Centre for
Health Service Economics
& Organisation

Are hospital services used differently in deprived areas? Evidence to identify commissioning challenges

Barry McCormick | Peter-Sam Hill | Emmi Poteliakhoff

Working Paper No. 2, March 2012

Are hospital services used differently in deprived areas? Evidence to identify commissioning challenges

Barry McCormick, Peter-Sam Hill and Emmi Poteliakhoff

Working Paper No. 2

Published by:
Centre for Health Service Economics & Organisation (CHSEO)
5th Floor Zone B, Skipton House, 80 London Road, London SE1 6LH
Nuffield College, New Road, Oxford OX1 1NF

Corresponding author(s):

Barry McCormick
Director, Centre for Health Service Economics & Organisation
barry.mccormick@chseo.org.uk

Peter-Sam Hill
Project Lead, Centre for Health Service Economics & Organisation
peter-sam.hill@chseo.org.uk

Emmi Poteliakhoff
Economic Adviser, Department of Health

Table of contents

1. Introduction

Health policy reform in the past decade has been strongly influenced by the view that commissioning should be flexible and reflect the distinctive needs of local populations. For example, the proposals to create a large number of Primary Care Trusts a decade ago and Clinical Commissioning Groups in 2011 were implemented despite criticism for creating too many organisations. The proposal that patients might choose their PCT was also opposed because of the importance attached to providing local populations with appropriate services, which in turn requires small contiguous populations. In reality, however, commissioning for out-of-hospital services continues to show only limited geographic variation.

At the same time, increasing efforts have been applied to redefining care for patients with specific medical or social characteristics that might lead to social exclusion (Social Exclusion Task Force, 2010). Whilst this focus is justifiable, it remains the case that healthcare is delivered to geographic areas so efficiency gains are available to commissioners who provide services that reflect this geographic grouping of patients with certain needs and characteristics.

If commissioners and practitioners are to respond to local patient need, they must understand both how their needs differ from others and why these differences have arisen. Understanding distinct needs enables the services to be appropriately selected (allocative efficiency) whilst understanding how these differences arise may inform changes to policy and practice that influence the pattern of demand for hospital care so that the local health system can adjust to a more efficient structure. This is of particular concern for deprived areas where need is greater and more complex, evidence exists that patients' requirements of the health system is different and additional resources have created opportunities to address historic differentials in mortality and morbidity rates.

Use of secondary care provides a useful lens through which to understand how primary care in deprived areas might better meet the needs of its patients because patterns of hospital use have implications for NHS providers upstream. Economies of scale can be exploited in areas that generate particularly large volumes of admissions for some conditions. If many patients are failing to follow preferred care pathways, early intervention and better case management could enable them to receive better care. Hospital data does not clearly identify the causes of differences in use so it cannot indicate the best solution, but it does reveal where the best opportunities lie.

1.1. Literature on deprivation and healthcare

Most of the literature in this area focuses on whether utilisation of NHS care is equal for all patients with equal need (See for example Dixon et al., 2007; van Doorslaer et al., 2006; Goddard and Smith, 2001; Propper et al., 2005; Morris et al., 2005; Chaturvedi and Ben-Shlomo, 1995; O'Donnell, 2000). Although results vary between studies, the consensus is that GP use is broadly equitable given need, whilst specialist treatment, particularly outpatient care is pro-rich.

The majority of studies of overall hospital utilisation do not distinguish between emergency and elective inpatient care either because their data does not allow it or they choose to focus on elective care alone. Reid et al. (1999), however, examined both elective and emergency admissions for all conditions in a sample of GP practices in London. Higher emergency admissions rates were associated with a larger proportion of patients being unskilled, from a one parent family or unemployed. The same factors had a much weaker relationship with elective admissions. Some condition-specific evidence, which effectively controls for the

varying nature of disease by deprivation, supports these findings (e.g. some cancers, Pollock and Vickers, 1998; Raine et al., 2010).

Variations in use of care have been explained by differences in need, quality of care and barriers to access. Need is influenced mostly by public health, but the NHS can have an effect through early detection, case management and quality of care and discharge. The literature mentioned above imperfectly removes the variation driven by differences in need.

Patient preferences are exogenous, but the NHS can accommodate them to generate better outcomes. It is unlikely that differences in preferences expressed, for example, in attendance at A&E relate to the emergency department per se; rather, they relate to aspects of the care provided therein. With varying degrees of difficulty, these aspects of care could be applied to general practice or other primary care providers.

Studies into differences in the quality of primary care using QOF scores have varying results, but suggest that quality might be slightly poorer in deprived areas (Hippisley-Cox et al., 2004; Wright et al., 2006; Ashworth et al., 2007; Ashworth et al. 2008, McLean et al 2006, Sigfrid et al., 2006; Sutton and McLean, 2006).

Dixon-Woods et al. (2006) reviewed the literature on access to healthcare and developed concepts to describe the barriers to access caused by both supply and demand side factors at different stages of the care process. The first is candidacy, which "describes the ways in which people's eligibility for medical attention and intervention is jointly negotiated between individuals and health services". The patient needs to view their need as suitable for healthcare in order for them to visit the GP initially, but candidacy then depends on the interactions between the patient and health professionals. The patient formulates and articulates the problem whilst the doctor should aid the patient to do so effectively and then judge whether they should "allow or inhibit continued progression of candidacy". To do this doctors assess the possible risks and reach a view as to whether the patient would benefit from each available treatment.

A second concept, permeability, relates to the ease of using services and is greater where fewer qualifications and fewer resources are required to access care, such as in the case of A&E departments. Practical resources include transport and the ability to be available at the appropriate time, which may require flexible work arrangements or childcare. Appointment systems may reduce permeability, particularly where the patient has limited choice of times. Patients' choice of care provider is also influenced by how comfortable they feel with the "organisational values of the service" so a lack of 'cultural alignment' can reduce permeability.

Even where appropriate candidacy is achieved in a permeable system, interventions may be prevented by patients resisting offers of referral or treatment.

Four broad areas restrict the use of health services by patients from deprived areas by hindering candidacy or diminishing permeability. The first is financial costs of transport or making time to attend an appointment. Rigid working patterns may particularly increase costs for patients from deprived areas and thresholds for the level of costs that is tolerable are likely to be lower. These costs particularly restrict "optional services related to health promotion and health prevention."

The second area is patients' knowledge, competencies and viewpoints. Patients in deprived areas may not be aware of some services, precluding their use. Poor literacy skills may hinder use of appointments systems, an inability to articulate the issue may make it harder for doctors to reach a correct diagnosis, and shortfalls in confidence or persistence can prevent patients from demanding better care. Patients' views on health and care providers

may change the way they respond to symptoms. “Lack of a positive conceptualisation of health, the normalisation of symptoms…, and fear of being “blamed” by health professionals” can reduce the importance of early symptoms.

Doctors’ views of which patients benefit sufficiently from interventions and perceptions of “social deservingness” may disadvantage patients from deprived areas. Doctors are less likely to offer interventions to patients with risk factors such as smoking, obesity and co-morbidities that can harm outcomes and are particularly prevalent in deprived areas. Much of this resistance is clinically justified, but it is possible that doctors are overly risk averse. Some GPs also appear to take into account whether the patient is economically active or has dependents, which would also disadvantage many in deprived areas.

Finally, the nature of the interaction between patients and doctors can also act as a barrier. Patients may be reluctant to visit a GP because they feel uncomfortable relating to someone in a different social position or because they feel “alienated from the cultural values” of service providers.

This study builds on the literature using Hospital Episode Statistics (HES) from 2008/09 to provide more details about the nature of NHS care received for every inpatient episode, outpatient appointment and A&E attendance. Unlike survey data, this dataset does not enable systematic adjustment for need. The literature using survey data is well established so the aim for this work is to expand the knowledge base and dialogue towards a more practicable understanding of differences in use by deprivation. It describes how people from deprived neighbourhoods use hospital care differently to the rest of the country. A more detailed understanding is established by identifying the conditions that present the best opportunities to reduce these differences, either through the exploitation of economies of scale, by intervening at an earlier stage or by improving the management of patients in the community.

2. Deprived areas

2.1. Definition

The following analysis uses a variant of the Index of Multiple Deprivation (IMD) as the measure of deprivation and Lower Layer Super Output Area (LSOA) as the geographical area at which deprivation is defined. LSOAs are very small geographical areas that have an average population of only 1,500 people. There are about 220 LSOAs in an average PCT. The IMD 2007 is calculated using data on seven domains (see Communities and Local Government, 2007 for details). This study uses a variant of the IMD, (the Non-Health IMD or NHIMD) which excludes the health domain to avoid circularity. Using the NHIMD instead of the IMD changes the decile of 17 per cent of LSOAs. However, it has a minimal impact on the most deprived LSOAs; 94 per cent of the LSOAs in decile 10 of the NHIMD are also in the same decile of the IMD.

Analysis of the most deprived geographical areas does not equate exactly to analysis of the most deprived people, so in considering the 10 per cent most deprived LSOAs we are looking at the people who live in the 10 per cent most deprived areas, but almost certainly not the 10 per cent most deprived individuals in the country. Deprived and socially excluded people sometimes live close to one another and sometimes live interspersed with less deprived people. For example, many homeless people choose to live in areas that are generally affluent. These people would not necessarily be picked up as deprived in our sample. This problem is, however, reduced as far as possible by using very small areas, thereby providing greater homogeneity within LSOAs.

2.2. Characteristics of deprived areas

25 per cent of the LSOAs in decile 10 of the NHIMD (the most deprived) are in the North West. London, Yorkshire and the Humber and the West Midlands contain a further 51 per cent of the most deprived areas (17.7, 16.9 and 16.3 per cent respectively). According to the Office for National Statistics' classifications, almost 99 per cent of the LSOAs in decile 10 are urban. The comparative figure for the whole of England is 81 per cent. This does not imply that there are few deprived people living in rural areas, only that they are living in more mixed communities. Urban areas and therefore deprived areas are more likely to be nearer to hospitals.

The population in decile 10 is younger: 11.3 percentage points more of the adult population are under 30 compared to decile 1 and 14.5 percentage points fewer are over 44. Although this paper is not concerned with paediatric care, it is interesting to note that there are more children in deprived areas because this affects the way communities interact with the healthcare system.

Figure 1

The more deprived deciles have larger Black, Asian and Mixed Ethnicity populations than the less deprived deciles. 22.0 per cent of the population in decile 10 are ethnic minorities (figure 1) compared to only 3.5 percent in decile 1.

Figure 2 shows how primary care provision differs with deprivation as defined by NHIMD at PCT level.

Figure 2

Although deprived areas have a similar number of GPs and nurses per head to the rest of the country, when the needs of their populations are accounted for they appear to be under-served by these professions. There are also more single-handed practices in these areas.

3. Use of secondary care in deprived areas: the aggregate view

Before analysing individual conditions, it is useful to understand the aggregate picture. This section presents the trends in emergency inpatient, elective inpatient, outpatient and A&E use by deprivation not adjusting for need or case-mix.

3.1. Inpatient care

Apart from section 4.3.1 on maternity, this analysis includes all episodes where the admission method is classified as 'elective' or 'emergency'. It excludes those where the admission method is 'babies' or 'other'. These form a very small proportion of all care for everyone other than women aged 16-44, who have significant numbers of 'other' episodes relating to maternity. Overall, there were 31 admissions and 38 episodes in the year per 100 population in decile 10 and 22 admissions and 25 episodes per 100 population in decile 1. 50 per cent of admissions and 58 per cent of episodes were unplanned in decile 10 compared with 34 per cent and 42 per cent in decile 1.

Case mix appears to account for a large proportion of this variation, but there is still a significant variation that is not explained by this. If the episodes in decile 1 had the same composition of primary diagnoses as those in decile 10, the difference in the proportion of episodes admitted as an emergency would be 71 per cent smaller.

Figure 3

Figure 3 gives an overview of the utilisation of NHS secondary care across areas with different levels of deprivation in England. Utilisation of all forms of care is higher in the most deprived areas with the exception of elective admissions, which is roughly similar across the deciles. A&E attendance has the steepest gradient, particularly at the bottom end of the distribution.

Finding 1	More deprived areas had more emergency inpatient admissions per head than less deprived areas. Decile 10 had more than twice as many as decile 1.

Finding 2	The number of elective admissions per head is broadly similar across all deprivation deciles. Decile 10 had only 8 per cent more than decile 1.

Giving these findings, overall there were more admissions per head in deprived areas.

Figure 4 shows how utilisation of NHS emergency care varies by deprivation decile, age and sex.

Figure 4

Finding 3	The positive relationship between deprivation and emergency episodes per head applies in a similar way to all age-sex groups. Hence, the steep gradient does not depend materially on age structure.

Although the gradient for elective episodes is much shallower, the differences between the age groups are similar.

