Scottish Health and Wellbeing Profiles 2010

Technical Report

CONTENTS

Introduction

The Scottish Health and Wellbeing Profiles 2010 include a number of products: 38 individual Community Health Partnership (CHP)/local area profile reports, 38 sub-CHP Excel chart tools, 38 CHP spine packs and a Scotland Overview Report. These have been produced to support health improvement in Scotland by providing information about the health of local populations that will help service providers, planners, policy makers and the public make informed decisions to improve health.

This document provides technical information to supplement the information contained in the Definitions and Sources table included in each of the products listed above. It includes extra detail on the 67 indicators, their derivation, descriptions of statistics and methods, differences from profiles 2008 and caveats about the information.

1. Interpreting the Health Summary 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 these profiles all the indicators are shown against the Scottish mean value (red line) as a reference. A modified 'traffic light' system has been applied to identify areas which are statistically significantly 'better' (blue) or 'worse' (red) than the Scottish average, or not significantly different from the Scottish average (white). An additional colour (orange) has been introduced in the 2010 Profiles to indicate where an area is significantly different from the Scottish average, but no judgement as to 'better' or 'worse' is appropriate as this would require a range of local factors to be taken into account. The 95% level of significance is used throughout.

To take some examples: in some cases (such as death rates) a higher level is clearly 'worse' (red) and a lower level 'better' (blue), while in other cases (such as immunisation coverage) a higher level is clearly 'better' (blue) and a lower level 'worse' (red). Three indicators (children looked after by the local authority, referrals to the Children's Reporter for violence-related offences, and teenage pregnancies among under-18s) are coloured orange when significantly higher or lower than the Scottish average, as no judgement is made as to whether a higher or lower level is 'better' or 'worse'.

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 not statistically significantly different from Scotland.

The 5th, 25th, 75th and 95th percentiles are also included in the spine charts to show the distribution of the indicators. If we consider the sub-CHP tool with all intermediate zone (IZ) area results: 50% (618)[1] of the values for an indicator are within the dark grey area (25th to 75th percentiles), and 90% (1,111) are within the whole grey bar (5th to 95th percentiles). The remaining 124 IZ values will sit outside the grey bars to highlight they are in the top or bottom 5% of values.

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 patients hospitalised with alcohol conditions at intermediate zone, the rates are much more widely spaced at the higher ('worse') end than the lower ('better') end. At the 'better' end, the minimum rate is 242 per 100,000 population and the 25th percentile is 742 per 100,000 population; a difference of around 500. At the 'worse' end, the 75th percentile is 1,352 and the maximum 3,459 per 1000,000 population, giving a difference of 2,106 (much wider).

Each indicator is based on the most recent of the time periods given in the Definitions and Sources table (included with each product). These time periods were the most recent for which data were available at a Scotland level at the end of August 2010. Wherever possible we include data up to the end of 2009.

2. Measures used in the profiles

The measures generally follow the statistics and methods recommended by the Association of Public Health Observatories (APHO).[2] 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/population having the specified characteristic and *n* is the total number of individuals in the sample/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.

[1] there are 1,235 IZs, and 1,235*0.5=618.
[2] APHO Technical Briefing paper: http://www.apho.org.uk/resource/item.aspx?RID=48457. Date of publication 1st March 2008.

- **Directly age-sex standardised rates** have been calculated for some 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 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

A confidence interval is a 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, 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 the Scottish Health and Wellbeing 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 the profiles, following APHO recommendations.

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

4. Geographies and populations

Where possible, raw data for the profiles was collected at data zone level (with data for exact NHS Board and exact CHP also collected where available). Data zones are a stable small area geography made up from aggregations of the 2001 census output areas and have an average population of between 500 and 1000 residents. These data zones were used as 'building blocks' for the other larger geographies: intermediate geography zones (IZs), local areas, best-fit NHS board areas and best-fit Community Health Partnership areas (CHPs). The latter are referred to here as CHPs for simplicity, although in some areas they

are called Community Health and Care Partnerships (CHCPs) or Community Health and Social Care Partnerships (CHSCPs or CHaSCPs).

Instead of including five CHCPs for Glasgow City Council area, we have presented the results for three areas, covering Glasgow North East, Glasgow North West and Glasgow South. This gives a total of 38 comparator areas for the 2010 Profiles.

These 38 areas nest within 32 councils (local authorities) in Scotland. In most cases, the CHP and council area are coterminous, but Glasgow, Fife and Highland Council areas each contain a number of CHPs. Where indicators are unavailable at CHP level, data for the relevant council area are presented instead.

Where available, we have presented data for exact NHS Board and exact CHP. For indicators where we did not have exact values at NHS Board/CHP level, we used the data zones as a building block. Some data zones cross geographical boundaries such as NHS boards or CHPs, and in these circumstances we used a 'best-fit' methodology to assign the data zone to one NHS board/CHP. This methodology uses the population-weighted centroid of a data zone to assign it to the larger geography. For the majority of data zones, the best fit used follows the recommendations of Scottish Neighbourhood Statistics (SNS). One exception is data zone S01001694 which is located on the Lanarkshire/Greater Glasgow & Clyde NHS Board boundary and which has been assigned to Greater Glasgow & Clyde NHS Board in these profiles.

