

Title: Reducing Smoking Inequalities in Glasgow:
Estimating the potential impact of smoking cessation services

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ABSTRACT

Background

The aim of the study was to assess the potential future impact of smoking cessation services in Glasgow reducing overall smoking prevalence in general and inequalities between areas in particular.

Method

An observational study of administrative information linked with synthetic estimates of smoking prevalence for small areas and assumptions about future levels of service delivery and long-term success.

Synthetic estimates of smoking prevalence for the 144 electoral wards in Glasgow were obtained from Health Scotland. The Scottish Index of Multiple Deprivation was used to combine small areas into two sets of deciles ranked in order of disadvantage. One set of deciles was derived from data for Glasgow only, and the other used data for Scotland as a whole. Area of residence data from smokers setting a quit date in 2004 were used to calculate the proportion of smokers in receipt of treatment services in deprivation deciles. Estimates of long-term success rates were derived from published studies.

Results

In general services are provided in proportion to the number of smokers in each deprivation decile. For example, using Glasgow only deciles, 48.9% of smokers treated lived in the most disadvantaged decile compared with 50.2% of all smokers.

Simulations suggest that services might be expected to reduce overall smoking prevalence amongst adults, from a baseline of 39.47% in 2004, by between 6.7% (36.82%) and 13.8% (34%) over a period of ten years. On the most plausible assumptions, however, services will not help to reduce inequalities and using Glasgow decile data the relative index of inequality is predicted to increase from 2.78 in 2004 to 2.91 in 2014, a rise of almost five per cent.

Conclusions

Smoking treatment services in one of the most disadvantaged cities in the UK have proved very successful in overcoming the inverse care law and ensuring that cessation services are provided broadly in proportion to need in all deprivation deciles. However, because higher levels of addiction among the most disadvantaged smokers produce lower cessation rates for these groups, more innovative and intensive forms of support need to be developed and evaluated if treatment services are to make a positive contribution to reducing inequalities.

KEYWORDS: Deprivation, Health Inequalities, Smoking Cessation

INTRODUCTION

Cigarette smoking is the most important preventable cause of ill-health and premature death in Scotland, far outweighing any other single cause.^{1, 2} Adult smoking-related deaths from cancer and vascular diseases are higher for men and women in Scotland than in England and Wales.³ In Scotland adult smoking prevalence is 33%⁴; significantly higher than the average rate in Great Britain of 26%.⁵ Moreover, Greater Glasgow NHS Board area has one of the highest smoking prevalence rates at over 39%, and in some of the most socially disadvantaged areas in Glasgow, smoking rates are as high as 63 per cent.⁶

A strong and increasing relationship between cigarette smoking and social disadvantage has been established.^{7, 8} Smoking disproportionately affects those already disadvantaged by poverty and is a major contributor to health inequalities.^{9, 10} For example the 1998 Scottish Health Survey indicated that 51% of men in Social Class IV and 45% in Social Class V smoked compared with 12% in Social Class I. Similar patterns were found for women.¹¹

There are suggestions that smoking is the single most important factor that determines geographical variations in mortality. It has been shown, for instance, that mortality is 15 percent higher in the most socio-economically deprived districts compared to the most affluent districts and that differences in smoking behaviour account for 85 percent of the excess.¹² Through focusing on relatively small geographical areas a better understanding of smoking behaviour can be developed.¹³

Reducing health inequalities is a primary objective of Scotland's health improvement strategy. Strategies to improve health in Scotland have focused on reducing population smoking rates and smoking in priority groups.^{17, 18, 19, 20}

The Scottish Executive announced smoking inequality targets in 2004, set to increase the rate of improvement for the most disadvantaged communities by 15% by 2008. This amounts to a reduction in the smoking rate for adults aged 16-64 in the most deprived areas by 10.9% from 42.1% in 2003 to 37.5% in 2008.²¹

Locally, the *Glasgow Tobacco Strategy*²² was launched in 2004, after a long period of development in the context of national policies and tobacco control activity in Glasgow dating back to 1983. One of the Strategy's key principles is that tobacco control efforts should target disadvantaged groups and populations with the highest prevalence of smoking and smoking related disease.

