and booklets

Cessation Interventions for Adult Sub-populations

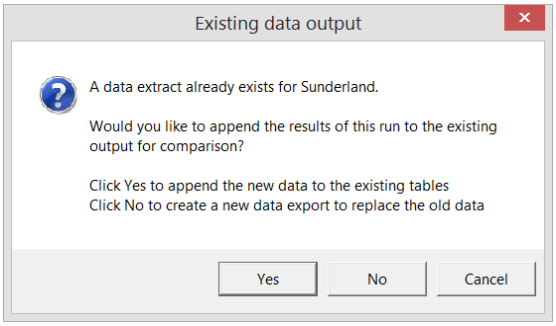
- Behavioural Support for Pregnant Women
- Incentives to Quit for Pregnant Women
- Rx Combo NRT for Pregnant Women
- Harm Reduction for Smokers Unwilling to Make Quit

Generating the Data Dashboard

By clicking the "Get Detailed Data Dashboard (MS Excel)" button in the Results Overview, you can generate an export containing the ROI metrics that allows you to compare multiple different packages of interventions against the Baseline and each other.

After you first run the tool and generate an export, it will contain the information relating to the Current and Alternative Packages, renamed Packages 1 and 2.

If you make additional changes to the Alternative Package in the Results Area of the ROI tool – or if you re-run the tool to generate a new Current Package for the same location – exporting the data again will prompt you whether you want to replace the existing dashboard or append the new data to it:



Selecting to append the data will result in the relevant packages being added to the existing dashboard, renamed with appropriate numerical designation (e.g. Package 3, Package 4, etc). This allows you to perfrom a finer-grained analysis, comparing multiple different scenarios at your selected location.

The dashboard has a number of options that you can select (see below image):

- Time horizon
  - You can select to view your results at 2 years, 5 years, 10 years and Lifetime
- Benchmark Package
  - The benchmark package is that against which you wish to make a comparison
- Comparator Package
  - The comparator package is that which you wish to compare against your selected benchmark; both the benchmark and comparator are automatically compared against the baseline (i.e. the baseline cost of tobacco to society in the absence of any interventions).
- Level of Analysis for each metric
  - There are four types of metric available, for each of which a table and graph are presented: avoidable burden of disease, incremental cost-effectiveness ratio (ICER), net present value (NPV) analysis, benefit-cost analysis (BCA)
  - Each metric has a range of different areas of focus that can be selected via the relevant yellow drop-down lists

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NICE ROI Tool for Tobacco Control

Metric Dashboard (Adult data only)

Time horizon: 2 years

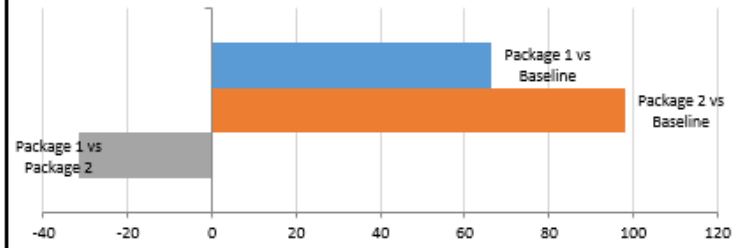
Welcome to the Excel output Metric Dashboard. Select your Benchmark and Comparator packages from the yellow box. The time horizon can also be changed (2yrs, 5yrs, 10yrs or Lifetime).

Benchmark: Package 1 **Comparator:** Package 2

Avoidable Burden of Disease

QALYs gained (across all s

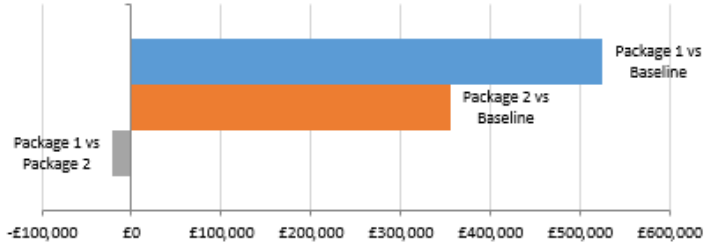
	QALYs gained
Package 1 vs Baseline	66
Package 2 vs Baseline	98
Package 1 vs Package 2	-32



Incremental Cost-Effectiveness Ratio (ICER)