There are 12 IZs which cross CHP boundaries. In these cases, the IZ has been assigned to a CHP based on a best-fit approach similar to that used at data zone level.

All of the population estimates presented in the profiles are aggregations of data zone level populations provided by the General Register Office for Scotland (GROS). Where we have used exact NHS Board indicator numerators, we have used corresponding exact published population figures as denominators in the calculation of rates.

Note that these profiles are based on the 14 NHS board structure in Scotland resulting from Argyll and Clyde NHS Board being split and allocated to Highland and Greater Glasgow NHS Boards on 1st April 2006.

5. Further details on specific indicators

Please note that all the data presented in Profiles 2010 are residence-based, to aid public health interpretation. Thus hospitalisation rates are based on a patient's home address (rather than the location of the hospital); child immunisation rates are based on the child's home address (rather than the location of their GP practice); and prisoner population rates are based on the prisoner's address prior to their being imprisoned (rather than the location of the prison).

The raw data used to produce the indicators came from a variety of sources (see Definitions and Sources table in all the products). The aim was to obtain information from 1996 (or earlier in some instances) to the latest year for which data were available at Scotland level.

Where necessary, some 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 IZs. Combining years allows more reliable figures to be produced for small areas.

For some indicators obtained from cohort/survey data, the percentages are presented but the numbers are not available.

Indicators 1 and 2 - Life expectancy (LE)

Life expectancy (LE) at birth for an area is the number of years that a newborn baby would live if they experienced the age-specific mortality rates for that area, for the time period used, throughout their life. It is a theoretical measure that reflects recent mortality rates throughout life, rather than a true prediction of the life expectancy of the local population.

The calculations use abridged life tables, with LE calculations based on Chiang (II)[3] methodology. They use GROS mid-year population estimates and death registrations (by year of registration), with a 5-year period used to ensure reasonably robust estimates for small areas.

Note that over the period 1994-2007, out of 814,190 death records, 11 were excluded as they had no date of birth. In 2007, 2 death records for newborn babies had sex recorded as 'unspecified'; these were assumed to be male. For the NHS board, CHP and local area analyses, over the period 1994-2007 a total of 6,013 death records were assigned to the relevant 'area of residence' by imputation.[4] These included 5,808 records of non-residents of Scotland dying in Scotland, and 205 records of residents of Scotland where postcode did not match to the required geography. The IZ LE calculations for 2003-07 were carried out by the GROS, and they also used the imputation methodology on death records.

Due to the unavailability of 1994 and 1995 population estimates by CHP, IZ and local area, populations for the 5-year period 1994-1998 were estimated from the 1996 figures multiplied by 5. There may therefore be a few slight differences in LE estimates for coterminous areas such as the island NHS boards and CHPs due to slight differences in population estimates and also in total estimated deaths after imputation.

For further details of LE calculation, including imputation of death records, please see the Healthy life expectancy topic on the ScotPHO website (follow the link to the technical paper from

[3] Chiang CL, The life table and its construction, in Chiang CL, Introduction to stochastic processes in Biostatistics. New York, John Wiley 1968.

[4] The imputation technique was used to assign 'pseudo area of residence' to certain death records, based on the pro-rata expected numbers for each time period, age and sex.

http://www.scotpho.org.uk/home/Populationdynamics/hle/hle_introduction.asp).

Data availability and interpretation

Note that LE for a sex and area and 5-year period is not available where any of these apply:

a) the 5-year total population for that sex is less than 5,000 people
b) there are fewer than 40 deaths for that sex over the 5-year period
c) there is a 5-year population estimate of zero for any age group
d) there are no deaths in the 5-year period in the oldest age group (85+).

This only affects LE in IZs and local areas, not the higher geographies.

There may still be some unexpected trends in the remaining LE data, due to random fluctuations in variables such as the number of deaths and age at death. The results should therefore be interpreted as providing a general indication of LE estimates for the various geographies and over time, rather than precise and robust figures. The confidence intervals give an indication of the stability of the estimates.

Note also that for LE by CHP, there are minor changes compared to the 2008 Profiles - up to 0.17 years in males (North Highland in 1999-2003) and 0.11 years in females (Shetland in 2001-05). This is due to the assignment of deaths among CHPs having changed very slightly. As expected, Scotland total deaths and LE remain unchanged from the 2008 Profiles.

