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Informing the development of performance ratings:

A report for the Commission for Health Improvement

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Executive summary

1. Performance star ratings were published by the Department of Health for acute NHS Trusts for the first time in 2000/01. Two further sets of ratings have subsequently been published in successive years (by the Department and then by the Commission for Health Improvement) and coverage has expanded to include non-acute Trusts and PCTs.

2. This report presents the results of research to assist the Commission for Health Improvement (CHI) in the development of performance ratings for NHS organisations by facilitating a greater understanding of the relationships underlying the existing ratings for acute Trusts and PCTs.

3. The statistical analysis comprised three stages: first, the influence of key targets and indicators on the star ratings; second, (more importantly) the influence of other explanatory variables on the star ratings and key indicators, including factors that may be less amenable to management control; third, the links between PCT and acute trust performance were examined. The rationale for this approach is that organisations should be assessed on aspects of performance over which managers have some control, rather than on the basis of exogenous factors that cannot be influenced by management action. The analysis seeks to offer insights into this issue.

4. A multivariate linear regression approach was adopted wich does not approximate the rule-based algorithm for constructing the star ratings, but rather explores the nature and strength of the relationships between the performance indicators and the star ratings within this linear framework.

5. Data from a wide variety of sources was assembled and linked in order to provide rich datasets at both Trust and PCT level. A range of statistical analyses was undertaken to address the research questions.

Acute Trusts

6. For acute trusts, the key targets and the CHI review are the main determinants of star rating, explaining 61% of the variation. Analysis of the subsidiary balanced scorecard indicators included in the star ratings showed that only a small number of them materially influence the star rating, and when analysed in conjunction with the key targets, only one further indicator added significant explanatory power (six month inpatient waits from the patient focus variables). None of the clinical focus indicators was significant and the proportion of variation in star ratings explained increased only marginally to 62%.

7. The second stage of the analysis explored the association of other explanatory factors with Trust star ratings and key indicators, including exogenous factors such

as socio-economic characteristics of the population and deprivation. The latter were not significantly associated with the star ratings of acute Trusts. Some managerial indicators (e.g. expenditure on agency staff) were found to be associated with star ratings. The extent to which these are within the control of managers will vary, depending on factors such as local labour market conditions and budgetary constraints. Whilst there are no obvious explanations for some of the associations, others are plausible, for example, supporting the view that less use of agency nursing staff will produce better performance, or reflecting the important role of good financial management in achieving good performance more broadly.

8. Analysis of the association of other explanatory factors with performance on the key targets for Trusts highlighted the significance of a range of mainly organisational and activity variables that are (subject to budgetary constraints) within management control, such as occupancy rates and availability of day theatres. Whilst socio-economic or deprivation measures were significantly associated with performance on a few of the key targets, they did not play a major role. However the deprivation measures used in this study were attributed to acute Trusts via the main PCTs with which Trusts contract, and may not be sensitive enough to reflect deprivation of Trust populations.

9. Given the current method of constructing the acute Trust star ratings, it is clear they are determined to a large degree by whatever is included in the key targets, and the CHI review. The influence of the balanced scorecard indicators is marginal. If policy-makers wish to target other areas for improvement – such as clinical outcomes – they will need to incorporate them into the key targets or use an alterative methodology and weighting process if they are materially to influence the star ratings.

10. There appear to be relatively few truly exogenous influences on acute Trust performance. There may be some factors, such as budgetary limits, capital configuration, or local labour markets that constrain some organisations from improving. However, subject to careful audit of the reasons for failure to adopt more effective managerial practices, it seems broadly reasonable to hold Trust managers to account against their performance ratings.

Primary Care Trusts

11. Regressing the key targets on the PCT star rating revealed that all nine key targets were statistically significant and had the 'correct' sign. They accounted for 44% of the variation in star ratings. The balanced scorecard indicators were less able to explain variations in the star ratings. From a total of 37 indicators, our preferred model identified seven significant indicators which, together, explained just 23% of the variation in star ratings. Together, the key targets and balanced scorecard indicators were able to explain almost two-thirds of the variation in the star ratings.

12. The analysis of star ratings employing all of the other variables in our PCT database (that is excluding all key targets and balanced scorecard indicators) found that 17

variables accounted for almost one-third of the variation in the star ratings. This model was rather difficult to interpret but suggested that: deprivation, the accessibility of psychiatric beds, health care expenditure and short waits all have a positive effect on star ratings.

13. There is some evidence that socio-economic conditions do affect performance against PCT key targets. However, this effect is not consistent across all key targets. There are two key targets – access to a GP and access to a primary care professional – where deprivation appears to have a negative effect on the key target score. However, there are five other key target variables where deprivation apparently has a positive effect on the key target score.

Links between PCT and Acute Trusts' Ratings

14. We explored the association between PCT and Trust star ratings using the purchaser-provider matrix supplied by CHI. We found that 28% of the variation in acute Trust star ratings is explained by PCT star ratings; and conversely, 16% of the variation in PCT ratings is explained by the star ratings of acute Trusts. Some association is to be expected given that some of the PCT ratings depend both directly or indirectly on the performance achieved by their local Trusts. Similarly, acute Trust performance is influenced by the performance of PCTs as commissioners and providers.

Conclusions

15. This preliminary analysis has therefore provided some suggestive insights into the potential determinants of performance at Trust and PCT level. However the time constraints were demanding and given the major effort required to assemble and link a wide range of data in order to proceed with the analysis, our approach has necessarily focused on the use of appropriate statistical techniques rather than on construction of models with a strong underlying theoretical basis.

16. We believe that the next stage should be the development of theoretical models that address more specific research questions. The vast amount of data we have assembled can serve as a resource for testing a range of carefully constructed statistical hypotheses concerning the determinants of performance amongst health care organisations.

1. Introduction

In September 2001, the Department of Health published the first set of performance ratings for acute NHS Trusts 2000/01 (Department of Health, 2001). The performance ratings (often referred to as 'star' ratings) are a composite index score, providing an overall assessment of the performance of the organisation across a number of indicators. Two further sets of ratings have subsequently been published in successive years (by the Department and then by the Commission for Health Improvement) and coverage has expanded to embrace ambulance trusts, mental health trusts and Primary Care Trusts (PCTs).

The purpose of this research was to assist the Commission for Health Improvement (CHI) in the development of performance ratings for NHS organisations by facilitating a greater understanding of the relationships underlying the existing ratings for acute Trusts and PCTs. The work was undertaken over a three-month period and focused on issues relevant to the immediate development of performance ratings for 2003/04. Guided by the priorities of CHI, the work utilised a wide range of data from numerous sources to examine quantitatively the performance of Trusts and PCTs, with a specific focus on identifying the factors that are associated with the performance of these organisations, but lie outside their control. The rationale for this approach is that organisations should be assessed on aspects of performance over which managers have some control, rather than on the basis of exogenous factors that cannot be influenced by management action.

In order to explore this issue, our broad approach has been first to examine the influence of key targets and the other indicators on the star ratings; and second, (more importantly) to investigate the association of other explanatory variables with the star ratings and key targets. These included a wide range of managerial, finance and other process indicators, and exogenous factors such as socio-economic and deprivation scores.

This work follows from an earlier study for the Commission for Health Improvement (CHI) employing a univariate analysis of variance for acute Trusts (Jacobs & Smith,

2003). In this earlier work we could only explore the relationship between star ratings and a single variable at a time, not controlling for other factors which may simultaneously influence the relationship with star ratings. This report is an extension of the earlier work in that it employs a multivariate analysis to explore the nature and strength of the relationships between the star ratings, key targets and indicators estimating the effect on individual variables holding all other variables constant. The analysis is also extended to PCTs.

After providing a brief background to the star ratings in section 2 below, the report describes the nature of the data and methods used in sections 3 and 4. Sections 5 and 6 present the results of the analysis for acute Trusts and PCTs respectively, whilst section 7 provides overall conclusions, discussion and suggestions for further research. Much of the descriptive data and variable definitions are provided in appendices.

2. Background

The NHS Performance Ratings system places NHS organisations in England into one of four categories:

1. Those with the highest levels of performance are awarded a performance rating of three stars;

2. Those that are performing well overall, but have not quite reached the same consistently high standards, are awarded a performance rating of two stars;

3. Those for which there is some cause for concern regarding particular areas of performance are awarded a performance rating of one star;

4. Those that have shown the poorest levels of performance against the indicators are awarded a performance rating of zero stars meaning that performance must be improved in a number of key areas.

The key government targets are the most significant factors in determining overall performance ratings. They represent a range of performance targets, including various aspects of waiting, financial performance and the working lives of staff. Each key target is assessed as having been achieved, underachieved or significantly underachieved. The organisation is given a provisional star rating on the basis of these

scores. This rating is then refined depending on performance against a 'balanced scorecard' of further indicators. These balanced scorecard indicators are grouped into three broad categories: patient focus, clinical focus, and capacity and capability. Finally, CHI reviews of clinical governance arrangements can also play an important role in determining star ratings amongst organisations at the top and bottom levels of performance. Three star organisations need to perform well on all key targets as well as the CHI clinical review, whilst a poor CHI review can override performance on other indicators to result in a zero star designation. In summary, the rating secured by an organisation results from the application of a complex six-step algorithm against a wide range of performance measures. The most important driving factors for obtaining the highest rating are the key targets and the CHI review.

The ratings are intended to be 'not primarily a commentary on the quality of clinical care', but rather to assess the 'overall patient experience' (Department of Health, 2001). Because of the complex method of transforming and combining variables, there is no straightforward relationship between the underlying performance measures and the eventual performance rating. This report seeks to shed some light on the strength and nature of those relationships.

3. Data

Both the acute Trust and PCT studies involved the construction and amalgamation of various data sets. Given the three-month time horizon of the project, we were constrained to using data either already in the public domain or prepared by us in the course of previous studies. The discussion below outlines the major data sources employed and the type of variables gathered from each source, under the following headings:

- CHI data
- Population census data
- General Medical Services (GMS) statistics
- National Primary Care R&D Centre data for PCTs
- Prescribing data
- HES-based commissioner-provider matrix

- Department of Health website
- Hospital Episodes Statistics
- Hospital activity statistics
- NHS workforce census data
- Vacancy survey data
- Reference Costs
- CIPFA data

A more detailed definition of the variables in the data sets for acute Trusts and PCTs can be found in Appendices A and B respectively.

