Table 1 Effect of NHS smoking cessation services on the relative risk of smoking in people living in the most and least deprived quintiles using hypothetical smoking rates

		Pre-intervention			Post-intervention				
Deprivation quintile	Population*	Smoking rate, %†	Number of smokers‡	Relative risk‡ (95% CI)§	% Of population quitting*	Number of quitters*	Number of smokers‡	Smoking rate, %†	Relative risk (95% CI)‡§
Least deprived	187064	25	46766		0.05	85	46681	24.95	
Most deprived	336800	25	84200	1 (0.99 to 1.01)	0.25	826	83374	24.75	0.99 (0.98 to 1.00)
Least deprived	187064	5	59353		0.05	85	59268	4.95	
Most deprived	336800	50	168400	1.58 (1.56 to 1.59)	0.25	826	167574	49.75	1.57 (1.56 to 1.58)
Least deprived	187064	15	28060		0.05	85	27975	14.95	
Most deprived	336800	39	131352	2.60 (2.57 to 2.63)	0.25	826	130526	38.75	2.59 (2.56 to 2.62)

*Data from Lowey *et al*[2]; †sensitivity estimates including data from Lowey *et al*[2]; ‡data calculated by us; §relative risk of smoking in most deprived compared with least deprived quintile.

of air pollution on asthma hospitalisation and the possible impact that autocorrelations in the data would have on our risk estimates. In our study, the effects of certain gaseous pollutants on asthma hospitalisation were found to differ between boys and girls 6 to 12 years of age. Some of these differences were ''statistically significant'', for example, the regression coefficient for six to seven day SO_2 effect was significantly greater for girls than for boys ($p<0.01$). Although individual results can be examined for statistical significance in this manner, we prefer to base conclusions on the broad risk patterns in the data that emerge after our analysis of a number of gaseous pollutants and exposure periods. Collectively, these results suggest a differential effect of gaseous air pollutants on asthma hospitalisation in girls as compared with boys.

We agree that it is probable that some children would be admitted to hospital for asthma more than once during the study period, and consequently, some autocorrelation may exist in our admission series. Generalised estimation equations (GEE) can be used to address this issue if readmissions can be identified. Unfortunately, our data do not include personal identifiers needed to identify readmissions. However, the residuals of asthma hospitalisation count data did not display notable ''intraclass'' type correlation, and then it is not obvious that the repeated asthma hospital admissions have induced sizable additional variation. In addition, in a separate analysis using a different dataset from Vancouver in which asthma readmissions were identifiable, the results based on all admissions were similar to those based on first admission. This second analysis suggests that the effect of autocorrelation on our presented risk estimates within our asthma admission series is small.

M Lin, Y Chen
Department of Epidemiology and Community Medicine, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada

R T Burnett
Safe Environments Directorate, Health Canada, Ottawa, Ontario, Canada

P J Villeneuve
Department of Public Health Sciences, University of Toronto, Ontario, Canada

D Krewski
Mclaughlin Centre for Population Health Risk Assessment, University of Ottawa, Ottawa, Ontario, Canada

Correspondence to: Dr Y Chen, Department of Epidemiology and Community Medicine, Faculty of Medicine, University of Ottawa, Ottawa, Canada; ychen@uottawa.ca

Reference

1 **Lin M**, Chen Y, Burnett RT, *et al*. Effect of short-term exposure to gaseous pollution on asthma hospitalisation in children: a bi-directional case-crossover analysis. *J Epidemiol Community Health* 2003;**57**:50–5.

Smoking cessation services may not reduce inequalities

Given the oft quoted proposition that health promotion interventions frequently increase, rather than decrease, socioeconomic inequalities in health (SEIH),[1] we were interested to read the article by Lowey *et al*.[2] However, we believe that the title of this article is misleading, that the authors have not analysed the data to its fullest potential, and that a number of the conclusions drawn are unjustified.

The authors do not present any data on the magnitude of inequalities in smoking in the areas studied either before or after the introduction of smoking cessation services. Without such data, conclusions relating to the impact of the intervention on inequalities in smoking rates by deprivation quintile cannot be drawn. As the authors note, the lack of data on overall smoking rates in the different deprivation quintiles means that one cannot immediately determine the impact of the intervention on smoking rates and hence inequalities. However, it is possible to carry out sensitivity analyses based on estimated smoking rates to investigate the potential impact of the intervention on inequalities in smoking.

Table 1 shows the number of male smokers before and after the intervention, using data published in the paper and hypothetical pre-intervention smoking rates representing perfect equality (25% in both the least and most deprived quintiles), extreme inequality (5% in the least deprived, and 50% in the most deprived quintiles) and the degree of inequality quoted in the paper using data from the General Household Survey (15% in the least deprived and 39% in the most deprived quintiles). We have also calculated relative risks of smoking in the most deprived, compared with the least deprived, quintile before and after the intervention as a measure of inequality. In all three scenarios, it can be seen that the quit rates achieved by the intervention in people living in the most and least deprived quintiles have a very small effect on the relative risk of smoking in the least compared with the most deprived quintile, and hence on inequality.