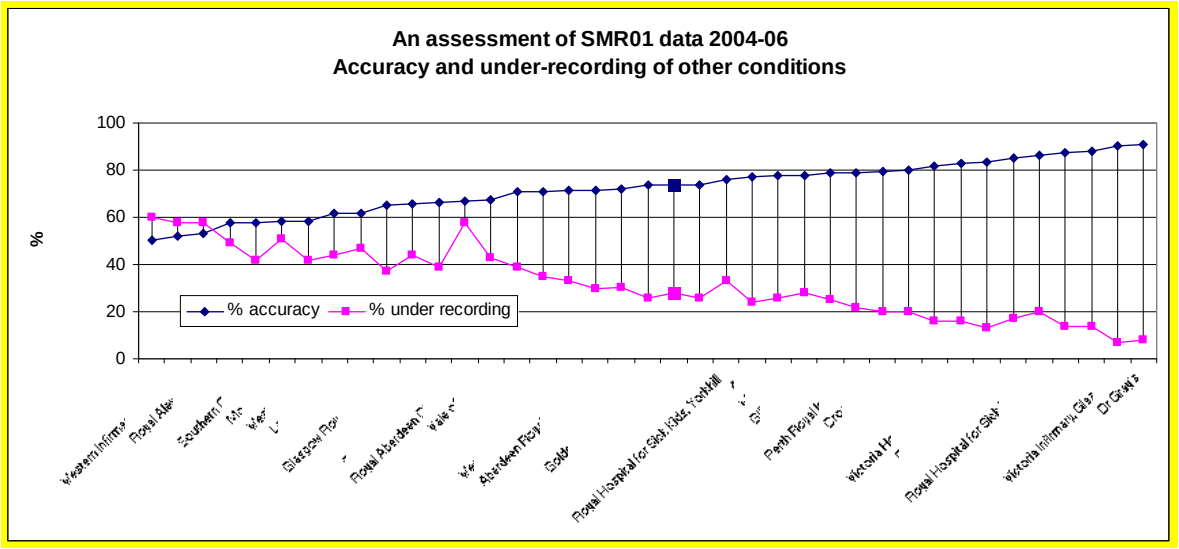
Indicators 9, 11, 18, 22, 46, 59 – Some hospital-based indicators

The selection of diagnostic codes for these indicators used all six diagnostic positions (primary position and 5 secondary positions) on the hospital records. Completenesss of recording of secondary positions (co-morbidities) varies among hospitals with a balance being sought by some hospitals between quality of recording of the main position and quality and completeness of recording of the other (secondary) positions.

The figure shows that during 2004-06, for example, Falkirk and District Royal Infirmary has relatively high levels of missing secondary diagnoses, and Victoria Infirmary in Glasgow very high completeness of the secondary diagnoses (pink line). The figure also shows that the hospitals that had the highest completeness of recording of secondary conditions also had the highest quality of recording of secondary conditions (blue line).

Note: please refer to the QA report (see source to figure) to compare quality of recording of the main position across hospitals.

Under-recording may contribute to variations seen in the data for indicators 9, 11, 18, 22, 46 and 59, and may also contribute to some of the time trends (if recording practice changed as specific hospitals over time). These issues should be borne in mind when interpreting these indicators.



Source: DQA sample for June 2004 to March 2006 from ISD Scotland SMR01 acute hospital data (http://www.isdscotland.org/isd/2737.html). With thanks to Sophie Houston and Margaret Mason, ISD Data Intelligence Team, for producing this graph.

Note: The actual impact of the under-recording of relevant secondary positions for the profiles indicators is unknown because the secondary position is not used only to record relevant comorbidities, but is also used to record external causes of morbidity and mortality, and factors influencing health status and contact with health service.

The ISD Data Intelligence team are currently undertaking a new Quality Assurance of SMR01 acute hospital data which will be published in 2011.

Indicator 7 - Smoking attributable deaths

The following text is adapted from *'Mortality from tobacco in developed countries: indirect estimation from national vital statistics.' Peto R, Lopez AD, Boreham J, Thun M and Heath Jr C. Lancet 1992; **339**:1268-78.*

The methodology used for Profiles 2010 is based on the premise that in developed countries, age-sex-specific mortality rates for lung cancer, vascular disease and various other categories of disease can be used to indicate the approximate numbers and proportions of deaths due to tobacco. Thus, in the absence of direct information on smoking histories, national mortality from tobacco use can still be estimated approximately. For a particular country/sub-area in a particular year, the national mortality rates from various categories of disease are taken and certain proportions of deaths from those disease categories are attributed to tobacco use. These attributable proportions vary from one category to another, being largest for lung cancer, upper aerodigestive[5] cancer and chronic obstructive pulmonary disease (COPD), intermediate for vascular disease. They also vary with age, sex, and CHP, being largest in populations where lung cancer is common.

[5] The combined organs and tissues of the respiratory tract and the upper part of the digestive tract.

Data used in Scottish calculations:

- smoking status and mortality data from the ACS CPS-II study[6]
- Scottish mortality data from GROS for 2000-04 and 2007-09[7], by sex, by 5-year age group, and by nine major cause-of-death categories: lung cancer, upper aerodigestive cancer (mouth, pharynx, larynx, oesophagus), other cancer, COPD, other respiratory disease, vascular disease, cirrhosis, other medical causes, and non-medical causes
- GROS mid-year population estimates.

Description of calculations: All calculations are age- and sex-specific.

1. For lung cancer, directly compare the CHP death rate with the rate in CPS-II non-smokers, and attribute the excess deaths to tobacco.

2. The ratio of the absolute excess lung cancer deaths in the CHP (from 1. above) to the absolute excess in CPS-II smokers (as estimated by the ASC CPS-II study) can be regarded as an indication of the proportion of smokers in the CHP population.

The ratio from 2. above is applied to the CPS-II smoker excess mortality ratios (SMRs) for six separate disease categories (upper aerodigestive cancer, other cancer, COPD, other pulmonary disease, vascular disease and other medical causes) to estimate the excess mortality ratio for these diseases in the CHP as a whole (smokers plus non-smokers). Then these excess mortality ratios are halved to obtain a conservative estimate of the proportions of such deaths to attribute to tobacco. (This is because the relationship between the absolute excess of lung cancer and the proportional excess of other diseases can only be approximate, and we are guarding against overestimating the effect of tobacco on diseases other than lung cancer).