3.1. CHI data

Data on the key targets and indicators for the balanced scorecard were downloaded from the CHI website for both acute Trusts and PCTs. In most cases we used the raw CHI data and not the transformed indicators (achieved/under achieved/significantly under achieved). However, for a few of the indicators (particularly those measuring breaches which were highly skewed) we used the data as transformed by CHI, with the same thresholds. This included the inpatient and outpatient waits against the standard (15 months for an inpatient admission and 26 weeks for an outpatient appointment), as well as the A&E over 12 hour waits.

3.2. Population census data

During the course of this study the ONS published key statistics for PCT boundaries as at 31 December 2002 (see http://www.statistics.gov.uk/census2001/cn_61.asp). These statistics were based on the population census undertaken in April 2001 and allowed us to calculate a number of socio-economic indicators reflecting the provision of unpaid care, household tenure, household composition, ethnicity, and economic activity. Full details of the variables constructed can found in appendix B.

3.3. General Medical Services (GMS) statistics

GMS statistics relate to General Medical Practitioners, their patients, partnerships and services offered. The GMS statistics division of the National Health Service Executive

collects twice yearly statistical returns from PCTs for each registered general practice in England and Wales. A wide range of information is collected including the age and sex breakdown for each registered practice population in the country, details of practice organisation such as staffing, list size, GP characteristics, and details of service provision such as asthma and diabetes services and immunisation. Using this information, it is possible to profile primary care provision and registered practice populations in any geographical area and, for the purposes of this study, data from the 2002 GMS returns were aggregated up from Practice to PCT level. This GMS dataset comprises some 40 variables details of which can be found in appendix B.

3.4. NPCRDC data for PCTs

From the National Database for Primary Care Groups and Trusts at the University of Manchester we obtained 50 further variables. Many of these had been constructed for the AREA project (Sutton *et al*, 2002) and they fell into three broad groups. The first group of variables comprised deprivation scores from the DETR's Index of Multiple Deprivation, including various measures of income and health deprivation (such as attendance allowance claimants). The second group comprised a dozen or so measures of the accessibility of local health care facilities. These measures included both the number of beds and the distance to these beds for both acute, mental health, and private services. A third group comprised six waiting time measures that had been constructed for the AREA project. Details of these variables can be found in appendix B.

One problem we faced with the use of these variables was that they were calculated at practice level and only had a practice identifier for 2001 PCG/T boundaries. We therefore constructed a look-up table that related 2001 PCG/Ts to 2002 PCTs. A very small number of 2001 PCG/Ts were split between more than one PCT in the April 2002 re-organisation with some practices joining one PCT and other practices joining another PCT. Without detailed investigation of which practices were assigned to which PCTs, we were unable to assign some practices to the new April 2002 PCTs and we therefore dropped the four affected PCTs from the analysis. PCT level aggregates were calculated using practice population weighted averages.

3.5. Prescribing data

From the National Database for Primary Care Groups and Trusts website (see http://www.primary-care-db.org.uk/) we obtained a number of prescribing measures that have been constructed by calculating a series of cost and volume variables using 2001-02 data. These variables indicate the extent to which prescribing costs and/or volumes exceed or fall short of what would be expected given the age and sex profile of the local population. These cost and volume indicators are available for six drug types (corticosteroids, anti-bacterials, ulcer healers, cardiovascular drugs, beta blockers, and statins). There is also a measure of the extent of generic prescribing. Definitions of the denominators and numerators employed to construct these prescribing indicators can be found in Appendix B.

3.6. HES-based commissioner-provider matrix

To enable us to examine the relationship between the performance of acute Trusts and the performance of PCTs, we required a method of relating the performance of each PCT to its acute providers, and of relating the performance of each acute Trust to its commissioners. CHI kindly supplied us with two matrices based on HES all specialty spell data for 2001-02. The first matrix was a PCT by acute Trust matrix. It showed how many spells of care each PCT 'commissioned' from each provider. The second matrix was an acute Trust by PCT matrix and showed the number of spells each acute Trust provided for patients resident within each PCT's boundaries. We used these spell-based matrices as weights in the conversion of acute-based data to a PCT-basis, and PCT-based data to an acute Trust basis.

For example, for each PCT we calculated a weighted average of the star ratings awarded to each of its five largest acute providers (with the weights based on the number of HES all specialty spells for 2001-02). This enabled us to examine the correlation between PCT and acute Trust star ratings. For each PCT we also calculated a weighted average of the scores achieved by its top five providers on each key target. Similar weighted averages of the star rating and key target variables were calculated for acute Trusts based on PCT data.

All the population census data for PCTs as well as the NPCRDC data for PCTs constructed for the AREA project and the DETR Indices of Multiple Deprivation were all attributed from PCTs to acute Trusts in this way.

3.7. Department of Health website

From the Department of Health website we extracted two variables for PCTs. The first was an index of acute and maternity service need as generated by the AREA project and now used to inform the annual allocation of resources to PCTs. The second was a measure of the extent to which the PCTs budget for 2003-04 exceeds its target allocation (one would expect a PCT with a budget in excess of its needs based target to perform better than a PCT with a budget less than its target holding constant all other factors).

3.8. Hospital Episodes Statistics

Hospital Episode Statistics (HES) provide information on admitted patient care delivered by NHS hospitals in England. The HES database is a record level database of hospital admissions and is currently populated with a sub-set of the data submitted by NHS Trusts for each financial year. The HES data used in this database is aggregated to Trust level and supplies broad measures of activity, by age and sex and includes measures such as the number of electives, daycases and emergency admissions. This broad aggregate data is available on the DH website at: http://www.dh.gov.uk/PublicationsAndStatistics/Statistics/HospitalEpisodeStatistics/fs/en.

3.9. Hospital activity statistics

Hospital activity statistics are annual data available on the Department of Health website at: http://www.performance.doh.gov.uk/hospitalactivity/. We extracted a number of acute Trust based variables from the hospital activity statistics database. Many of these are derived from the HES data set although some are based on other returns. Variables drawn from these annual activity statistics include:

1. the average length of stay in hospital
2. the availability of day case theatres and supporting facilities
3. bed occupancy and availability rates
4. the number of imaging, diagnostic and screening tests

3.10. NHS workforce census data

The NHS workforce census is an annual snapshot of the NHS workforce taken every year on 30 September. The data for this study refer to September 2002. These data are compiled by the Department of Health and are available on their website at http://www.publications.doh.gov.uk/public/work_workforce.htm for NHS Trusts, by staff grade, but not by specialty. We however managed to obtain the more detailed data for NHS Trusts, by grade and by specialty. These are listed in Appendix A. From these data we also calculated variables relating the number of trainee staff and non-trainee staff to other groups (such as consultants). Non-trainee staff include Associate Specialists and Staff Grades whilst trainee staff groups include SHOs, HOs and Registrars.

3.11. Vacancy survey data

The Department of Health publishes an annual survey of the 3-month vacancy rates in the NHS. The survey is a snapshot of vacancy rates on 31 March and the data for the this analysis was from the 2003 survey. The data covers consultants, nurses, allied health professionals, scientific, technical and therapeutic staff, healthcare assistants, and administrative staff with a further breakdown of vacancy rates within some of these larger groups. The data is available on the Department of Health website. http://www.publications.doh.gov.uk/public/vacancysurvey.htm

3.12. Reference Costs

The Reference Cost publications present average costs for all HRGs and a Reference Cost Index (RCI) for each NHS Trust. These are available on the Department of Health website. We have used reference costs from the financial year 2002/03.

http://www.dh.gov.uk/PolicyAndGuidance/OrganisationPolicy/FinanceAndPlanning/N
HSReferenceCosts/fs/en

3.13. CIPFA data

The CIPFA data is an annual database released by the Institute of Public Finance and covers the Trust Financial Returns (TFRs) and Trust Accounts (TAC) returns for all acute Trusts in England. The CIPFA database covers financial data, as well as data on activity and staffing (http://www.cipfa.org.uk/panels/health/index.cfm).

4. Methods

4.1. The modelling approach

The overall aim was to examine the factors that may affect the performance of acute Trusts and PCTs. The intention was to cast some light on the extent to which the performance rating secured by an organisation lies outside its immediate control. As mentioned, a complex rule-based algorithm is employed to construct the star ratings. The modelling framework used in this report is based on multivariate regression analyses with a linear functional form which does not seek to replicate the algorithm. The linear framework we adopted can in no way approximate the complex relationship between the performance measures and the way in which the star ratings are constructed. The purpose of the modelling approach is to shed light on the relationships which exist between the star ratings, key targets and indicators within this modelling framework where all right-hand side variables are assumed to have a linear fit.

Within this framework, for both acute Trusts and PCTs, we undertook three main sets of analyses.

Stage 1: Determinants of performance ratings

(a) We examine the statistical relationship between star ratings, key targets, indicators and CHI inspections (where available) to explore the relative importance of key targets, inspections and indicators in influencing the star rating.

(b) We then analyse the influence on star ratings of socio-economic factors and a range of managerial and process measures.

Stage 2: Determinants of key targets/indicators

Since the star ratings are driven mainly by the key targets, we examine statistically the relationship between the key targets and the managerial and socio-economic variables.

Stage 3: PCTs and Acute Trusts

Since the performance of the two types of Trusts may be interdependent the association between the ratings secured by acute Trusts and the ratings of the PCTs using the acute Trusts was examined.

The model underlying our analysis is that the performance rating S_i is determined by:

$$S_i = S(P_i, V_i, J_i) \qquad (1)$$

where P denotes both key targets and (performance) indicators, V is the result of a CHI inspection, and J allows for the possibility that judgement leads to a deviation from the algorithm for setting ratings.

Judgement may be influenced by observable factors (perhaps some unspoken allowance for some local socio-economic factors z is made if a PCT or Trust is just at the margin of a star category):

$$J_i = J(x_i, \varepsilon_i^J) \qquad (2)$$

If J does enter the algorithm and is affected by local factors z then:

$$S_i = S(P_i, V_i, J(z_i, \varepsilon_i^J)) = S^1(P_i, V_i, z_i, \varepsilon_i^J) \qquad (3)$$

This would justify regressing star ratings on P, V and x. However, in the first instance we ignore this possibility and just regress S on P and V to identify the important elements in P which affect S.