3.2. Accident and Emergency (A&E) attendance

Figure 3 also shows that people in decile 10 attended A&E more than those from areas that are more affluent. The gradient for this is steeper than that of emergency admissions so there are more A&E attendances per emergency inpatient admission in more deprived areas.

Separate analysis of the HES data found that a smaller proportion of A&E attendances are admitted in decile 10 than in decile 1, though the difference was not large and the gradient was not uniform across the deciles.

Finding 4	There are more A&E attendances per emergency admission in more deprived areas.

Disposal type describes the way in which a patient left the A&E department and who if anyone was responsible for their care afterwards. This information reveals that a larger proportion A&E attendees from deprived areas were discharged for follow up by a GP (18.5 per cent compared with 17.6 per cent for the rest of the population). A slightly smaller proportion were admitted or referred to another healthcare professional or provider (29.7 per cent compared with 30.5 per cent for the rest of the population).

If we assume that doctors treat patients according only to need, there are three possible explanations for these findings. Firstly, there could be greater need in deprived areas and insufficient capacity to meet it leading to higher thresholds for admission. Secondly, people from deprived neighbourhoods may have attended A&E for conditions that were not serious, whereas those from less deprived areas stayed at home or sought care from other providers. Finally, people's reaction to any given condition may not vary with deprivation, but the prevalence of conditions that lead to an attendance but not admission was higher in more deprived areas.

Differences in outpatient referral thresholds cannot explain all of the difference because, as we show below, a relatively large proportion of outpatient appointments for this group were referred from emergency care.

Finding 5	Evidence showing the conversion of A&E attendances to emergency admissions, together with disposal type data suggest that there is more attendance in deprived areas for less serious health problems that could be treated in primary care.

3.3. Outpatient appointments

There were 34 per cent more initial outpatient appointments per head in decile 10 than in decile 1 (see figure 4). The outpatient data has been extracted from a relatively new HES dataset and so may be less robust than other HES data.

The HES data on the source of outpatient referrals shows that patients in deprived areas are accessing care differently. A larger proportion of appointments in decile 10 were referred by A&E or following an emergency admission than for rest of the population (7.1 per cent compared to 5.6 per cent) and a smaller proportion were referred by a GP (38.5 per cent compared with 41.7 per cent)[1]. In absolute terms, the volume of appointments referred by a GP is greatest in decile 10.

Finding 6	Deprivation is associated with a lower proportion of referrals to outpatient care from the GP and a higher proportion referred following an A&E admission or from an A&E department.

Failure to attend outpatient appointments wastes resources and risks damaging health so it may be beneficial to invest in innovations to reduce the number of appointments that are not attended[2].

HES data divides outpatient appointments into four attendance type categories:

- The hospital postponed or cancelled the appointment
- The patient cancelled the appointment
- The patient did not attend the appointment
- The patient attended the appointment

The percentage of appointments where the hospital cancelled or postponed was broadly similar across deprivation deciles.

A smaller proportion of appointments were cancelled by the patient in decile 10 than the rest of the population.

Figure 5

Of the appointments that were not cancelled, patients from deprived areas did not attend (DNA) a substantially higher proportion (figure 5). DNA rates are particularly high for young men: 1 in 5 appointments for men from deprived areas aged under 30 were not attended.

This confirms findings in the literature that deprived patients are more likely to miss outpatient appointments for cardiac rehabilitation (Melville et al., 1999) and cancer (Johnson et al. 2004).

This evidence suggests that interventions to reduce DNA rates could have the largest impact among young men and in deprived areas. Lee and McCormick (2003) found that telephone reminders may help although it is not clear whether this is the case for deprived areas particularly.

Finding 7	Deprivation is associated with lower rates of attendance and cancellation prior to the outpatient appointment date.
Finding 8	Young men in the most deprived areas fail to attend more than 1 in 5 outpatient appointments.

3.4. Summary of the aggregate picture

The evidence presented above highlights a number of systematic differences between the use of secondary care in deprived areas and that in more affluent areas. Compared with people more affluent areas, those in deprived areas:

- used more emergency care
- used a similar amount of elective care
- attended A&E more frequently
- appear to have attended A&E for less serious conditions
- accessed outpatient care more via emergency channels
- failed to attend a larger proportion of outpatient appointments

Reducing dependence on emergency care is usually seen as desirable because emergency care is more expensive and often generates poorer outcomes for patients. Not adjusting for case-mix, emergency spells cost 10 per cent more than elective spells[3] even though they contained fewer operative procedures. One aspect of the additional cost of emergency care is the lower bed occupancy rates necessitated by large fluctuations in demand (Bagust et al., 1999). Poorer outcomes from emergency admission include higher 28-day emergency readmission and post-operative mortality rates in some cases (Primatesta and Goldacre, 1996).

4. Conditions providing potential for improvement in deprived areas

The following sections look at the HES data in closer detail in order to reveal patterns of secondary care use in deprived areas that have the potential to be improved through the efforts of practitioners, researchers and policy makers. As with the previous section, the data presented highlights problems and problem areas, rather than specifying solutions.

There are four types of trends that are of interest for the purposes of this study:

1. Differences in hospital use, particularly emergency, for ambulatory care sensitive conditions (ACSCs defined as "conditions for which hospital admission could be prevented by interventions in primary care."; Purdy et al., 2009)
2. Differences in rates of elective procedures and treatments
3. Large differences in absolute volumes of emergency admissions
4. Large differences in the proportion of all inpatient stays that were admitted as an emergency

Each trend would contribute to the differing patterns of use shown in figure 3 and could potentially be diminished by policy and management interventions. The amount of hospital care required to treat ACSCs could be decreased by improving the quantity and quality of general practice in deprived as well as potentially by changing the model of delivery. The rates of elective procedures and treatments could be related to the quality of case management and early intervention. Large differences in volumes of emergency admissions indicate the potential for economies of scale to be exploited to improve care. Differences in admission method (emergency or elective) suggest that there may be scope to improve primary care in deprived areas to achieve a profile more similar to the rest of the country.

Purdy et al. (2009) provide a definition of ACSCs that has achieved broad acceptance. We examine all of the primary diagnosis codes (ICD10) on this list to identify trends in hospital use by deprivation.

The elective procedures that were likely to exhibit trends in hospital use are identified by the relevant literature.

Large differences in absolute volumes of emergency admissions are identified by at least 20 per cent of these admissions being generated by the most deprived decile of the country. Table 1 shows the 11 conditions in this category.

Table 1

Apart from sickle-cell anaemia, these conditions fall into three categories; mental health, alcohol and drugs and problems in pregnancy.

In order to identify the conditions exhibiting wide variations in admission method, we first identified the 50 diagnosis codes that cause the most emergency admissions in decile 10 so that scale is adequate to provide large enough potential benefits[4]. Within this set of conditions, those for which the difference in the percentage of admissions that were emergency between deciles 1 and 10 was 30 percentage points or more fell into eight groups. Mental health, alcohol and drugs and problems in pregnancy featured again. The other conditions were respiratory diseases (largely COPD and asthma), epilepsy and related

conditions, diabetes mellitus, influenza and pneumonia and infections of the skin and subcutaneous tissue.

This section identifies conditions exhibiting each type of trend in turn. The conditions exhibiting are subsumed within trends 'i' and 'iii'.

Few conditions exhibit the opposite trends to 'iii' and 'iv'. Of the 855 three-figure ICD10 codes that generate at least 100 episodes in a year, decile 10 generates less than 5 per cent of emergency admissions for only nine. The proportion of spells admitted as an emergency was at least 30 percentage points more in decile 1 than decile 10 for only four.

4.1. Ambulatory care sensitive conditions (ACSCs)

Ambulatory care sensitive conditions (ACSCs) are those "for which hospital admission could be prevented by interventions in primary care." (Purdy et al. 2009). Appropriate management or preventative care of these conditions should prevent admissions. High rates of admission for these conditions in a given area could therefore indicate poorer availability and/or efficacy of primary care. Alternatively, it could result from higher prevalence of ACSCs.

The ICD-10 codes that fall into this category are identified by the same article, which list two main sets diagnoses that could be considered ACSCs. The first was identified by Dr Foster and the NHS Institute for Innovation and Improvement and is therefore commonly used in the NHS. The second includes additional codes suggested by other researchers. In the interest of using the most widely accepted list, the analysis below is focused on the first list (which we have termed ACSC1), though the second list (ACSC2) was also investigated and discussed in less detail.

ACSC1 consists of 19 conditions that can be prevented in three ways (Gray, 2009); effective management of chronic conditions to avoid acute episodes, timely interventions to prevent acute conditions from escalating and immunisable conditions[5].

International evidence suggests higher rates of hospital admission for a range of ACSCs (Roos et al., 2005; Agabiti et al., 2009), whilst studies in the UK have found similar trends without the same breadth of conditions (Bottle et al., 2008)

Figure 6

Figure 6 shows the number of ACSC1 episodes per head across the deprivation deciles. There are 2.2 times as many emergency ACSC episodes and 1.9 times as many elective ACSC episodes in decile 10 as in decile 1. The equivalent figures for all conditions are 2.0 and 1.08 (see figure 3).

Figure 7

Figure 7 shows that a greater proportion of both emergency and elective episodes are due to ACSCs in decile 10 than in decile 1. Even within the context of higher hospital utilisation in general, admissions for ACSCs are high in decile 10 compared with decile 1.

The HES data is not sufficient to disaggregate the four main drivers of variations in admissions described in section 3; differences in need, patient preferences, quality of care and barriers to access.

Whatever the cause, interventions to reduce the number of these admissions may be most effective in more deprived areas. To the extent that higher morbidity drives these results, there are economies of scale that could be exploited. To the extent that differing patient preferences or barriers to access drive the results, new models or styles of service delivery could help. To the extent that these data are explained by poorer quality of primary care in deprived areas, encouraging broader implementation of best practice would improve the situation.

4.1.1. Individual ASCSs

Analysis at diagnosis level found that dental caries and cavities accounted for 64 per cent of the difference shown in figure 9 for **elective** episodes. Other dental conditions, acute tonsillitis, diabetes mellitus and iron deficiency anaemia make up a further 23 per cent. Angina, epilepsy, convulsions, female pelvic peritoneal adhesions and hepatitis B are the other most significant contributors. The fact that these are elective admissions means that a referral has taken place from either a GP or another health practitioner, but it is possible that effective management may have precluded the need for any admission.

The conditions with the greatest effect on variations in **emergency** ACSC1 episodes are asthma (which accounts for 28 per cent of the difference between decile 1 and 10), ear, nose and throat infections (19 per cent), epilepsy (17 per cent) and diabetes (11 per cent). Convulsions, dental conditions, gastroenteritis and colitis account for a further 17 per cent of the difference.

The following analysis shows the relationship between deprivation and admissions for some of the main ACSCs. Chronic conditions needing proper management (asthma and diabetes) are followed by conditions requiring timely interventions to prevent an acute episode (epilepsy and ENT infections).

Where possible, studies are cited that have sought to identify differences in prevalence by deprivation in order to give an indication of the degree to which this might explain observed trends.

Figure 8

Figure 8 shows that, dependent on age and sex, there are between 2.3 and 4.9 times as many emergency ACSC admissions per head for asthma in decile 10 as in decile 1. The difference is greatest for 30-64 year olds. Elective episodes are not shown, but they are few in number and show no evident trends.

Some studies carried out in the early 1990s suggest that the geographic variation in prevalence might be smaller than the variation in emergency episodes. Basagana et al. (2004) used data from a cross-sectional study among 20-44 year olds in 32 study centres in Europe, Australia, New Zealand and the United States. They found that, for this age group, the prevalence of asthma was 50 per cent higher among social classes IV and V than in classes I and II. For the 16-44 age group, there were 150 per cent more emergency ACSC episodes in the most deprived quintile than in the least deprived.

Although NHIMD quintiles do not equate exactly to these social classes, if only a 3rd of the difference in emergency ACSC episodes for asthma is explained by prevalence, better management of the condition in more deprived areas could reduce emergency admissions.

Figure 9

Figure 9 shows that there are between 1.7 and 5.0 times as many emergency ACSC admissions per head for diabetes in decile 10 as in decile 1. In contrast to asthma, there are also more elective appointments for most age-sex groups although these numbers are small.

There is evidence that diabetes is more prevalent in deprived areas. Studies contradict each other on the scale of this trend (HSE, 2004; Evans et al., 2000), but evidence controlling for need found that patients from poorer areas had an excessive number of hospitalisations for diabetes (Booth and Hux, 2003).

The data on ambulatory care sensitive epilepsy and ear, nose and throat (ENT) infections leads to similar conclusions. Heaney et al. (2002) found that people in the most deprived quintile (as defined by Carstairs) were 2.33 times as likely to have epilepsy as those in the least deprived quintile. The number of emergency episodes for the adult population as a whole varies in a similar manner, but men aged 30-64 in the most deprived decile had 5.6 times more emergency episodes than their equivalents in decile 1. This is unlikely to be fully explained by higher prevalence.