4. The excess mortality ratios are then applied to the observed deaths in the CHP for the separate disease categories, to give an attributable number of deaths that can be summed over all the categories.

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

Note: Where the number of lung cancer deaths was less than 100 (for either sex) within a CHP we have included the result but it will be shown as non-significant.

[6] The American Cancer Society's second Cancer Prevention Study (ACS CPS-II) is a prospective study of smoking and death among more than one million Americans aged 30 or older when they completed a questionnaire in 1982.

[7] The 2000-04 analysis was undertaken in 2007 as part of a larger project estimating smoking prevalence. It used 5-year time periods for robustness. The 2007-09 analysis was undertaken specifically for Profiles 2010 and uses a 3-year time period to tie in with the other mortality based indicators in Profiles 2010

With grateful thanks to Dr Jill Boreham of Oxford University for producing these figures for us.

Indicators 9 and 10 - Patients hospitalised or dying from alcohol conditions

Since the 2008 profiles were published, ISD has published population attributable fractions (PAFs) for alcohol for Scotland for 53 conditions, of which 19 conditions are by definition wholly attributable to alcohol consumption and 34 conditions partly attributable to alcohol consumption.[8] The relative risk from alcohol consumption varies across conditions. To derive alcohol PAFs for Scotland, these risks were then applied to the levels of alcohol consumption in the Scottish population. The resultant PAFs have been applied to both hospitalisations and deaths for Profiles 2010.

The PAF is the estimated proportion of an individual condition for which alcohol is responsible. For example, it is estimated that 31% of cases of oesophageal cancer in males occur as a result of drinking alcohol: the PAF is therefore 0.31. The two main determinants of PAF are (a) the extent to which increased alcohol consumption increases the risk of the disease and (b) the proportion of the population who consume alcohol at that increased level.

PAFs reflect alcohol consumption levels at the time they were calculated. To date, only one set of PAFs has been published for Scotland (based on 2003 alcohol consumption data from the Scottish Health Survey) and these PAFs have been used to calculate the alcohol related and attributable hospitalisations and deaths in this report for the whole time period described (1997-2009). There are caveats to this. If alcohol consumption has risen since 2003, these results will *under-estimate* hospitalisations and deaths due to alcohol. Conversely, if alcohol consumption has fallen then the results will *over-estimate* hospitalisations and deaths due to alcohol. However it should be noted that changes in consumption would not have an immediate effect on all the conditions considered.

For hospitalisations: ICD10 codes were used to extract data from SMR1/01 (hospital inpatient and day case records from acute specialties) on patients who had been discharged from hospital with a diagnosis of at least one of the alcohol related or attributable conditions for which we had PAFs. Codes were extracted for the primary diagnosis and for all secondary diagnoses. Patients in psychiatric hospitals (SMR4/04) were not included.

A person may be discharged during a particular time period with more than one alcohol related or alcohol attributable condition. We counted the highest PAF diagnosis in the individual within the year (in any diagnostic position and at any point during their inpatient stay). For example, if someone was admitted with a diagnosis of alcoholic liver disease (PAF 1.0) and oesophageal cancer (PAF 0.31), only the condition with the higher PAF (alcoholic liver

[8] Alcohol attributable mortality and morbidity: alcohol population attributable fractions for Scotland. Grant I, Springbett A, Graham L. ISD Scotland, June 2009. http://www.scotpho.org.uk/nmsruntime/saveasdialog.asp?lID=5318&sID=4562

disease) was used in the analysis. This approach was taken to be consistent with the 2008 profiles but differs from the approach taken by the authors of the Scotland PAF report. Other approaches could include only selecting the primary diagnosis field, or using only the initial or discharge diagnoses. Our approach results in slightly higher estimates of numbers of patients hospitalised with alcohol conditions, compared to the other approaches mentioned here.

For deaths: Selection was made only on the underlying cause of death, which is consistent with the method used in the Scotland PAF report.

Indicator 12 – Active travel to work

The indicator used the cohort of all adults employed, self-employed or in full-time education and not working from home taken from the random respondents to the Scottish Household Survey question RD3 (2007/2008) "How do you usually travel to work (or school/college/university if in full time education)?" The options listed are: walking; driving car/van; passenger car/van; motorcycle/moped; bicycle ; school bus; works bus; ordinary bus; taxi; rail; underground; ferry; aero plane; horse-riding; other.

The indicator measures those adults who responded with either walking or cycling. The denominator is the total number of random adults answering this question (from the relevant local authority or NHS board).

Indicator 13 – Sporting participation

This indicator used random adult respondents to the Scottish Household Survey question SPRT3a "In the last four weeks, have you done any of the activities listed on this card?" The activities listed are: walking; swimming; football; cycling; keepfit/aerobics; multigym use/weight training; golf; running/jogging; snooker/billiards/pool; dancing; bowls; walking; other; none. The indicator measures those who report taking part in any of the above (and includes walking). The denominator is the total number of random adults answering question (from the relevant local authority or NHS board).

Indicator 24 - Patients prescribed drugs for anxiety/depression/psychosis

The drugs selected were: British National Formulary (BNF) code 4.1.2 (Anxiolytics), BNF code 4.2 (Antipsychotics) and BNF code 4.3 (Antidepressants).

