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Persistence despite Action? Measuring
the Patterns of Health Inequality in England
(1997-2007)

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Abstract

The persistence of inequalities in health is a major policy concern in England, which was addressed by the new Labour government in 1997 through prioritising the curtailment of health inequalities as a policy goal. However, whether specific interventions have managed to attain their goals is a question for empirical welfare analysis to elucidate. This paper addresses two related questions: first, it empirically examines the dynamic patterns of inequalities in health in England from 1997 to 2007 by estimating concentration indexes of inequality over three measures of health, namely self-reported health, long standing illness and health limitations, calculated across different years of the Health Survey for England. Second, using regression-based decomposition analysis, we explore whether specifically prioritised areas (so-called “spearhead” local authority areas ranked in the bottom fifth on national health indicators) exhibit a different pattern of inequality in the years following a targeted intervention in 2005. Results suggest that patterns of health inequalities in England exhibit moderate variation from 1997 to 2007, although some improvement in self-assessed health inequalities is found. Importantly, patterns of inequality in prioritised (spearhead) areas are not found to be significantly different than health inequalities in non-spearhead areas.

JEL codes: I12, C21

Keywords: health inequalities, England, spearhead areas, concentration index, inequality decomposition

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1. Introduction

A widely accepted governmental goal in a number of countries that organise their health system along the lines of publicly financed healthcare, including the National Health Service (NHS) in England, is to improve equity in the distribution of health. The reduction of health inequalities is also one of the measures of health system performance that the World Health Organization (WHO) has recommended.[†] However, the recent WHO Commission on the Social Determinants of Health (WHO Health Commission on the Social Determinants of Health 2008) concluded that neither variation in income levels or in health care provision fully explains health inequality. Health equity thus remains at the core of the health-policy agenda and local area variation in health service provision is often justified through recourse to health inequality.

In the United Kingdom, where healthcare is organised along the lines of free care at point of delivery, health inequalities remain a top health policy priority. Since the creation of the NHS in 1945, inequalities were present because of the inherent notion of free care regardless of ability to pay. Formal policy interest in health inequalities began with the Black Report in 1980, which suggested occupation-related differences in health were of primary importance, though policy actions to tackle health inequalities were not fully addressed until 1997. From 1997 onwards, policy making has explicitly pinpointed health inequalities as a key policy target, and has led to the commissioning of an independent inquiry into health inequalities. The Acheson Report concluded in 1998, almost 20 years after the Black Report, that health inequalities were persistent in the UK. Subsequently, the Government set a national target for health inequalities in 2000, in the form of a reduction in the gap between different measures of health across different social classes. As later confirmed, the aim was to reduce by 10% the inequalities, measured by different health outcomes, experienced by the highest and lowest social classes, and specifically infant mortality and life expectancy at birth. However, the House of Commons Health Committee Third Report on Health Inequalities (House of Commons Health Committee, 2009) has recently documented extensively that although health has been improving for all, health inequalities across all common measures of health were persisting despite a range of governmental actions.

A number of initiatives have been undertaken by recent governments to address health inequalities. These included the establishment of “Health Action Zones” based around multi-agency partnerships

[†] The WHO performance index draws upon a measure of social inequality in health along with a measure of fairness in health-care financing (WHO, 2000).

aimed at reducing health inequalities largely through a focus on preventative and wider environmental matters. However, these were abandoned in 2003 as ill-conceived and badly resourced. Then there was the establishment of the “Sure Start” programme which, although aimed at reducing child poverty generally, also included a range of health-related outcomes within its programme objectives. The overall assessment is that whilst positive in ambition, the programme failed to reach a broad range of its objectives and there is little evidence that it has had any impact on children’s health (House of Commons Health Committee, 2009: paras 137-139). In 2003, the government also outlined a cross-cutting review which sought to address the issue through consolidating policies aimed at tackling health inequalities across a number of spending departments. While a number of target indicators were achieved, there has been little real impact on relative health inequalities. A more recent initiative, introduced in 2005, aimed at tackling health inequalities in the 70 most deprived local authority areas through targeting expenditure and policies specifically aimed at reducing these inequalities.

Assessment of governmental work is scarce and exhibits limited use of adequate methodological instruments. Reporting on an early assessment by the Kings Fund, the House of Commons Health Committee suggested that the perceived results were disappointing and overall that “despite much hype and considerable expenditure we have not seen the evidence to convince us that any of the specific support given to deprived areas to tackle healthy inequalities has yielded positive results” (House of Commons Health Committee, 2009: para 170). This conclusion has been disputed in a 2009 Government response to the Health Select Committee Report using a base year prior to the introduction of the spearhead area, which is a geographically prioritised area[‡]; that is, an area that receives a relatively higher share of resources to tackle special health needs. Indeed, after 2001 the geographically weighted capitation method has been used to account for geographic differences in health needs (for example, through the Resources Allocation Working Party (RAWP) formulae) by targeting health authorities judged to be making the greatest attempt to alleviate persisting health inequalities. The initial resources allocated for the spearhead programme was comparatively small, but it was increased in 2009/10 and 2010/11 in new funding formula allocations which will adjust for life expectancy differences in allocating Primary Care Trust (PCT) expenditure levels. Thus, aggregate health funding is now incorporating explicit resources for the level of health inequality witnessed at a local level. The Government’s response argues for some productivity gains in those areas, insofar as average life