A study in Scotland by Hannaford et al. (2005) found that the proportion of people reporting "severe sore throat/tonsillitis" was 25 per cent higher among people form Carstairs 7 areas (the most deprived) than among those from Carstairs 1 areas (the least deprived). However our HES data shows that there were 124 per cent more emergency ACSC episodes for ENT infections in decile 10 than in decile 1 again suggesting that higher incidence is unlikely to be the only driver.

4.1.2. The expanded list of ACSCs

The ACSC2 list includes additional diagnosis codes for some of the conditions in the ACSC1 list as well as codes for some additional conditions.

Figure 10

Including ACSC2 diagnosis codes as well as ACSC1 serves to increase the scale of the trend already observed.

The main additional condition that is highlighted in the expanded list is chronic obstructive pulmonary disease (COPD).

Figure 11

Using only the first list of primary diagnoses, few COPD episodes are classed as ambulatory care sensitive and there are 2.4 times as many episodes in decile 10 as there are in decile 1.

Adding the codes in the second list increases the total number of episodes by a factor of 24 whilst the gradient by deprivation decile becomes twice as steep.

COPD mortality is strongly linked to deprivation so prevalence may be as well although the scale is not clear. In 2003 in England the mortality rate from COPD for social class V were roughly twice that of class IV and 12 times that of class I (Devereux, 2006). Much, but not all of the difference in mortality is caused by differences in smoking rates.

Whatever the cause, the HES evidence suggests that improved management of COPD would probably yield greatest benefits in terms of reduced admissions in the most deprived areas.

4.1.3. ACSC summary

Total and condition-specific admission rates by level of deprivation are given in this section for several conditions for which admission should be avoidable through appropriate primary care. The main conditions for which the rate is much higher in the most deprived areas compared to less deprived areas are highlighted. For example, there are over 4 times as many ACSC asthma admissions for men aged 30-64 and women aged 45-59, 5.6 times as many ACSC epilepsy episodes for men aged 30-44 and 5 times as many ACSC diabetes episodes for women aged 30-44.

We have discussed what might be driving these trends and shown that the literature on prevalence would suggest that this is unlikely to explain all of the difference. Whatever the cause, we may expect that innovations to improve the management of some chronic diseases (particularly asthma, diabetes and COPD) and to provide timely interventions for other conditions (particularly ENT infections and epilepsy) in primary care would have the greatest effect in reducing hospital admissions in the most deprived areas where there is greatest scope for improvement. Further research is needed to establish why people in deprived areas are having so many episodes for ACSCs and what can be done to reduce this.

Finding 9	Innovations to improve the management of some chronic ACSCs and to provide timely interventions for some other ACSCs in primary care are likely to have the greatest effect in reducing hospital admissions in the most deprived areas.

4.2. Admissions for elective procedures and cancer treatment

This section analyses data for four elective procedures for which the literature suggests there is unequal utilisation. If patients from deprived communities have too few procedures, the NHS has the opportunity to improve outcomes by addressing these inequalities. Increasing the volume of some procedures is likely to reduce costs elsewhere in the hospital sector, below, data on the number of episodes for relevant HRGs in each deprivation decile is compared with estimated differences in prevalence from the literature. This provides an indication of whether the probability of having one of these procedures varies depending on the area in which a patient lives. The causes of any such trends are not observable in HES so they may be medically justifiable.

4.2.1. Hip and knee replacements

The most common reason to require a hip or knee replacement is osteoarthritis, which appears to be more prevalent in more deprived areas. Consultations rates with GP for osteoarthritis (including hip and knee) are higher in more deprived wards (Chaturvedi and

Ben-Shlomo, 1995). There is a suggestion in the literature, however, that rates of primary hip replacement are higher amongst those in higher socioeconomic groups, but rates of knee replacement appear to be higher in the most deprived areas (Judge et al., 2009).

Rates of emergency admission for hip and knee replacement were at a similar low level across all deprivation levels and are therefore not presented. Private procedures are not included in this dataset. According to Williams et al. (2000) private procedures in the 1990s amounted to over 20 per cent of all hip replacement procedures. Current rates are unknown but hypothetical rates of 10 per cent of total additional procedures added to deciles 1 to 4 would smooth the dip seen in figure 12.

Figure 12

Analysis of HES data by area level deprivation without adjustment for need found there to be more hip replacements in less deprived areas for the population over pension age, but not in the younger age group.

Similarly, there were more knee replacements in deprived areas for those under pension age and for women over 60, but not for men over 65 (inverse u curve that peaks in decile 4).

4.2.2. Hernia repair

The literature suggests that rates of hernia surgery in England are higher amongst those in higher socioeconomic groups. This is especially true after adjusting for need; there is evidence of higher need amongst more deprived groups (Chaturvedi and Ben-Shlomo, 1995).

Figure 13

In more deprived areas, utilisation is lower for men over 65 but not for younger men or for women. Emergency admissions are low in volume and rates are higher in more deprived areas. Overall hernia admission rates for males of all ages are approximately even across the deprivation deciles, peaking in decile 5 (147 per 10,000). Overall hernia admission rates for females of all ages are greatest in the most deprived decile (33 per 10,000).

Together, the evidence of similar numbers of operations for all deprivation deciles presented above combined with Chaturvedi and Ben-Shlomo's (1995) finding that need is greater in more deprived areas suggests that deprived patients are not receiving the same treatment as less deprived patients.

4.2.3. Heart interventions

Evidence suggests that circulatory disease may be more prevalent in deprived areas. Marmot (2010, p53) shows that there are more than twice as many deaths from circulatory disease at age under 75 in the most deprived compared to the least deprived decile. There is also evidence suggesting that rates of investigation and revascularisation to treat heart disease do not match the higher levels of need amongst those in lower socioeconomic groups (Dixon et al., 2007).

Below, admissions for cardiac interventions are compared with those for cardiac events to assess whether care differs. High rates of admission for cardiac events relative to cardiac interventions suggest poorer management of these conditions, but do not necessarily imply poor primary care because other factors play a role such as patients following medical advice.

Figure 14

Utilisation of elective interventions for heart disease is lower in more deprived areas for men over 65 but not for younger men or for women (Figure 14). For men under 65 and for women there are more coronary interventions per person in more deprived areas, but the gradients are not very steep. Admissions for coronary bypass are not shown, but exhibit similar trends.

Figure 15

Figure 15 shows emergency and elective admissions for two types of cardiac event for males and females aged over 44 by deprivation decile. Admissions for chest pain, which could be considered in the same category, are not shown but exhibit similar trends. The majority of admissions are emergency. There is a gradient in admissions with the highest rates in decile 10 indicating a higher level of heart disease in more deprived areas. This is expected given higher rates of smoking in these areas.

If need were the only driver of the trends in cardiac interventions (figure 14) then we would expect similar trends for cardiac events (figure 15). However, we observe larger differences between deciles 1 and 10 for events than for interventions. For example, men aged 45-64 in decile 10 have more than double the rates of admission for AMI, over three times the rate for chest pain and about 4 times the rate for IHD compared to decile 1. However, the ratio of admissions for elective and emergency interventions are only about twice as high in decile 10 compared with decile 1. HES data therefore suggests underutilisation of cardiac interventions in deprived areas.

4.2.4. Elective procedures summary

There were some differences by age and sex in the patterns of admission for each of the elective procedures examined, but overall rates of admission for elective care seem to be low compared to need, especially in men aged over 65. In some cases, especially for this group, the rates of elective intervention are lower in absolute terms than in less deprived areas. For other age groups, rates of intervention were higher in deprived areas, but may not be sufficient to match the greater need.

Potential explanations for differences seen in rates of elective procedures relate to the drivers described in section 1.1. Poor quality primary care, if it exists would also produce this outcome although QOF evidence suggests that this does not vary significantly. The preferences of patients in deprived areas against primary and preventative care and towards harmful lifestyle factors could play a role. The former would preclude health care seeking whilst the latter would worsen outcomes and make surgery more risky. Differences in barriers to access could also help explain the trends. Patients in deprived areas may fail to define their candidacy adequately either because they accept their poor health state as normal and fail to start the process or their interaction with medical professionals is less effective. Related problems with permeability may contribute to the trends; people from deprived areas may struggle to navigate the system.

Finding 10	People in deprived areas have fewer elective procedures, either in absolute terms (males over 65) or relative to their estimated level of need (other groups over 45).
Finding 11	People in deprived areas have more emergency episodes for procedures more commonly carried out as an elective operation (heart and hernia).

4.2.5. Cancer

The National Cancer Intelligence Network (NCIN) reports cancer incidence at small area level (NCIN, 2009). This shows that incidence is highest in deprived areas for the majority of cancers, including liver, lung and cervical. However, there are some for which this trend is reversed, such as female breast cancer, prostate cancer and male brain cancer. Across all sites they report that the ratio between the most deprived and the least deprived quintile was 1.2 to 1.

Cancer mortality under the age of 75 was higher overall in more deprived neighbourhoods. The Marmot review reports ratios of about 1.6 to 1 for men and 1.4 to 1 for women, comparing most and least deprived quintiles (ONS data p53). This suggests that the degree to which there are more cancer deaths under the age of 75 in deprived areas is greater than the difference in the number of cancer diagnoses, although the incidence rates by level of deprivation apply to all ages so these figures are not directly comparable.

In a study of admissions for colorectal, breast and lung cancer, Raine et al. (2010) find that people in deprived areas are more likely to be admitted as emergencies for these conditions and that this has not improved over time. This follows Pollock and Vickers (1998) who find that people from deprived communities are more likely to receive their initial cancer diagnosis in an emergency setting. There is evidence that this shortens their survival as the cancer is likely to be more advanced at diagnosis and the effectiveness of treatment is reduced (Porta et al., 1998; Jack et al., 2006). Cancer diagnosis in an emergency setting can be seen as evidence of poor access to, or quality of primary care though it may also be associated with different health care seeking behaviour or confounding factors that accelerate the development of cancer.

Below, the HES data of hospital use for 10 chemotherapy HRGs and 18 other cancer HRGs is compared with data on prevalence from NCIN (2009) to indicate how cancer care differs with deprivation. The incidence data presented in table 2 is for 1994-2004.

Table 2

For five of the nine cancer sites (a-e) for which data is available, there were fewer chemotherapy episodes in deprived areas relative to more affluent areas than the relative incidence would suggest were necessary. Of the two sites in this group that have equivalent HRGs, for one (a) there appears to be underutilisation of elective care in deprived areas, whilst for the other (e) use of elective care is in line with incidence.

Chemotherapy and elective care use in deprived areas relative to affluent areas was broadly in line with the relative incidences for three of the remaining four cancer sites (g-i). For the final site, (j) there were more chemotherapy and elective episodes in deprived areas than the incidence data would suggest.

For all sites with available data, comparing the two columns on the right of table shows that deprived areas have more emergency episodes relative to elective in deprived areas than in affluent areas, although for two (g and h) the difference is small..

Finding 12	For a number of cancer areas, people from deprived communities have more emergency and fewer elective episodes for cancer than would be expected given differences in incidence rates.

Lower rates of chemotherapy and elective care compared to incidence and greater utilisation of emergency care is likely to be necessitated by a combination of later diagnosis, poorer management of conditions and harmful lifestyle factors.

Late diagnosis could be cause by patient preferences leading to the failure to seek care early or barriers to access such as poor candidacy and permeability. Management of the condition includes home care and pain management, which is known to reduce the likelihood of emergency admission (NHS Confederation and Macmillan, 2010). Harmful lifestyle factors, such as smoking, alcohol consumption and poor diet contribute to greater prevalence and increase the risk of complications.

Although all three factors may be mainly driven by the nature of patients in deprived areas, GPs could potentially improve outcomes through case finding, improved relationships and communication with patients and achieving greater influence among patients.

4.3. Conditions causing particularly large volumes of emergency admissions in deprived areas

Table 1 shows that a particularly large proportion of emergency admissions relating to maternity, alcohol and drugs and mental health are for patients from the most deprived decile. This section describes the extent of this trend for a broader definition of these conditions and in doing so highlights the potential economies of scale in these areas.

4.3.1. Problems relating to maternity

Birthweight is negatively associated with deprivation (Wilcox et al., 1995; Spencer et al. (1999). Deprivation is also associated with high rates of other poor pregnancy outcomes including perinatal and infant mortality, intrauterine growth restriction and preterm birth (Kramer et al., 2000; Gray et al., 2008). This is partly explained by the higher prevalence of risk factors (such as smoking) in deprived areas (Bonellie, 2001).