The performance variables P are determined by:

$$P_i = f(a_i, x_i, z_i, \varepsilon_i^P) \qquad (4)$$

a indicates things the Trust can control but which are not observed – if they were observable they would presumably be used as the performance indicator. An example is managerial effort. x indicates local socio-economic factors and z other factors that it

cannot control. The latter include possibly characteristics of its GPs, local acute Trusts, resourcing under the AREA formula, inherited capital stock and so on.

Thus suppose that *P* is the key target *Access to a GP* - % of patients who are offered an appointment to see a GP within two working days. *P* will depend on the number of GPs in the area (*z*), the health needs of the local population *x* (affecting demand) and random unobserved shocks. The PCT can attempt to improve access by expending effort (and other scarce resources) to persuade GPs to open longer, have more convenient surgery locations or opening times, to employ more nurses to free up GP time and so on. This activity is captured by *a*.

On the other hand, if the number of GPs in the area can be affected by PCT policies and efforts (e.g. offering attractive PMS contracts) then *z* is endogenous:

$$z_i = g(a_i, x_i, \varepsilon_i^z)$$ (5)

and the reduced form is:

$$P_i = f^1(a_i, x_i, \varepsilon_i^P, \varepsilon_i^P)$$ (6)

and we should regress *P* on *x*.

Ideally one should attempt to construct explicit theoretical models to guide the specification and interpretation of the results of the statistical models. However in the short time available to us we were not able to undertake this formidable task. Instead we attempted a preliminary set of statistical analyses which we hope will identify some empirical regularities which may be of interest in themselves and which will help to guide the formulation of more detailed theoretical models in the future.

4.2. Statistical methods

4.2.1. Analysis of Variance

The initial descriptive statistical analysis was to examine the distribution of key target and indicator variables across the star categories.

In Appendices A and B we show tables of ANOVA results for each of the key targets and indicator variables for acute Trusts and PCTs respectively. The one-way ANOVA

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results use least squares to fit a linear model. The last column gives the number of observations (n) used in the regression, the significance level for the F statistic, whether the overall model is significant or not, and the R-squared or the proportion of variation explained.

The results are interpreted as follows (using the A&E 12 hour waits as an example). The mean level on the A&E waits variable for zero star Trusts (the omitted group) is 125.9 (standard error 23.7). This corresponds with the mean of the variable given in the descriptive statistics for zero star Trusts (see Descriptive statistics by star ratings). One star Trusts' A&E waits are −89.9 lower (significantly) at 35.9 (standard error 28.7) (p = 0.002). Three star Trusts' A&E waits are -125.4 lower than zero star Trusts (significantly) at 0.4 (standard error 26.7) (p = 0.000). Two star Trusts' A&E waits are −122.9 lower than zero star Trusts (significantly) at 7.5 (standard error 26.4) (p = 0.000). The overall model for the regression with this variable is significant (p = 0.000) with n = 155 and 0.145 (or 14.5 percent) of the variation in star ratings explained in the regression by the key target A&E waits.

All results that are significant at the 10 percent level (coefficients, constants and overall model results) are highlighted in bold for ease of recognition.

4.2.2. Regression analysis

In order to examine the effects of the potential explanatory variables on star ratings and the key targets we use multiple regression analysis which estimates the effect on the individual variables holding all other variables constant.

4.2.2.1. Ordered probit analysis

Some of the key targets are continuous variables and so we can use an Ordinary Least Squares regression. But the star ratings and many of the key targets are categorical or binary variables for which OLS is not appropriate. For the star ratings and the key targets, which are ordered categories, we use ordered probit regression models. These models assume that there is a latent, unobservable, variable y_i^* for Trust i which we could think of as the goodness of performance of i. Instead of observing y_i^* we observe

only a category of performance y_i. In the case of star ratings $y_i = 0$ if Trust i has no stars, $y_i = 1$ if it has one star and so on. The star ratings y_i are determined by the unobserved y_i^* in such a way that a Trust with a better underlying but unobservable performance is more likely to have a higher number of stars:

$$y_i = \begin{cases} 0 \\ 1 \\ 2 \\ 3 \end{cases} \quad \text{if} \quad \begin{aligned} \tau_0 = -\infty \leq y_i^* < \tau_1 \\ \tau_1 \leq y_i^* < \tau_2 \\ \tau_2 \leq y_i^* < \tau_3 \\ \tau_3 \leq y_i^* < \tau_4 = \infty \end{aligned} \quad (7)$$

The y_i^* are determined by a set of observable explanatory variables and by some unobservable explanatories ("error" terms). By using the information on the observed categories y_i, the observed potential explanatories, and by making assumptions about the probability distribution of the error terms we can estimate the effect of the explanatory variables on the underlying unobservable performance variable y_i^*. In particular if we assume that the error distribution is normal we have the ordered probit model. In some cases, for example with the Improved Working Lives target, the dependent variable is binary and we use logistic regression instead, though the interpretation of the results is very similar to those for the ordered probit models: the coefficients on the explanatory variables show their effect on the unobserved latent performance measure which is generating the observed categorical measure.

4.2.3. Standardisation and interpretation of coefficients

Aside from examining whether explanatory variables are significant or not, we are also interested in the relative size of effect or the contribution of individual variables to the dependent variable. When variables are measured in different units it is necessary to express them in comparable terms before we can discuss their relative effects on the dependent variables (star ratings or key targets). We therefore fully standardised all coefficients to have zero mean and unit standard deviation (except for dummy variables and categorical variables). This rescaling ensures more straightforward interpretations of the coefficients since the coefficient on the standardised variable shows the effect of a one standard deviation increase in the variable on the dependent performance variable. The coefficients on binary variables show the effect of the variable being present (equal to one) rather than absent (equal to zero). The coefficients on categorical

variables are the effect of the variable being in a particular category rather than in a baseline category.

4.2.4. Stepwise procedure

For statistical models examining the effects of socio-economic and managerial variables on key targets and star ratings we had more potential explanatory variables (over 1500) than observations (at most 304 in the case of PCT regressions). We therefore had to apply a stepwise procedure to separate groups of explanatory variables. With backward stepwise regression we start with a group of explanatory variables and then successively drop variables which are insignificant at some pre-specified level. Generally we set the critical significance level at 5%. We ran the models adding in batches of variables, firstly socio-economic and deprivation measures such as Census data, then forcing in a London dummy variable, other geographical and supply variables, then GMS and practice characteristics (for PCTs), then performance data of local providers (for PCTs) or local commissioners (for acute Trusts), then all other organisational variables (staffing, resources, institutional arrangements, expenditure).

Variables from an earlier batch, which were significant, were forced into the regressions for later batches. If forcing a variable into the model made it insignificant, it was then dropped in the following stepwise regression. For a number of 'batches' of variables there were such large numbers of explanatory variables (particularly for the organisational variables for acute Trusts), that they had to be divided into smaller groups and the procedure repeated several times, in order to avoid the models not estimating or not reaching convergence. The smaller subsets of significant variables within the 'batches' were then used to determine the final model.

4.2.5. Goodness of fit measures

In each of the regressions we report the main goodness of fit measure of the models as the R-squared or the proportion of variation explained. In the case of limited dependent variables a pseudo R-squared is reported. The pseudo R-squared in the ordered logit and probit regression results is based on a likelihood ratio index. If $L(0)$ represents the value of the log-likelihood function when all the parameters are set equal to zero, and

L(b*) represents the value when the log-likelihood function has been maximised, the likelihood ratio index reported is defined as 1-(L(b*)/L(0)).

If the maximisation procedure suggests that there is no gain from changing any of the estimated parameters from zero, then the index will equal zero. Alternatively, if the likelihood function predicts every choice in the sample correctly, the estimated likelihood function would be 1 and the log-likelihood would be 0. With L(b*) = 0, the likelihood ratio index equals 1. Thus this log-likelihood index ranges from 0 to 1, just as R-squared does. It provides some indication of how much can be gained from the addition of new variables to a model.

5. Analysis of acute Trusts

In this section we present the results of the analysis for acute Trusts. The following table shows a tabulation of acute Trust star ratings over the three years. Due to reorganisations, there are fewer acute Trusts each year. The largest group of Trusts fall in the two star category.

Table 1: Tabulation of star ratings for 2000/01, 2001/02 and 2002/03 for acute Trusts

Star ratings	2000/01	2001/02		2002/03	
	acute only	acute only	specialist only	acute only	specialist only
Zero stars	12	10		14	
One star	23	34	2	30	1
Two stars	103	77	12	59	9
Three stars	35	45	6	53	10
Total	173	166	20	156	20

Figure 1 presents the data graphically, indicating a large reduction in the number of two star rated Trusts and a relatively large increase in the number of three star Trusts.

Figure 1: Star ratings for 2000/01, 2001/02 and 2002/03 for acute Trusts
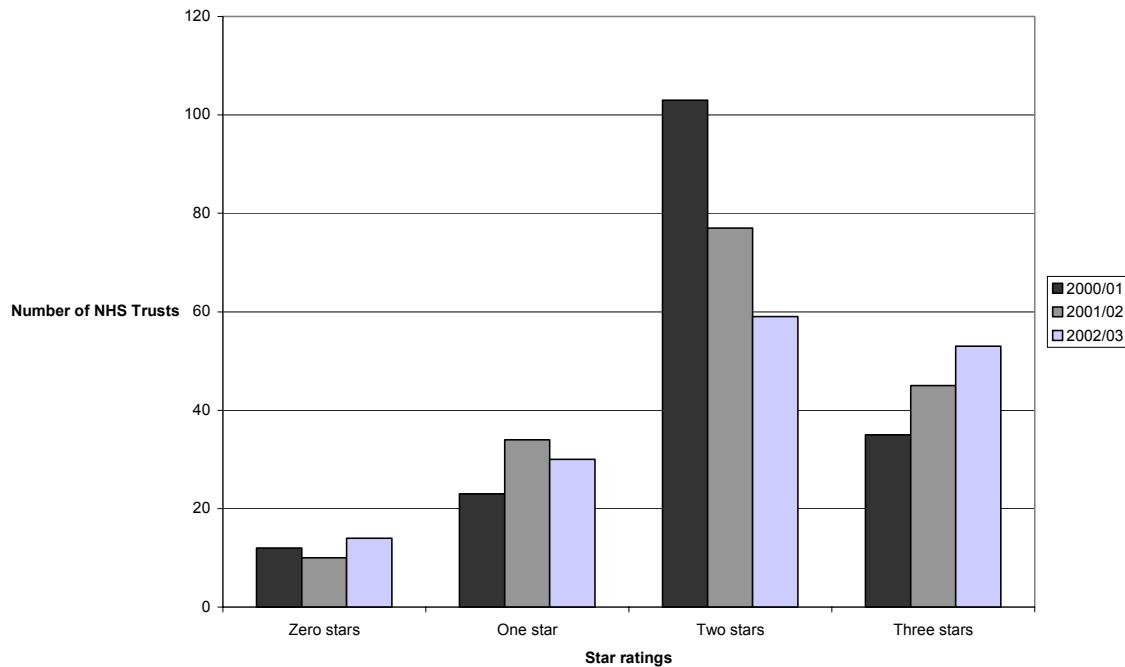
5.1. Regression of star ratings on key targets and indicators

This section examines the relationship between the star ratings and the key targets and indicators in the balanced scorecard, using the multivariate linear regression approach, to see which variables have the greatest impact on the star ratings. We first examine the key targets and the CHI review as a sub-group, as these are the most influential elements of the ratings algorithm. We then examine the balanced scorecard indicators as separate sub-groups (i.e. capacity and capability, clinical focus and patient focus). Finally we put all the key targets and indicators together to examine their overall association with the star ratings.