These indicators are derived from prescriptions data at practice level (using patient postcode), and Community Health Index (CHI) populations.

First, the number of WHO defined daily doses (DDDs) dispensed by each valid GP practice was calculated for each year (1999-2009). To be considered valid, a dispensing practice was required to have a list size associated with it.

Thus, dispensers that were not considered valid were those central facilities or services that dispense drugs but were not defined as GP practices, e.g. addiction service centres, and 'dummy' practices where it was difficult to tell from inspection of scanned prescription forms which practice had issued the prescription. In addition, only those practices that were open throughout the 12 month period were included: practices where there was a change of hands, where the partners retired or where a new practice opened were all excluded.

Second, the CHI extract was used to estimate the population breakdown of each data zone in Scotland, and identify the GP practices where these residents were registered.

Third, practice dispensing rates were applied to data zone populations. As residents of one data zone were not necessarily registered with the same GP practice, an average population weighted data zone rate was calculated using the rates for all the practices where the residents were registered. The data were aggregated up from data zone to obtain IZ, CHP and NHS Board level results.

Please note that the CHI population count, used in the denominator for this prescribing indicator, is known to over-inflate the estimate of population compared to mid-year estimates from the GROS (by around 5%). There may be some regional variation in inflation factors, both across administrative areas of Scotland and within demographic groups, and the consequent effect on the estimated prescribing rates is unknown.

Continuing corrections in processing of prescriptions mean that some historical data may change over time. As a result, the data zone level results for patients being prescribed drugs for anxiety/depression/ psychosis will not exactly match the results published on the web by the Scottish Government for Scottish Neighbourhood Statistics (SNS) or the Scottish Index of Multiple Deprivation (SIMD).

This method includes the following assumptions:

- that the DDD is given to all patients. This may not always be the case, as the dose used for some drugs may vary. However, using DDD is a standard and internationally recognised method currently used by ISD.

- that there is an even distribution of prescriptions across each person in the practice, regardless of age and sex. Although this is unlikely to be true, there is no current way of identifying individuals who have received each prescription.

Indicator 28 – Adults claiming incapacity benefit/severe disability allowance

Employment and Support Allowance (ESA) replaced Incapacity Benefit (IB) and Income Support paid on the grounds of incapacity for new claims from 27th October 2008. This has resulted in a reduction in the IB figures. Recipients of

ESA are *not* included in Profiles 2010, but will be included in future publications.

Indicator 32 – Single adult dwellings

These are the number of dwellings which are entitled to a 'single adult' Council tax discount. This category includes one adult living alone or with children, or with other people who are 'disregarded' for Council Tax purposes.

The data zone data is constrained to the council area totals for dwellings which are entitled to a single adult Council Tax discount. These data are collected as part of Scottish Government's statistical support for local government's CTAXBASE data collection. They have been obtained from council area Council Tax billing systems. The council area figures are considered more accurate than the small area figures.

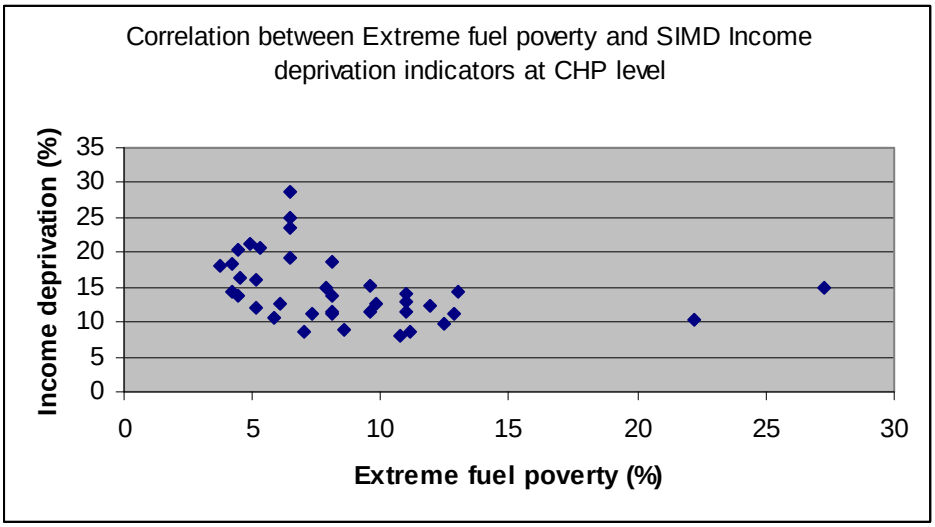
Indicator 33 - Households in extreme fuel poverty

This indicator comes from the Scottish House Condition Survey (SHCS; see sheet 8.12 in http://www.scotland.gov.uk/Topics/Statistics/SHCS/shcslar0508tables).

There is general information on the indicator at http://www.scotland.gov.uk/Publications/2009/11/23090958/4.

It is worth noting that this indicator does not correlate well with income deprivation (see figure), and therefore we would recommend it be interpreted with caution.

SHCS published more recent estimates (2007-09) on 25th November 2010 using a new methodology, but the results are very similar with the exception of South Lanarkshire which has higher extreme fuel poverty using the new methods.



