



ScotPHO Tobacco Profiles Second release (January 2015)

Technical Report

Contents

Introduction	3
1. Interpreting the spine charts.....	3
2. Measures used in the profiles	5
3. Confidence intervals	5
4. Geographies and populations	6
5. Further details on specific indicators.....	6
Indicators 1 to 7 – Adult prevalence	7
Indicators 8 to 15 – Smoking During and Post Pregnancy.....	7
Indicators 16 to 20 – Smoking in School children	9
Indicators 21 to 31 – Smoking Cessation and Smoking Cessation Products.....	9
Indicator 32 - Smoking attributable deaths.....	11
Indicators 33, 34, 35, 36 & 37 - Lung cancer, Chronic Obstructive Pulmonary Disease (COPD) and Smoking Attributable Admissions	13
Indicator 38 – Retailer Information	13

Introduction

The second release of the Scottish Tobacco Control Profiles (13/01/2015) include: (1) an overview report summarising the Scotland trends, spine charts and commentaries for NHS Boards and Local Authorities, and a Definitions and Sources table, and (2) access to spine charts, rank charts, time trends and the raw data for NHS Boards and Local Authorities through the ScotPHO online profiling tool. These have been produced to support the reduction in tobacco use in Scotland by providing information about tobacco use, cessation and the health effects. The aim of the profiles is to help service providers, planners, policy makers and the public make informed decisions.

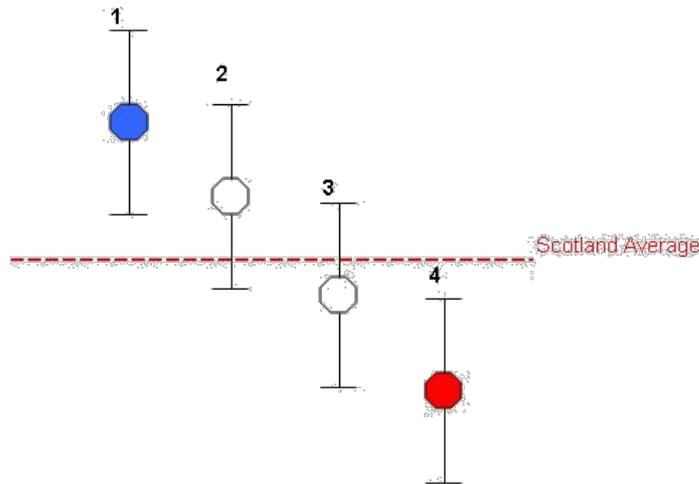
This document provides technical information on the 37 indicators, their derivation, descriptions of statistics and methods, and caveats about the information.

1. Interpreting the spine charts

Spine charts are commonly used in public health profiles to illustrate graphically a range of complex information in a way which it is intended will be quickly and easily understood. To aid comparison, in the overview report all the indicators are shown against the Scottish mean value (red line) as a reference. Within the online tool the user can select other comparator populations. A modified 'traffic light' system has been applied to identify areas which are statistically significantly 'better' (blue) or 'worse' (red) than the comparator population, or not significantly different from the comparator population (white).

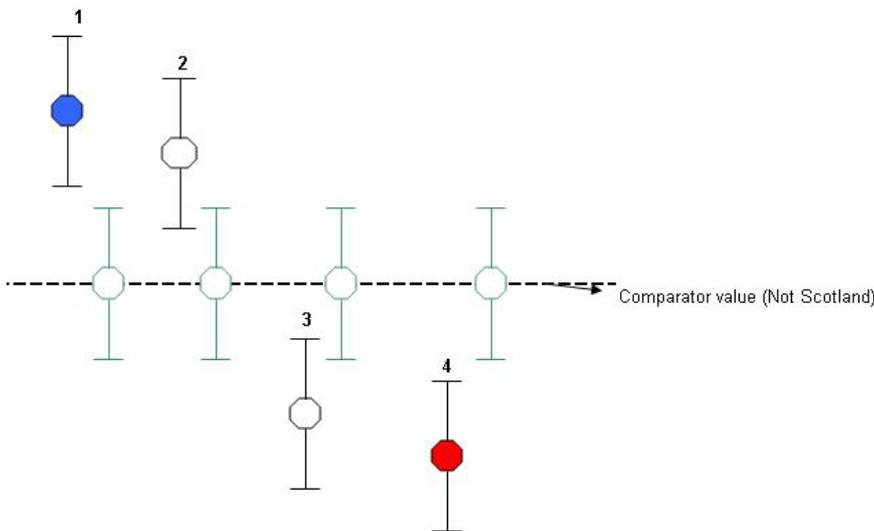
To take some examples: in some cases (such as prevalence) a higher level is clearly 'worse' (red) and a lower level 'better' (blue), while in other cases (such as quit rates in cessation) a higher level is clearly 'better' (blue) and a lower level 'worse' (red).