[‡] The 70 local authority areas with the worst health and deprivation indicators are defined as the “Spearhead Areas”. The Spearhead Group is made up of 70 local authorities and 88 Primary Care Trusts, based upon the local authority areas that are in the bottom fifth nationally for 3 or more of the following 5 indicators: male life expectancy at birth, female life expectancy at birth, cancer mortality rate for people aged under 75, cardio vascular disease mortality rate for people aged under 75 and the average score of the Index of Multiple Deprivation 2004 by Local Authority.

expectancy has been improving in these areas and that cancer and cardiovascular death rates, in particular, have fallen (HM Government, 2009). However, whether inequalities in health outcomes are sensitive to recent policy incentives is an empirical question still to be examined.

Overall, however, there has been limited empirical evidence on the effects of health policy reforms on health inequalities. As stated in the House of Commons Health Committee report on Health Inequalities (2009), there has been little evaluation of programmes aimed at reducing health inequalities. Interventions have been implemented either without piloting or adequate evaluation; if evaluation has been undertaken it has been muted and not adequately designed to tackle the complexities of these interventions (House of Commons Health Committee report on Health Inequalities, 2009: Chapter 3). Again, the Government's response to the Health Select Committee on Health Inequalities has argued, on the basis of little evidence, that spearhead areas which have benefited from better local funding have witnessed markedly better performance across a range of targets compared to non-spearhead areas (HM Government, 2009).

To help address this debate, that is to provide evidence on whether a specific health care reform such as the spearhead areas initiative has had impact on health inequality, this study examines whether the identification and subsequent resource expenditure targeted at the 70 local authority areas in England with the worst health and deprivation indicators, the so-called spearhead areas, have had any impact on their degree of health inequality. This assessment is based on the examination of estimated indices of health inequalities constructed from Health Survey for England data from 1997 to 2007. Given that the spearhead areas were introduced in 2005, this gives a relatively short time period over which to assess the trend in health inequalities in these areas, but the study does provide indicative quantitative evidence of the impact of these interventions on trends in health inequalities using individual data rather than relying on aggregate data normally adopted in this area of work. Healthcare expenditure data at the GP level was also explicitly analysed: available data refers to the period from 2005 to 2007 which would be expected to pick up the effect of the introduction of the program but not its 2009 reforms. Furthermore, the analysis is informed by the use of econometric techniques of inequality measurement and decomposition introduced by Wagstaff et al (2000). It is also possible to disentangle the impact of various contributory factors, including education, income and spearhead status, on health inequality trends, which we do.

2. Socioeconomic inequalities in health: issues

Explanation of the persistence of health inequalities is a complex matter which has given rise to an on-going debate in the literature over causal mechanisms and their relevance. There is a large and growing literature in this area which we do not attempt to review comprehensively (on this see O'Donnell et al, 2008). An important issue of debate relevant to this study is the association between health and socioeconomic status - in particular, health and education alongside income or wealth. A positive relationship between health and socioeconomic status is widely documented across many societies and periods but the causal mechanisms underlying this relationship are complex and controversial. Socioeconomic status can influence health through the direct influence of material deprivation on the health production function and on access to healthcare. In addition, the level of education can influence the uptake of and compliance with medical treatments. However, health can also influence socioeconomic status through the impact of health shocks on labour market outcomes, such as unemployment, early retirement (Bound, 1991; Disney et al, 2006) and earnings (Contoyannis and Rice, 2001). The WHO Commission on the Social Determinants of Health (WHO, 2008) concluded that variation in income or health service access could not alone explain persistent health inequality and that wider social determinants play an important role.

As such there remains considerable debate in the literature with regards to the inter-action between income and health and subsequently the relationship between income inequality and health inequality, the role of wider socio-economic factors (in particular education), and the manner in which policies targeted at reducing health inequalities should be introduced. In fact, it is difficult to ascertain the causal relationship in the association between income and health. There is much evidence across a range of studies to suggest that a relationship exists, but little to base a causal argument on. It is widely found that an increase in income is associated with improvements in self-assessed health status at the individual level, for example (Mackenbach et al, 2005). If the relationship between household income and morbidity is curvilinear, then it is likely that the direct effects of material circumstances and poverty on health status are the most important. On the other hand, if the relationship is more linear, indirect effects of income through psychosocial factors are more likely to explain health inequalities.

Contoyanis et al (2004) used panel data from the British Household Survey in an attempt to establish a causal relationship between income and health, using average income across the time-period for households and self-reported health measures. His results supported the supposition that income did

determine health. Jones and Wildman (2008) appear to have found a similar result using current income and its effect on health, but to a much smaller degree in a similar British population. Smith (2004) using US data, however, does not establish such a link. In the latter two studies education plays an important role in improving health, leading to wider concerns that a range of variables, not merely income, influence health inequalities.