Indicator 34 - Average tariff score of all pupils on the S4 roll

The average tariff score enables different types of certification to be considered together, making it easier to compare average educational attainment for different areas. The tariff score of a pupil is calculated by allocating a score to each level of qualification and award, using the Unified Points Score scale. For example, a Standard Grade at level 1 counts as 38 points, and at level 4 counts as 14 points.

Data for this indicator are restricted to secondary year 4 (S4) pupils attending publicly funded secondary schools. The data do not include: pupils attending publicly funded special schools and private independent schools; adults attending publicly funded secondary schools; and pupils educated outwith the school education system (e.g. at home).

Indicator 45 - Referrals to the Children's Reporter for violence-related offences

This indicator provides information on the number of children, aged 8-15, referred to the Scottish Children's Reporter Administration (SCRA) for 'violence-related offences'. Children and young people are referred to the SCRA because some aspect of their life is giving cause for concern. They may be referred from a variety of sources, including police, social work, education and health. Each referral is then investigated to determine whether compulsory measures of intervention are required. Referrals may be on offending grounds or non-offending grounds, with the former being subdivided by type of offence. Profiles 2010 use a bespoke definition of what constitutes a 'violence-related' offence. The definition includes a broad range of offences, commonly associated with violence, as listed below:

- Assault
- Assault with attempt to rob
- Assault with intent to ravish
- Attempted murder
- Bodily injury
- Carrying offensive weapon
- Culpable homicide
- Indecent assault
- Knives (Sc) Act s.1
- Murder
- Possession of firearm with intent to injure/to rob
- Rape
- Serious assault
- Willful and malicious fire-raising.

Data are analysed by number of children referred and not number of referrals, to avoid a child being counted more than once. Data are presented as a number and the crude rate per 1,000 population aged 8 to 15 years. Referrals to SCRA may include children aged over 15 years who are subject to a supervision requirement, but such referrals are excluded for the purpose of

this indicator. In addition, it is important to note that very serious offences such as rape, murder, etc. are almost always dealt with by the Criminal Justice System and not the Children's Hearing System.

This indicator is included in the profiles as it provides a measure of violent behaviour in children and young people. Local referring practice may vary and this indicator may reflect the extent to which violent offences are reported and acted upon, as well as the actual rate of occurrence of such offences. Accordingly, local interpretation is crucial and values for this indicator are not categorised as 'better' or 'worse' than the Scottish average within spine charts. As with all indicators, additional caution should be used when interpreting information based on a small number of events.

Indicator 52 – Teenage pregnancies

Profiles 2010 present information on teenage pregnancies in women aged less than 18 years. Current Scottish Government policy focuses on teenage pregnancies under 16 years, and this younger age range is also used in the menu of local outcome indicators for Single Outcome Agreements.

Data based on pregnancies under 18 years have been presented within the ScotPHO profiles 2010 for several reasons:

(i) the relatively small number of pregnancies in those aged under 16 precludes presentation of robust data at the required geographies
(ii) to continue a time series from previous profiles
(iii) this information may be useful for planning purposes locally.

It should be recognised that pregnancies in those aged 16 and 17 are not necessarily associated with poorer outcomes for mothers and infants. Accordingly, local interpretation of this indicator is vital, and values for this indicator are not categorised as 'better' or 'worse' than the Scottish average within spine charts.

To improve the robustness of the data set, data have been aggregated over three years. The source for this indicator is GROS registered births and stillbirths, and notifications of abortions to the Chief Medical Officer for Scotland under the Abortion Act 1967.

Indicator 54 – Babies exclusively breastfed at 6-8 weeks

These statistics are derived from breastfeeding data recorded at the 6-8 week review, for NHS Boards in Scotland which participate in the Child Health Systems Programme Pre-School system (CHSP-PS). Due to the phased implementation of the CHSP-PS, data are not available for all years for some participating NHS Boards and the constituent Community Health Partnerships. Data are available for all years presented (1997 to 2008) for eight NHS boards: Ayrshire & Arran, Borders, Fife, Greater Glasgow & Clyde, Highland, Lanarkshire, Lothian and Tayside. Note that NHS Highland fully implemented CHSP-PS in May 2007; data presented for 1997 to 2006 relate only to the area

of NHS Highland inherited from former NHS Argyll & Clyde (i.e. Argyll & Bute Council area).

In addition, data are available for NHS Forth Valley from 1998, for NHS Dumfries & Galloway from 2001, for NHS Western Isles from 2006 and for NHS Shetland from 2008. Grampian and Orkney do not use the CHSP-PS therefore data are not available for these NHS Boards.

Time trend data is omitted for any 3-year time periods where the area was not using CHSP-PS for the whole 3-year period. The exception to this is Highland, where results for a 2-year period (2007-08) are shown for the NHS Board and CHPs instead of the 3-year period 2006-08.

Among participating NHS boards, the majority of 6-8 week reviews are carried out before babies are 9 weeks old. The maximum age limit for the 6-8 week review is recommended as 12 weeks. Variation in the timing of the 6-8 week review may affect the reported rates as there is a known drop-off in breastfeeding rates with time.

Indicators 55 and 56 – Immunisation uptake at 24 months

The results for the immunisation uptake indicators do not exactly match immunisation statistics published on the ISD website. This is because we used the child's address of residence rather than the address of the child's GP practice (all Profiles 2010 analyses are residence-based to aid public health interpretation). Additionally, some children do not have a postcode recorded so they are included in the Scotland total figure but not at lower geographical levels.