The 95% confidence interval for an indicator value for an area was used to compare that area against the overall Scotland value. The Scotland value was treated as an exact reference value, allowing the confidence interval for an indicator value to be used to test whether the value was statistically significantly different to the Scottish figure. If the interval did not include the Scottish value, the area was assessed as being statistically significantly different from Scotland (perhaps 'better' or 'worse', depending on the indicator); if the interval included the Scottish value, the area was assessed as being similar to Scotland. This is illustrated in the example below.



Area 1: Area is statistically significantly better than the Scotland Average. Area 2: Area is similar to the Scotland Average.
 Area 3: Area is similar to the Scotland Average.
 Area 4: Area is statistically significantly worse than the Scotland Average.

When the comparator is changed from the Scotland Average to another area, the comparator is no longer treated as an exact reference value. Instead the confidence interval for the comparator value is used. Statistical significance is determined if the interval for the indicator value falls out with the interval for the comparator value. If the interval for the indicator value includes the comparator value (OR any value within the comparator interval), the area will be assessed as being not statistically significantly different. This is illustrated in the example below.



Area 1: Area is statistically significantly better than the Comparator value.
 Area 2: Area is similar to the Comparator value.
 Area 3: Area is similar to the Comparator value.
 Area 4: Area is statistically significantly worse than the Comparator value.

The 5th, 25th, 75th and 95th percentiles are also included in the spine charts to show the distribution of the indicators for the geography being analysed.

Different indicators have different lengths of bars representing the distribution, depending on the variability inherent in the data. Note that in some profiles, the illustration of the distribution may exceed the space allowed for the bar, and is therefore truncated. When the distribution is skewed, the light grey bar will be longer on one side of the dark gray bar than the other. For example, in the case of smoking during pregnancy in the most

deprived quintile, the percentages are much more widely spaced at the higher ('better') end than the lower ('worse') end.

Each indicator is based on the most recent of the time periods given in the Definition and Sources table in Appendix 1 of the overview paper. These time periods were the most recent for which data were available at a Scotland level in November 2014. Wherever possible we include data up to the end of 2013.

2. Measures used in the profiles

The measures generally follow the statistics and methods recommended by the Association of Public Health Observatories (APHO).¹

The definitions given below are adapted from the APHO paper.

- **Proportions** are statistics where the denominator is the count of a 'closed' population, and the numerator is the count of members of this population that have a specified characteristic. If O is the observed number of individuals in the sample or population having the specified characteristic and n is the total number of individuals in the sample or population, then the estimated proportion is given by $p = O/n$. In these profiles, proportions have been multiplied by 100 to obtain **percentages** for presentation purposes.
- **Crude rates** are calculated in these profiles as follows. If O is the number of people experiencing an event (such as a hospital admission) in a population of size n during a period t , then the estimated crude rate is given by $r = O/nt$. The crude rates are expressed per 100,000 population or per 1,000 population, per year.
- **Directly age-sex standardised rates** have been calculated for most of the hospital patient and mortality indicators because the overall rate may vary with the age-sex structure of the populations. The direct standardisation method was used, with the age-sex specific rates of the local population applied to the age-sex structure of a standard population (in this case the original European standard population). This gives the overall rate that would have occurred in the local population if it had the same age-sex profile as the standard population. It allows valid comparisons to be made between local areas with differing population age-sex structures. In the profiles, age-sex standardised rates are expressed per 100,000 population per year.