5.1.1. Regressions on key targets only

The following table shows the regression results, using the stepwise procedure for all key targets on the star ratings for acute Trusts. Eight of the 9 key targets are significant, along with the CHI review. Hospital cleanliness is the target which was not significant in the regression. These key targets, along with the CHI review explain a large proportion of the variation in star ratings (nearly 61 percent) .

Table 2: Ordered probit of star ratings on key targets

```
Ordered probit estimates                      Number of obs   =        142
                                              Wald chi2(9)    =      88.11
                                              Prob > chi2     =     0.0000
Log likelihood = -69.586867                   Pseudo R2       =     0.6071


------------------------------------------------------------------------------
             |              Robust
   pi_stars |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      finman |   .8888557   .1276512    6.96   0.000     .6386638    1.139048
  chi_review |   1.089021   .1855811    5.87   0.000     .7252892    1.452754
 aetotwaitst |   .8909849   .1820695    4.89   0.000     .5341352    1.247835
   opwtgtst_s |  1.911416   .2760801    6.92   0.000     1.370309    2.452523
    impwlive |   3.638412    .714405    5.09   0.000     2.238204     5.03862
  cancop28st |  -.4692083   .1137915   -4.12   0.000    -.6922356   -.2461811
   cancwaitst |  .5671094    .115884    4.89   0.000      .339981    .7942378
   inwtgtst_s |  1.270678   .3604101    3.53   0.000     .5642874    1.977069
   aewait12_s |  1.345581   .3405673    3.95   0.000     .6780815    2.013081
-------------+----------------------------------------------------------------
       _cut1 |   9.981397   1.494451          (Ancillary parameters)
       _cut2 |   13.50755   1.859397
       _cut3 |   16.98054   2.154676
------------------------------------------------------------------------------
* finman = financial management - higher number better (not standardised)
* chi_review = CHI inspection - higher number better (not standardised)
* aetotwaitst = percent patients waiting <4 hrs - higher number better (standardised)
* opwtgtst_s = outpatients waiting against standard - higher number better (not
standardised)
* impwlive = improving working lives - higher number better (not standardised)
* cancop28st = cancelled operations not admitted in 28 days - lower number better
(standardised)
* cancwaitst = cancer waits <2 wks - higher number better (standardised)
* inwtgtst_s = inpatients waiting against standard - higher number better (not
standardised)
* aewait12_s = A&E 12 hour waits - - higher number better (not standardised)
```

All coefficients have the expected sign and are highly significant. Because all the continuous variables have been standardised (mean zero, standard deviation 1), their coefficients can be interpreted as showing the relative size of effect on the dependent variable star ratings. Any variable names with the suffix *st* show that the variable has been standardised. For example, the variable *aetotwaitst* (percent patients waiting less than 4 hours) has been standardised and its coefficient shows the effect of a one standard deviation increase in the underlying latent performance measure, holding all other variables constant. *aetotwaitst* has a slightly larger effect (0.890) than does a one standard deviation increase in *cancwaitst* (cancer waits less than 2 weeks), which has a coefficient of 0.567.

We also provide, as for all succeeding regressions, a table with the unstandardised descriptive statistics for the explanatory variables.

Table 3: Descriptive statistics for key targets

```
    Variable |     Obs       Mean    Std. Dev.      Min        Max
-------------+-------------------------------------------------------
      finman |     156    .3205128    1.20208        -2          1
  chi_review |     148     2.77027    .6810815        2          4
    aetotwait |    155    92.90314    5.047609   70.73631   99.71449
   opwtgtst_s |    156    1.839744    .4613696        0          2
     impwlive |    156    .9423077    .2339116        0          1
     cancop28 |    151    .0014517    .0022344        0    .0209281
     cancwait |    156    97.16174    3.889902   76.47059        100
   inwtgtst_s |    156    1.871795    .4503468        0          2
   aewait12_s |    155    1.812903    .5319298        0          2
```

The following table shows the distribution of key targets across the star rating categories. As expected, the variables all tend to increase across the four categories (except for cancop28 (cancelled operations not admitted in 28 days) where a lower number suggests better performance).

Table 4: Descriptive statistics for key targets across star ratings

```
_____
-> pi_stars = 0

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
      finman |      14   -1.714286    .8254203        -2          1
  chi_review |      14    2.428571    .5135526         2          3
    aetotwait |      14    84.55471    8.351654   70.73631   96.49533
  opwtgtst_s |      14         1.5    .7595545         0          2
    impwlive |      14    .8571429    .3631365         0          1
    cancop28 |      11    .0020793    .0017419         0    .0065075
     cancwait |      14     96.0018    4.117867   84.26736   99.35139
  inwtgtst_s |      14    1.285714    .9138735         0          2
   aewait12_s |      14    .8571429    .9492623         0          2


_____
-> pi_stars = 1

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
      finman |      30         -.3    1.368362        -2          1
  chi_review |      29    2.241379    .4354942         2          3
    aetotwait |      30    92.64052    5.783627   77.48148   99.71449
  opwtgtst_s |      30         1.7    .5959634         0          2
    impwlive |      30          .8    .4068381         0          1
    cancop28 |      28     .002968    .0040905         0    .0209281
     cancwait |      30    95.25516    5.607419   76.47059        100
  inwtgtst_s |      30         1.7    .6512587         0          2
   aewait12_s |      30         1.7    .6512587         0          2


_____
-> pi_stars = 2

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
      finman |      59    .5084746    1.056554        -2          1
  chi_review |      56    2.660714    .6681531         2          4
    aetotwait |      59     93.6167    3.197601   85.71429   99.46996
  opwtgtst_s |      59    1.847458     .447736         0          2
    impwlive |      59    .9830508    .1301889         0          1
    cancop28 |      59    .0012419    .0013308         0    .0053758
     cancwait |      59    97.29841     3.51898   84.71338        100
  inwtgtst_s |      59           2           0         2          2
   aewait12_s |      59    1.932203    .2535545         1          2


_____
-> pi_stars = 3

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
      finman |      53           1           0         1          1
  chi_review |      49    3.306122    .4656573         3          4
    aetotwait |      52    94.49269    2.483596    89.0863   98.72041
  opwtgtst_s |      53           2           0         2          2
    impwlive |      53           1           0         1          1
    cancop28 |      53    .0007539    .0011347         0    .0057569
     cancwait |      53     98.3952    2.341984   89.26247        100
  inwtgtst_s |      53    1.981132    .1373606         1          2
   aewait12_s |      52           2           0         2          2
```

5.1.2. Regressions on indicators only

The following section models performance ratings as a function of the sub-blocks of 'balanced scorecard' indicators under the headings: capacity and capability, clinical focus and patient focus.

5.1.2.1. *Capacity and capability*

Four out of seven variables emerged as significant. These four variables explain nearly 11 percent of the variation in the model. The variables all have the expected sign and are significant at the 5 percent level. *Firehsafst* (fire, health and safety backlog) and *staffopnst* (staff opinion survey) have larger relative contributions than the other two variables to star ratings.

Table 5: Ordered probit with capacity and capability indicators

```
Ordered probit estimates                        Number of obs   =        148
                                                Wald chi2(4)    =      37.42
                                                Prob > chi2     =     0.0000
Log likelihood =  -167.9448                     Pseudo R2       =     0.1089


------------------------------------------------------------------------------
             |               Robust
    pi_stars |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   firehsafst |  -.4378421   .1112889    -3.93   0.000    -.6559642   -.2197199
    infogovst |   .2349259   .0953665     2.46   0.014     .0480111    .4218407
    jdochrsst |   .2330012   .0977146     2.38   0.017     .0414841    .4245183
   staffopnst |   .4064226    .105051     3.87   0.000     .2005265    .6123187
-------------+----------------------------------------------------------------
        _cut1 |  -1.558371   .1780233           (Ancillary parameters)
        _cut2 |  -.6991864   .1226358
        _cut3 |   .4380864   .1091489
------------------------------------------------------------------------------
* firehsafst = fire, health and safety backlog - lower number better (standardised)
* infogovst = information governance and data accreditation - higher number better
(standardised)
* jdochrsst = % junior doctors complying with New Deal - higher number better
(standardised)
* staffopnst = staff opinion survey - higher number better (standardised)
```

Table 6: Descriptive statistics for capacity and capability indicators

```
    Variable |     Obs       Mean    Std. Dev.      Min        Max
-------------+---------------------------------------------------------
   firehsaf |     154    25.45279   40.08085         0    284.315
    infogov |     156    52.71154   13.97971        24         72
    jdochrs |     156    .7646277    .157629   .3026316         1
   staffopn |     150    3.207337   .1657506   2.64538    3.73048
```

The following table shows the distribution of the above indicators across the star rating categories. Again, the variables all tend to increase across the four categories (except for firehsaf (fire, health and safety backlog) where a lower number suggests better performance).