Indicator 57 – Child dental health in primary 1

The results for dental health in primary 1 (P1) do not exactly match NHS board-level data published by the Scottish Dental Epidemiological Coordinating Committee. There are two reasons for this:

- Profiles 2010 used the child's address of residence rather than the address of the school (all Profiles 2010 analyses are residence-based to aid public health interpretation).

- The Scotland total figure is slightly higher in the profiles because we included everyone with a Scottish postcode, including a few records where postcode did not match to a CHP orNHS board.

The Profiles 2010 indicator is the percentage of 'C' letters (indicating no obvious decay experience) received by the P1 children receiving a Basic Inspection. The results should be interpreted with caution, as the proportion of the P1 child population receiving a Basic Inspection varied across CHPs. The results for areas with low response rates may be unreliable and should not be used without further investigation. Further information can be obtained from the dental team at ISD.

The response rates for individual NHS boards were as follows: Ayrshire & Arran, 88.1%; Borders, 83.7%; Dumfries & Galloway, 79.8%; Fife, 83.7%; Forth Valley, 44.9%; Grampian, 63.4%; Greater Glasgow & Clyde, 92.7%; Highland, 82.9%; Lanarkshire, 91.3%; Lothian, 89.6%; Orkney, 81.7%; Shetland, 93.9%; Tayside, 85.2%; Western Isles, 92.9%. Response rates are thought to vary even more widely at CHP level, but response rates by CHP are not currently available

Indicator 58 –Child obesity in primary 1

The Child Health Systems Programme - School aged Children (CHSP-S), from which these data are derived, was introduced in 1993 and the number of participating boards has increased over the years to 11 NHS Boards (and a corresponding 26 CHPs) in school year 2008/09. The body mass index (BMI) statistics cover approximately 70% of children in primary 1 among the 11 participating NHS Boards, and approximately 62% of children in Primary 1 in Scotland. Due to the phased implementation of the CHSP-S, and the small number or proportion of reviews recorded on the system in some areas, data are not available for all years for some participating NHS Boards and CHPs:

(a) NHS Board - data are not shown for: NHS Grampian, NHS Orkney, NHS Shetland. As at school year 2008/09, NHS Orkney did not participate in the CHSP-S, and NHS Grampian and NHS Shetland had only partially implemented CHSP-S.

(b) Community Health Partnerships (CHPs)/local areas - data are not shown for: East Dunbartonshire, North East Glasgow, East Renfrewshire, Inverclyde, North West Glasgow, South Glasgow, West Dunbartonshire, Orkney, Shetland, Aberdeen City, Aberdeenshire and Moray.

6. Comparisons with Profiles 2008

We advise that Profiles 2008 and Profiles 2010 are not directly compared. For several of the 44 indicators which have been retained in Profiles 2010 from Profiles 2008, there have been some changes in definition or methodology which mean they are not comparable between the two sets of profiles (see Table 1 for details). All data points in the trends in the Profiles 2010 products are based on Profiles 2010 methodology and definitions so are comparable over time, and these should be used to look at changes over time.

Table 1: Indicators which have been changed between Profiles 2008 and Profiles 2010

Indicator number	Indicator	Changes made between Profiles 2008 and Profiles 2010
4, 16	Coronary heart disease deaths (<75s) and hospital patients	In Profiles 2008 the definition included all heart disease, but this has now been restricted to coronary heart disease.
6, 17	Cerebrovascular disease deaths (<75s) and hospital patients	In Profiles 2008 the definition included strokes, but this has now been expanded to all cerebrovascular disease.
8	Smoking prevalence	Profiles 2008 used modelled data down to intermediate zone. Profiles 2010 uses estimates from the Scottish Household Survey (available only down to council area).
9, 10	Alcohol conditions: deaths and patients hospitalised	The methodology has been updated (see section 5 for details).
9, 11, 15-22, 46, 59	Hospital patient based indicators	In Profiles 2008 these indicators had a caveat around over-counting individuals. This was estimated to lead to an over-count of the annual hospital patient rates of around 3%. This issue has now been resolved and has resulted in slightly lower figures in Profiles 2010. See also the note below about indicator 21.
14	Patients registered with cancer	We have moved from a 3-year to 5-year average to tie in with other published estimates.
21	Road traffic accident casualties	In Profiles 2010 we have included RTA deaths (that do not result in a hospital admission) along with the RTAs resulting in a hospital inpatient or daycase admission. (Note that people who only attend A&E are not included.) In Profiles 2008 only hospital admissions were included. See also the note above about the hospital indicators.
22	Patients hospitalised after a fall in the home (65+)	In Profiles 2008 this indicator included all unintentional injuries, not just falls. Also note comment below regarding indicator 59 which also applied to the Profiles 2008 data for this indicator.
24	Patients prescribed drugs for anxiety/ depression/ psychosis	Values for this indicator are slightly higher in absolute terms in Profiles 2010 than in Profiles 2008 because of the practices which are excluded from analysis in Profiles 2010. Practices that were open for only part of any one year are excluded in Profiles 2010, thus the list size (practice population) and defined daily doses (DDDs) associated with these practices were not included in the calculations. However, as the list size is a near-constant throughout the year while DDDs dispensed gradually accrue over the year, excluding list size figures from calculations has a larger (and inflationary) effect on aggregated drug