Per Smoking Related Death a

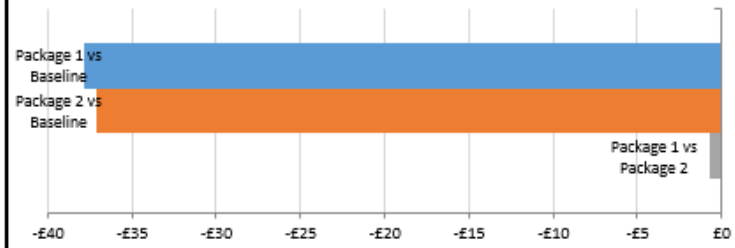
	Per Smoking Related Death averted
Package 1 vs Baseline	£525,036
Package 2 vs Baseline	£355,027
Package 1 vs Package 2	-£20,910



Net Present Value (NPV)

Average quasi-societal cos

	Average quasi-societal cost savings (per smoker)
Package 1 vs Baseline	-£38
Package 2 vs Baseline	-£37
Package 1 vs Package 2	-£1



Benefit-Cost Analysis (BCA)

Quasi-societal savings

	Quasi-societal savings
Package 1 vs Baseline	£0.23
Package 2 vs Baseline	£0.28
Package 1 vs Package 2	£0.99

Return to the ROI tool

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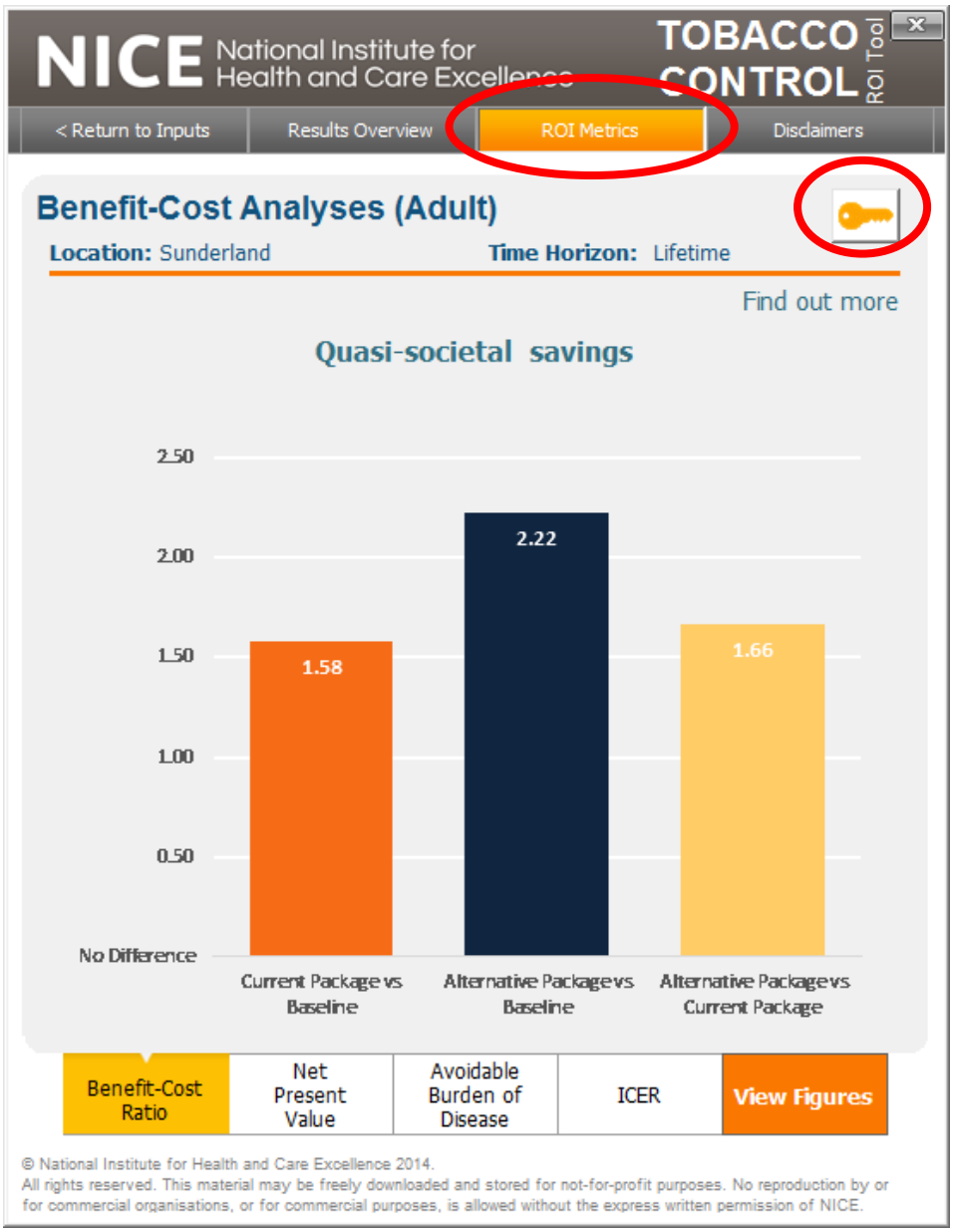
Running a Probabilistic Sensitivity Analysis (PSA) – advanced users only