Table 7: Descriptive statistics for capacity and capability indicators across star ratings

```
-> pi_stars = 0

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    firehsaf |      14    41.34712    73.57566   .0022622    284.315
     infogov |      14    50.71429    14.79308         30         66
     jdochrs |      14     .665987    .1630325   .4390244   .9426752
    staffopn |      14    3.164094    .1412928    2.92982    3.42024


-> pi_stars = 1

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    firehsaf |      30    39.89856      50.443          0    223.189
     infogov |      30    46.86667    14.15367         24         65
     jdochrs |      30    .7829054    .1416596   .4532374          1
    staffopn |      28    3.113464    .1652496    2.64538    3.34743


-> pi_stars = 2

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    firehsaf |      57     26.5574    34.33721          0    143.434
     infogov |      59    52.08475    13.27727         25         71
     jdochrs |      59    .7372621    .1681176   .3048781          1
    staffopn |      56    3.201838    .1483299    2.92007    3.64038


-> pi_stars = 3

    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    firehsaf |      53    11.88947    17.53186          0    77.5511
     infogov |      53    57.24528    13.31556         31         72
     jdochrs |      53    .8108014    .1373564   .3026316          1
    staffopn |      52    3.275448    .1639431    2.74802    3.73048
```

5.1.2.2.   Clinical focus

When running the step-wise procedure on the clinical focus variables at the chosen 5 percent significance level, none of the variables emerged as significant. At the 10 percent significance level only one variable *infectco* (infection control self-assessment) entered the model. Hence the p value was increased to 15 percent to produce the following results. Even at this level, only three out of ten variables emerged as significant. This model therefore has very low explanatory power (R-squared 4.6

percent) suggesting that, given this modelling approach, clinical focus variables do not explain much of the variation in star ratings for acute Trusts.

Table 8: Ordered probit with clinical focus indicators

```
Ordered probit estimates                        Number of obs   =        96
                                                Wald chi2(3)    =     15.60
                                                Prob > chi2     =    0.0014
Log likelihood = -111.34314                     Pseudo R2       =    0.0459

------------------------------------------------------------------------------
             |               Robust
    pi_stars |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   emrediscst |   .3033016   .1263008     2.40   0.016     .0557566    .5508465
    infectcost |   .2180177    .099956     2.18   0.029     .0221076    .4139278
    thrombttst |   -.231681   .1322097    -1.75   0.080    -.4908073    .0274453
-------------+----------------------------------------------------------------
        _cut1 |  -1.363311   .1802959            (Ancillary parameters)
        _cut2 |  -.7915967   .1546008
        _cut3 |   .2903565   .1339189
------------------------------------------------------------------------------
* emrediscst = emergency readmission following discharge - lower number better
(standardised)
* infectcost = infection control self-assessment - higher number better (standardised)
* thrombttst = thrombolysis treatment time - higher number better (standardised)
```

Table 9: Descriptive statistics for clinical focus indicators

```
    Variable |      Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    emredisc |      126    5.405541    .6642519    3.78493     7.4693
    infectco |      156    81.19231     11.1153         27        100
    thrombtt |      120    .6417155    .2007596          0          1
```

The following table shows the distribution of the above indicators across the star rating categories. While there is a clear positive gradient to *infectco* (infection control self-assessment), as expected, *emredisc* (emergency readmission following discharge) and *thrombtt* (thrombolysis treatment time) do not show the expected patterns across star rating groups, decreasing and increasing respectively. In fact *emredisc* (emergency readmission following discharge) increases across the four categories.

Table 10: Descriptive statistics for clinical focus indicators across star ratings

```
-> pi_stars = 0

   Variable |     Obs       Mean    Std. Dev.      Min        Max
------------+--------------------------------------------------------
   emredisc |      13   5.077789    .5502882    4.23029    6.00324
   infectco |      14   74.42857    8.428106         58         94
   thrombtt |       9   .6649005    .1369277    .464912    .849515


-> pi_stars = 1

   Variable |     Obs       Mean    Std. Dev.      Min        Max
------------+--------------------------------------------------------
   emredisc |      21   5.272189    .5530005    4.17088    6.30379
   infectco |      30   78.86667   11.48832         53         99
   thrombtt |      21   .5942645    .2030293          0    .810127


-> pi_stars = 2

   Variable |     Obs       Mean    Std. Dev.      Min        Max
------------+--------------------------------------------------------
   emredisc |      50   5.395759    .6700501    3.78493     6.7788
   infectco |      59    80.9661   12.56153         27         98
   thrombtt |      41   .6645407    .1876236          0    .879518


-> pi_stars = 3

   Variable |     Obs       Mean    Std. Dev.      Min        Max
------------+--------------------------------------------------------
   emredisc |      42   5.585308    .7031716     4.5388     7.4693
   infectco |      53   84.54717    8.599119         60        100
   thrombtt |      49   .6386945    .2207836          0          1
```

5.1.2.3.   *Patient focus*

The nineteen patient focus variables consist of five outpatient A&E survey variables which are all highly correlated (0.82 and higher). Although using these A&E outpatient survey variables in a regression together would lead to problems of multi-collinearity, we wanted to see which of these survey variables would emerge as significant. We therefore first ran the survey variables in a single model, then ran a model on the rest of the patient focus variables and finally ran a model combining all patient focus variables. All three of these models were run without the variable *hartwait* (nine month heart operation waits) since the variable only has 25 observations.

Only one of the outpatient A&E survey variables emerged as significant, namely *opsclean* (outpatient survey - clean, comfortable, friendly place to be). Note however the extremely low R-squared in the model (1.3 percent).

Table 11: Ordered probit with patient survey indicators

```
Ordered probit estimates                         Number of obs   =        154
                                                 Wald chi2(1)    =       6.29
                                                 Prob > chi2     =     0.0121
Log likelihood = -191.9411                       Pseudo R2       =     0.0129


-------------------------------------------------------------------------------
            |               Robust
   pi_stars |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+------------------------------------------------------------------
  opscleanst |   .2055568   .0819313     2.51   0.012     .0449745    .3661391
------------+------------------------------------------------------------------
       _cut1 |   -1.37797   .1535491           (Ancillary parameters)
       _cut2 |  -.6471343   .1142895
       _cut3 |   .3855849   .1049066
-------------------------------------------------------------------------------
* opscleanst = outpatient survey clean, comfortable, friendly place - higher number
better (standardised)
```

We then ran the ordered probit stepwise model on the rest of the patient focus variables (excluding the outpatient A&E survey variables). The R-squared is slightly higher at 13 percent and the variables all have the expected signs.

Table 12: Ordered probit with the rest of the patient focus indicators

```
Ordered probit estimates                         Number of obs   =        155
                                                 Wald chi2(3)    =      48.74
                                                 Prob > chi2     =     0.0000
Log likelihood = -171.13729                      Pseudo R2       =     0.1300


-------------------------------------------------------------------------------
            |               Robust
   pi_stars |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
------------+------------------------------------------------------------------
  inpwt6most |   .4302034   .1112788     3.87   0.000     .2121011    .6483058
   aewait4st |   .4367719   .0984798     4.44   0.000     .2437551    .6297887
  totwtinpst |   .2316286   .0823328     2.81   0.005     .0702592    .3929979
------------+------------------------------------------------------------------
       _cut1 |  -1.701048   .1742324           (Ancillary parameters)
       _cut2 |  -.7501341   .1169811
       _cut3 |   .4546838   .1149748
-------------------------------------------------------------------------------
* inpwt6most = six month inpatient waits - higher number better (standardised)
* aewait4st = A&E emergency admission waits - higher number better (standardised)
* totwtinpst = total inpatient waits - higher number better (standardised)
```

The following table shows the results when including all patient focus variables in the stepwise procedure. Five out of 19 variables emerged as significant, although this time *opschoic* (outpatient survey - information and choice) was significant and not *opsclean* (outpatient survey - clean, comfortable, friendly place to be). The R-squared shows only a slight improvement over the previous model, suggesting that the variables *opschoic* (outpatient survey - information and choice) and *wtchescl* (waiting times for rapid access chest pain clinic) do not add a great deal to the model.

Table 13: Ordered probit with all patient focus indicators

```
Ordered probit estimates                        Number of obs   =        136
                                                Wald chi2(5)    =      40.82
                                                Prob > chi2     =     0.0000
Log likelihood = -144.84903                     Pseudo R2       =     0.1441


------------------------------------------------------------------------------
             |               Robust
    pi_stars |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   aewait4st |   .3095151    .118226     2.62   0.009     .0777964    .5412338
   opschoicst |  .3193397    .114028     2.80   0.005      .095849    .5428304
   inpwt6most |  .4016006   .1166448     3.44   0.001     .1729809    .6302202
   totwtinpst |  .3058207   .0894925     3.42   0.001     .1304185    .4812229
   wtchesclst |  .1774151   .0906463     1.96   0.050    -.0002483    .3550786
-------------+----------------------------------------------------------------
        _cut1 |  -1.825554   .2156484            (Ancillary parameters)
        _cut2 |  -.9054773    .133013
        _cut3 |   .3815863   .1232125
------------------------------------------------------------------------------
```
* aewait4st = A&E emergency admission waits - higher number better (standardised)
* opschoicst = outpatient survey on information and choice - higher number better
(standardised)
* inpwt6most = six month inpatient waits - higher number better (standardised)
* totwtinpst = total inpatient waits - higher number better (standardised)
* wtchesclst = waiting times for rapid access chest pain clinic - higher number better
(standardised)

Table 14: Descriptive statistics for patient focus indicators

```
    Variable |      Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    aewait4 |      155    .8891409   .1124877     .463459          1
    opschoic |     154   -.0478766   .8636292      -3.025      1.533
    inpwt6mo |     156    82.01798   7.296323    67.80923        100
    totwtinp |     156    .0257417   .1231704    -.601022   .3055774
    wtchescl |     139    .8272648   .2455943    .0410959          1
```

The following table shows the distribution of the above indicators across the star rating categories. For the most part, the mean values for the variables increase across the four categories as we would expect.