A range of other variables have also been analysed with respect to their influence in determining health inequalities, including education, lifestyle and diet (where the latter incorporate the influence of, for example, smoking and obesity). The overall conclusion to be drawn from this literature is that it remains unclear what the precise mechanisms are even if a set of covariates are known to exhibit some form of statistical association (WHO, 2008). However, there is conflicting evidence on the causal relationship between income and health and it is entirely plausible that there are both reverse causal effects and long-term dynamic interactions between these two variables. Of the wider socio-economic variables, education appears particularly important in helping to determine health outcomes, although again the precise dynamic is not known. This conclusion is drawn by other studies (for example, Epstein et al, 2009). Obviously, if the relationship between health outcome levels and a range of other important variables cannot be clearly established, it is then difficult to identify the confounding effects of these variables in explaining health inequalities and to identify appropriate policy interventions. This makes it complex to both prescribe and evaluate policies aimed at reducing health inequalities. That said, the degree of health inequality within a population must first be established. Following this, it may then be possible to attribute the influence of different factors on the level of inequality. This is what is attempted in the following section.

3. Methods

A number of ways to measure inequality have been developed to examine health inequalities. Health differs from other variables such as income in that it is less observable and as a result inequality measurement might rely quite strongly on the health indicator employed. In general, studies focusing on inequalities in health all tend to measure whether there are differences in ill-health across socio-economic groups, although the methodologies used differ substantially between studies. In this section, we discuss some that are used in the measurement of health inequalities and we end by proposing the methodology that is employed in this study.

Methods based on concentration curves and concentration indices have been extensively used for measuring inequalities and inequities (Wagstaff and van Doorslaer, 2000). The health concentration curve (CC) and concentration index (CI) provide measures of relative income-related health inequality (Wagstaff, Van Doorslaer and Paci, 1989). Wagstaff, Paci and van Doorslaer (1991) have reviewed and compared the properties of the concentration curves and indices with alternative measures of health inequality. They argue that the main advantages are the following: they capture the socioeconomic dimension of health inequalities; they use information from the whole income distribution rather than just the extremes; that they give the possibility of visual representation through the concentration curve, and finally, they allow checks of dominance relationships.

There are various ways of expressing the CI algebraically. The one that is most commonly used in the literature is:

$$C = \frac{2}{\mu} \sum_{i=1}^N (h_i - \mu) \left(R_i - \frac{1}{2} \right) = \frac{2}{\mu} \text{cov}(h_i, R_i) \quad (1)$$

This shows that the value of the concentration index is equal to the covariance between individual health (h_i) and the individual's relative rank (R_i), scaled by the mean of health in the population (μ). Then the whole expression is multiplied by 2, to ensure the concentration index ranges between -1 and +1. Equation (1) represents the CI as a measure of the degree of association between an individual's level of health and their relative position in the income distribution. It is important to highlight that a value of $CI = 0$ does not mean absence of inequality, but an absence of the socioeconomic gradient in the distribution; this is, an absence of inequality associated with the socioeconomic characteristics.

Assuming an objective of measuring the magnitude of avoidable inequalities in health, the concentration index must account for the role that demographic factors play in generating such inequality. Thus, the index has been standardised by age and gender, according to methodology proposed in the literature (Kakwani et al, 1997).

Wagstaff, van Doorslaer and Watanabe (2003) show that the health concentration index can be decomposed into the contributions of individual factors to income-related health inequality, in which each contribution is the product of the sensitivity of health with respect to that factor and the degree of income-related inequality associated with that particular factor.

Assuming a linear additive regression model that links health (h) with a set of explanatory variables (x_k), such as:

$$h_i = \alpha + \sum_k \beta_k x_{ki} + \varepsilon_i, \quad (2)$$

Wagstaff van Doorslaer and Watanabe (2003) show that the concentration index for h , expressed as C , can be written as follows:

$$C = \sum_k (\beta_k \bar{x}_k / \mu) C_k + GC_\varepsilon / \mu, \quad (3)$$

Where μ is the mean of h , \bar{x}_k is the mean of the explanatory variable x_k , C_k is the concentration index for x_k , and GC_ε is the generalised concentration index for the error term ε .

In fact, C is equal to a weighted sum of the CI estimated with respect to the k explanatory variables, where the weight for x_k , is the elasticity of h with respect to x_k $\left(\eta_k = \beta_k \frac{\bar{x}_k}{\mu} \right)$. The residual component captured by the last term reflects the income-related inequality in health that is not explained by systematic variation in the regressors with respect to income, which should approach zero for a well-specified model.

Hence, the concentration index of our health variable can be decomposed into two components. Firstly, there is a deterministic part that equals the weighted sum of the concentration indices of the k regressors, where each explanatory variable x_k is weighted by the elasticity of h for this regressor and evaluated at the sample mean. The second part is the residual, which reflects the inequality in health that cannot be explained by the systematic variation across income groups in the x_k .

Our main objectives in this study are to adopt this Concentration Index approach to:

1. Measure socioeconomic inequalities in different health outcomes (self-assessed health, long-standing illness, limited daily activity), by calculating the corresponding concentration index for different years, using the Health Survey for England which is the only database that contains the same health outcomes over the time period examined and allowed us to identify local authorities, so as to match local specific health expenditure variables and identify spearhead areas.