Note that the results presented in the tool are presented as point estimates. In generating such results, economic models use assumptions and best available evidence which often are subject to uncertainty in their own right. A probabilistic sensitivity analysis (PSA) can be conducted to allow estimation of the degree of uncertainty around the model results. The PSA results are generated by representing key parameters within the models as probability distributions rather than fixed values. The PSA involves sampling from each of these probability distributions and obtaining a new estimate of the lifetime costs and QALYs within each population for each intervention package. For each estimate, a random value is obtained for every uncertain parameter in the model. These estimates can be called "replications". There are 1000 replications made in the PSA.

You can run PSA by going to the ROI metrics tab in the results panel:

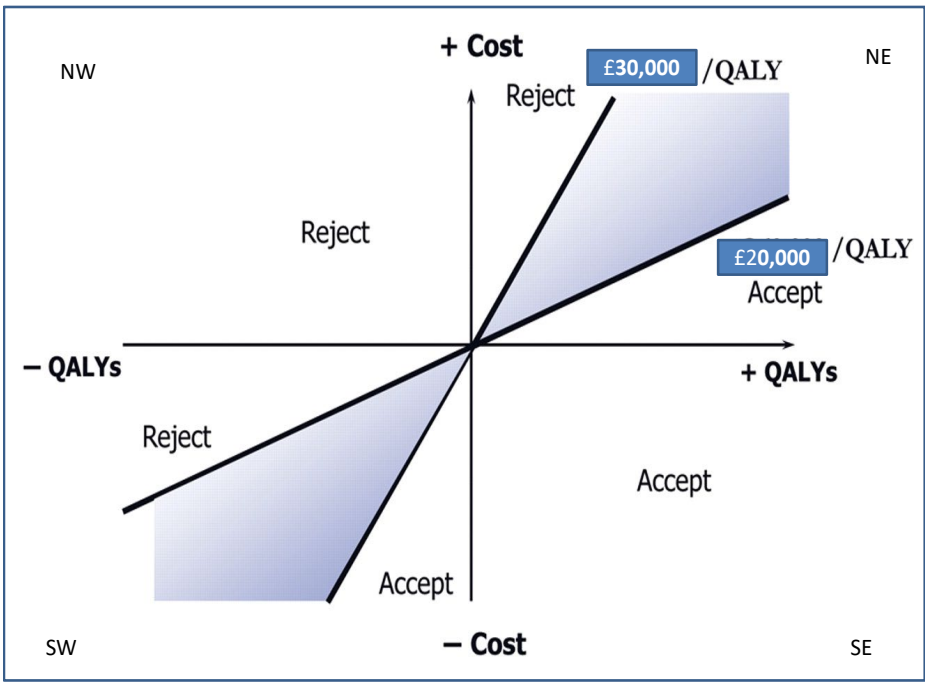


You will see a key button (see above) on the top right corner. When you click on this a pop-up window appears with a warning that it may take several hours to run.

Warning: Running a PSA takes several hours and requires users to have an understanding of probability distribution concepts. This is why it is currently restricted to "advanced users" only. If you are not an advanced user or do not want your machine to be occupied for several hours (you won't be able to do anything else on your machine when PSA is running), you should not attempt to run PSA.