Table 15: Descriptive statistics for patient focus indicators across star ratings

```
-> pi_stars = 0

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     aewait4 |      14    .7672669    .1574693    .463459    .962908
     opschoic |      14      .1765    .8343504     -1.746      1.172
     inpwt6mo |      14    78.9102    6.177502   69.90018     89.203
     totwtinp |      14   -.0594583   .1551864  -.2804325   .2231932
     wtchescl |      11    .7007321     .30676    .229167          1


-> pi_stars = 1

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     aewait4 |      30    .8670281    .1060653    .562171    .999742
     opschoic |      28   -.3568571    .7729418     -3.025       .747
     inpwt6mo |      30    78.31647     6.3643   70.50236   92.83066
     totwtinp |      30   -.0139222   .1699513   -.601022   .2107317
     wtchescl |      26    .7771914    .2626325     .10559          1


-> pi_stars = 2

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     aewait4 |      59    .8941134    .092193    .625574    .998789
     opschoic |      59   -.1993898    .9259547      -2.38      1.408
     inpwt6mo |      59    81.64614    6.243695   67.80923        100
     totwtinp |      59     .033258    .0949373  -.2090643   .2960256
     wtchescl |      53    .8401629    .2577676   .0410959          1


-> pi_stars = 3

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     aewait4 |      52    .9290685    .0990235    .516798          1
     opschoic |      53    .2247547    .7662937     -1.882      1.533
     inpwt6mo |      53    85.34803    7.817279   68.53228        100
     totwtinp |      53    .0623315    .0935339  -.1042152   .3055774
     wtchescl |      49    .8682886    .1974099    .178082          1
```

5.1.3. Regressions with key targets and indicators together

The following table shows the results from the stepwise linear regression of the star ratings on all the key targets and indicators combined. The results are virtually identical to those obtained using the key targets only. Again 8 of the 9 key targets are significant, along with the CHI review, along with one other patient focus indicator, *inpwt6mo* (six month inpatient waits). None of the clinical focus or capacity and capability indicators emerged as significant. It is not surprising that the clinical focus variables do not enter this final model, since none of them were significant at the 5 percent level when no other variables were included in the model. The proportion of explained variation is 62 percent, slightly higher than the regression results with key targets and the CHI review only. Thus the one extra variable, *inpwt6mo* (six month inpatient waits) contributes

very little additional to the final model. All coefficients have the expected signs and particularly the key targets and CHI review are highly significant.

Table 16: Ordered probit of star ratings on key targets and indicators

```
Ordered probit estimates                    Number of obs   =        142
                                            Wald chi2(10)   =      92.53
                                            Prob > chi2     =     0.0000
Log likelihood = -66.615853                 Pseudo R2       =     0.6239

------------------------------------------------------------------------------
             |             Robust
    pi_stars |     Coef.   Std. Err.     z     P>|z|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
      finman |  .8274465   .1218733    6.79   0.000    .5885792    1.066314
  chi_review |  1.052962   .1814504    5.80   0.000    .6973262    1.408599
  aetotwaitst |  .970736   .1901334    5.11   0.000    .5980814    1.343391
   opwtgtst_s |  1.810476   .2631389    6.88   0.000    1.294733    2.326218
     impwlive |  3.770388   .6740256    5.59   0.000    2.449322    5.091453
   cancop28st | -.481581   .1176982   -4.09   0.000   -.7122653   -.2508967
    cancwaitst |  .4958832   .1178422    4.21   0.000    .2649166    .7268497
    inwtgtst_s |  1.197917    .358292    3.34   0.001    .4956771    1.900156
   aewait12_s |  1.332493   .3528283    3.78   0.000    .6409627    2.024024
    inpwt6most |  .3684853   .1443649    2.55   0.011    .0855353    .6514353
-------------+----------------------------------------------------------------
        _cut1 |   9.55876   1.442148          (Ancillary parameters)
        _cut2 |  13.14215    1.78291
        _cut3 |  16.57071   2.066994
------------------------------------------------------------------------------
* finman = financial management - higher number better (not standardised)
* chi_review = CHI inspection - higher number better (not standardised)
* aetotwaitst = percent pts waiting <4 hrs - higher number better (standardised)
* opwtgtst_s = outpatients waiting against standard - higher number better (not
standardised)
* impwlive = improving working lives - higher number better (not standardised)
* cancop28st = cancelled operations not admitted in 28 days - lower number better
(standardised)
* cancwaitst = cancer waits <2 wks - higher number better (standardised)
* inwtgtst_s = inpatients waiting against standard - higher number better (not
standardised)
* aewait12_s = A&E 12 hour waits - higher number better (not standardised)
* inpwt6most = six month inpatient waits - higher number better (standardised)
```

The following tables show the descriptive statistics for the key targets and indicators in the above regression. Again, for the most part, all variables show improved (mean) performance across the four categories.

Table 17: Descriptive statistics for key targets and indicators

```
    Variable |     Obs        Mean   Std. Dev.        Min        Max
-------------+--------------------------------------------------------
      finman |     156   .3205128    1.20208         -2          1
  chi_review |     148    2.77027   .6810815          2          4
   aetotwait |     155   92.90314   5.047609   70.73631   99.71449
   opwtgtst_s |    156   1.839744   .4613696          0          2
     impwlive |    156   .9423077   .2339116          0          1
      cancop28 |   151   .0014517   .0022344          0   .0209281
     cancwait |    156   97.16174   3.889902   76.47059        100
   inwtgtst_s |    156   1.871795   .4503468          0          2
    aewait12_s |   155   1.812903   .5319298          0          2
     inpwt6mo |    156   82.01798   7.296323   67.80923        100
```

Table 18: Descriptive statistics for key targets and indicators across star ratings

```
-> pi_stars = 0

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+-----------------------------------------------------------
      finman |      14   -1.714286    .8254203         -2           1
  chi_review |      14    2.428571    .5135526          2           3
    aetotwait |     14    84.55471    8.351654   70.73631    96.49533
   opwtgtst_s |     14         1.5    .7595545          0           2
     impwlive |     14    .8571429    .3631365          0           1
     cancop28 |     11    .0020793    .0017419          0    .0065075
     cancwait |     14     96.0018    4.117867   84.26736    99.35139
   inwtgtst_s |     14    1.285714    .9138735          0           2
   aewait12_s |     14    .8571429    .9492623          0           2
      inpwt6mo |    14     78.9102    6.177502   69.90018     89.203


-> pi_stars = 1

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+-----------------------------------------------------------
      finman |      30         -.3    1.368362         -2           1
  chi_review |      29    2.241379    .4354942          2           3
    aetotwait |     30    92.64052    5.783627   77.48148    99.71449
   opwtgtst_s |     30         1.7    .5959634          0           2
     impwlive |     30          .8    .4068381          0           1
     cancop28 |     28     .002968    .0040905          0    .0209281
     cancwait |     30    95.25516    5.607419   76.47059         100
   inwtgtst_s |     30         1.7    .6512587          0           2
   aewait12_s |     30         1.7    .6512587          0           2
      inpwt6mo |    30    78.31647      6.3643   70.50236    92.83066


-> pi_stars = 2

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+-----------------------------------------------------------
      finman |      59    .5084746    1.056554         -2           1
  chi_review |      56    2.660714    .6681531          2           4
    aetotwait |     59     93.6167    3.197601   85.71429    99.46996
   opwtgtst_s |     59    1.847458     .447736          0           2
     impwlive |     59    .9830508    .1301889          0           1
     cancop28 |     59    .0012419    .0013308          0    .0053758
     cancwait |     59    97.29841     3.51898   84.71338         100
   inwtgtst_s |     59           2           0          2           2
   aewait12_s |     59    1.932203    .2535545          1           2
      inpwt6mo |    59    81.64614    6.243695   67.80923         100


-> pi_stars = 3

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+-----------------------------------------------------------
      finman |      53           1           0          1           1
  chi_review |      49    3.306122    .4656573          3           4
    aetotwait |     52    94.49269    2.483596    89.0863    98.72041
   opwtgtst_s |     53           2           0          2           2
     impwlive |     53           1           0          1           1
     cancop28 |     53    .0007539    .0011347          0    .0057569
     cancwait |     53     98.3952    2.341984   89.26247         100
   inwtgtst_s |     53    1.981132    .1373606          1           2
   aewait12_s |     52           2           0          2           2
      inpwt6mo |    53    85.34803    7.817279   68.53228         100
```

5.1.4. Comments

This section has explored the influence of key targets and the balanced scorecard indicators on the performance ratings of acute trusts. We have not surprisingly found that the key targets and the CHI review are the biggest influence on ratings – alone they explain 61% of the variation in ratings. Of all the remaining balanced scorecard indicators, only one – six month inpatient waits – adds significant explanatory power (1% additional). Within the modelling framework we have adopted, the indicators reflecting clinical focus do not affect ratings materially in any way.

5.2. Regression of star ratings on all other explanatory variables

The preceding sections examined the relationship between the indicators used to construct the ratings and the ratings themselves. Of more potential interest to policy makers is the association of ratings with other variables, some of which may be beyond managerial control. This section therefore explores the relationship between acute Trust star ratings and all other explanatory variables. We ran stepwise ordered probit models of star ratings on groups of other explanatory factors, namely socio-economic and deprivation measures such as Census data, geographical measures such as a London dummy variable, performance data of local commissioners (PCTs), supply variables and Trust characteristics and large numbers of organisational variables (staffing, resources, institutional arrangements, expenditure). The extent to which these variables are truly exogenous varies, and some may be subject to some degree of managerial control (albeit at a cost). We cannot pass definitive judgement on the extent to which factors lie outside managerial control, but this section does highlight the relative importance of other factors.

The full list of Trust variables in the database is listed in Appendix A. Since there are over 1500 potential variables the statistical models cannot be implemented if too many explanatory variables were included at a time. Therefore, smaller batches of indicators were entered in the stepwise modelling procedure, and some judgement was applied to select the most plausible and relevant explanatory variables. In future work selection of variables should be based on explicit theoretical models of the determination of performance.

The following table shows the ordered probit results for the regression of star ratings on all other explanatory variables. The R-squared is 32 percent.