Figure 16

Figure 16 shows the number of births[6] and antenatal admissions not related to delivery event[7] (HRG N12) for women aged 16-44 by deprivation decile[8]. The number of births to older mothers is higher in less deprived areas and births to younger mothers are much higher in more deprived areas. There are more admissions not related to a delivery event per birth in deprived areas for both age groups.

Finding 13	Younger women in more deprived areas had more births than those in more affluent areas, whilst older women had fewer births then their more affluent comparators.

Finding 14	There are more antenatal admissions not related to a delivery event per birth in deprived areas for both older and younger women.

4.3.2. Alcohol and drugs

Higher rates of alcohol and drug abuse in more deprived areas are well documented. For example, the Marmot report shows how alcohol related admissions are more than twice as high in the most deprived compared to the least deprived quintile (p57) and there is a strong association between prevalence of problematic drug use and deprivation at Local Authority level (p60).

Figure 17

Emergency episodes for dependent or non-dependent use of alcohol or drugs show a gradient between the deciles is present for all age-sex groups with the numbers largest in decile 10. The slope is steepest for men aged 30 to 64 both with and without dependency.

These episodes accounted for 4.4 per cent and 3.0 per cent of emergency episodes for men aged 30-44 and 45-64 respectively in decile 10. The respective figures for decile 1 were 1.7 per cent and 0.8 per cent. Improvements in this area could therefore contribute notably to health in deprived neighbourhoods.

Finding 15	Men aged 30-64 in the most deprived areas are 10 times more likely to be admitted for alcohol or drugs dependent and non-dependent use than men in the least deprived areas.

4.3.3. Mental health

The Marmot review reports a steep social gradient in the rate of mental illness, with a two-fold variation between the highest and lowest quintiles for common mental health problems and a much steeper 9-fold variation for psychotic disorders (NCSR, 2009). The review argues that “while the particularly high rate of psychotic disorder in the lowest quintile may, to some extent, result from downward social drift, this is unlikely to account for the social gradient.” (Marmot, 2010 p. 54)

Figure 18

Our analysis of HES data at HRG level found similar variation to the McManus report for admissions across deprivation deciles for psychotic disorders. For the more common disorders such as depression, variation in emergency episodes (which represents the severe end of the spectrum) across deprivation deciles to be much greater than two fold. These findings are shown in the 4 graphs in Figure 18. Depression has been highlighted in the consultation on the outcomes framework as a leading cause of emergency bed days in adults. Our analysis indicates that in order to reduce emergency admissions for depression overall, targeting effort in the most deprived areas could be an efficient strategy.

Mania, anxiety, acute reactions or personality disorders were also examined using HRG level data on admissions. Comparison of rates of admission between deciles 10 and 1 (most and least deprived) for these illnesses produced the following results.

Mania

Age 16-44	Elective admissions are 3.8 times higher
	Emergency admissions are 5.5 times higher
Age 45 plus	Elective admissions are 4.1 times higher
	Emergency admissions are 3.9 times higher

Anxiety

Age 16-44	Elective admissions are 1.6 times higher
	Emergency admissions are 2.4 times higher
Age 45 plus	Elective admissions are 1.2 times higher
	Emergency admissions are 3.1 times higher

Acute Reactions or Personality Disorders

Age 16-44	Elective admissions are 1.5 times higher
	Emergency admissions are 4.5 times higher
Age 45 plus	Elective admissions are 1.7 times higher
	Emergency admissions are 3.6 times higher

It should be noted that many admissions associated with mental health problems are not be contained within these HRGs.

Finding 16	Admissions for mental disorders match research on higher prevalence of these conditions in deprived areas

Finding 17	For most mental health conditions, the deprivation gradient in emergency admissions is steeper than the gradient for elective admissions

5. Conclusion

The evidence presented in this paper outlines how patients from deprived areas use hospital care differently. The main trend displayed is greater use of emergency care, whilst elective care varies very little.

The mix of conditions presented in deprived areas explains part, but not of all of the extra emergency care. For example, there are more problems relating to mental health, use of drugs and alcohol and complications in pregnancy and childbirth. A larger proportion of admissions for these conditions are not planned in advance. Whilst public health initiatives attempt to reduce the burden of these conditions in deprived areas, the NHS may be able to improve use of hospitals through initiatives that capitalise on the higher prevalence to reduce demand. These initiatives are unlikely to prove cost effective in other areas.

Beyond these differences in the conditions patients suffer from, differences in the way they use hospital care are apparent. A tendency to access hospital care via emergency channels is implied by the finding that patients in deprived areas are more likely to present at A&E with symptoms more appropriate for a GP consultation (as revealed by disposal type). The outpatient data supports this finding because it reveals that a larger proportion of appointments are referred from A&E in deprived areas.

This tendency to access hospital care via emergency channels is also revealed in both the admission method for many conditions and in the apparent under-provision of some elective surgical interventions. A significantly larger proportion of hospital spells for cancer and some ACSCs (asthma, diabetes, COPD and ENT infections) are admitted as an emergency rather than electively. HES data supports findings in the literature that relative to patients from

affluent areas, those from deprived areas have fewer hip and knee replacements, hernia repair procedures and heart surgery than would be expected given their estimated need.

The different patterns of hospital use presented above represent important opportunities to improve outcomes in a cost effective, and in some instances cost-saving, manner. Further research should seek to identify the roles of differences in need, patient preferences, quality of primary care and barriers to access in driving the different patterns of hospital use. Informed policy decisions can then be made about how to improve care in the most deprived areas of the country.

1 These figures exclude tele-consultations and appointments where the referral source was not known.
2 E.g. through reminding patients or moving clinics closer to patients.
3 Date source: reference costs 2008/09
4 The least common of these 50 conditions caused 47.7 emergency admissions per 100,000 population in decile 10.
5 Management – angina, asthma, COPD, congestive heart failure, diabetes complications, hypertension, iron deficiency anaemia, nutritional deficiency; timely intervention – cellulitis, convulsions and epilepsy, dehydration and gastroenteritis, dental conditions, ear, nose and throat infections, gangrene, pelvic inflammatory disease, perforated/bleeding ulcer, pyelonephritis; immunisable – influenza and pneumonia, other immunisable.
6 The number of births is estimated from a composite of several HRGs: N06 - Normal Delivery w cc, N07 - Normal Delivery w/o cc, N08 - Assisted Delivery w cc, N09 - Assisted Delivery w/o cc, N10 - Caesarean Section w cc, N11 - Caesarean Section w/o cc
7 HRG N12, which covers over 400 diagnosis and procedure codes including “late vomiting of pregnancy”, “diagnostic amniocentesis” and “maternal care for high head at term”.
8 Only episodes with method of admission “other” are included because these represent all of the episodes and other episodes are more likely to contain errors.

References

Agabiti, N., Pirani, M., Schifano, P., Cesaroni, G., Davoli, M., Bisanti, L., Caranci, N., Costa, G., Forastiere, F., Marinacci, C., Russo, A., Spadea, R., Perucci, C.A., and Italian Study Group on Inequalities in Health Care (2009) Income level and chronic ambulatory care sensitive conditions in adults: a multicity population-based study in Italy, BMC Public Health, 9:457

Ashworth, M., Medina, J. and Morgan, M. (2008) Effect of social deprivation on blood pressure monitoring and control in England: a survey of data from the Quality and Outcomes Framework. BMJ, 337:a2030

Ashworth, M., Seed, P., Armstrong, D., Durbaba, S. and Jones, R. (2007) The relationship between social deprivation and the quality of primary care: a national survey using indicators from the UK Quality and Outcomes Framework. British Journal of General Practice, 57(539): 441-448.

Bagust, A., Place, M. and Posnett, J. (1999) Dynamics of bed use in accommodating emergency admissions: stochastic simulation model, BMJ, 319:155.

Basagana, X., Sunyer, J., Kogevinas, M., Zock, J.P., Duran-Tauleria, E., Jarvis, D., Burney, P. and Anto, J.M. (2004) Socioeconomic status and asthma prevalence in young adults. The European Community Respiratory Health Survey. American Journal of Epidemiology, 160(2): 178-188.

Bonellie (2001) Effect of maternal age, smoking and deprivation on birthweight, Paediatric and Perinatal Epidemiology, 15(1): 16-26

Booth, G. and Hux, J. (2003) Relationship between avoidable hospitalisations for diabetes mellitus and income level. Archives of Internal Medicine, 163: 101-106.

Bottle, A., Millett, C., Xie, Y., Saxena, S., Wachter, R.M. and Majeed, A.M.D. (2008) Quality of primary care and hospital admissions for diabetes mellitus in England, Journal of ambulatory care management, 31(3): 226-238

Chaturvedi, N. and Ben-Shlomo, Y. (1995) From the surgery to the surgeon: does deprivation influence consultation and operation rates? British Journal of General Practice, 45(392): 127-131.

Devereux, G. (2006) ABC of chronic obstructive pulmonary disease: Definition, epidemiology, and risk factors. BMJ, 332:1142

Dixon, A., Le Grand, J., Henderson, J., Murray, R. and Poteliakhoff, E. (2007) Is the British National Health Service equitable? The evidence on socioeconomic differences in utilization. Journal of Health Services Research & Policy, 12(2): 104-109.

Evans, J.M.M., Newton, R.W., Ruta, D.A., MacDonald, T.M. and Morris, A.D. (2000) Socio-economic status, obesity and prevalence of Type 1 and Type 2 diabetes mellitus. Diabetic Medicine, 17(6): 478-480.

Goddard, M. (2009) Access to health care services – an English policy perspective. Health Economics, Policy and Law, 4: 195-208.

Goddard, M. and Smith, P. (2001) Equity of access to health care services: Theory and evidence from the UK. Social Science and Medicine, 53(9): 1149-1162.

Gray, A. (2009) Ambulatory care sensitive conditions: a note for commissioners. Produced for a workshop on 22/09/2009. Public Health Intelligence North East. Available at: http://www.phine.org.uk/uploads/event/vid_3980_ACSCNote.pdf

Gray, R., Bonellie, S.R., Chalmers, J., Greer, I., Jarvis, S. and Williams, C. (2008) Social inequalities in preterm birth in Scotland 1980-2003: findings from an area-based measure of deprivation, BJOG: An international journal of obstetrics & gynaecology, 15(1): 82-90

Gulliford, M.C. (2002) Availability of primary care doctors and population health in England: is there an association? Journal of Public Health Medicine, 24(4): 252-254

Hannaford, P.C., Simpson, J.A., Bisset, A.F., Davis, A., McKerrow, W. and Mills, R. (2005) The prevalence of ear, nose and throat problems in the community: results from a national cross-sectional postal survey in Scotland. Family Practice, 22(3): 227-233.

Heaney, D.C., MacDonald, B.K., Everitt, A., Stevenson, S., Leonardi, G.S., Wilkinson, P. and Sander, J.W. (2002) Socioeconomic variation in incidence of epilepsy: prospective community based study in south east England. BMJ, 323:1013.

Hippisley-Cox, J., O'Hanlon, S. and Coupland, C. (2004) Association of deprivation, ethnicity, and sex with quality indicators for diabetes: population based survey of 53,000 patients in primary care, BMJ, 329: 1267-1270.

Jack, R.H., Gulliford, M.C., Ferguson, J. and Moller, H. (2006) Explaining inequalities in access to treatment in lung cancer, Journal of Evaluation in Clinical Practice, 12(5): 573-582

Johnson, R., Horne, B., Feltbower, R.G., Butler, G.E. and Glaser, A.W. (2004) Hospital attendance patterns in long term survivors of cancer. Archives of Disease in Childhood, 89(4): 374-377.

Judge, A., Welton, N.J., Sandhu, J., Ben-Shlomo, Y. (2009) Geographical variation in the provision of elective primary hip and knee replacement: the role of socio-demographic, hospital and distance variables. Journal of Public Health, 32(1): 413-422.

Kramer, M.S., Séguin, L.,Lydon, J. and Goulet, L. (2000) Socio-economic disparities in pregnancy outcome: why do the poor fare so poorly? Paediatric and perinatal epidemiology, 14: 194-210

Lee, C. and McCormick, P. (2003) Telephone reminders to reduce non-attendance rate for endoscopy, Journal of the Royal Society of Medicine, 96(11): 547-548.

Marmot, M. (2010) The Marmot Review: Fair society, healthy lives. UCL, London.

McLean, G., Sutton, M. and Guthrie, B. (2006) Deprivation and quality of primary care services: evidence for persistence of the inverse care law from the UK Quality and Outcomes Framework. Journal of Epidemiol Community Health, 60: 917-922.

Melville, M., Packham, C., Brown, N., Weston, C. and Gray, D. (1999) Cardiac rehabilitation: socially deprived patients are less likely to attend, but patients ineligible for thrombolysis are less likely to be invited. Heart, 82: 373-377.