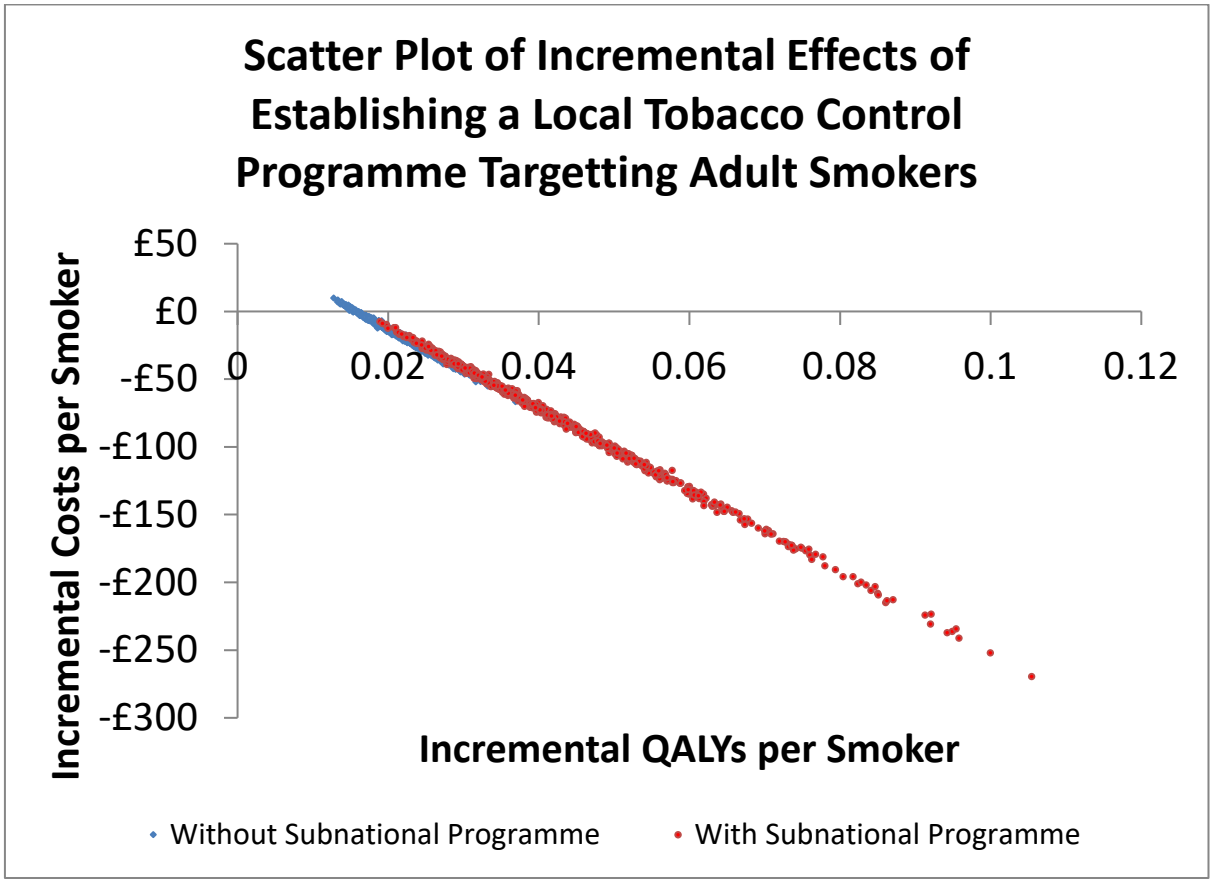
The results of the PSA are presented in the model by two graphical tools. The scatterplot shows the distribution of the incremental costs and QALYs for each package. Each dot represents a pair of these values from one replication. The scatterplot allows the user to obtain a visual representation of the distribution of the incremental costs and QALYs – this can be defined as "joint density plots".

A scatter plot of incremental effects (QALYs) and incremental costs can provide a quick overview of how likely it is that the package is cost-effective. This is called the cost-effectiveness plane. In order to understand the results, it is important first to look at Figure 1a below. NICE generally suggests that technologies that cost less than £20,000 -£30,000 per QALY gained (termed as, the "threshold") are considered cost effective. Those packages that fall into the lower right section of the graph, indicating the package is both cost saving and more effective, will always be considered cost effective. Depending on where most of the dots in the scatter plots lie, one can determine whether the package is cost effective or not.