Stop smoking services were established throughout the NHS in Scotland from 1999 and in Glasgow an intensive group-based service was piloted and co-ordinated by *Smoking Concerns*, the specialist tobacco team for NHS Greater Glasgow. Local health care co-operatives in Greater Glasgow NHS Board currently provide these services as well as access to appropriate pharmacotherapies, free or at prescription cost, using a seven week programme based on the Maudsley model.²³ Additionally, a Glasgow pharmacy stop smoking project provides a 12-week pharmacotherapy programme and one-to-one support from staff involving an extensive network of accredited community pharmacies across Greater Glasgow.

This study then aims to address two key questions:

- What impact do existing smoking cessation services (and projected expanded services) in Glasgow have on overall smoking prevalence?
- What impact do existing smoking cessation services (and projected expanded services) have on reducing smoking-related inequalities?

METHODS

The main aim of this study was to estimate synthetic projections of future smoking prevalence rates by deprivation decile in Greater Glasgow NHS Board (GGNHSB), in order to assess the impact that smoking cessation services might have on reducing smoking-related inequalities. It is assumed, for the purposes of this study, that the only factor to influence smoking prevalence rates is the number of smokers who have attended specialist smoking cessation services in GGNHSB - provided by either Smoking Concerns clinics or the pharmacy stop smoking project - and have set a quit date.

Three main measures have been used:

- The Index of Multiple Deprivation
- Synthetic estimates of smoking prevalence
- Smokers setting a quit date

The Index of Multiple Deprivation (IMD) is a composite measure of area deprivation, based upon various scales related to factors such as income, employment, health, education and housing.²⁴ All electoral wards in Scotland were listed in rank order of their total IMD scores. In order to create Scottish deprivation categories, electoral wards were categorised into ten equal groups numbered 1 (most disadvantaged) to 10 (most advantaged). As such a large proportion of wards in GGNHSB were in deprivation decile 1 (49 out of 144) a second set of deprivation categories was created. This was done by listing in rank order of IMD score just those wards located in GGNHSB in order to create ten equal groups.

Synthetic estimates of adult smoking prevalence have been calculated for a range of administrative geographies in Scotland.⁶ For the purpose of this study the subset of 144 wards in GGNHSB was selected.

For each ward, information is provided on the total adult population and the adult smoking population enabling smoking prevalence rates to be calculated. Smoking prevalence rates were then expressed by deprivation category (both Scottish and Glasgow).

Data on numbers of people setting a quit date in 2004 were obtained using two sources. The first included records obtained from questionnaires completed by smokers who attended a Smoking Concerns clinic and set a quit date. The second included records obtained on every smoker who attended a pharmacy stop smoking service and set a quit date. These two databases were combined at the client level.

To maintain confidentiality and anonymity, postcodes were automatically transformed into deprivation deciles before the data were sent to the research team. The numbers of smokers setting a quit date in 2004 for each of the two deprivation categories were combined with the smoking prevalence data to create a single database.

From the numbers of smokers setting a quit date in 2004 the number of 52-week quitters was estimated using the CO-validated quit rate calculated in an English study.²⁵ These estimates were obtained by combining the following two pairs of assumptions:

1. The English 52-week quit rate was applied using two alternative assumptions:
 - (a) All deprivation deciles were assumed to have the same 52-week quit rate of 14.6% (flat rate assumption).
 - (b) The breakdown of 52 week CO-validated cessation rate by English deprivation quintile in the English study was assumed to apply using the Scottish and Glasgow deprivation quintiles. This works out as 13.0% (deciles 1 and 2), 15.0% (deciles 3 and 4), 14.8% (deciles 5 and 6), 18.8% (deciles 7 and 8) and 16.9% (deciles 9 and 10).

2. Throughput of cases by deprivation decile was assumed to:
 - (a) Remain constant
 - (b) Double.

By combining (1) and (2), four possible combinations of assumptions were obtained. Smoking prevalence rates by each of the two deprivation categories were then

estimated both for 2004 and, using projections for all four possible combinations of assumptions, for 2005 (one year later) and 2014 (ten years later).

With knowledge of projected smoking prevalence rate by deprivation decile over time, a measure of inequality was calculated using the Slope Index of Inequality (SII).²⁶ Details of the technique are described by Low and Low.²⁷

One of the best summary measures of health inequalities is the Relative Index of Inequality.²⁸ Following Regidor, the RII can be derived from the calculation of SII which “represents the linear regression coefficient that shows the relation between the level of health or the frequency of a health problem in each socio-economic category and the hierarchical ranking of each socio-economic category on the social scale” (p902). The RII is obtained by dividing “the predicted value of the regression at the highest point (range=1) by the predicted value of the regression at the lowest point (range=0)” (p902).