Morris, S., Sutton, M. and Gravelle, H. (2005) Inequity and inequality in the use of health care in England: an empirical investigation. Social Science and Medicine, 60(6): 1251-1266.

National Cancer Intelligence Network (2009) Cancer incidence by deprivation, 1195-2004. Available at: http://www.ncin.org.uk/search/Cancer+Incidence+by+Deprivation+England.aspx

National Centre for Social Research (NCSR), ed. McManus, S., Meltzer, H., Brugha, T., Bebbington, P. and Jenkins, R. (2009). Adult psychiatric morbidity in England, 2007. Results of a household survey. National Centre for Social Research, London.

NHS Confederation and Macmillan (2010) Coordinated cancer care: better for patients, more efficient. Briefing 203. Available at: http://www.macmillan.org.uk/Documents/AboutUs/Health_professionals/CancerCareBri

Noble, M., McLennan, D., Wilkinson, K., Whitworth, A., Barnes, H., Dibben, C. (2008) The English Indices of Deprivation 2007, Department for Communities and Local Government, London

O'Donnell, C.A. (2000) Variation in GP referral rates: what can we learn form the literature? Family Practice, 17(6): 462-471

Pollock, A.M. and Vickers, N. (1998) Deprivation and emergency admissions for cancers of colorectum, lung and breast in south east England: ecological study. BMJ, 317: 245-252.

Porta, M., Fernandez, E., Belloc, J., Malats, N. and Alonso, J. (1998) Emergency admission for cancer: a matter of survival? British Journal of Cancer, 77(3): 477-484.

Primatesta, P. and Goldacre, M.J. (1996) Inguinal hernia repair: Incidence of elective and emergency surgery, readmission and mortality, International Journal of Epidemiology, 25(4): 835-839

Propper, C., Eachus, J., Chan, P., Pearson, N. and Davey Smith, G. (2005) Access to health care resources in the UK: the case of care for arthritis. Health Economics, 14(4): 391-406.

Purdy, S., Griffin, T., Salisbury, C. and Sharp, D. (2009) Ambulatory care sensitive conditions: terminology and disease coding need to be more specific to aid policy makers and clinicians. Public Health, 123(2): 169-173.

Raine, R., Wong, W., Scholes, S., Ashton, C., Obichere, A. and Ambler, G. (2010) Social variations in access to hospital care for patients with colorectal, breast and lung cancer between 1999 and 2006: retrospective analysis of hospital episode statistics. BMJ, 340:b5479

Reid, F.D.A., Cook, D.G. and Majeed, A. (1999) Explaining variation in hospital admission rates between general practices: cross sectional study. BMJ, 319: 98-103.

Roos, L.L., Walld, R., Uhanova, J. And Bond, R. (2005) Physician visits, hospitalizations and socioeconomic status: Ambulatory care sensitive conditions in a Canadian setting, Health services research, 40(4): 1167-1185

Sigfrid, L.A., Turner, C., Crook, D. and Ray, S. (2006) Using the UK primary care Quality and Outcomes Framework to audit health care equity: preliminary data on diabetes management. Journal of Public Health, 28(3): 221-225.

Social Exclusion Task Force (2010) Inclusion Health: Improving the way we meet the primary health care needs of the socially excluded, Cabinet Office and Department of Health, London.

Spencer, N., Bambang, S., Logan, S. and Gill, L. (1999) Socioeconomic status and birth weight: comparison of an area-based measure with the registrar general's social class, Journal of Epidemiology & community health, 53: 495-498

Sutton, M. and McLean, G. (2006) Determinants of primary medical care quality measured under the new UK contract: cross sectional study. BMJ, 332: 389-390.

Van Doorslaer, E., Masseria, C. and Koolman, X. (2006) Inequalities in access to medical care by income in developed countries, Canadian Medical Association Journal, 174(2): 177-183

Wilcox, M.A., Smith, S.J., Johnson, I.R., Maynard, P.V. and Chilvers, C.E.D. (1995) The effect of social deprivation on birthweight, excluding physiological and pathological effects, BJOG: An international journal of obstetrics and gynaecology, 102(11): 918-924

Williams, B., Whatmough, P., McGill, J. and Rushton, L. (2000) Private funding of elective hospital treatment in England and Wales, 1997-8: national survey, BMJ, 320(7239): 904-905.

Wright, J., Martin, D., Cockings, S., and Polack, C. (2006) Overall Quality of Outcomes Framework scores lower in practices in deprived areas. British Journal of General Practice, 56(525): 277-279.

Figures and Tables

Figure 1: Ethnicity by deprivation decile

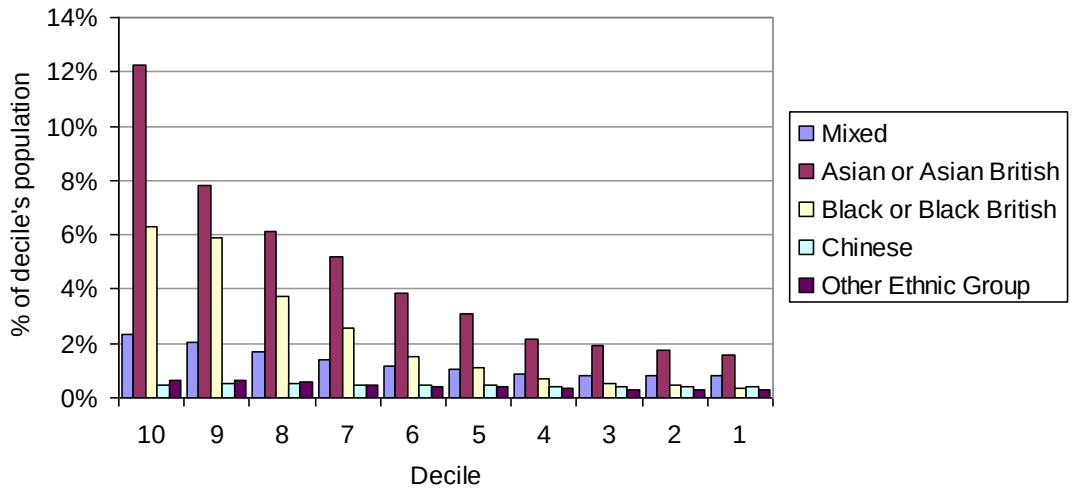
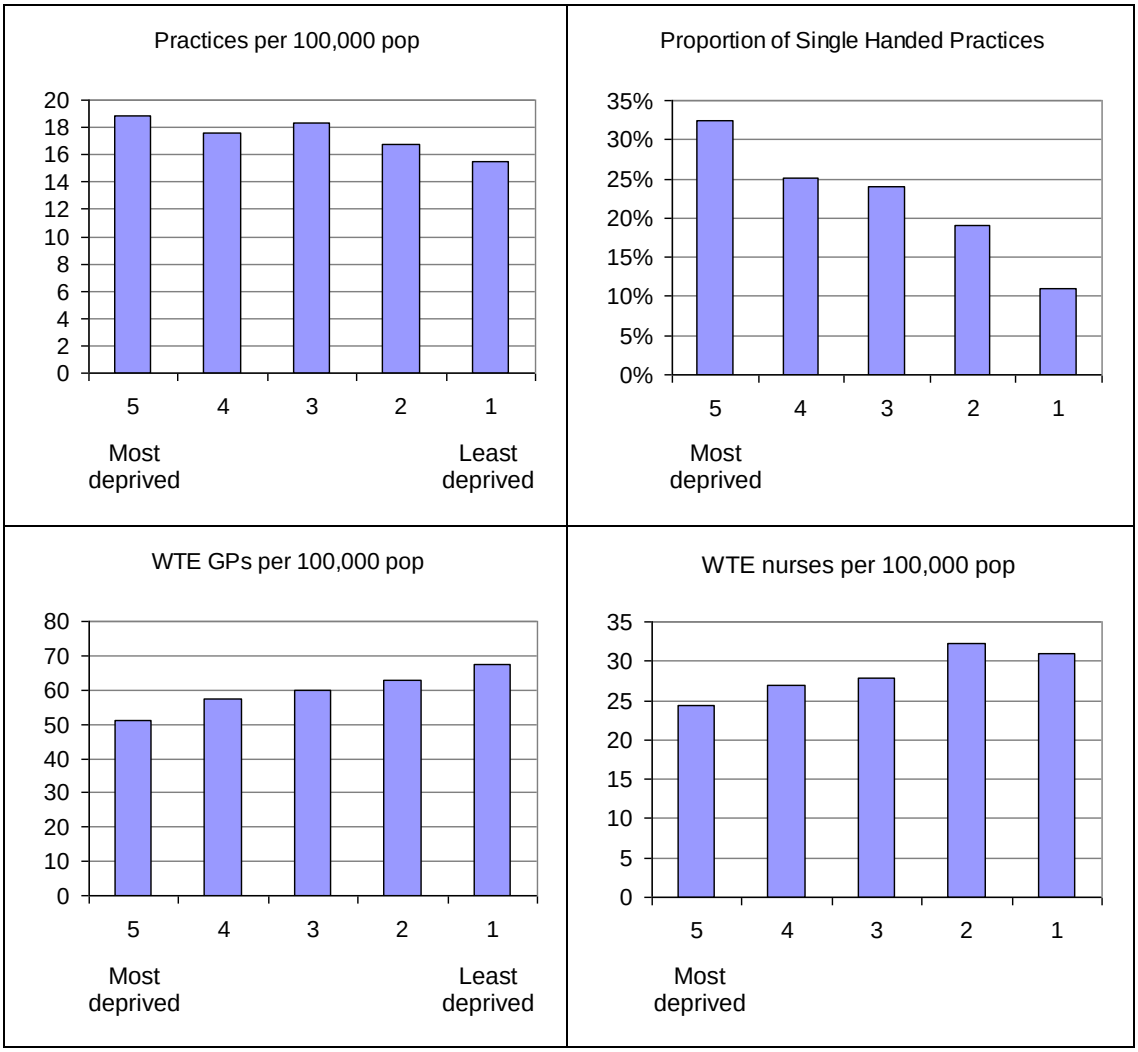


Figure 2: Primary care provision by deprivation



Source: DH

Figure 3: Emergency and Elective inpatient episodes, A&E attendances and outpatient appointments per head of population by deprivation decile, patients of all ages

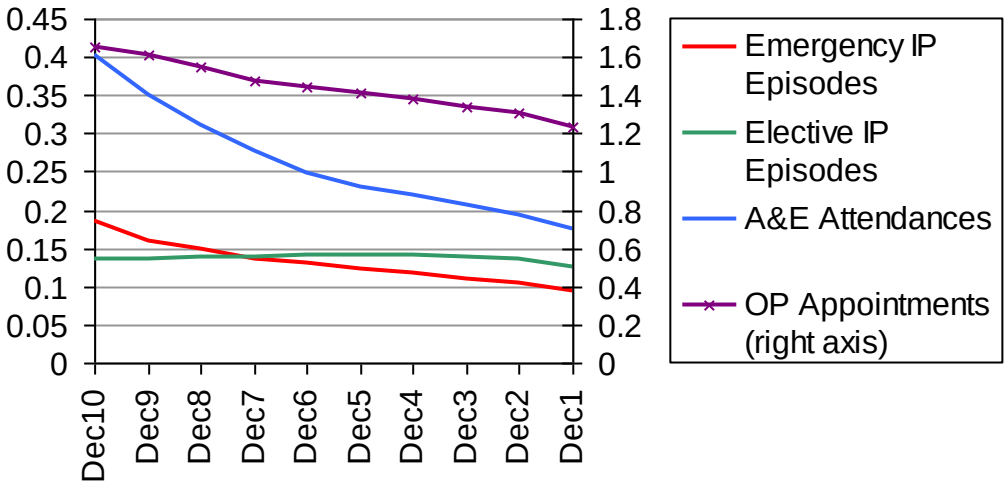


Figure 4: Emergency episodes per head by age and sex

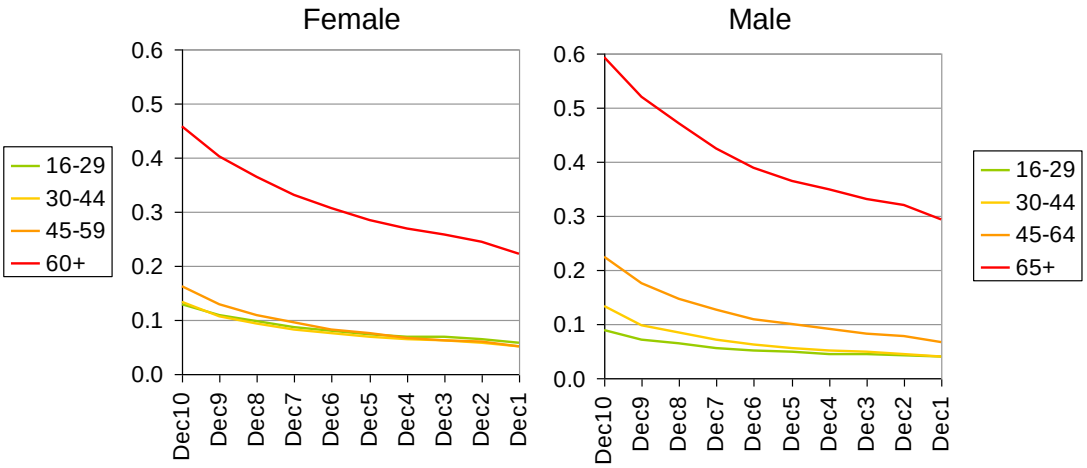


Figure 5: Percentage of appointments not postponed or cancelled where the patient did not attend (DNA)