The above figure is adapted from the figure available from
http://europace.oxfordjournals.org/content/early/2008/12/20/europace.eun342/F1.large.jpg

When you run PSA, the results are displayed in scatter plot:

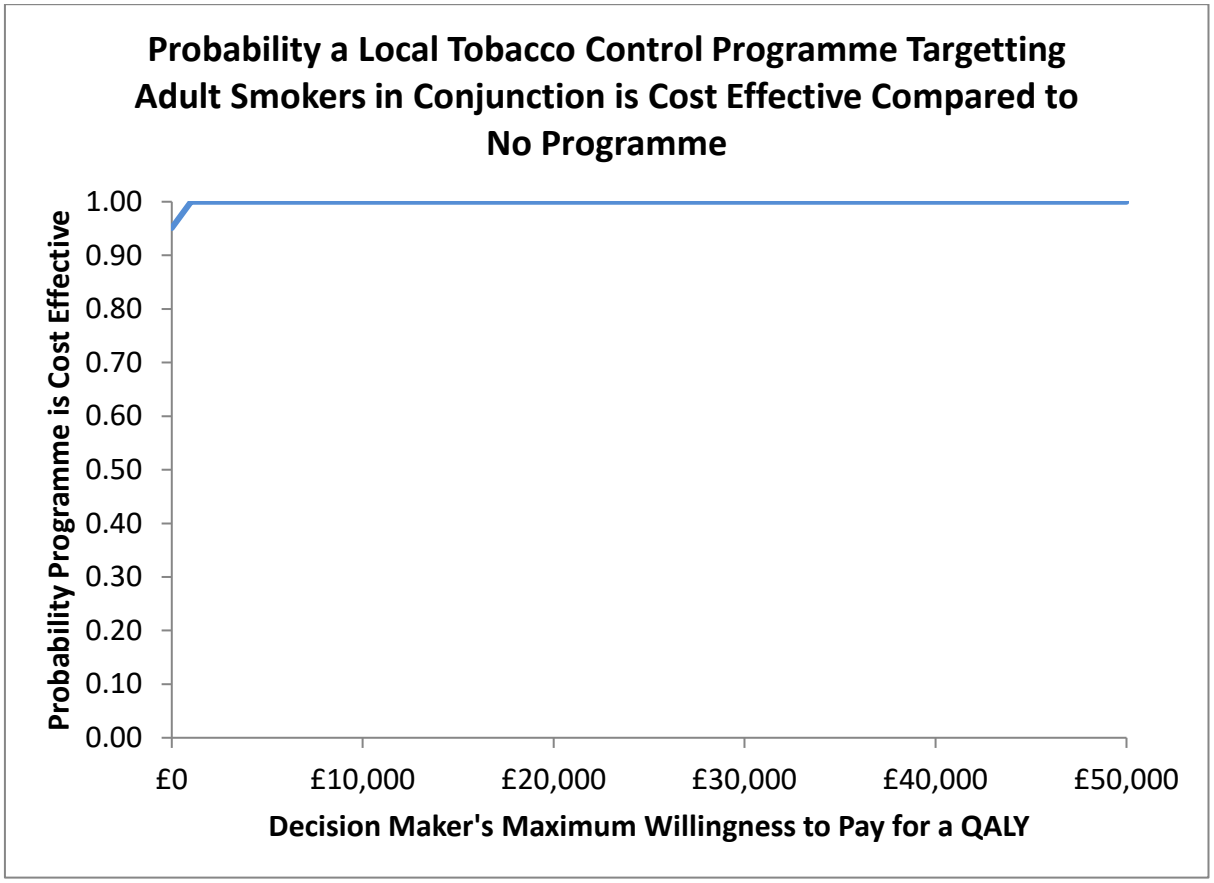


The figure above provides a scatter plot for the adult population in Sunderland. Note that the scatter plot is the outcome of a 1000 different estimations (called iterations) of incremental costs and incremental QALYs. In other words, 1000 combinations of all possible values, drawn at random, of different input parameters were used to generate incremental costs and QALYs. These estimates are for local interventions with or without subnational programme for all adult population (currently willing to make quit attempts, currently unwilling to make quit attempts and pregnant current smokers.