2. Test policy effectiveness by estimating the concentration index for those spearhead areas that have received special priority, where Government action on health inequalities is focused as well as the concentration index for non-spearheaded areas. Since April 2005, Government action has been focused in spearhead areas, a fixed list consisting of the local authority areas in the bottom fifth nationally for a selection of health and deprivation indicators. The spearhead list is made up of 70 Local Authorities and the 62 Primary Care Trust (PCT) areas that map to them. Once the indices are computed, spearhead areas are compared to non-spearhead areas over time.
3. Interpret the concentration index of the different health outcomes as a weighted sum of the inequalities in each of its determinants by decomposing the indices for the health outcomes, considering several demographic (age & gender, ethnicity) and socioeconomics factors (education, marital status, activity status) and the impact, if any, of spearhead area intervention. This will tell us what percentage of the inequality decomposition is associated with pure income effects, and what is associated with policy intervention.
4. Analyse budget-level per capita healthcare expenditure as a potential factor that could explain socioeconomic inequalities in health, taking into account information at the PCT level. This will allow us to ascertain what percentage of healthcare service inequalities is explained by intensity of governmental investment as measured by expenditure.

4. Health inequalities and targeted areas

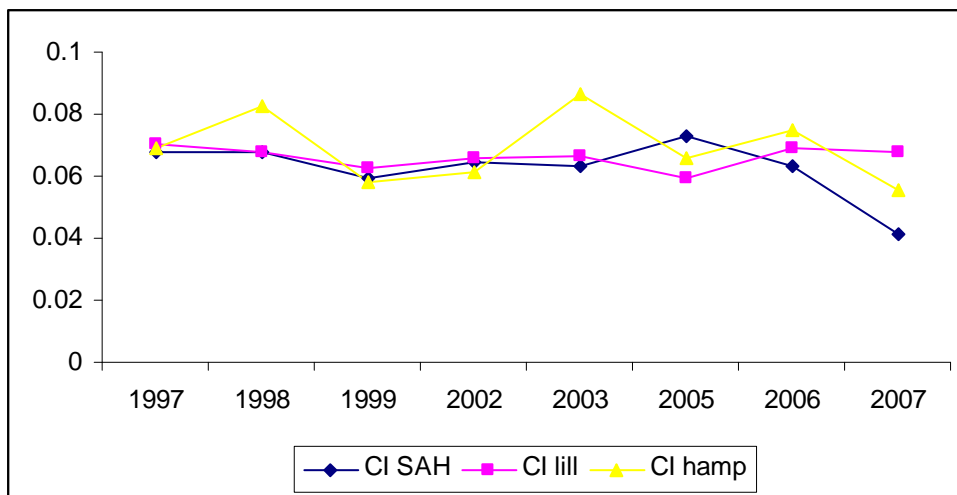
In this section we provide the results of the estimates of the concentration index (CI). In the Health Survey of England (HSE) there was significant missing data for one year's survey returns, 2004. Given that the missing data corrupts the overall picture, the main results presented below are based on exclusion of data for 2004.[§] Figure 2 exhibits the time pattern of non-standardised CIs for all local areas for the three measures of health outcome (self-assessed health, long-standing illness, limited daily activity), employed in the study for the years 1997 through 2003 and 2005 through 2007.^{**} The concentration indices appear to be relatively stable over this period, although with some fluctuation in

[§] Although various methods could be used to replace the missing data assuming it is missing at random, the large amount of data missing in 2004 implies that these data were not missing at random and without further investigation it seems optimal to drop this year from the analysis.

^{**} In the subsequent Figures, self-assessed health is referred to as "SAH", long-standing illness as "lill" and limited daily activity as "hamp".

the inequalities in suffering health limitations in daily activity (*hamp*), but over the entire period there does not appear to be any clear common pattern or clear trend in inequality. Overall, self-reported health inequalities (*SAH*) and inequalities in limitation in daily activities appear to be relatively constant overtime, although both indicate possible decreases in the final period from 2006 to 2007. Of course, whether this is a trend or not is too early to state. Inequalities in suffering health limitations (*hamp*) seem relatively constant over the entire period, with specific fluctuations in 1998 and 2003. These indices are not standardised for the unavoidable influences of age and gender.

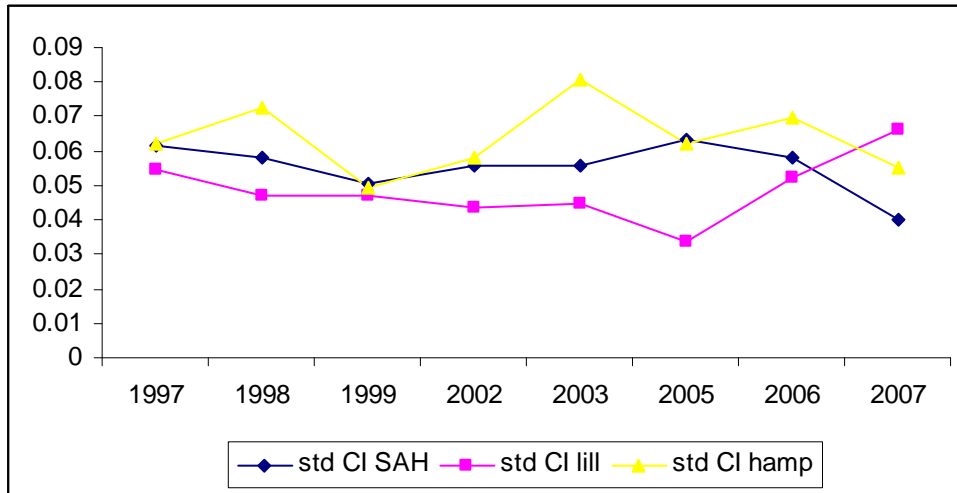
Figure 2. Unstandardised Concentration Indices (CIs) for all local areas