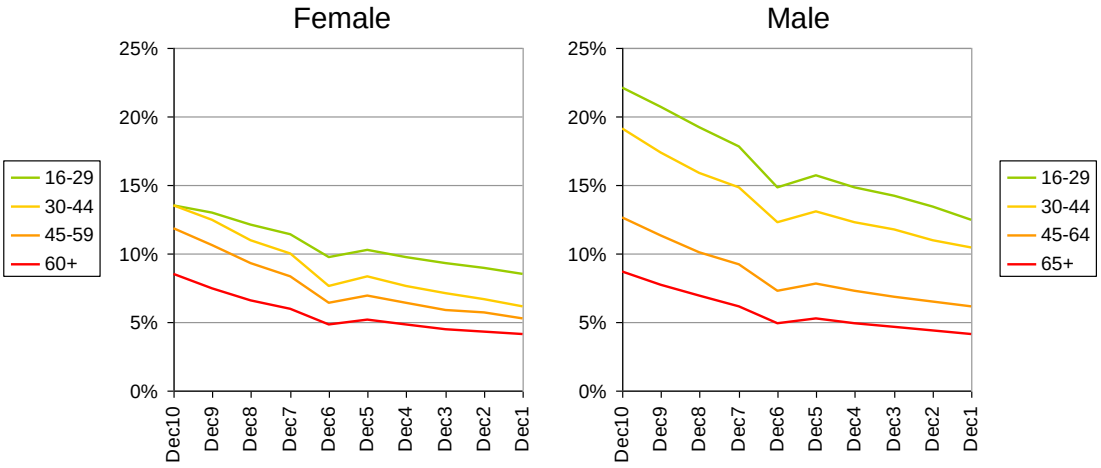


Figure 6: ACSC episodes per 1,000 population

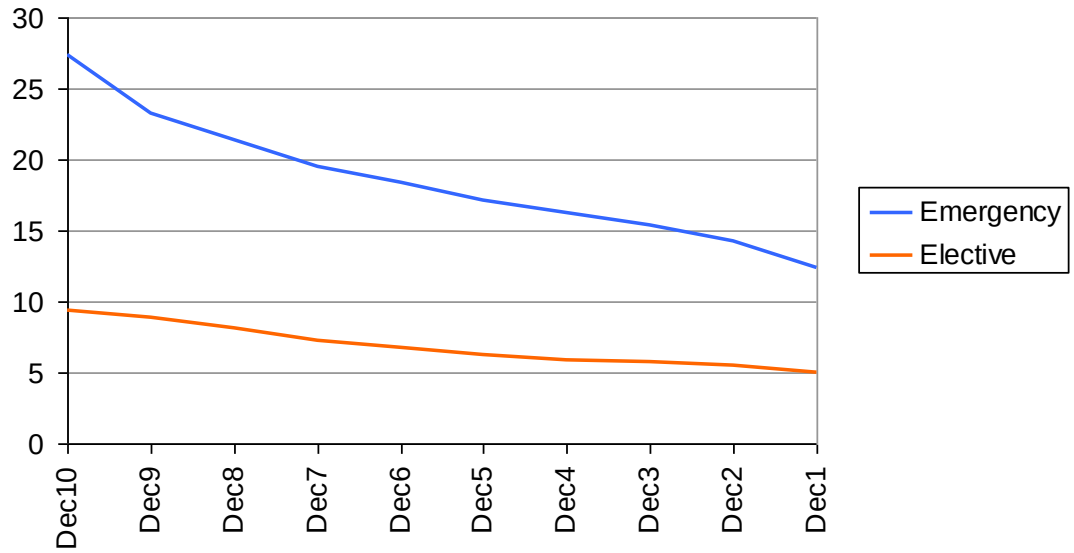


Figure 7: ACSC episodes as percentage of total episodes

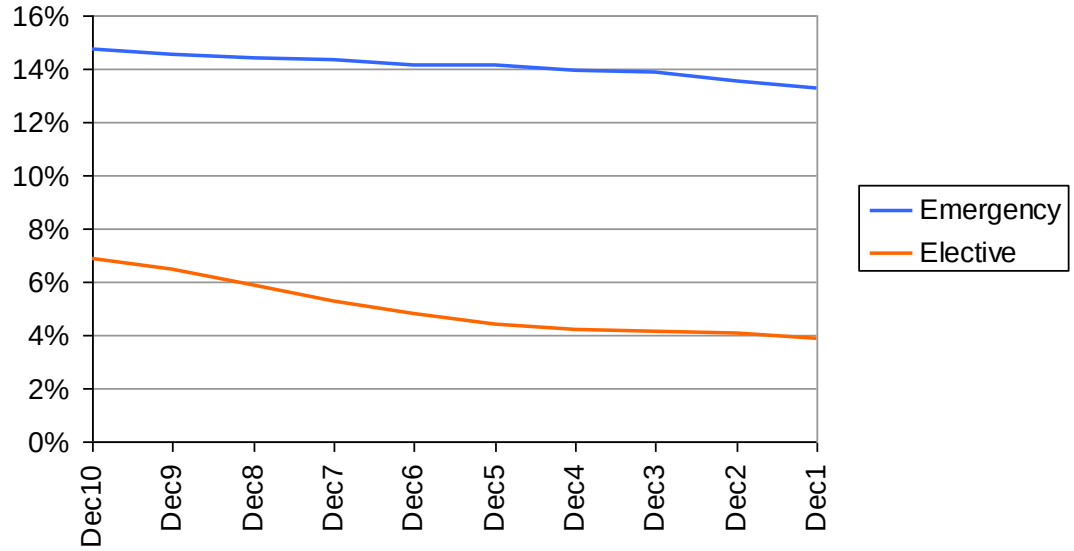


Figure 8: Elective and emergency ACSC admissions per 100,000 population for asthma

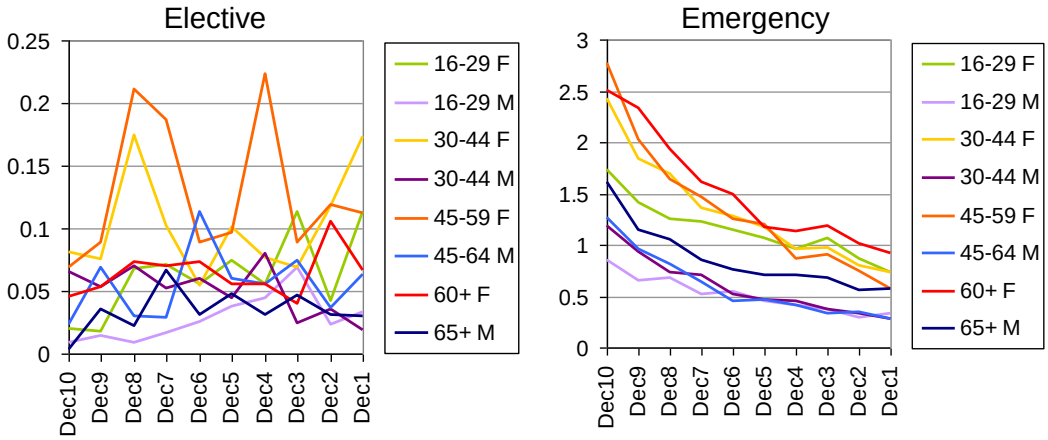


Figure 9: Elective and emergency ACSC admissions per 100,000 population for diabetes

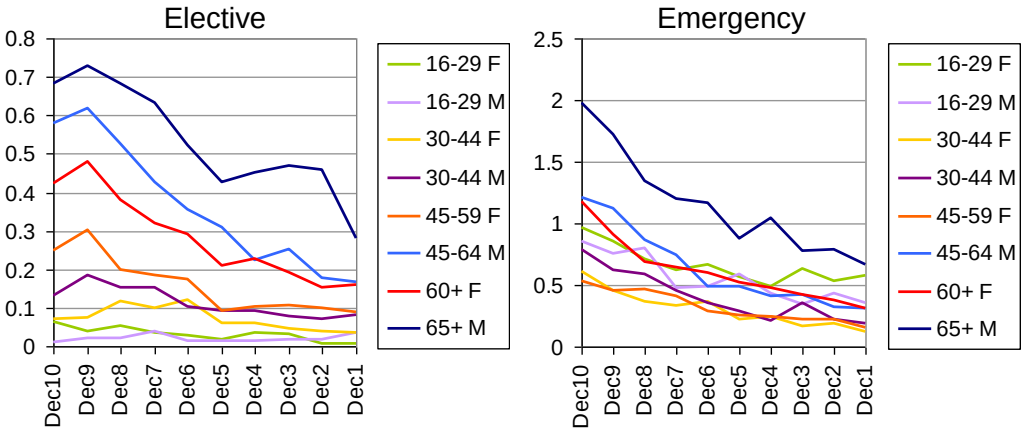


Figure 10: Emergency episodes per 1,000 population for ACSCs under the two definitions

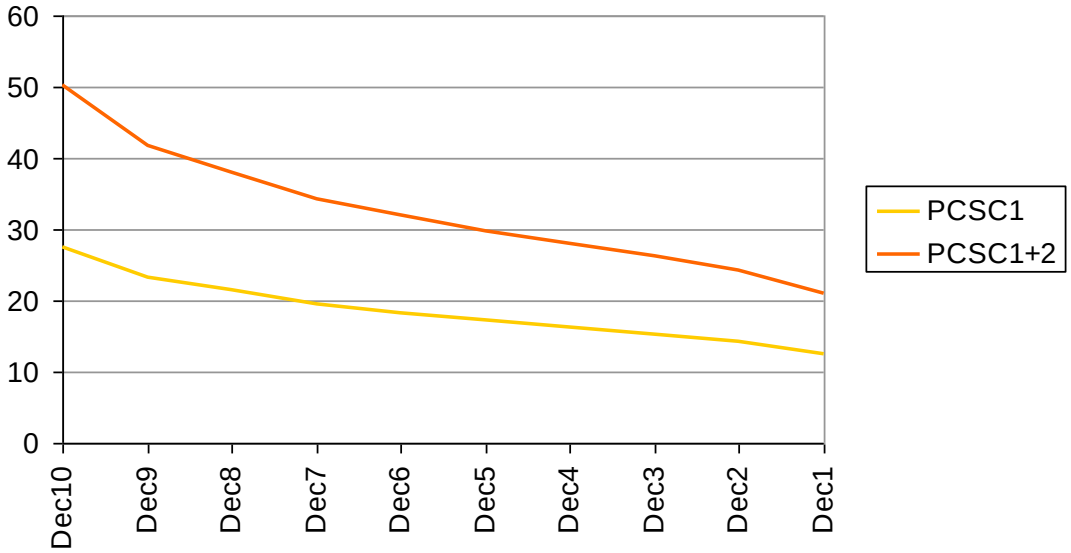


Figure 11: Emergency episodes per 100,000 for ambulatory care sensitive COPD under the two definitions

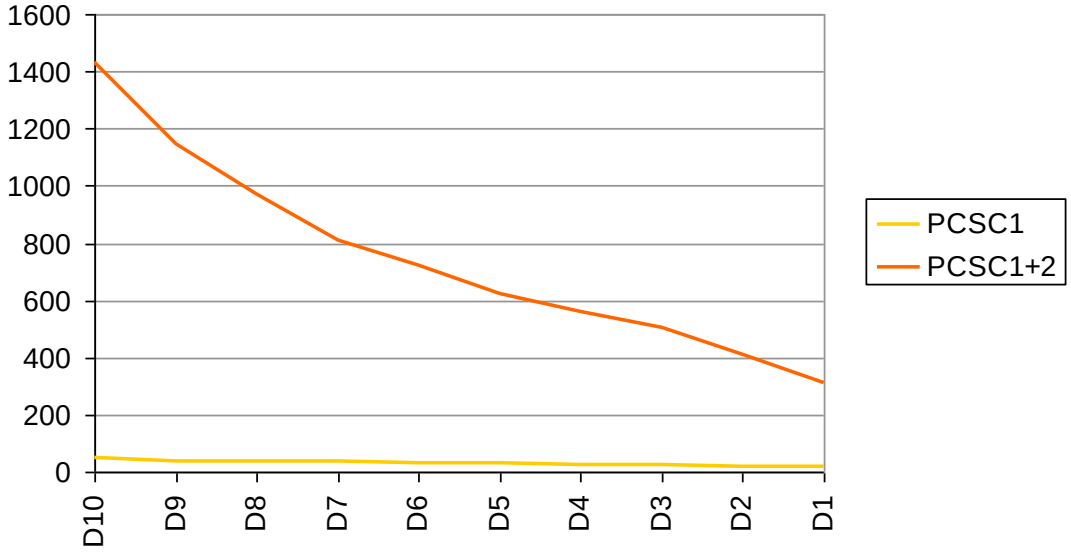


Figure 12: Elective admissions per 10,000 population for hip replacement by deprivation decile