The figure above shows that the vast majority of values fall in the southest quadrant which indicates the packages of interventions are cost saving. A few values fall in the northeast quadrant which, given a threshold for the NHS of £20,000 per QALY, indicates they are cost effective.

It can also be seen from the above figure that the values corresponding to a subnational programme all fall in the SE quadrant - in other words it was cost saving. The adult interventions without a subnational program is cost saving in 95% of the estimates (the blue dots). When sub-national programme was added to local services, the package for all adult population was always cost-effective.

The PSA results are also provided in CEAC (cost-effectiveness acceptability curves). This is another way to look at the uncertainty around the ROI estimates:



The X-axis in the above graph represents the value of the threshold (remember, NICE recommends £20,000 to £30,000 per QALY) and Y-axis represents the probability that the package is cost-effective at the given value of the threshold. Compared with baseline, the package for adult interventions without a subnational program is cost effective provided the value of the threshold is greater than £1,000 per QALY. In other words, there is at least a 95% chance that the package is cost-effective at even a very low threshold of, say, £1,000 per QALY.

Accessing the tool

The tool is made freely available for use and can be downloaded at www.nice.org.uk/ROItobacco

Version control

Note, some of the tool inputs are time limited (e.g. population statistics) and may be updated when new data become available. As such, it is the user's responsibility to ensure that they are using the latest version of the tool. All versions made available for download will be clearly marked with a version number.

Referencing the tool

Any analysis based on this tool needs to acknowledge the use of this tool as follows: "This analysis is based on NICE Return on Investment Tool for Tobacco Control, version 3" and include the citation as:

Pokhrel, S., Owen, L., Lester-George, A., Coyle, K., Coyle D., West R., Trapero-Bertran M., Meads C. (2013). Tobacco Control Return on Investment Tool. London: National Institute for Health and Care Excellence.

Project Team

Brunel University- Subhash Pokhrel (Lead), Catherine Meads (Systemic Review Expert), Kathryn Coyle (modeller), Doug Coyle (Special Advisor- University of Ottawa), Marta Trapero-Bertran (modeller); Robert West (Lead expert on effectiveness of interventions)

LeLan Solutions – Adam Lester-George (GUI and additional analyses)

NICE Project Team – Lesley Owen, Suzi Peden, Rachel Kettle, Victoria Axe, Simon Ellis, Antony Morgan

Disclaimer information

NICE has provided this tool to aid decision-making. NICE cannot be held liable for any investment or other decisions that are made using information and results obtained from this tool. Implementation of NICE guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement NICE guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this tool should be interpreted in a way that would be inconsistent with compliance with those duties.

Acknowledgement: All stakeholders who participated in three stakeholder meetings and consultations.

The user interface was developed by LeLan Solutions, Bespoke Technical Communication Services (adam@lelan.co.uk)

Request to the users

This tool may be subject to continuous improvement. If any problem is encountered or inconsistency is found, please report it to NICE by emailing nice@nice.org.uk

Appendix I: The definition of different metrics used in the tool

Table A1- The definition of different metrics used in the tool

Metrics	Description[5]
Baseline estimates	Count of events (e.g. days of absenteeism, passive smokers, GP visits or hospitalisations), productivity losses or health and social care costs due to tobacco use. These estimates refer to current economic burden of tobacco in local area.
Net cost saving, 1 year (including health care cost saving)	Net health care cost savings per recipient for year 1 (health care cost savings in the first year minus the cost of the intervention).
Net cost saving, 1 year (including health care cost saving and the value of productivity saving)	Net health care cost savings per recipient for year 1 (health care cost savings and the value of productivity savings in the first year minus the cost of the intervention).
NPV (including health care cost saving)	The sum of health care cost savings per recipient less implementation cost per recipient. A positive value indicates that the value of the benefits exceeds the intervention costs.
NPV (including health care cost saving and health gain)	The sum of health care cost savings and value of health gains (monetary value of QALY multiplied by the number of QALYs gained) per recipient less implementation cost per recipient. A positive value indicates that the value of the benefits exceeds the intervention costs.
B:C ratios (including health care cost saving)	The sum of health care cost savings per recipient divided by the cost of the intervention per recipient. A value greater than 1 indicates that the benefits of the intervention exceed its costs.
B:C ratios (including health care cost saving and health gain)	The sum of health care cost savings per recipient and value of health gains (monetary value of QALY multiplied by the number of QALYs gained), divided by the cost of the intervention per recipient. A value greater than 1 indicates that the benefits of the intervention exceed its costs.
Cost per QALY gained	Intervention cost minus health care cost savings divided by the number of QALYs gained. A negative number indicates that the health care cost savings are greater than the original cost of the intervention.