3. Confidence intervals

Uncertainty intervals are presented alongside the point estimates for all indicators. The uncertainty interval is the range of values that is normally used to describe the uncertainty around a point estimate of a quantity, for example a mortality rate. In the case of indicators based on a sample of the population, uncertainty arises from random differences between the sample and the population itself. The stated value should therefore be considered as only an estimate of the true or 'underlying' value. Confidence intervals quantify the uncertainty in this estimate and, generally speaking, describe how different the point estimate could have been if the underlying conditions stayed the same,

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¹ APHO Technical Briefing paper: <http://www.apho.org.uk/resource/item.aspx?RID=48457>. Date of publication 1st March 2008.

but chance had led to a different set of data. The wider the confidence interval, the greater the uncertainty in the estimate.

Confidence intervals are given with a stated probability level. In these Profiles this is 95%, and so there is a 95% probability (ie a 19 in 20 chance) that the confidence interval includes the 'true' value of the indicator. The use of 95% is arbitrary, but is conventional practice in medical and public health statistics.

Appendix 1 comprises a table of the methods used to calculate confidence intervals for the different measures used in these profiles, following APHO recommendations where available.

Confidence intervals have also been used to make comparisons with the comparators as described in Section 1.

4. Geographies and populations

On 1st April 2014, NHS Board boundaries were changed to align with those of local authorities. This means that all 32 Local Authorities (1996 configurations) should be coterminous with the 14 NHS Boards based on the 2014 NHS Board boundaries. Where possible, these new NHS Board configurations were used, and this is indicated in the spine chart where applicable.

Where it was not possible to use 2014 NHS Board configurations, 2006 configurations were used instead. However, this means that the Local Authorities do not map exactly onto the NHS Boards. Where 2006 Boards have been used, this is indicated in the spine chart. Care should be taken when making comparisons between Local Authorities and 2006 NHS Boards as aggregations of the local authorities will not represent the 2006 NHS Boards.

Another effect of the NHS Board changes is that the population represented in an NHS Board area may have changed between the 2006 and 2014 configurations. Care should be taken when making comparisons between indicators produced using 2006 and 2014 NHS Board boundaries. Generally, the movement of individuals between boards has been small, but the effect is particularly pronounced for NHS Greater Glasgow and Clyde and NHS Lanarkshire boards, with a large number of individuals moving out of NHS Greater Glasgow and Clyde and into NHS Lanarkshire. NHS Board (2014 configuration) population estimates are aggregates of the equivalent local authority population estimates.

All of the population estimates for the Local Authorities presented in the profiles are aggregations of data zone level populations provided by National Records of Scotland (NRS). Where we have used exact NHS Board indicator numerators, we have used corresponding exact published population figures as denominators in the calculation of rates. Where we have used data zone aggregations to get best fit NHS Board we have used the corresponding data zone aggregated population for the denominator.

5. Further details on specific indicators

Please note that most of the data presented in the Tobacco Profiles are based on the individual's place of residence, to aid public health interpretation. Percentages and rates

are based on a patient's home address (rather than the location of the hospital or antenatal booking clinic for example).

The raw data used to produce the indicators came from a variety of sources (see Definitions and Sources table online and in the briefing report). The aim was to obtain information from 2002 to the latest year for which data were available at Scotland level wherever possible.

Where necessary, indicators are based on more than one year of data. This is because numbers for a single year may be too small to give robust figures for the Local Authorities and small NHS Board areas. Combining years allows more reliable figures to be produced.

Indicators 1 to 7 – Adult prevalence

The most appropriate indicator for smoking prevalence at small areas is the Scottish Household Survey (SHoS), as this has a sufficiently robust sample size. The number of current smokers was obtained by a 'yes' response to the question 'Do you smoke cigarettes nowadays?' in adults aged 16 and over. The Scottish Health Survey contained more information on smoking, including smoking patterns of former smokers, but the sample size was too small for data to be available at Local Authority level.

Data was collected from SHoS for the years 2005 to 2013. Because of small sample numbers in the Local Authorities, data was amalgamated into three 2 year samples: 2005-2006, 2007-2008, 2009-2010 and 2012-2013.

The percentages are calculated using weighted survey estimates, with the base denoting the achieved sample size for each particular indicator. This weight takes account of the disproportionate sampling between local areas, the differential response between these areas, and any residual mismatch between the profile of responding households/adults and the profile of the population. It is because of the degree of estimation that the numerators (i.e. the number column in the spine charts) are not shown.

Smoking prevalence was also available by gender and selected age groups. The base sample was not large enough to look at young smokers (ages 16 to 24), so we include the age groups 16-39, 40-64, and 65 and over, along with 16-64 years.