Table 19: Ordered probit of star ratings on all other explanatory variables

```
Ordered probit estimates                    Number of obs   =        127
                                            Wald chi2(10)   =      99.56
                                            Prob > chi2     =     0.0000
Log likelihood = -107.89149                 Pseudo R2       =     0.3207

------------------------------------------------------------------------------
             |               Robust
    pi_stars |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 ipd_spellst |  -.5123802   .1345365    -3.81   0.000    -.7760668   -.2486936
  complainst |  -.3881246    .109668    -3.54   0.000    -.6030699   -.1731792
  agnurspcxst |  -.5473747   .1376121    -3.98   0.000    -.8170894   -.2776599
agadminpcxst |   .5022693   .1333602     3.77   0.000     .2408881    .7636505
   surplusst |   .7416332   .1978397     3.75   0.000     .3538746    1.129392
 stationery~t |   .2861486   .1150638     2.49   0.013     .0606277    .5116696
   hcasalpcst |   .2702954   .1293264     2.09   0.037     .0168203    .5237706
 pct_ttimea~t |   .6536963   .1433081     4.56   0.000     .3728175    .934575
 radiothepp~t |  -1.268658   .3836069    -3.31   0.001    -2.020513   -.5168019
  supra~oppcst |   1.170334   .3324005     3.52   0.000     .518841    1.821827
-------------+----------------------------------------------------------------
        _cut1 |   -2.39331   .3011404          (Ancillary parameters)
        _cut2 |  -.8994625   .1651402
        _cut3 |   .7102596   .1525313
------------------------------------------------------------------------------
```

* ipd_spellst = inpatient days per spell or length of stay - higher number longer stay (standardised)
* complainst = number of complaints received - lower number better (standardised)
* agnurspcxst = percent nurse expenditure on agency staff - higher number more bank nurses (standardised)
* agadminpcxst = percent admin expenditure on agency staff - higher number more agency admin staff (standardised)
* surplusst = retained financial surplus - higher number better (standardised)
* stationeryxpcst = percent establishment expenditure on stationery (standardised)
* hcasalpcst = percent salary expenditure on health care assistants (standardised)
* pct_ttimeaaest = PCT target total time in A&E - higher number better (standardised)
* radiotheppcst = percent radio therapy episodes from total episodes (standardised)
* supraregservoppcst = supra-regional specialist services outpatient attendances from total (standardised)

The results suggest that higher star rating (better performance) is associated with shorter inpatient lengths of stay, fewer complaints received, a higher retained financial surplus (which will be closely linked to the financial management key target), a higher proportion of salary expenditure on health care assistants, and a higher proportion of supra-regional specialist services outpatient attendances[1]. Trusts offering more

---

[1] This particular measure includes the following services: Cranio Facial Services, Chorion-carcinoma, Liver Transplantation, Severe Combined Immunodeficiency and Related Disorders, Ocular Oncology, Management of Gauchers Disease, Severe Personality Disorder Services, Small Bowel Transplantation, Inpatient Psychiatric Service for Deaf Children and Adolescents, Pulmonary Thrombo Endarectomy, Prion Disease, Amyloidosis, Paediatric Bladder Exstrophy, Rare Neuromuscular Diseases, Psuedomyxoma Peritonei, Gynaecological Reconstruction, Treatment of Established Intestinal Failure, Total Anorecial Reconstruction.

outpatient attendances for these specialist services appear to perform better in the star ratings, possibly picking up a casemix and specialisation effect.

Higher star ratings (better performance) are associated with a higher proportion of expenditure on agency administrative staff and a higher proportion of expenditure on stationery. The star ratings are also significantly associated with a lower proportion of expenditure on agency nursing staff (or bank nurses). Higher proportions of agency nursing staff have been linked elsewhere with poorer patient care, less continuity and worse health outcomes (Audit Commission, 2001). If higher star ratings are indeed associated with better patient care, then this result would seem to concur.

The PCT key target for lower waiting times in A&E is also significantly associated with the acute Trust star ratings.

None of the socio-economic or deprivation measures emerge as significant in the model. This may mean that deprivation is not a significant factor in Trusts achieving their star ratings. However it may mean that the existing data do not adequately reflect deprivation. Deprivation variables were attributed to Trusts via the purchaser-provider matrix for the five main PCTs with which a Trust does business. The deprivation measures are therefore not directly attributed to Trust populations, and therefore some caution is needed in interpreting these results.

Table 20: Descriptive statistics for explanatory variables

```
    Variable |     Obs       Mean   Std. Dev.        Min        Max
-------------+--------------------------------------------------------
    ipd_spell |     156   3.866466   .7177573   2.354492   7.103635
     complain |     155   428.6516   211.3043        151       1248
    agnurspcx |     156   .0714823   .0685557          0   .3865399
   agadminpcx |     156   .0403921   .0503002          0   .3225332
      surplus |     156   -618.641   4688.555     -44620      11668
  stationery~c |     156   303.2609   65.41423   182.6884   484.3024
      hcasalpc |     156   .0537492   .0294874   .0003151   .1431505
  pct_ttimeaae |     127   92.64381   4.681339   73.17088   99.33518
    radiotheppc |     156   .0084831   .0208402          0   .1221323
  suprare~oppc |     156   .0003544   .0019058          0   .0169946
```

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5.3. Regressions of key targets on all other explanatory variables

We now examine which factors affect the achievement of the key targets for acute Trusts, given that the key targets largely drive the star rating system. The tables show the regression results for each of the key targets on all other explanatory variables. Some models are run using OLS whilst others use ordered probit or logit models, depending on the nature of the key target used as the dependent variable.

5.3.1. Total time in A&E

The following table shows the OLS regression results for the target total time in A&E. A higher number means the target is achieved or a higher percentage of patients are waiting less than 4 hours in A&E. A reasonable R-squared of 52 percent is achieved.

Table 21: Regression results for total time in A&E

```
Regression with robust standard errors                Number of obs =      121
                                                      F( 13,   107) =     7.27
                                                      Prob > F      =   0.0000
                                                      R-squared     =   0.5188
                                                      Root MSE      =   .76569

------------------------------------------------------------------------------
             |               Robust
 aetotwaitst |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    surplusst |   .1835914   .0782267     2.35   0.021     .0285161    .3386668
    hcasalpcst |   .2369501   .0753663     3.14   0.002     .0875452     .386355
  cardiothsu~t |   .6979795   .1227033     5.69   0.000     .4547344    .9412245
   nephroldpcst |   .2433273   .0592182     4.11   0.000      .125934    .3607205
     mansalpcst |  -.2531439     .07444    -3.40   0.001    -.4007124   -.1055754
   opthalmxpcst |  -1.030564   .4691826    -2.20   0.030    -1.960664   -.1004642
   supra~eppcst |    .228257    .039611     5.76   0.000     .1497328    .3067812
   rheumatopp~t |   1.139738   .4552701     2.50   0.014     .2372184    2.042258
   radiothepp~t |  -.9917524   .2736587    -3.62   0.000    -1.534249    -.449256
   pct_poppuc~t |   .3302195   .1169878     2.82   0.006     .0983047    .5621342
   pct_aplwb~st |  -.2278121   .0760909    -2.99   0.003    -.3786534   -.0769709
        london |   .8651487    .280883     3.08   0.003     .3083309    1.421967
  train_oth_~t |  -.2013707    .101412    -1.99   0.050    -.4024081   -.0003333
         _cons |  -.3111538   .1140988    -2.73   0.007    -.5373414   -.0849662
------------------------------------------------------------------------------
* surplusst = retained financial surplus - higher number better (standardised)
* hcasalpcst = percent salary expenditure on health care assistants (standardised)
* cardiothsureppcst = percent cardio-thoracic surgery inpatient episodes from total
(standardised)
* nephroldpcst = percent nephrology days from total inpatient days (standardised)
* mansalpcst = percent salary expenditure on managers (standardised)
* opthalmxpcst = percent ophthalmology expenditure from total inpatient expenditure
(standardised)
* supraregserveppcst = supra-regional specialist services inpatient episodes from total
(standardised)
* rheumatoppcst = percent rheumatology outpatient attendances from total (standardised)
* radiotheppcst = percent radiotherapy inpatient episodes from total (standardised)
* pct_poppucarst = derived from PCT matrix - unpaid care providers in population
(standardised)
* pct_aplwbwgtst = derived from PCT matrix - percentage of low birth-weight babies
(standardised)
* london = London dummy variable London=1 (not standardised)
* train_oth_cons_pcst = ratio of trainees (SHOs + HOs + Registrars) to consultants
(standardised)
```

Two of the deprivation measures are significant, namely A&E waits are associated with a higher proportion of unpaid care providers in the population and a lower percentage of low birth-weight babies. The London dummy variable is also significant suggesting that London Trusts may do better on this particular target. Again the specialist regional services is significant suggesting a possible casemix effect.

Table 22: Descriptive statistics for explanatory variables

```
      Variable |      Obs        Mean    Std. Dev.        Min         Max
---------------+-----------------------------------------------------------
      aetotwait |      155    92.90314     5.047609    70.73631    99.71449
       surplus |      156    -618.641     4688.555      -44620       11668
      hcasalpc |      156    .0537492     .0294874    .0003151    .1431505
   cardiothsu~c |      156     .003401     .0085112           0    .0563533
     nephroldpc |      156     .009175     .0174638           0    .0945951
       mansalpc |      156    .0435693     .0132635    .0119782     .084239
     opthalmxpc |      153    .0213698     .0168617           0    .0912604
  suprare~eppc |      156    .0004537     .0026534           0    .0300889
    rheumatoppc |      156    .0303984     .0154652           0    .0784655
     radiotheppc |      156    .0084831     .0208402           0    .1221323
    pct_poppucar |      127    .0977228     .0112244    .0706012    .1243055
    pct_aplwbwgt |      127    7.384791     .8639966     5.99624     9.70048
        london |      156    .1730769     .3795322           0           1
   train_oth_~c |      150    1.778529     .3015866    .8853065    3.841379
```

5.3.2. A&E emergency waits (12 hours)

The following table shows the ordered probit results for the target A&E emergency waits. A higher number means fewer breaches or fewer patients are waiting more than 12 hours in A&E. For this variable the raw CHI data was transformed to the categorical variable constructed by CHI using the same thresholds. The R-squared is 45 percent.