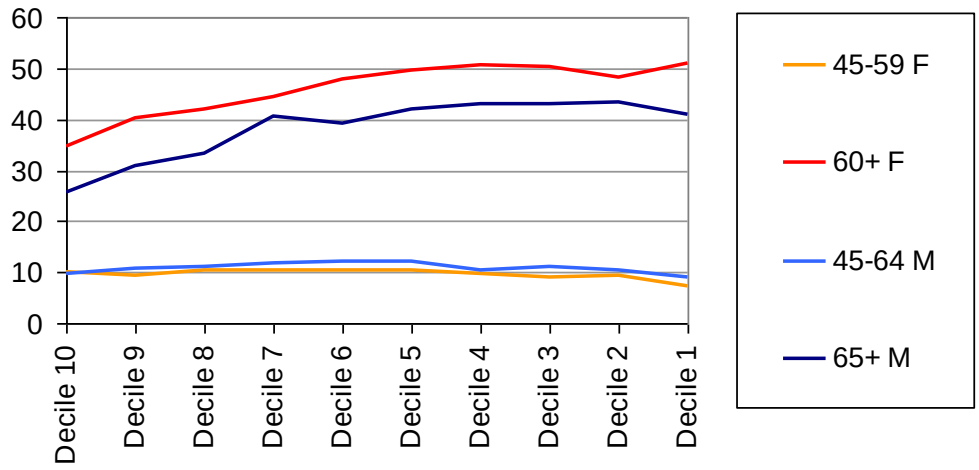


Figure 13: Elective and emergency admissions per 10,000 population for hernia by deprivation decile

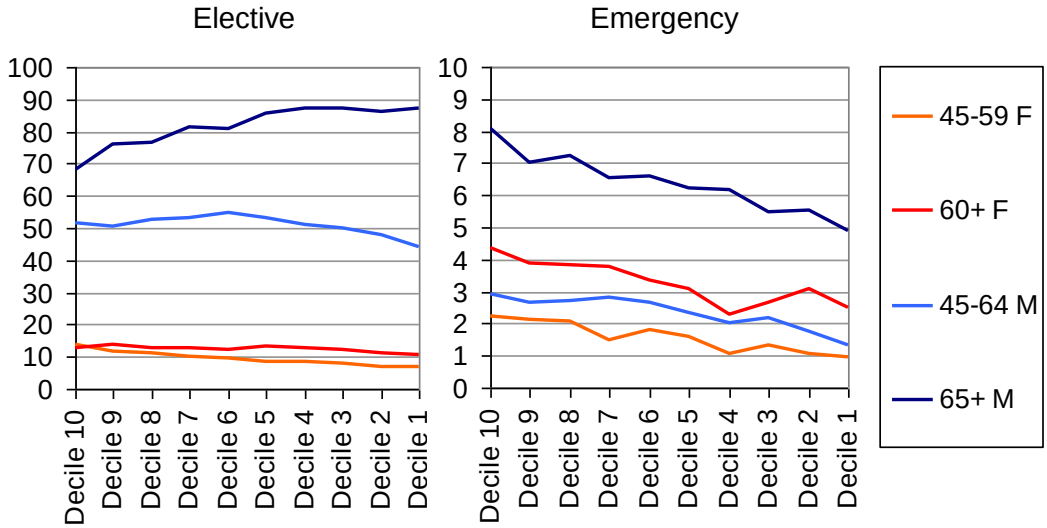


Figure 14 Emergency and elective admissions for cardiac catheterisation and percutaneous coronary intervention (PCI) by deprivation

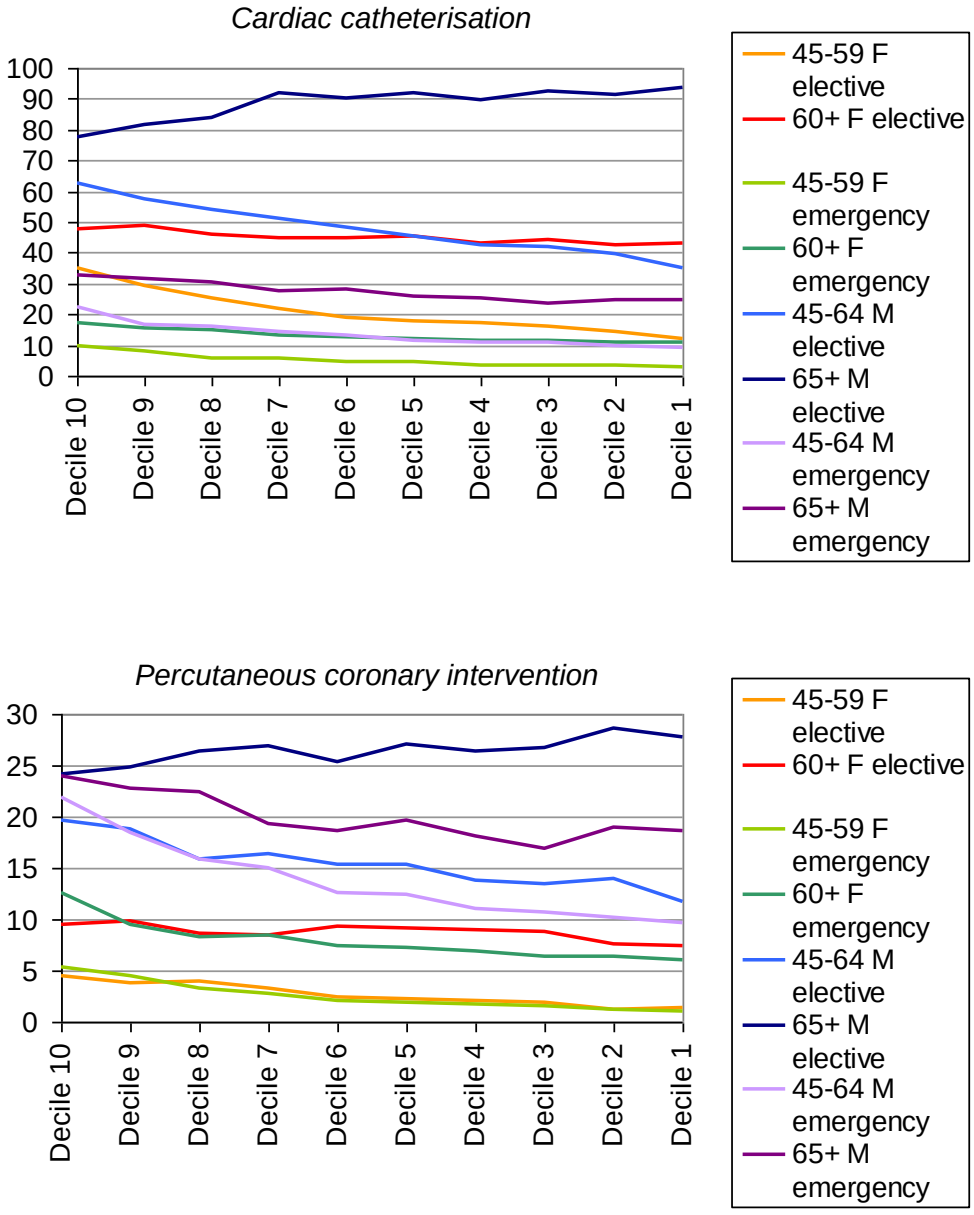


Figure 15: Emergency and elective admissions for Ischaemic Heart Disease (IHD) and Acute Myocardial Infarction (AMI) by deprivation decile, males and females over 45

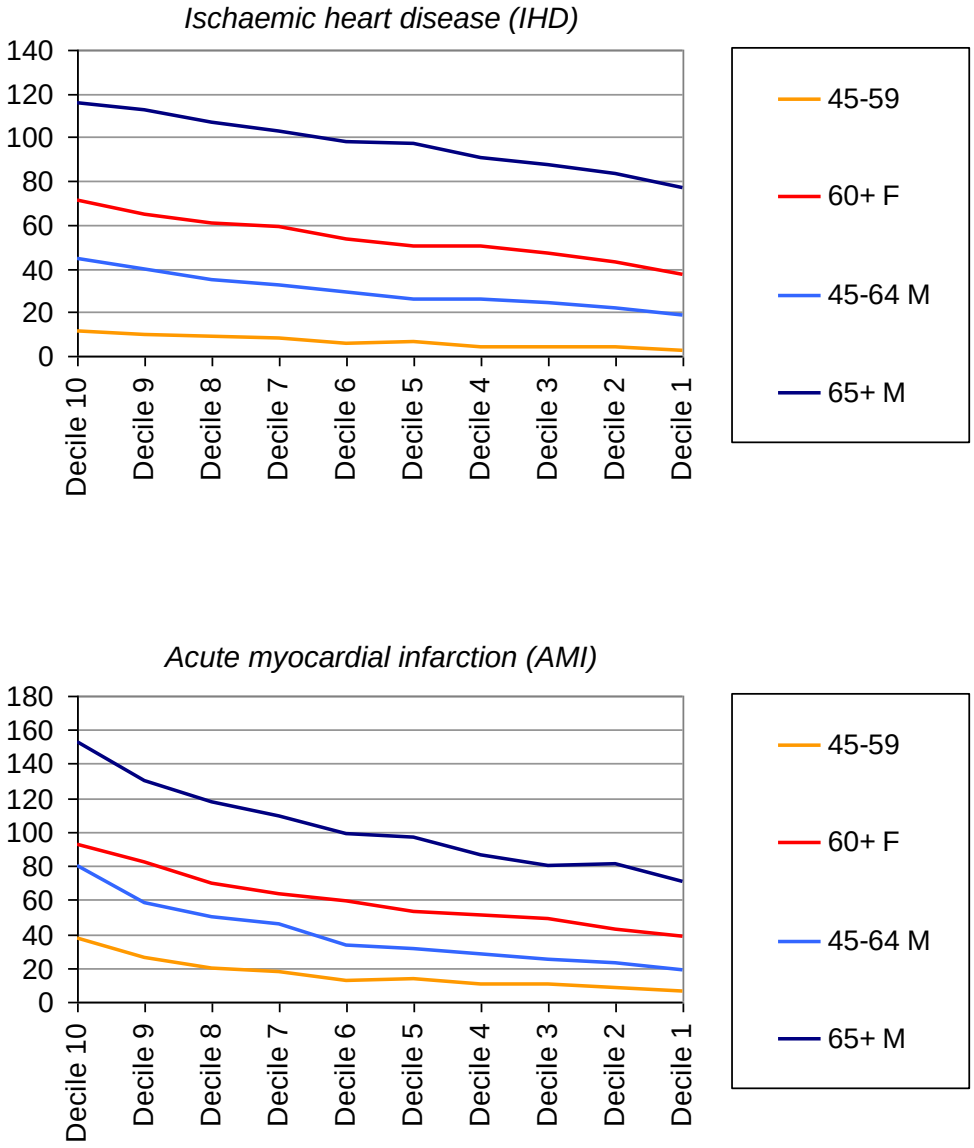


Figure 16: Births and antenatal admissions not relating to delivery event per 10,000 women