These figures were provided by the Scottish Government and the confidence intervals are calculated using the standard SHoS methodology.

Indicators 8 to 15 – Smoking During and Post Pregnancy

These indicators measure the number of women who were recorded as a current smoker at the time of their first antenatal booking appointment. The denominator was the number of women at the antenatal booking appointment with a known smoking status (those with an unknown status have been removed from the calculation to avoid possible bias resulting from large numbers with unknown status).

There is considerable pressure on women not to smoke during pregnancy, and there is evidence of under-reporting by women of their smoking behaviour at the booking clinic (see the latest [ISD births report](#) for further information). However, this issue is being

addressed, and the issue of under-reporting has improved in recent years. This may have had an effect on prevalence levels and therefore trend data.

The data was taken from the SMR02 system from 2002 to 2012, with 2012 being the most recent year available. In order to make the data more robust, especially for smaller areas, 3 year percentages were calculated using 3-year rolling combined totals 2002-2004, 2003-2005, 2004-2006, 2005-2007, 2006-2008, 2007-2009, 2008-2010, 2009-2011 and 2010-2012.

Figures are also presented by SIMD (Scottish Index of Multiple Deprivation) within-Scotland population-weighted quintiles for each geographical area reported on. This means that the Scotland population is split into SIMD groupings 1-5, rather than splitting each Local Authority or Health Board population into SIMD 1-5, where SIMD1 includes women living in the 20% most deprived population in Scotland, and SIMD5 includes the women living in the 20% least deprived population in Scotland (indicators 9-13). This enables comparisons of each NHS Board and Local Authority with the Scottish average. Additionally it allows comparison of NHS Board and Local Authority information in one area to that in another.

Note that some of the small NHS Boards and Local Authorities, there are no individuals in some of the SIMD quintiles, and these will appear as n/a in the spine charts. For trend analysis SIMD versions 2004, 2006, 2009 and 2012 were each used and allocated to the appropriate years as discussed in [ISD Deprivation measures: Guidance for analysts](#). For the 3-year rolling combined totals reported on, some included a combination of two versions of SIMD, e.g. for 2005-2007, SIMD2004 was allocated to years 2005 & 2006, and SIMD2006 to 2007.

Note: ISD's policy of population-weighting the quintiles means that the data zones in each quintile will differ slightly to those shown in Scottish Government releases.

As the allocation across SIMD quintiles is based on the total population of Scotland, this can result in different distributions across the SIMD quintiles when looking at the data at NHS Board/Local Authority level. Some areas, e.g. Grampian and Lanarkshire NHS Boards, which have a SIMD profile that differs significantly from that of the Scottish population as a whole, have overall results that appear inconsistent with their individual SIMD quintile results. Providing SIMD-standardised results (along the same lines as age standardising) would have eliminated these apparent inconsistencies, and will be considered for future releases of the data.

Indicator 14 is based on women smoking during pregnancy as the denominator, and the number of quit attempts made with an NHS smoking cessation service by pregnant women (from the National Smoking Cessation Database) as the numerator, in order to calculate the percentage of quit attempts made by women in pregnancy. Data on pregnant smokers was available in 3-year groupings for 2002-2012. However, quit attempts were available for calendar years 2008-2013, so the data shown for this indicator is for the period 2008-2012, shown in rolling 3-year aggregates. As a result, the years for this indicator are: 2008-10, 2009-11, 2010-12.

For indicator 15 the percentage rate of post partum smoking comes from the health visitors First Visit review (at around 10 days old), for NHS Boards in Scotland which participate in the Child Health Systems Programme Pre-School system (CHSP-PS). Some NHS Boards and Local Authorities did not begin recording their data until financial year 2008/09; therefore complete records are available only after this time. Additionally, some of the figures for individual financial years were small, so the years were combined

into 3-year rolling aggregates to improve the robustness of the data. Therefore, the data is presented for financial years 2008/09-2010/11, 2009/10-2011/12 and 2010/11-2012/13. To calculate the confidence intervals Wilson's method was used (see Appendix 1).

Indicators 16 to 20 – Smoking in School children

The figures for indicators 16-20 were taken from the Scottish Schools Adolescent Lifestyle and Substance Use Surveys (SALSUS) of 2006, 2010 and 2013. Data from the 2008 SALSUS survey was excluded, as the target sample size was too small and thus the data would not have been reliable.