[5] In all the descriptions that follow, cost and effect of the intervention applies to the first year only unless stated otherwise. The metrics are provided for 2, 5, 10 years and lifetime, unless stated otherwise.

Cost per death avoided	Intervention cost minus health care cost savings divided by the number of deaths avoided. A negative number indicates that the health care cost savings are greater than the original cost of the intervention.
Cost per LY saved	Intervention cost minus health care cost savings divided by the number of life years saved. A negative number indicates that the health care cost savings are greater than the original cost of the intervention.
Short run productivity gain	Productivity gains per recipient for the first 2 years following the intervention.
Avoidable burden of disease (QALYs)	The product of number of QALYs gained per person and the population reached by the intervention (the population reached is the proportion of the UK population affected by the condition). This provides an indication of the scale of the health problem that can be resolved by the intervention. In the tool, this metric is standardised as QALYs gained per 1000 smokers.

Appendix II: Tobacco control interventions included in the tool[6]

Interventions	Description
Mono NRT + group support	Target population: Adult current smokers 18+. A specialist clinic is a clinic that offers multi-session (usually for at least 4 weeks post quit date) specialist behavioural support by practitioners whose primary role is in tobacco controlsupport and who have competences as assessed by the NCSCT recommendations (www.ncsct.co.uk). Lower intensity support by less specialised practitioners is covered by the figures for NHS non specialist clinic setting below.
Combo NRT + group support	
Varenicline + group support	
Bupropion + group support	
Mono NRT + one-to-one support	
Combo NRT + one-to-one support	
Varenicline + one-to-one support	
Bupropion + one-to-one support	
Mono NRT + drop-in support	
Combo NRT + drop-in support	
Varenicline + drop-in support	
Bupropion + drop-in support	
All other SSS interventions	
OTC Mono NRT	Target population: Adult current smokers 18+. These include interventions in primary care and hospital setting in which there is limited behavioural support which may range from a prescription from the GP only to stop-smoking advice from practice nurses or pharmacists. If the pharmacist or nurse is delivering behavioural support according to the recommended treatment plan (see above) and has the necessary competences to do this, then the estimated success rates will be as given above for specialist services.
Prescription Mono NRT	
Prescription Combo NRT	
Varenicline	
Bupropion	
Pharmacy one-to-one support	Target population: Adult current smokers 18+. Non-NHS interventions include those that smokers purchase themselves, or are (or could be) delivered by other agencies.
Proactive telephone support	
Internet support	
Text to Stop	
Self help books and booklets	
GP Brief Advice	Target population: Adult current smokers 18+ who are not pregnant women. The only intervention known to have an effect is physician advice. Brief opportunistic advice from other health professionals may have an effect but to date there is no good evidence for this. Nevertheless they are recommended to give such advice so as to encourage smokers to use the Stop-Smoking Services which do have proven effectiveness.
Behavioural Support for Pregnant Women	Target population: Pregnant women aged 16-44 years Interventions that are targeted at pregnant current smokers to help them quit during pregnancy and post-partum.
Incentives to Quit for Pregnant Women	
Rx Combo NRT for Pregnant Women	
Harm Reduction for Smokers Unwilling to Quit	Target population: Adult current smokers who are not currently willing to make quit attempts Reducing tobacco use in those current smokers who are currently

[6] More details provided in the accompanying Technical Report, available here

	unwilling to make quit attempts. The intention here is to reduce the harm from tobacco by cutting down, which eventually may lead to quitting. This intervention is supported by use of some kind of NCP, especially NRT.
Comprehensive sub-national programme	Target population: General population A coordinated programme of tobacco control at sub-national (e.g. regional) levels built around major key strands advocated by World Health Organisation's MOPWER model of tobacco control and is similar to FRESH North East
No intervention (background quit rate)	Expected annual rate of fall in smoking prevalence