From our further analysis of the published data, we conclude that the authors' claims that ''services are reducing inequalities between geographical areas'' are not justified and hence the title of the article is misleading. Furthermore, the conclusion that ''NHS smoking cessation services are successfully attracting significant number of people from deprived areas'' seems of limited validity. Only 1.13% (3799 of 336 800) of people from the most deprived quintile actually accessed services. Even if 50% of people in the most deprived quintile were smokers, this still only represents 2.26% of smokers in this quintile.

We believe that the proposition that health promotion interventions may often increase, rather than decrease, overall SEIH[1 3] is feasible, and worthy of further consideration. Analyses such as those attempted by Lowey *et al*, and completed by us, are essential for confirming or refuting the validity of this hypothesis. As we have shown, simple statistics can be used to quantify and compare the degree of inequality within a population. Authors should be careful to ensure that their claims are substantiated by the data they present and be prepared to extend analysis with sensitivity models where necessary to test relevant hypotheses.

J Adams, M White
School of Population and Health Sciences, The Medical School, University of Newcastle upon Tyne, Newcastle upon Tyne, UK

Correspondence to: Dr J Adams, The Medical School, University of Newcastle upon Tyne, Newcastle upon Tyne, NE2 4HH, UK; j.m.adams@ncl.ac.uk

Funding: Jean Adams is supported by the BUPA/FPHM Joint Research Fellowship, 2001–4.

References

1 **Acheson D**. *Report of the independent enquiry into inequalities in health*. London: Stationery Office, 1998.
2 **Lowey H**, Tocque K, Bellis MB. Smoking cessation services are reducing inequalities. *J Epidemiology Community Health* 2003;**57**:579–80.
3 **Victora C**, Vaughan J, Barros F, *et al*. Explaining trends in inequities: evidence from Brazilian child health studies. *Lancet* 2000;**356**:1093–8.

Authors' reply

Adams and White fall shy of refuting that smoking cessation services are reducing inequalities. However, using our data[1] and

Table 1 Estimated proportions of male smokers quitting by deprivation quintile

Survey source	Grouping	Population (aged over 17 years)	Smoking rate (%)	Estimated smokers	Quit smoking	Smokers quitting (%)	χ^2*	p Value
General Household	Least deprived quintile	187064	15	28060	85	0.30		
	Most deprived quintile	336800	39	131352	826	0.63	43.2	<0.001
Primary care trusts	Bebington and West Wirral PCT	42288	13	5497	95	1.73		
	Birkenhead and Wallasey PCT	68028	25	17007	387	2.28	5.94	0.01

*The χ^2 test compares the proportion quitting with the proportion not quitting between groupings.

speculative levels of smoking, they examine how smoking cessation services might have changed the relative risk of smoking between the least and most derived areas. Like Adams and White we are aware of data from the national household survey[2] on prevalence of smoking according to deprivation. Furthermore, since then a smoking prevalence survey has been published for two of the primary care trusts (one relatively affluent, Bebington and West Wirral and one relatively deprived, Birkenhead and Wallasey) within our study area. Prevalence of smoking for these was measured at 13% and 25% respectively.[3] Using these figures and those from the General Household Survey (15% smokers in least deprived areas and 39% in the most deprived) we have tested whether greater proportions of smokers are quitting from deprived areas. Data from our study showed that the proportions of males quitting from deprived areas are significantly higher (table 1). In our original paper we chose not to publish any such analyses as the actual prevalence of smoking across our study areas was not known. Instead, in our comments we acknowledged the urgency with which such data are needed.[1]

We would not dispute that currently changes in smoking prevalence resulting from smoking cessation services are relatively modest. However, this is to be expected as only a fraction of all smokers are currently accommodated by such services. Furthermore, disproportionate effects on areas of high deprivation are also reduced by a greater drop out rates of people recruited from those most deprived areas. Again this is an issue we have suggested is tackled as a matter of urgency.

In reality, smoking cessation services can never dramatically affect relative risks of smoking (between least and most deprived areas) while the number of people they see represent such small proportions of the smoking population. However, we have shown that modest investment in such services has had an impact disproportionately on more deprived populations. Consequently, greater investment in smoking cessation services (as part of a suite of interventions to reduce smoking) may even deliver the changes in relative risk sought by Adams and White.

H L Lowey, B Fullard, M Bellis, K Tocque
Centre for Public Health, Liverpool John Moores University, Liverpool, UK

Correspondence to: Dr H L Lowey, Centre for Public Health, Liverpool John Moores University, 70 Great Crosshall Street, Liverpool L3 2AB, UK; helen.lowey@bwwpct.nhs.uk

References

1 **Lowey H**, Tocque K, Bellis MA, *et al.* Smoking cessation services are reducing inequalities. *J Epidemiol Community Health* 2003;**57**:579–80.
2 **Walker A**, Maher J, Coulthard M, *et al. Living in Britain.* Results for the General Household Survey 2003. London: The Stationery Office, 2003. (http://www.statistics.gov.uk/lib2001/Section3489.html)
3 **Health Links**. *Wirral Health and lifestyle survey.* Wirral: Birkenhead and Wallasey Primary Care Trust, 2002.