The surveys were based on S2 and S4 pupils (mainly 13 and 15 years old respectively, at the time of the survey) across Scotland. NHS Board and Local Authority geographies were taken from the SALSUS files provided by Ipsos Mori.

The indicators used were the smoking prevalence for S2 and S4 pupils (both sexes), as well as the smoking prevalence for boys in S2 and S4 combined and girls in S2 and S4 combined.

Calculation of confidence intervals was in line with methods as used in the SALSUS report. For further information on this, see the [latest SALSUS technical report](#).

Attempts to purchase cigarettes (indicator 20) indicates the percentage of S2 and S4 pupils who either attempted to buy (and were refused) or successfully bought cigarettes from a shop, supermarket or van in the past 4 weeks (With "the past 4 weeks" being at the time the survey was undertaken). For this indicator only, we were required to calculate our own standard error values, as we were combining multiple answers to the question, each with their own standard error value. By calculating a standard error for the combined value, this had the effect of tightening the confidence intervals. This standard error for the combined value was calculated using the same method as the [SALSUS technical report](#). As this question has not always been asked in the survey, the data was available for years 2010 and 2013 only.

Indicators 21 to 31 – Smoking Cessation and Smoking Cessation Products

These indicators provide an analysis of uptake and outcomes of smoking cessation services in Scotland for calendar years 2008 to 2013. The statistics are based on 'quit attempts' made during each year. The primary source of the data is the National Smoking Cessation Database which was established by ISD Scotland in 2005 to capture data recorded on the agreed national minimum dataset for NHS smoking cessation services in Scotland. The second data source is local information systems. Further information on the minimum dataset and the database is available in the:

[NHS Smoking Cessation Service Statistics \(Scotland\) Annual Report \(2014\)](#).

The denominator for indicators 21 and 22 uses the Scottish Household Survey (SHoS) estimated rate of adult smokers aged 16 and over and NRS population estimates for the most recent or relevant year available. So, for example the 2013 cessation data uses the

estimate of the adult smoking population based on 2012-2013 SHoS data and 2012 NRS population data. Confidence intervals have been calculated using the standard methods for proportions, without trying to take into account the sample element of the denominator.

There are differences in the types of services provided in different areas. For some areas the majority of records are from specialist smoking cessation services. For others the majority of records are from pharmacies (larger numbers of people seen, but less intensive support).

For indicators 23-25, self-reported quit outcomes based on client follow-up at different intervals (1, 3 and 12-months) after the quit date were calculated using the National Smoking Cessation Database. Quit outcomes at 12 month follow-up were calculated for years 2008 – 2012 only, as the figures for 2013 will not fully complete until late January 2015. As the denominator for these indicators is total quit dates set, this means that where there are large numbers of cases 'lost to follow-up/smoking status unknown' this will greatly lower the calculated percentage quit rate. There are some NHS Boards in Scotland with particularly high numbers 'lost to follow-up/smoking status unknown', and therefore care should be taken in comparing areas. This is particularly the case at 12 month follow-up.

In addition, quit outcomes are likely to be influenced by differences in the types of services provided (e.g. support provided by pharmacies is less intensive than that offered by specialist services), so for NHS Boards where a large number of quit attempts take place in pharmacies the overall percentage quit rates may be lower.

For indicators 26-30, the percentage of quit attempts with a successful outcome (self-reported) at one month follow-up are presented by SIMD (Scottish Index of Multiple Deprivation) within-Scotland population-weighted quintiles for each geographical area reported on. This means that the Scotland population is split into SIMD groupings 1-5, rather than splitting each Local Authority or Health Board population into SIMD 1-5, where SIMD1 includes successful one-month outcomes in the 20% most deprived population in Scotland, and SIMD5 includes successful one-month outcomes in the 20% least deprived population in Scotland. In doing so this enables data comparisons between NHS Boards and Scotland, Local Authorities and Scotland, and between NHS Boards, and between Local Authorities. Note that some of the small NHS Boards and Local Authorities, there are no individuals in some of the SIMD quintiles, and these will appear as n/a in the spine charts. For trend analysis SIMD version 2009 was used for years 2008 and 2009, and SIMD version 2012 for years 2010 to 2013. Further information on use of SIMD for trend analysis is discussed in [ISD Deprivation measures: Guidance for analysts](#).