RESULTS

Table 1 shows how adult population, adult smoking population, smoking prevalence rates and numbers setting a quit date in 2004 were linked to the Scottish and Glasgow deprivation categories. Using the Scottish deprivation category, nearly half (48.9 per cent) of smokers were in deprivation decile 1 (most disadvantaged). A similar proportion (49.8 per cent) of smokers setting a quit date were in deprivation decile 1. Furthermore, approximately half (50.2 per cent) of all adults in deprivation decile 1 were smokers. The smoking prevalence rate in deprivation decile 10 (most

advantaged) was 21.2 per cent. There was a relatively smooth reduction in smoking prevalence rates across intermediate deprivation deciles.

Using the Glasgow deprivation category, a much smaller proportion of smokers (16.2 per cent) were in deprivation decile 1, yet within this group there was a very high smoking prevalence rate of 55.2 per cent. The smoking prevalence rate for deprivation decile 10, at 20%, was similar to that for the corresponding Scottish deprivation decile (21.2%).

Table 2 provides estimates of numbers of CO-validated quitters by deprivation category, assuming 52-week outcomes found in England as detailed previously.²⁵ As expected, estimates varied depending on the assumptions applied. Whilst in deprivation deciles 1 and 2 there are lower numbers of CO-validated quitters under the quintile rate assumption than the flat rate assumption, the reverse is true in progressing from deprivation decile 3 through to 10, the difference in numbers increasing systematically.

By subtracting the numbers of smokers quitting in Table 2 (multiplied by the relevant number of years) from the number of smokers in 2004 in Table 1, smoking prevalence rates in 2005 (one year later) and 2014 (ten years later) by deprivation decile were estimated, using the various assumptions.

Table 3 shows that in 2005, assuming a doubling of service levels and using the flat rate, the overall reduction in smoking prevalence rate was very modest (from 39.47 to 38.94). Over ten years it was more substantial; the smoking prevalence rate reduced to

34.17, a 13.4 per cent reduction. Using the Scottish deprivation category, this reduction amounted to 13.7 and 14.3 per cent for deciles 1 and 2 and 12.0 and 12.2 per cent for deciles 9 and 10. Thus, assuming a flat rate relationship between cessation rate and deprivation decile, smoking cessation services had a proportionately greater effect on prevalence rates amongst the most disadvantaged groups.

However, assuming a doubling of service levels and using the quintile rate, the overall prevalence level fell from 39.47 to 34.00, a 13.9 per cent reduction. Breaking this down by Scottish deprivation decile, this reduction amounted to 12.2 and 12.7 per cent for deciles 1 and 2 and 13.9 and 14.1 per cent for deciles 9 and 10. In this instance smoking cessation services would have a proportionately smaller effect on prevalence rates amongst the most disadvantaged groups. For both the Scottish and Glasgow deprivation categories, use of the quintile rate leads to a slightly higher smoking prevalence rate in deciles 1 and 2, but a slightly lower rate in remaining deciles.

Table 4 provides indices of inequality to measure the extent to which smoking prevalence rate depends upon deprivation decile. The Slope Index of Inequality (SII) provides a measure of the *difference* in the proportion achieving a 52-week CO-validated quit between cases in areas of low deprivation and those in areas of high deprivation. Using the flat rate assumption of CO-validated cessation rate being independent of deprivation decile, and with service level unchanged, the increase in equity as measured by the SII was from -37.0 to -34.2 over ten years, using the Scottish deprivation category. When the gradient assumption was used, the increase of equity was slightly less (from -37.0 to -35.0). The effect of doubling the numbers

setting a quit date in a particular year was to double the increase of equity; thus using the flat rate assumption, equity increased from –37.0 to –31.3.