The CIs were then re-estimated standardising for age and gender. These standardised results are reported in Figure 3. They exhibit similar patterns to the unstandardised indices, although with slightly lower absolute values. Again, we conclude that although there is no overall trend, a small decrease in inequalities is seen in self-assessed health (SAH) from 2005 through 2007, while there is a more marked increase in inequalities in this same period (2005-2007) for suffering long-standing illness (lill). Given that these movements may be read as no more than fluctuations, there appears little evidence to suggest either a pattern of long-term improvement or deterioration in any of the indices; certainly they are not clearly associated with any improvement in health inequalities. Over the period, whole inequalities measured by the standardised CI fell from 0.06 to 0.04 for self-assessed health; rose from 0.055 to 0.066 for long-term illness; and fell from 0.062 to 0.055 for daily living activities scores. Of course, given the fluctuations, it cannot be said that these movements represent trends nor, given the

arbitrary start and finish dates (as dictated by our data) that the whole period assessment is authoritative. The figures are indicative of movements over this period, however.

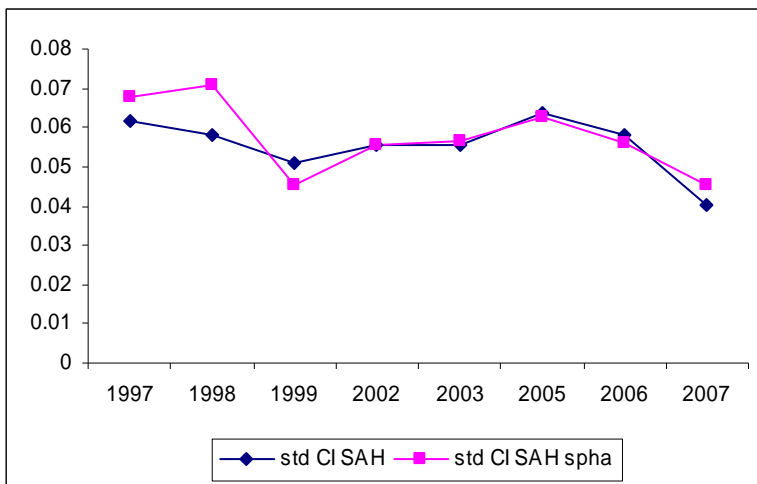
Figure 3. Standardised Concentration Indices (CIs) for all local areas



To further understand the influence of governmental spearhead initiative tackling health equity, we now turn to examine whether any change occurred in prioritised areas (spearhead areas) as opposed to non-priorities areas (that is, areas where there was no additional targeted expenditure). Only the standardised CIs are reported and it should be borne in mind that the spearhead areas form the smaller sample.

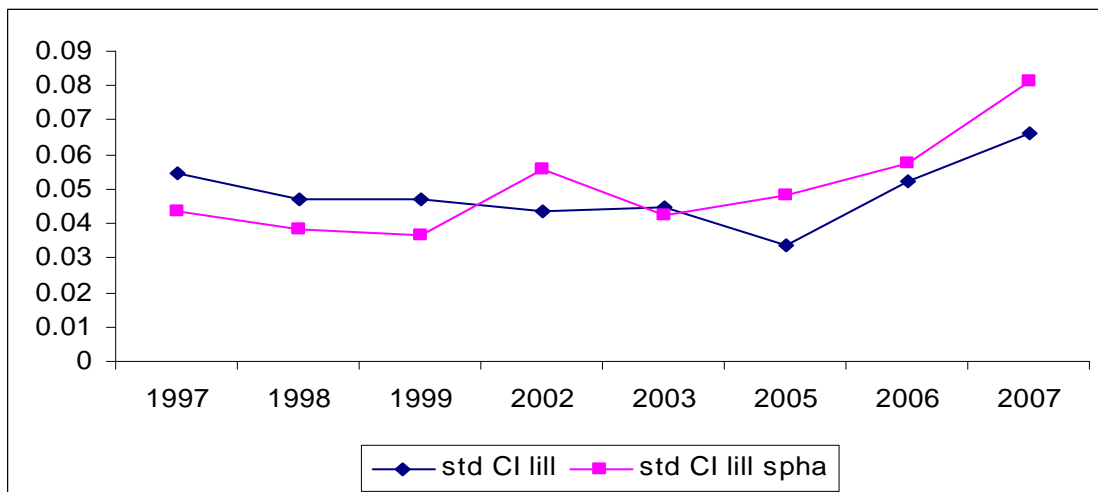
That said, over the period as a whole, health inequalities, as measured by the standardised CI, fell from 0.06 to 0.04 for self-assessed health in the non-spearhead areas and from 0.067 to 0.045 in the spearhead areas. As can be judged from Figure 4, this improvement in measured inequality followed the same pattern over time for both non-spearhead and spearhead areas, giving no indication of the effectiveness of the intervention policy.