As the allocation across SIMD quintiles is based on the total population of Scotland, this can result in different distributions across the SIMD quintiles when looking at the data at NHS Board/Local Authority level. Some areas, e.g. Grampian and Lanarkshire NHS Boards, which have a SIMD profile that differs significantly from that of the Scottish population as a whole, have overall results that appear inconsistent with their individual SIMD quintile results. Providing SIMD-standardised results (along the same lines as age standardising) would have eliminated these apparent inconsistencies, and will be considered for future releases of the data.

Note: ISD's policy of population-weighting the quintiles means that the data zones in each quintile will differ slightly to those shown in Scottish Government releases.

Figures for the smoking cessation indicators may differ from those previously published, because the national smoking cessation database is a dynamic database.

For indicator 31, the availability of Smoking Cessation Products shows the crude rate of Defined Daily Doses (DDDs) per 1,000 people in the population for the cessation products detailed below. Note: the measure of DDDs can change periodically. The DDDs definition was taken from the World Health Organisation (WHO) published in 2014.

Name	DDD	Unit	Product Type
Nicotine	30	mg	Sublingual/Buccal
	30	mg	Chewing gum
	60	mg	Inhalation
	30	mg	Nasal
	14	mg	Transdermal
Varenicline	2	mg	Oral
Bupropion (Amfebutamone)	0.3	g	Oral

The numerator for indicator 31 uses the number of DDDs, and the denominator the NRS populations for the area being considered. Byar's method of confidence interval calculation is used to provide confidence intervals around the crude rate (see Appendix 1).

Indicator 32 - Smoking attributable deaths

This year we have updated the methodology used to calculate smoking attributable deaths to bring the profiles in line with the [Public Health England profiles](#). This means that the figures are not necessarily comparable with those of previous years; thus caution is required when considering these profiles in relation to those of previous years. However, there is now a significant benefit in that our smoking attributable death figures are now directly comparable to those which appear in the Public Health England profiles.

In the absence of direct information on individual smoking histories, a proxy measure was used to calculate the proportion of each death which was due to smoking. In line with the Public Health England method, we only included deaths for those aged 35 and older, as the likelihood of younger individuals dying from smoking is very low.

For every death in an ICD10 category related to smoking, a smoking attributable fraction (SAF) was calculated. The following ICD10 codes were used:

Cancers:

C00-C14, C15, C16, C25, C32, C33-34, C53, C64-C66, C68, C67, C80, C92

Cardiovascular diseases:

I20-I25, I00-I09, I26-I51, I60-I69, I70, I71, I72-I78

Respiratory diseases:

J10-J18, J40-J42, J43, J44

Digestive diseases:

K25-K27

Each disease had its own sex and age-specific risk associated with it. These can be

found in the [Statistics on Smoking in England 2013 publication](#) (Table B.2).

We then calculated a combined age-sex-area specific prevalence for current and ex smokers. This was then divided by 100 to give the proportions of current and ex smokers, specific to each age, sex and area. To do this, the following information was used:

- Local Authority, Health Board and Scotland- specific smoking prevalence, for current and ex smokers
- Age-specific prevalence information, for current and ex smokers

The following equations were used to calculate the specific prevalence for each area:

Current smoker prevalence=(current area-specific smoking prevalence
/national current smoking prevalence)
* current smokers' age-specific prevalence/100.

Ex smoker prevalence=(ex-smoker area-specific smoking prevalence
/national ex-smoker smoking prevalence)
* ex-smokers' age-specific prevalence/100.

In both cases, the prevalence information came from the Scottish Household Survey. The information was available for 2012 and 2013 only, which meant we were only able to produce one 2-year combined value for this indicator. Values were combined so as to follow the method used in the Public Health England profiles.

This current and ex smoker prevalence information was then used to calculate the SAF, the fraction of each death which could be attributed to smoking. The SAF was calculated using the following:

$$\text{SAF} = (\text{prev_current} * (\text{current} - 1) + \text{prev_ex} * (\text{ex} - 1)) / (1 + \text{prev_current} * (\text{current} - 1) + \text{prev_ex} * (\text{ex} - 1)).$$

These SAFs were multiplied by the number of deaths for each area. They were then added together to find the total number of deaths which could be attributed to smoking, which gave the numerator value for each Local Authority and Health Board.