The Relative Index of Inequality (RII) differs from the SII in providing a measure of the *ratio* between the proportion achieving a 52 week CO-validated quit in areas of low deprivation and that in areas of high deprivation. Whilst measuring inequality using the SII leads to a reduction in its magnitude, measurement using the RII leads to a reduction under the flat rate assumption of how smoking prevalence rate is dependent on deprivation decile, but to an increase under the gradient assumption. Thus, under the flat rate assumption, the RII in 2014 with numbers setting a quit date doubled is 2.70, compared with 2.79 in 2004, using the Scottish deprivation category. However, under the gradient assumption, the corresponding value of RII is 2.85, which is larger than the value 2.79 in 2004.

DISCUSSION

The Glasgow conurbation is one of the most disadvantaged areas in the UK with particularly high smoking prevalence rates. Nevertheless, one of the most striking findings of this paper is that NHS treatment services were doing an excellent job in 2004 in delivering services to those smokers living in the most deprived parts of Glasgow. Broadly speaking the proportion of smokers treated by deprivation decile matches the estimated distribution of smokers in the population. There is no clear evidence of an inverse care law at work whether Glasgow specific deprivation categories or those applicable to Scotland as a whole are employed.

Assessing whether or not services will have a substantial impact on either overall smoking prevalence or inequalities between deprivation deciles in the Glasgow area is more problematic. Clear evidence about the impact of local services on outcomes is not available, and both smoking cessation services and wider tobacco control policies are in state of flux. Assumptions had to be made about long-term cessation rates and whether or not they will vary between social groups, and about the level and nature of services that will be delivered in future years. For the purposes of this paper, we have also had to make the unrealistic assumption that the world, insofar as it affects smoking behaviour, will stand still for a period of years.

The key starting point for the analysis was that 52 week outcomes associated with treatment services in Glasgow would be similar to those reported in a recent study of services in England²⁵, and that there would be no relapse beyond that point. Using this assumption implies that between 1648 and 1710 of the 11712 smokers treated in 2004 would be long-term quitters and *ceteris paribus* the overall prevalence rate would fall by about 0.7 per cent from the baseline level of 39.5. If services doubled then the rate of decrease would rise proportionately, so that over a period of 10 years we estimate that overall prevalence could reduce by as much as 14 per cent to a rate of 34 in 2014.

Whether or not this potential overall fall in prevalence is matched by a reduction in inequalities depends on whether or not all social groups are assumed to benefit equally from receipt of treatment services, and also on which measure of inequalities is used to monitor trends over time. Because all social groups are expected to benefit to some extent the absolute gap between the disadvantaged and advantaged deciles as measured by the SII falls under all of the assumptions shown in Table 4. However, we

believe that the RII is a better indicator of trends in inequalities and is more consistent with public policy objectives in Scotland. Trends in relation to the RII are very much a function of whether or not one assumes equal capacity to benefit or a social bias in outcomes. Table 4 shows that on the basis of the equal capacity to benefit or flat rate assumption then the RII decreases over time, using both Glasgow and Scottish deprivation deciles, and the amount depends on the volume of services provided. For example, Table 4 shows that by 2014 – using the Scottish deciles – the RII falls from 2.79 to 2.74 if services remain at their 2004 level and to 2.70 if they double in volume. On a range of reasonably optimistic assumptions, therefore, and using the preferred measure of inequalities, the health divide in smoking might be reduced by a little over 3 per cent in 10 years. Unfortunately, we believe that this result is based on an unrealistic set of assumptions.

The gradient assumption is based on the belief that the most addicted smokers who are predominantly to be found in the most disadvantaged areas have lower cessation rates than those who are less addicted and who tend to be found in more advantaged areas. Using the gradient assumption, the RII tends to increase over time, the more so as services are expanded. Table 4 shows that by 2014 – using the Glasgow deciles – the RII increases from 2.78 to 2.84 if services remain at their 2004 level and to 2.91 if they double in volume. Given that services are already committed to rapid expansion this suggests that inequalities might increase by almost 5 per cent in the next decade.

There are a number of other reasons why the assumptions used for the purpose of estimating future prevalence rates in this paper might be optimistic. One is the fact that the predominant method of service delivery through pharmacists in Glasgow

might not be as effective as the English model of one to one counselling by specialist advisers. Another factor is that smokers in Glasgow are on average more deprived than those in Nottingham and North Cumbria from where the English outcome statistics were obtained.