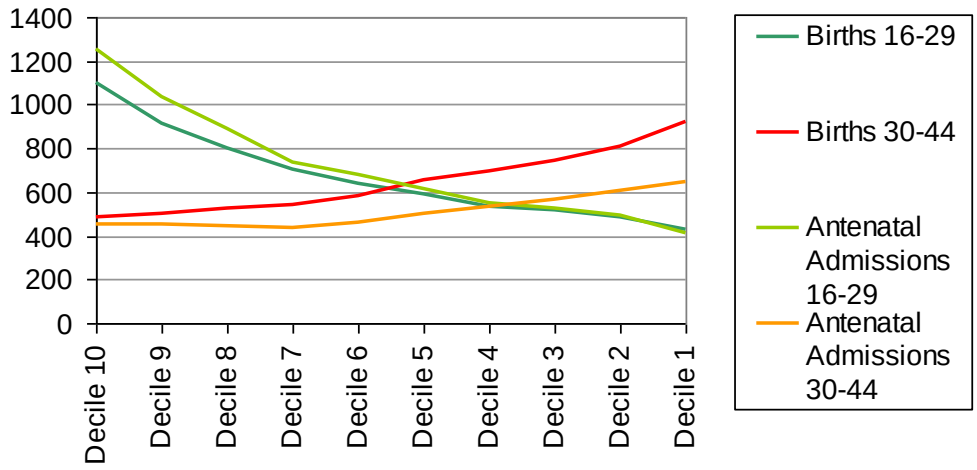
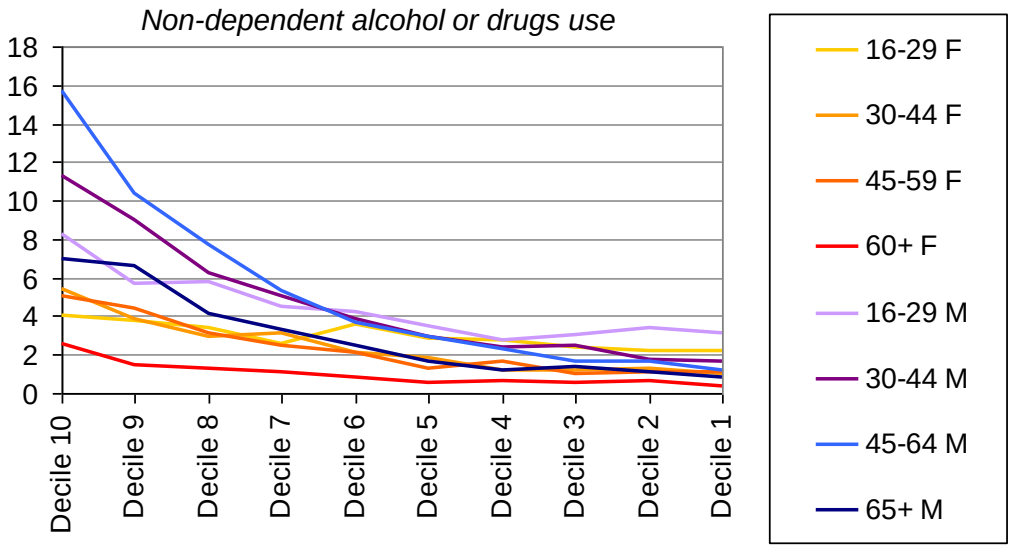


Figure 17: emergency episodes for dependent and non-dependent alcohol or drugs use per 10,000 population



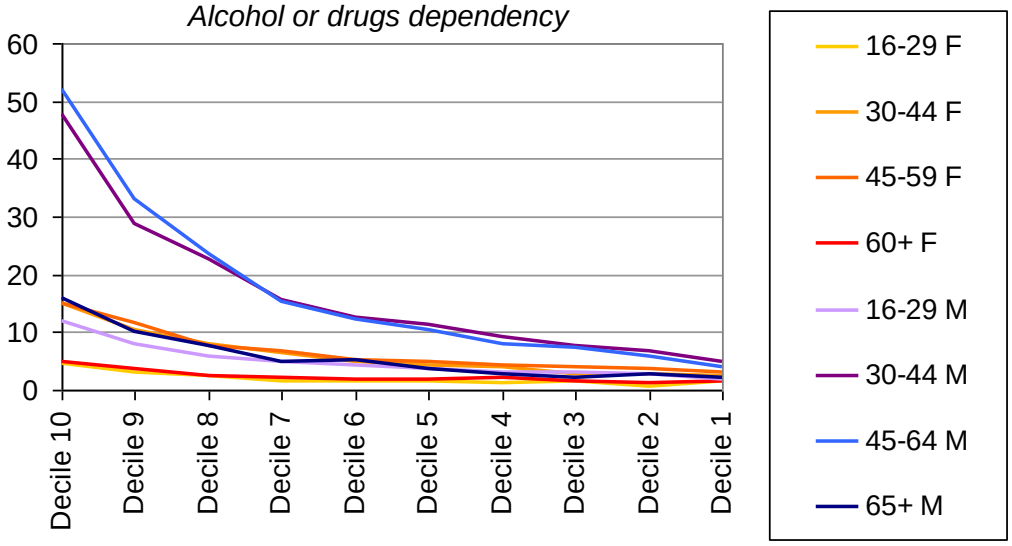


Figure 18: Emergency and elective episodes for schizophreniform psychosis and depression per 10,000 population

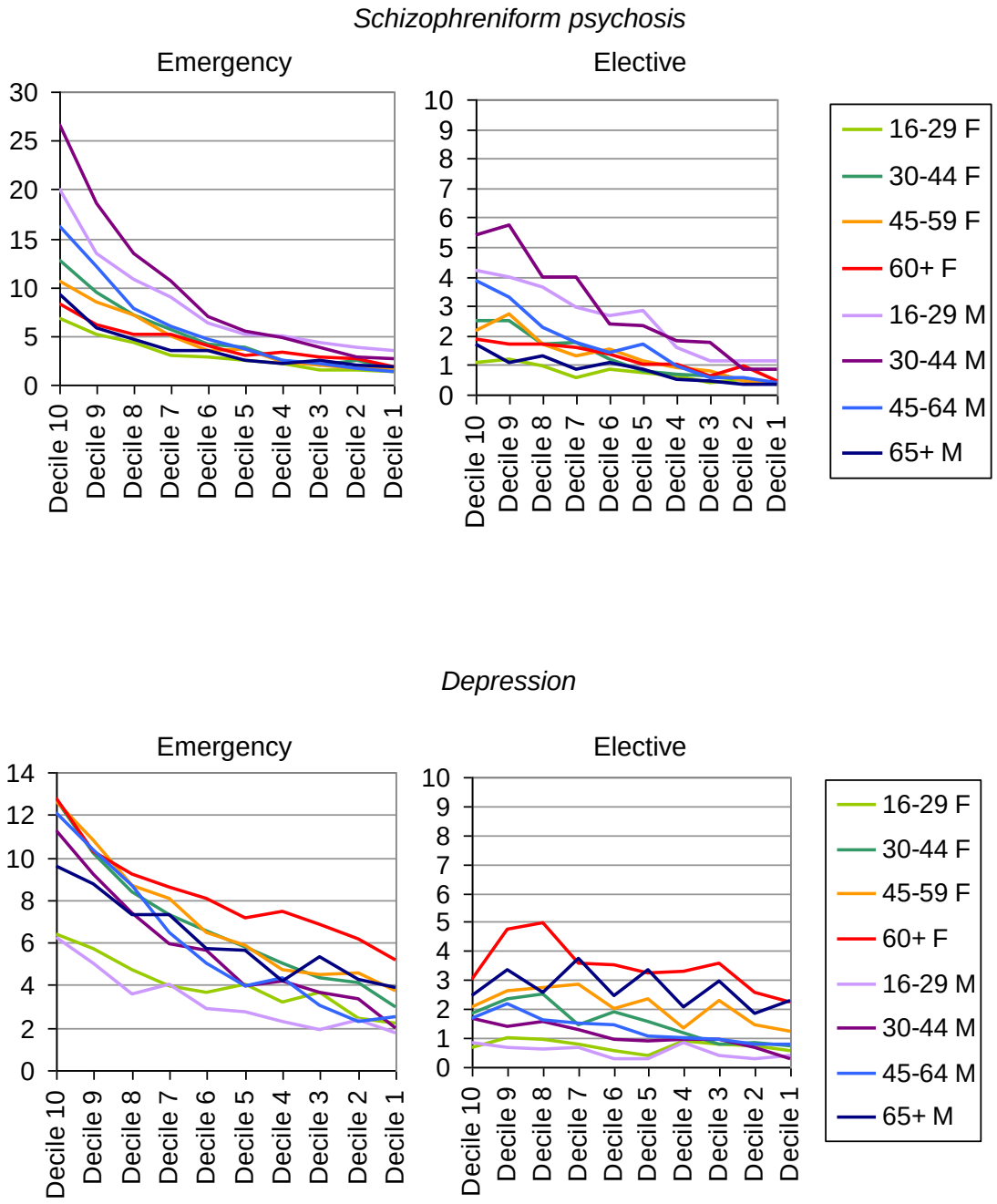


Table 1: conditions for which at least 20% of emergency episodes were for patients living in decile 10 areas[1]

Primary diagnosis		Decile 10		Deciles 1-9		D10 emergency eps / total emergency eps
ICD-10	Description	Episodes	% emergency	Episodes	% emergency	
D57	Sickle-cell anaemia with crisis	2494	77.79%	5703	67.02%	33.67%
F20	Schizophrenia	3692	80.99%	11207	73.60%	26.61%
F10	Mental & behavioural disorders due to use of alcohol: acute intoxication	8612	90.46%	28383	88.03%	23.77%
T40	Poisoning by narcotics and psychodysleptics (hallucinogens)	2185	100.00%	6697	99.85%	24.63%
T50	Poisoning by diuretics and other and unspecified drugs, medicaments and biological substances	1140	99.74%	4327	99.77%	20.85%
T43	Poisoning by psychotropic drugs, not elsewhere classified	3497	99.91%	13606	99.82%	20.46%
K86	Alcohol-induced chronic pancreatitis	1974	76.60%	7673	64.11%	23.51%
K70	Alcoholic fatty liver	2609	80.76%	11181	72.43%	20.65%
O21	Mild hyperemesis gravidarum (extreme, persistent nausia and vomitting during pregnancy)	3534	96.69%	12586	98.50%	21.61%
O20	Threatened abortion	7104	91.58%	26867	93.47%	20.58%
O26	Excessive weight gain in pregnancy	4410	81.29%	16126	88.43%	20.09%

[1] Excludes chapter Z of ICD-10 (factors influencing health status and contact with health services) because these are not condition-specific.

Table 2: Cancer Incidence, chemotherapy and other admission episodes, comparison of most to least deprived quintiles

Cancer area (chemotherapy HRG definition)	**Incidence by cancer type (NCIN data closest match)**	**Chemotherapy utilisation matches area**	**Elective admissions, Related HRG**	**Emergency admissions, Related HRG**
a) Respiratory System	Lung 2.5 to 1	1.7 to 1	Respiratory Neoplasms (D25)	
			1.6 to 1	2.5 to 1
b) Mouth, Head, Neck or Ear	Head and neck 2.1 to 1	1.7 to 1	No sufficiently specific HRG to use	
c) Digestive system	Stomach 1.8 to 1 Oesoph. 1.4 to 1 Male colorectal 1.1 to 1	1 to 1	No sufficiently specific HRG to use	
d) Female Reproductive System	Cervical 1.9 to 1 Ovarian 1 to 1	1 to 1	No sufficiently specific HRG to use	
e) Hepato-Biliary or Pancreatic System	Pancreatic 1.2 to 1	0.9 to 1	Therapeutic Pancreatic or Billary Procedures with Neoplasms (G26)	
			1.2 to 1	1.9 to 1
			Biliary Tract Neoplasms (G20)	
			1.2 to 1	1.5 to 1
f) Endocrine or Metabolic System	Not mentioned specifically	1.3 to 1	Non Pituaritary Endocrine Neoplasms (K18, K19)	
			1.3 to 1	1.5 to 1
g) Haematology, Infectious disease, poisoning	Male non-Hodgkin lymphoma 0.9 to 1 Female 1 to 1	1 to 1	Malignant Disorder of the Lymphatic/ Haematological Systems (S27, S28)	
			1 to 1	1.1 to 1
h) Urinary tract or Male reproductive	Kidney 1.2 to 1 Bladder 1.2 to 1 Prostate 0.8 to 1	1 to 1	No sufficiently specific HRG for kidney or bladder	
			Malignant Prostate Disorders (L31)	
			1.1 to 1 (U curve)	1.2 to 1
i) Nervous system	Male Brain 0.8 to 1	0.9 to 1	Brain Tumours or Cerebral Cysts	
			1 to 1 (male1.2 to 1)	1.2 to 1 (male and female
j) Skin, Breast or Burn	Malignant melanoma 0.5 to 1	1 to 1	Major Skin Tumours (J43)	
			0.9 to 1 (Inverse U)	1.1 to 1 (Inverse U)
	Breast 0.8 to 1		Malignant Breast Disorders (J09, J10)	
			0.9 to 1 (Inverse U)	1.3 to 1

U curve indicates that rates are higher in the most and least deprived areas with lower rates in areas in the middle, whilst inverse U indicates the opposite.

Centre for
Health Service Economics
& Organisation

Skipton House
80 London Road, London SE1 6LH

Nuffield College
New Road, Oxford OX1 1NF

Tel. 020 7972 5219, www.chseo.org.uk

A Centre of the Department
of Economics, University of Oxford