		dispensing percentages than does excluding the DDDs dispensed. The broad time trends in the drug dispensing percentages remain similar to the previously published data in Profiles 2008.
25	Psychiatric hospital patients	The definition has been brought into line with the other hospital-based indicators and has resulted in higher numbers in Profiles 2010. Previously an individual could only be counted once within the 3-year period, but now they can be counted once per annum.
26	Deaths from suicide	In Profiles 2010 we have included deaths from undetermined intent (which were not included in Profiles 2008).
37	Working age adults with low or no educational qualifications	To align to the Scottish Government single outcome agreement indicator, we have now included people with low (SCQF level 4 or lower) educational qualifications. Profiles 2008 only focused on those with no educational qualifications.
42	People claiming pension credits (aged 60+)	It came to our attention whilst extracting the data for this indicator for Profiles 2010 that we double counted some people claiming pension credits in Profiles 2008. This means that the Profiles 2008 data for this indicator was higher than it should have been (although the geographical picture is similar in the two sets of profiles).
49	Adults rating neighbourhood as a very good place to live	In Profiles 2008 the definition included "good" and "very good". In Profiles 2010 we have only included "very good".
51	Mothers smoking during pregnancy	This relates to smoking status at antenatal booking appointment. In Profiles 2008 we included returns with "not known" in the denominator. For Profiles 2010 the denominator only includes current smokers, former smokers, and "never smoked"; mothers whose smoking status was not known are excluded. Therefore smoking percentages will be higher in Profiles 2010 than Profiles 2008, particularly for local areas which have high levels of "not known". Note: This is a different approach to other data published for this indicator (for example, on the ISD website).
53	Low weight live births	In Profiles 2010 this is based on true geography, not data zone aggregates as in Profiles 2008.
58	Teenage pregnancies	In Profiles 2008 this indicator was based on SMR02 hospital returns. For Profiles 2010 we gained permission to use data from GROS (births and stillbirths) and Notifications of Abortions to the Chief Medical Officer for Scotland, on the condition that we only display data for under-18s.
59	Patients hospitalised by unintentional injuries at home (<15)	An error was found in the original Profiles 2008 reports. It was subsequently corrected on the web versions but hard copies will still contain the incorrect data, referring to all emergency admissions for unintentional injuries (not just those in the home).

7. Data disclosure

The data contained in the Scottish Health and Wellbeing Profiles 2010 have been adjusted to conform to ISD policy on statistical disclosure control. As a result, the data do not contain cells considered potentially disclosive (cells, generally with small numbers, which might enable an individual patient to be identified, perhaps with the aid of further knowledge of the topic). Both primary and secondary cell suppression have been applied where appropriate.

Results which have had cell suppression applied will appear as follows:

In the spine chart: number column blank, measure column blank (unless a standardised rate), measure displayed on chart.

In the rank chart: bar suppressed (unless a standardised rate).

In the time trend graph: The points either side of a suppressed value are joined (unless a standardised rate).

APPENDIX 1

Methods used to calculate confidence intervals

For indicator presented as:	Method	Comments/ Assumptions	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. *J Am Stat Assoc* 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.	
Directly age-sex standardised rates	Dobson	Rates assume the Poisson distribution.	Dobson A et al. Confidence intervals for weighted sums of Poisson parameters. *Stat Med* 1991;**10**:457-62.

APPENDIX 2

Codes selected for death and hospital patient indicators

Indicator number	Indicator	Codes
4, 16	Coronary heart disease deaths and hospital patients	ICD9: 410-414 ICD10: I20-I25 (principal diagnosis only)
5,14	Cancer registrations and deaths	ICD9: 140-208 (excl 173) ICD10: C00-C97 (excl C44)
6,17	Cerebrovascular disease deaths and hospital patients	ICD9: 430-438 ICD10: I60-I69, G45 (principal diagnosis only)
9,10	Alcohol related and attributable hospital patients and deaths	See http://www.scotpho.org.uk/nmsruntime/saveasdialog.asp?lID=5318&sID=4562
11	Drug related hospital patients	ICD9: 292, 304, 305.2-305.9 ICD10: F11-F19 (excluding F17) (all diagnostic positions)
15	COPD hospital patients	ICD10: J40-J44, J47 (principal diagnosis only)
18	Asthma hospital patients	ICD10: J45, J46 (all diagnostic positions)
19	Emergency admission hospital patients	Old type admission code 4,5,6,7,8
20	Multiple admission hospital patients	Patients aged 65+ with 2 or more emergency admissions (see codes above) in a year. Excludes dental hospital and geriatric long stay admissions.
21	Road traffic accident casualty patients	Type of admission code 32 for hospital admissions (principal diagnosis only) ICD9: E810-E819, E826-E829 and ICD10: V01-V89 for deaths
22	Falls in the home aged 65+	Type of admission code 33, along with: ICD9: E880-E888 ICD10: W00-W19

		(All diagnostic positions)
26	Deaths from suicide or undetermined intent	ICD9: E950-E959, E980-E989 ICD10: X60-X84, Y10-Y34,Y87.0, Y87.2
46	Assault hospital patients	ICD9: E960-E969 ICD10: X85-Y09 (all diagnostic positions)
59	Unintentional injuries in the home aged <15	Type of admission code 33.