Figure 4. Spearhead versus non-spearhead area CIs for self-assessed health



As measured by the standardised CI, health inequalities increased from 0.055 to 0.066 for long-standing illness in the non-spearhead areas and from 0.044 to 0.081 in the spearhead areas. Again, as can be judged from Figure 5, this deterioration in measured inequality associated with recorded long-standing illness followed essentially the same pattern over time for both non-spearhead and spearhead areas, again giving no indication of effectiveness of the intervention policy.

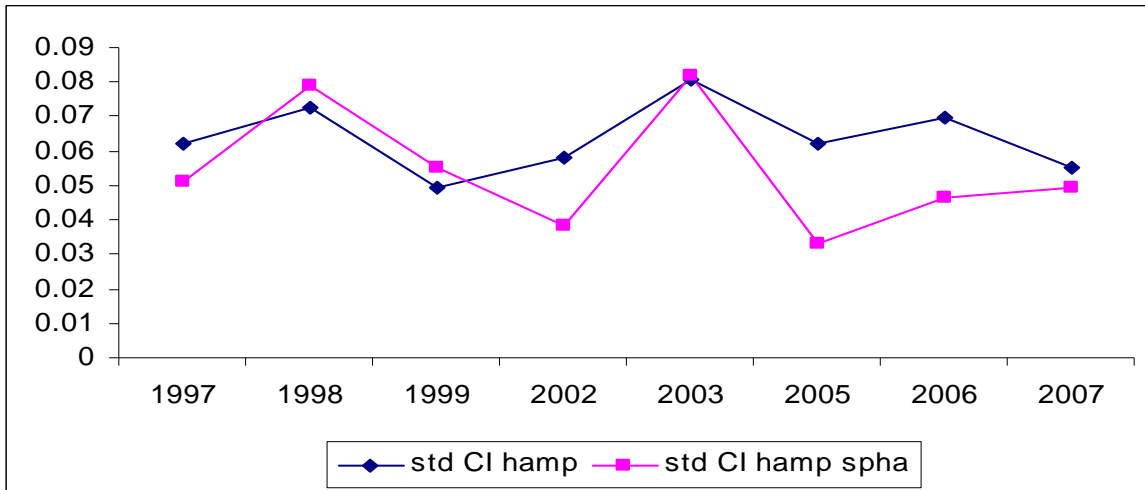
Figure 5. Spearhead versus non-spearhead area CIs for long-standing illness



As measured by the standardised CI, health inequalities decreased from 0.063 to 0.055 for health as measured by limitations in daily activity scores in the non-spearhead areas and from 0.051 to 0.049 in the spearhead areas. Again, as can be judged from Figure 6, this deterioration in measured inequality associated with recorded limitations in daily activity measures followed essentially the same pattern

over time for both non-spearhead and spearhead areas, with some fluctuation, again giving no indication of the effectiveness of the policy intervention.

Figure 6. Spearhead versus non-spearhead area CIs for limitations in daily activities



5. Decomposition Analysis

This section explores the question of the sources of health inequality using a decomposition analysis of different health determinants. Using the decomposition measures introduced by Wagstaff, van Doorslaer and Watanabe (2003) outlined in section 3 above, we estimate the impact that individual characteristics had on the CIs for the various measures of health. This decomposition allows us to factor out the influence of being a spearhead area on health inequalities.

Figure 7 reproduces, for a set of years where there were enough observations for all variables available, the sources of health inequalities in self-assessed health, based on equation (3) in section 3. This equation measures the impact of different influences on health inequalities through a regression analysis at the individual level of our calculated CI against individual factors that may explain the level of the CI. These coefficients included age, gender, race, income, marital status, educational attainment, whether employed, retired, whether living in a spearhead area or not and a number of regional fixed effects to control for unobserved heterogeneity. Our findings suggest that the contribution of age and gender accounts for (5-7%) of measured health inequality, while of the “avoidable” influences, income (5-6%) and education (20-27%) explain the largest percentage of health inequalities along with job status (5-10%). The residual explains about 50% of total health inequalities, which suggests that other

variables besides those included in our statistical analysis, might stand behind the evolution of health inequalities. Importantly, the variable measuring the specific impact of spearhead areas does not explain more than 1-3% of total health inequalities, although the coefficient on this variable is statistically insignificant.