Overall, we believe that the most likely consequence of existing patterns of service delivery in Glasgow is that they will exacerbate inequalities, and that these will be made worse if as expected services are expanded in their present form. The main findings, therefore, represent a major challenge for all of those agencies that are committed to using NHS Stop Smoking Services to contribute a reduction in inequalities. How can service delivery systems be adapted so as to help the most addicted and disadvantaged smokers achieve the same or better cessation rates than their more advantaged and less addicted peers? An answer to this question goes well beyond the scope of this paper, but new approaches to identifying those smokers in greatest need and providing them with more appropriate and intensive services supplemented perhaps by specialist and targeted relapse prevention services are among the options worth considering.

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Table 1: Adult population, adult smoking population, prevalence rates and numbers setting a quit date for two deprivation categories in Greater Glasgow NHS Board

Deprivation category ¹	Number of wards in each deprivation decile	Adult population ²	Adult smoking population ³	Smoking prevalence rate ⁴ (% smokers in each deprivation decile)	Number setting a quit date in 2004 ⁵ (percentage)
Scottish deprivation deciles ⁶					
1	49	247666	124303	50.2(48.9)	5834 (49.8)
2	16	71818	30055	41.8(11.8)	1473 (12.6)
3	12	55188	20843	37.8(8.2)	1052 (9.0)
4	10	49047	19476	39.7(7.7)	851 (7.3)
5	6	22367	7714	34.5(3.0)	344 (2.9)
6	9	40838	14197	34.8(5.6)	553 (4.7)
7	2	11432	3722	32.6(1.5)	173 (1.5)
8	3	15667	4434	28.3(1.7)	201 (1.7)
9	9	32269	8810	27.3(3.5)	362 (3.1)
10	28	98296	20870	21.2(8.2)	869 (7.4)
Glasgow deprivation deciles ⁷					
1	15	74703	41221	55.2(16.2)	1873 (16.0)
2	14	72800	36899	50.7(14.5)	1699 (14.5)
3	14	69999	33485	47.8(13.2)	1719 (14.7)
4	15	70592	29640	42.0(11.6)	1414 (12.1)
5	14	64071	25242	39.4(9.9)	1212 (10.3)
6	14	65729	26043	39.6(10.2)	1187 (10.1)
7	15	65645	23004	35.0(9.0)	941 (8.0)
8	14	57512	16083	28.0(6.3)	765 (6.5)
9	14	52400	12603	24.1(5.0)	518 (4.4)
10	15	51137	10203	20.0(4.0)	384 (3.3)
All deciles combined	144	644589	254424	39.5(100.0)	11712(100.0)

Notes:

1. The Scottish (and Glasgow) deprivation decile for each person receiving services in Greater Glasgow NHS Board (GGNHSB) in 2004 was determined by listing all Scottish (or GGNHSB) wards in rank order of index of multiple deprivation, a composite measure of area deprivation, based upon various scales related to factors such as income, employment, health, education and housing. The listing is then divided into ten equal groups labelled deprivation decile 1 to 10, 1 representing highest need.
2. Total adult population is known for each of the 144 wards in GGNHSB, and with the knowledge of deprivation decile for each ward, total adult population by deprivation decile can be determined.
3. With the knowledge of number of adult smokers, smoking prevalence rate and deprivation decile in each ward, the number of adult smokers broken down by deprivation decile may be determined.
4. Smoking prevalence rate in each deprivation decile is determined by expressing the corresponding adult smoking population as a percentage of adult population.
5. The number of cases setting a quit date in 2004 is obtained from the personal record of each person attending 'Smoking Concerns' or a Pharmacy in GGNHSB and setting a quit date in 2004. For the 1588 cases with deprivation decile missing, it was assumed that the cases were distributed by deprivation decile in the same proportions as for the 10124 cases with deprivation decile valid. Numbers and percentages by deprivation decile include the estimated figures for when deprivation decile is missing, giving a total of 11712 cases.
6. Deprivation decile based on the 1222 wards in Scotland, for a population aged 16-74.
7. Deprivation decile based on the 144 wards in Greater Glasgow NHS Board, for a population aged 16-74.