The denominator used NRS mid-year population estimates. This information was then used to calculate a directly age-sex standardised rate per 100,000 people, using the 2013 European Standard Population.

There are uncertainties over the extent to which deaths from certain causes could be associated with smoking. These causes include: external causes (including fires, suicides, and accidents), neonatal deaths (including stillbirths), all other deaths under 35 years, and deaths from cirrhosis of the liver. Therefore, none of these deaths was attributed to tobacco, even though some of these deaths would have been due to smoking.

Indicators 33, 34, 35, 36 & 37 - Lung cancer, Chronic Obstructive Pulmonary Disease (COPD) and Smoking Attributable Admissions

Both lung cancer and Chronic Obstructive Pulmonary Disease (COPD) are strongly associated with a history of smoking.

Indicators 33 and 34 (lung cancer and COPD deaths) are based on underlying cause of death as recorded by National Records of Scotland (NRS).

Indicator 35 - Smoking attributable admissions were calculated from hospital discharge data, where diseases wholly or partially attributable to smoking were identified. The method used the ICD10 Codes and Attributable Fractions published by the Royal College of Physicians in 2000.⁵ Further details are available in the [ScotPHO Smoking Ready Reckoner – 2011 Edition](#) (see Appendix 1, page 8). In comparison to the previous tobacco profiles the Attributable Fractions were applied to the 6 diagnosis fields during a hospital stay. However, the completeness of the diagnosis codes 2 to 6 vary between hospitals hence some areas may look worse than they are as they have filled in more diagnosis fields; for more information see the [Assessment of SMR01 Data 2010 – 2011](#). These numbers were expressed as three-year total and three-year average directly age-sex standardised truncated rates per 100,000 population aged 16 and over.

Indicator 36 is the number of registrations with a primary diagnosis of lung cancer, taken from the Scottish National Cancer Registry.

Indicator 37, COPD incidence, uses a proxy measure of incidence: the number of patients discharged from hospital with COPD recorded in the 6 diagnosis fields during that hospital stay, who had not had a COPD hospital stay in the 5 years prior to the stay of interest.

Lung cancer uses ICD10 codes C33-C34.
COPD uses ICD10 codes J40-J44.

These four indicators were expressed as a three-year total number (for the years 2002-2004, 2003-2005, 2004-2006, 2005-2007, 2006-2008, 2007-2009, 2008-2010, 2009-2011, 2010-2012 and 2011-2013) and three-year directly age-sex standardised rate per 100,000 population.

The confidence intervals were calculated using the Dobson method (see Appendix 1).

Indicator 38 – Retailer Information

Indicator 38 shows a crude rate of the number of tobacco retailers per 1,000 people in the population. The tobacco registry organisation supplied the data at Local Authority and Scotland level. However, some businesses were registered to more than one Local Authority, therefore if all the Local Authorities for the retailer were within one NHS Health Board they were assigned to that particular NHS Health Board but not to a Local Authority. However, if the Local Authorities are all from different NHS Health boards they are not assigned to a NHS Health Board or a Local Authority, but just to the Scotland total. The confidence intervals were calculated using Byar's method (see Appendix 1).

⁵ *Nicotine Addiction in Great Britain*. Available at <http://bookshop.rcplondon.ac.uk/details.aspx?e=131>

Appendix 1: Methods used to calculate confidence intervals

For indicator presented as:	Method	Comments/ Assumption	References
Proportions and Percentages	Wilson Score method	Wilson Score performs well when the numerator and/or denominator is small.	Wilson EB. Probable inference, the law of succession, and statistical inference. <i>J Am Stat Assoc</i> 1927;22:209-12.
Crude rates	Byar's approximation	Performs well with low rate and large denominator (i.e. the variability in the observed event O is described by the Poisson distribution). This method is simple to calculate and gives very accurate approximations to the exact Poisson probabilities even for small counts.	Dobson A et al. Confidence intervals for weighted sums of Poisson parameters. <i>Stat Med</i> 1991;10:457-62
Directly age-sex standardised rates	Dobson	Rates assume the Poisson distribution.	
SHoS percentages	Standard approach	Incorporates an atypical design factor of 1.2 to adjust the calculation to reflect the fact that the survey does not use a simple random sample. CIs are approximate.	See SHoS technical report
SALSUS percentages	Standard approach	See SALSUS technical report	