Figure 7. Decomposition of inequalities in self-assessed health

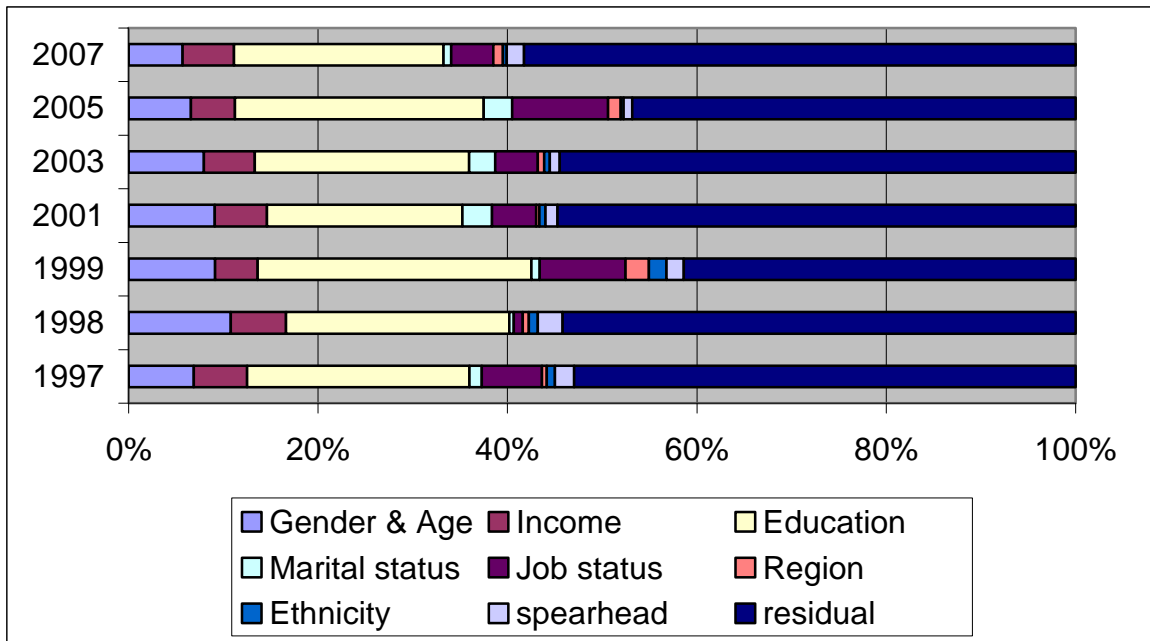
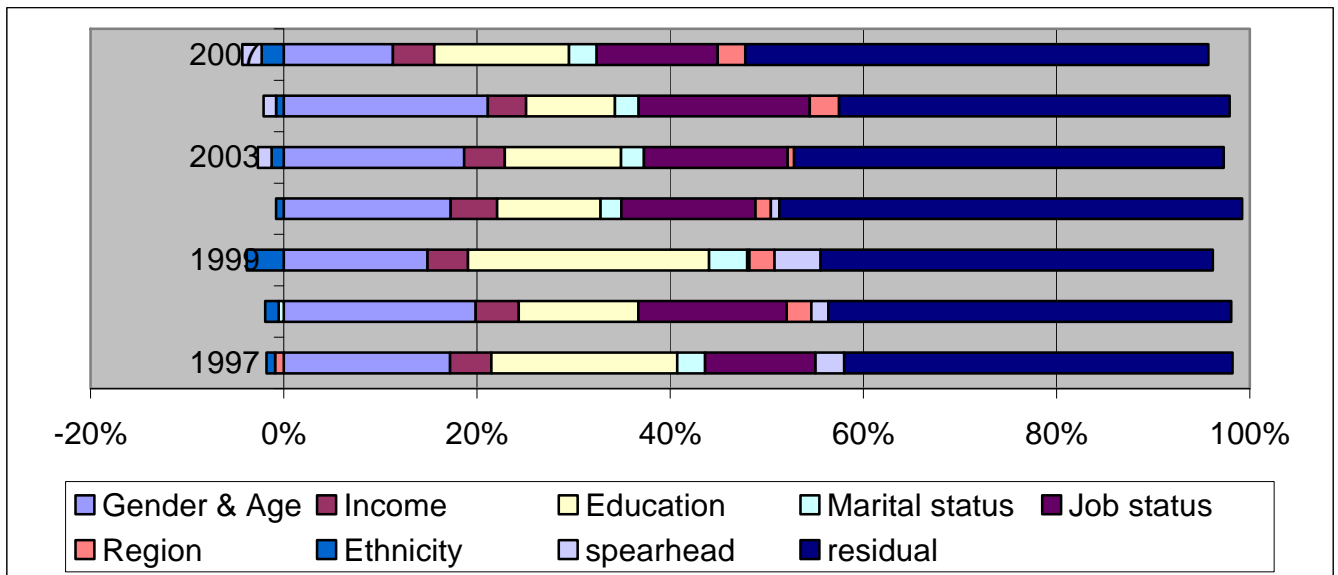


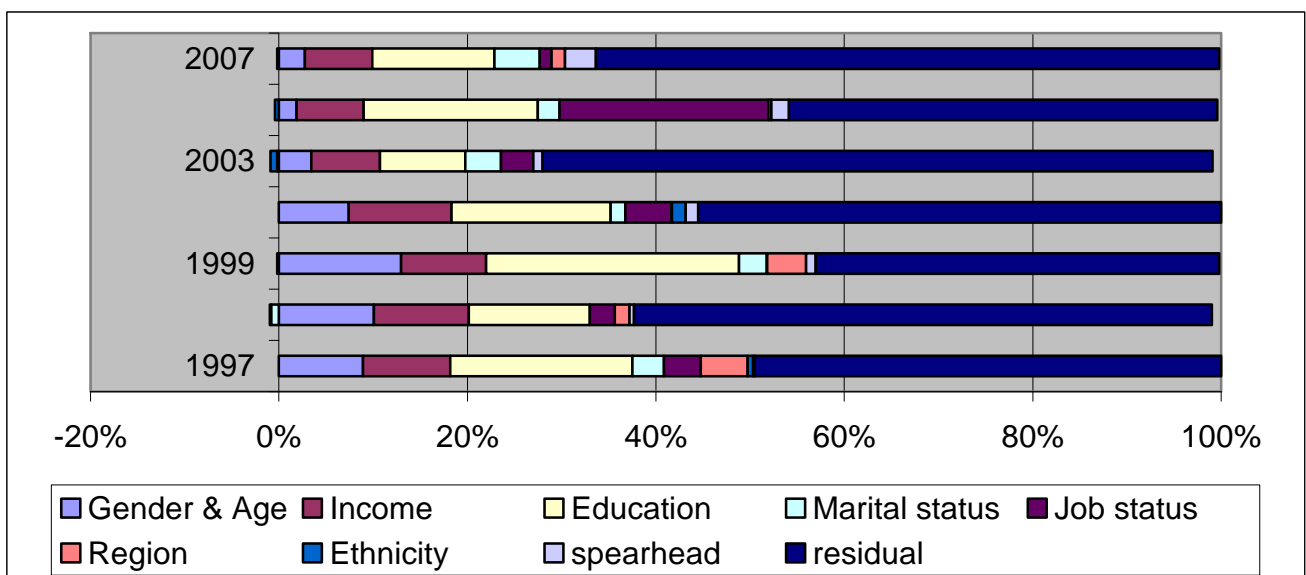
Figure 8 reports the same decomposition for long-standing illness, where health inequalities are less explained by education (20%) and income (5%) and more by socio-demographics. The effect of spearhead area of residence is again small at less than 5% of the total. The residual, namely unobserved factors, such as time preferences, aversion to risk or lifestyle choices, explain almost 40% of the total variability in health inequalities.