Table 2: Estimates of long-term CO-validated quitters by deprivation category in Greater Glasgow NHS Board

Deprivation category	Number of CO-validated quits.			
	2004		2005 (projected)	
	Assumption:		Assumption:	
	Flat rate ¹	Quintile rate ²	Flat rate ¹	Quintile rate ²
Scottish deprivation deciles				
1	852	758	1704	1517
2	215	192	430	384
3	154	158	308	316
4	124	128	248	255
5	50	51	100	102
6	81	82	162	164
7	25	33	50	65
8	29	38	58	76
9	53	61	106	122
10	127	147	254	294
Glasgow deprivation deciles				
1	273	243	547	487
2	248	221	496	442
3	251	258	502	516
4	206	212	412	424
5	177	179	354	359
6	173	176	347	351
7	137	177	275	354
8	112	144	223	288
9	76	88	151	175
10	56	65	112	130
All deciles combined	1710	1648	3420	3295

Notes:

1. In the flat rate method of estimating number of CO-validated quitters from number setting a quit date, it is assumed that the 1 year success rate is equal to that found in the N. Cumbria and Nottingham English study averaged over all cases of 14.6% (Ferguson, J., Bauld, L., Chesterman, J. & Judge, K. (2005) The English smoking treatment services: one-year outcomes. *Addiction*, 100, supp 2, 59-69.)
2. In the quintile-related method, number of CO-validated quitters can be estimated from the number setting a quit date using a breakdown of 1 year success rate by deprivation quintile in the English study. This works out as 13.0% (deciles 1 and 2), 15.0% (deciles 3 and 4), 14.8% (deciles 5 and 6), 18.8% (deciles 7 and 8) and 16.9% (deciles 9 and 10).

Table 3: Smoking prevalence rate estimated for 2004 and projected for 2005 and 2014 by deprivation category in Greater Glasgow NHS Board

Deprivation category	Estimated 2004 ²	Smoking prevalence rate in each deprivation decile ¹							
		-----Projected-----							
		-----2005-----				-----2014-----			
		Service level unchanged		Service level doubled ⁵		Service level unchanged		Service level doubled ⁵	
Flat rate ³	Quintile rate ⁴	Flat rate ³	Quintile rate ⁴	Flat rate ⁶	Quintile rate ⁷	Flat rate ⁶	Quintile rate ⁷		
Scottish deprivation deciles									
1	50.19	49.85	49.88	49.50	49.58	46.75	47.13	43.31	44.07
2	41.85	41.55	41.58	41.25	41.32	38.85	39.18	35.86	36.52
3	37.77	37.49	37.48	37.21	37.20	34.98	34.91	32.20	32.05
4	39.71	39.46	39.45	39.20	39.19	37.18	37.11	34.64	34.50
5	34.49	34.26	34.26	34.04	34.03	32.24	32.21	30.00	29.94
6	34.76	34.57	34.56	34.37	34.36	32.79	32.76	30.81	30.76
7	32.56	32.34	32.27	32.12	31.99	30.35	29.71	28.14	26.87
8	28.30	28.11	28.06	27.93	27.82	26.43	25.89	24.56	23.48
9	27.30	27.14	27.11	26.97	26.92	25.66	25.41	24.03	23.51
10	21.23	21.10	21.08	20.97	20.93	19.94	19.74	18.65	18.24
Glasgow deprivation deciles									
1	55.18	54.81	54.85	54.45	54.53	51.52	51.92	47.86	48.66
2	50.69	50.34	50.38	50.00	50.08	47.28	47.65	43.87	44.62
3	47.84	47.48	47.47	47.12	47.10	44.25	44.15	40.67	40.47
4	41.99	41.70	41.69	41.40	41.39	39.06	38.98	36.14	35.98
5	39.40	39.12	39.12	38.84	38.84	36.64	36.60	33.87	33.80
6	39.62	39.36	39.35	39.09	39.09	36.99	36.95	34.35	34.28
7	35.04	34.83	34.77	34.62	34.50	32.95	32.35	30.86	29.65
8	27.96	27.77	27.71	27.58	27.46	26.02	25.46	24.08	22.96
9	24.05	23.91	23.88	23.76	23.72	22.61	22.38	21.16	20.71
10	19.95	19.84	19.83	19.73	19.70	18.86	18.68	17.76	17.41
All deciles combined	39.47	39.21	39.20	38.94	38.92	36.82	36.74	34.17	34.00

Notes:

1. When deprivation decile was missing, it was assumed that the cases were distributed by deprivation decile in the same proportions as the cases for which it was valid.
2. Smoking prevalence rate in each deprivation decile is determined by expressing the corresponding adult smoking population as a percentage of adult population.
3. In the flat rate method of estimating number of CO-validated quitters from number setting a quit date, it is assumed that the 1 year success rate is equal to that found in the N. Cumbria and Nottingham English study averaged over all cases of 14.6% (Ferguson, J., Bauld, L., Chesterman, J. & Judge, K. (2005) The English smoking treatment services: one-year outcomes. *Addiction*, 100, supp 2, 59-69.). To obtain the projected smoking prevalence rate for 2005, the adult smoking population is revised by subtracting the number of CO-validated one year quitters from the adult smoking population for 2004, before expressing this as a percentage of adult population.
4. In the quintile-related method, number of CO-validated quitters can be estimated from the number setting a quit date using a breakdown of 1 year success rate by deprivation quintile in the English study. This works out as 13.0% (deciles 1 and 2), 15.0% (deciles 3 and 4), 14.8% (deciles 5 and 6), 18.8% (deciles 7 and 8) and 16.9% (deciles 9 and 10). To obtain the projected smoking prevalence rate for 2005 by deprivation decile, the adult smoking population is revised by subtracting the number of CO-validated one year quitters from the adult smoking population for 2004 for each decile, before expressing this as a percentage of adult population for each deprivation decile.
5. In a scenario in which smoking services expanded rapidly between 2004 and 2005, a doubling in the number of cases setting a quit date between 2004 and 2005 might suggest an upper limit on this expansion.
6. To obtain the projected smoking prevalence rate for 2014, use the method in note 3 above, though instead subtract 10 times the number of CO-validated one year quitters.
7. To obtain the projected smoking prevalence rate for 2014, use the method in note 4 above, though instead subtract 10 times the number of CO-validated one year quitters.

Table 4: Projected values of slope index of inequality and relative index of inequality after one year and ten years under different assumptions

Deprivation category ¹	Assumption of dependency of smoking prevalence rate on deprivation decile ²	Year ³	Service level ⁴	Inequality gap			
				Lower limit ⁵	Upper limit ⁵	Slope index of inequality (SII) ⁶	Relative index of inequality (RII) ⁷
Scottish		2004		20.7	57.7	-37.0	2.79
	Flat rate	2005	Unchanged	20.6	57.3	-36.7	2.78
	Gradient	2005	Unchanged	20.6	57.4	-36.8	2.79
	Flat rate	2005	Doubled	20.5	56.9	-36.4	2.78
	Gradient	2005	Doubled	20.4	57.0	-36.6	2.79
	Flat rate	2014	Unchanged	19.6	53.7	-34.2	2.74
	Gradient	2014	Unchanged	19.3	54.3	-35.0	2.81
	Flat rate	2014	Doubled	18.4	49.7	-31.3	2.70
	Gradient	2014	Doubled	17.8	50.8	-33.0	2.85
Glasgow		2004		20.8	57.9	-37.1	2.78
	Flat rate	2005	Unchanged	20.7	57.5	-36.8	2.78
	Gradient	2005	Unchanged	20.6	57.5	-36.9	2.79
	Flat rate	2005	Doubled	20.5	57.1	-36.6	2.79
	Gradient	2005	Doubled	20.4	57.2	-36.7	2.80
	Flat rate	2014	Unchanged	19.5	53.9	-34.4	2.76
	Gradient	2014	Unchanged	19.1	54.2	-35.2	2.84
	Flat rate	2014	Doubled	18.3	49.9	-31.6	2.73
	Gradient	2014	Doubled	17.4	50.6	-33.2	2.91

Notes:

1. When deprivation decile was missing, it was assumed that the cases were distributed by deprivation decile in the same proportions as the cases for which it was valid.
2. Smoking prevalence assumed to be either
 - (a) flat rate: independent of deprivation decile
 - (b) gradient: varies according to deprivation quintile
3. Initial results refer to 2004 for which estimates of smoking prevalence rate have been made. Projections refer to one year later (2005) and ten years later (2014).
4. Service level is either assumed to remain at its 2004 level or is assumed to have doubled.
5. The lower and upper limits refer to the intercept of the regression line with the vertical lines deprivation decile=10 (low need; relative rank=1) and deprivation decile=1 (high need; relative rank=0) respectively.
6. SII = (lower limit) – (upper limit).
7. RII = (upper limit) / (lower limit).