Figure 8. Decomposition of inequalities in long-standing illness



Finally, Figure 9 reports the same decomposition for limitation in daily activity as a measure of health outcomes. Again, results are explained mainly by education and income; demographics exert a lesser influence along with regional variables. Residence in a spearhead area does exhibit a limited contribution (2%) to health inequalities measures as a health limitation. Again, the residual explains approximately 50% of total variability in health inequalities measured as limitations in daily activities.

Figure 9. Decomposition of inequalities in limitations in daily activities



For the three years where Department of Health Programme Budget data were available, 2005, 2006 and 2007, we examined the contribution of total health expenditure and preventive health expenditure at the General Practice (GP) level. The expenditure data allowed computation of a measure of area health expenditure relative to national mean expenditure for both total GP service provision and GP provision relating to preventive services. These measures were used in the regression decompositions. The analysis revealed that there was little contribution to the CI explained by these relative expenditure measures. The greatest contribution made by GP expenditures with respect to health inequalities, as measured by the CI, was in 2007 with regards to health measured by indicators of long-standing illness and preventative expenditure impact on self-assessed measures of health. In both cases the influence of these expenditure measures was less than 2%. In all other cases there was a negligible impact of these expenditures on health inequality decomposition.

6. Conclusion

This study has sought to examine the patterns of inequalities in three measures of health outcomes from 1997 to 2007 using robust statistical techniques. In particular, we have considered the impact of a specific government intervention, the targeting of spearhead areas, in improving health inequalities. Whilst the results can only be taken as indicative as there were missing data problems, start and end dates were dictated by the data, the measures of health were restricted to those reported in the Health Survey for England, and (possibly most importantly) the length of follow-up time with respect to analysis of spearhead area intervention and GP expenditure levels was very curtailed, these results are the first to use individual reported data through time to measure health inequality in England, and to explore the impact that spearhead interventions had on health inequalities. In keeping with a large body of evidence, we found little or no improvement in health inequalities; although self-reported health measures did indicate some improvement. We also found that the spearhead interventions have not shown any conclusive change in impact on health inequalities, nor did differences in relative expenditure levels at the GP level exert much influence over the persistence of health inequalities.

Our results specifically suggest the following findings:

- There has been little movement in health inequalities over the recent past, despite the large number of government initiatives to reduce these. There is some indication that health as measured by self reported health may have experienced lessened inequality over time;

- Patterns of health inequality between spearhead and non-spearhead areas are not significantly different for any of our measured health variables;
- Decomposition analysis suggests that education is the main contributing variable to health inequalities and that residence in a spearhead area does not contribute as a significant influence on health inequality over time.

This last conclusion holds if residence within a spearhead area is augmented, for the years for which data were available, with relative (to the national mean) expenditure levels of GP expenditure on total GP provision of health services or on preventative health expenditure levels. Neither measure of relative GP expenditure level influenced health inequality over time.

These results are specific to particular time periods and particular governmental interventions. However, the data are based on individuals and measure health in a number of different ways. They do seem to concur with broader evidence that there is persistence in health inequalities. These inequalities suggest that individuals are not receiving equal treatment in the same way, or indeed that there is compensating treatment for individuals facing higher health inequalities. It also suggests that the opportunities open to some individuals are not available to others. The fact that the government has committed resources to lessening inequalities in health is to be commended. However, consideration of the specific policy intervention associated with increased targeting of health expenditure in spearhead areas was not found to have had any impact when comparison was made to non-spearhead areas. This confirms the suspicions of the House of Commons Health Committee (2009) that not only was there no evidence on this intervention but that there was little support for the suggestion that such policies are effective.

It is worthwhile reiterating, perhaps, the largest restriction of our study which is that the length of time over which the spearhead interventions and the GP expenditure influence on health inequalities can be judged is too short to evaluate the longer term effect of 2009 reforms. Similarly, it may be that both variables are playing a more significant role than this study's short period of follow-up allows us to judge.

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