Table 23: Ordered probit results for A&E emergency waits

```
Ordered probit estimates                      Number of obs   =        122
                                              Wald chi2(8)    =      38.27
                                              Prob > chi2     =     0.0000
Log likelihood = -27.261024                   Pseudo R2       =     0.4553

------------------------------------------------------------------------------
             |               Robust
   aewait12_s |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 prop_nursest |   1.333649   .4458622     2.99   0.003     .4597749    2.207522
    surplusst |   .4915206   .1462027     3.36   0.001     .2049685    .7780726
  cardiooppcst |  -2.112312   .5058631    -4.18   0.000    -3.103786   -1.120839
  nephrolopx~t |   .6432526   .3122604     2.06   0.039     .0312334    1.255272
    occupancst |  -.7770372   .3049176    -2.55   0.011    -1.374665   -.1794097
    complainst |  -.5858601   .2743689    -2.14   0.033    -1.123613   -.0481069
   daycase_th~t |   1.29273   .3311157     3.90   0.000     .6437548    1.941705
   totop1_dnast |   .9115347   .2307749     3.95   0.000     .4592242    1.363845
-------------+----------------------------------------------------------------
        _cut1 |  -3.154709   .6050863           (Ancillary parameters)
        _cut2 |  -2.598086    .490561
------------------------------------------------------------------------------
* prop_nursest = proportion of nurses from WTE staff (standardised)
* surplusst = retained financial surplus - higher number better (standardised)
* cardiooppcst = proportion of cardiology outpatient attendances from total
(standardised)
* nephrolopxpcst = proportion of nephrology outpatient expenditure from total
(standardised)
* occupancst = occupancy rate (standardised)
* complainst = number of complaints received - lower number better (standardised)
* daycase_theatres = number of available dedicated daycase theatres (standardised)
* totop1_dnast = proportion of first outpatient attendances Do Not Attend (DNA)
(standardised)
```

Trusts will do better on this target if they have a higher proportion of nursing staff, are in financial surplus, have lower occupancy rates, fewer patient complaints, and more daycase theatres available.

Table 24: Descriptive statistics for explanatory variables

```
     Variable |      Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
   aewait12_s |      155   1.812903    .5319298          0          2
   prop_nurse |      155   3.251092    .5321148    2.30163   6.220359
      surplus |      156   -618.641    4688.555     -44620      11668
   cardiooppc |      156   .0275413    .0221871          0   .0928674
 nephrolopxpc |      153   .0068283    .0114487          0   .0560759
      occupanc |      155   .8555124    .0510058   .7104876   .9720087
      complain |      155   428.6516    211.3043        151       1248
  daycase_th~s |      126    3.15873    1.936647          1         10
   totop1_dna |      155   .0977422    .0355693   .0449665   .2060796
```

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5.3.3. Cancelled operations not admitted within 28 days

The following table shows the OLS regression results for the target - cancelled operations not admitted within 28 days. A smaller number means the target is achieved or fewer patients are waiting more than 28 days after a cancelled operation. When the critical level for dropping variables from the stepwise regression was set at 5% the explanatory power of the model was very poor. We therefore used a 10% critical threshold.

Table 25: Regression results for cancelled operations not admitted within 28 days

```
Regression with robust standard errors              Number of obs =     100
                                                    F(  4,    95) =  175.47
                                                    Prob > F      =  0.0000
                                                    R-squared     =  0.1384
                                                    Root MSE      =  .70028

------------------------------------------------------------------------------
             |             Robust
  cancop28st |    Coef.   Std. Err.      t     P>|t|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
 supradists~t |   .44078   .0489412     9.01   0.000    .3436195    .5379406
 a_and_e_hp~t | -.0775358  .0302051    -2.57   0.012   -.1375005   -.017571
 daycase_th~t | -.1396594  .0742287    -1.88   0.063   -.2870219    .0077031
  ct_scansst |   .1873655  .0973011     1.93   0.057   -.0058016    .3805325
       _cons |  -.007316   .0692884    -0.11   0.916   -.1448708    .1302388
------------------------------------------------------------------------------
* supradistservop1pcst = supra-district specialist services first outpatient attendances
from total (standardised)
* a_and_e_hppcst = proportion of accident and emergency hospital practitioners from
total (standardised)
* daycase_theatresst = number of available dedicated daycase theatres (standardised)
* ct_scansst = the number of CT scans performed (standardised)
```

Trusts are more likely to achieve their target of fewer cancelled operations if they have a higher proportion of A&E hospital practitioners, have more dedicated daycase theatres, perform fewer CT scans and fewer supra-district specialist services. (These include renal dialysis and CAPD, renal transplant and open-heart surgery).

Table 26: Descriptive statistics for explanatory variables

```
    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    cancop28 |     151    .0014517    .0022344         0    .0209281
 supradists~c |    156    .0005826    .0058337         0    .0725916
 a_and_e_hppc |    130    .0417727     .127585         0          1
 daycase_th~s |    126     3.15873    1.936647         1         10
    ct_scans |     151    10986.06    6515.673      3240      51365
```

5.3.4. Two week cancer waits

The following table shows the OLS regression results for the target two week cancer waits. A higher number means the target is achieved or a higher percentage of patients are seen within two weeks for cancer treatment in an outpatient appointment. The model explains 22 percent of the variation in cancer waits.

Table 27: Regression results for two-week cancer waits

```
Regression with robust standard errors              Number of obs =      155
                                                    F(  6,   148) =     5.02
                                                    Prob > F      =   0.0001
                                                    R-squared     =   0.2190
                                                    Root MSE      =  .89446

------------------------------------------------------------------------------
             |               Robust
  cancwaitst |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   orthoeppcst | -1.176694   .3918776    -3.00   0.003    -1.951092   -.4022962
  hlthxnonnh~t | -.1652759   .0623076    -2.65   0.009    -.2884034   -.0421485
    occupancst | -.2568098   .0974466    -2.64   0.009    -.4493763   -.0642433
     resolvest |  .2690189   .0869067     3.10   0.002     .0972805    .4407572
  totop_privst | -.1794002   .0632493    -2.84   0.005    -.3043885   -.0544119
       london |  .5635379   .1594006     3.54   0.001     .2485428    .8785329
        _cons | -.1800994   .1046458    -1.72   0.087    -.3868922    .0266934
------------------------------------------------------------------------------
* orthoeppcst = proportion orthopaedic inpatient episodes from total (standardised)
* hlthxnonnhsst = healthcare expenditure (purchase) from non NHS bodies (standardised)
* occupancst = occupancy rate (standardised)
* resolvest = percentage of complaints resolved within 20 working days (standardised)
* totop_privst = total outpatient attendances by private patients (standardised)
* london = London dummy variable (not standardised)
```

The results suggest that Trusts performing better on cancer waits also appear to have lower occupancy rates, a lower proportion of expenditure on healthcare from outside the NHS, a higher proportion of complaints resolved, and a lower proportion of private patients seen as outpatients, leaving more time to see NHS patients. The London dummy is again significant suggesting that London Trusts may do better on this particular target.

Table 28: Descriptive statistics for explanatory variables

```
    Variable |     Obs       Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    cancwait |     156   97.16174    3.889902    76.47059         100
    orthoeppc |    156    .0723388    .0258431           0    .2113377
  hlthxnonnhs |    156    995903.1     1484322      -15323     1.05e+07
     occupanc |    155    .8555124    .0510058    .7104876    .9720087
      resolve |    155    .6375448    .1717428    .2489627    .9868421
   totop_priv |    155    969.4645    2058.343           0       14497
       london |    156    .1730769    .3795322           0           1
```

5.3.5. Financial management

The following table shows the ordered probit results for the target financial management. A higher number means Trusts are achieving the target with no deficit or unplanned financial support. The model has a high R-squared of 65 percent which is almost entirely driven by the variable retained financial surplus. Without this variable, the model performed very poorly.

Table 29: Ordered probit results for financial management

```
Ordered probit estimates                      Number of obs   =        110
                                              Wald chi2(6)    =      30.01
                                              Prob > chi2     =     0.0000
Log likelihood = -23.762494                   Pseudo R2       =     0.6546

------------------------------------------------------------------------------
             |               Robust
      finman |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    surplusst |   8.843271    1.97026     4.49   0.000     4.981632    12.70491
   anaesthdpcst |   1.62822   .6341527     2.57   0.010     .3853036    2.871136
  pct_hhnoca~t |   .6191612   .197978      3.13   0.002     .2311315    1.007191
  vacy_nurs_~t |  -.5977032   .2857342    -2.09   0.036    -1.157732   -.0376746
   ipd_spellst |  -.9278756   .3851021    -2.41   0.016    -1.682662   -.1730894
  vacy_physi~t |   .800504    .3717928     2.15   0.031     .0718035    1.529204
-------------+----------------------------------------------------------------
        _cut1 |  -1.782078   .4827112            (Ancillary parameters)
        _cut2 |   -.829645   .2589627
------------------------------------------------------------------------------
* surplusst = retained financial surplus - higher number better (standardised)
* anaesthdpcst = percent anaesthetic inpatient days from total (standardised)
* pct_hhnocarst = derived from PCT matrix - households without a car (standardised)
* vacy_nurs_midw_hlthvisst = vacancy rate for nurses, midwives and health visitors
(standardised)
* ipd_spellst = inpatient days per spell or length of stay - higher number longer stay
(standardised)
* vacy_physiost = vacancy rate for physiotherapists (standardised)
```

The results suggest better financial management is associated with shorter inpatient lengths of stay, lower vacancy rates for nurses, midwives and health visitors and a higher vacancy rate for physiotherapists. The deprivation measure of the proportion of households with no car is positively associated with better financial management.

Table 30: Descriptive statistics for explanatory variables

```
    Variable |       Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
      finman |       156    .3205128    1.20208         -2          1
     surplus |       156    -618.641    4688.555      -44620      11668
   anaesthdpc |      156    .0038446    .0048638          0    .0243032
  pct_hhnocar |      127    .2762451    .0995274    .132986    .5594159
  vacy_nurs_~s |    155    .0279923    .0332665          0    .1718064
    ipd_spell |      156    3.866466    .7177573    2.354492    7.103635
  vacy_physio |      135    .0436748    .0638768          0    .3390071
```

5.3.6. Hospital cleanliness

The following table shows the OLS regression results for the target hospital cleanliness. A higher number means the target is achieved or a higher score on hospital cleanliness. The R-squared is 26 percent.

Table 31: Regression results for hospital cleanliness

```
Regression with robust standard errors               Number of obs =      127
                                                     F(  6,   120) =    13.28
                                                     Prob > F      =   0.0000
                                                     R-squared     =   0.2568
                                                     Root MSE      =   .87553

------------------------------------------------------------------------------
             |               Robust
  hoscleanst |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   travelxpcst |   .2821127   .0759414     3.71   0.000     .1317541    .4324713
  supradists~t |  -.3143582   .0454615    -6.91   0.000    -.4043689   -.2243476
      otheppcst |  -.1224277   .0406985    -3.01   0.003    -.2030079   -.0418474
  pct_ownoccst |  -.2145825   .0773251    -2.78   0.006    -.3676809   -.0614842
  pct_poppuc~t |   .2903814   .0808708     3.59   0.000     .1302628    .4504999
   prop_adminst |   .2007713   .0739353     2.72   0.008     .0543845    .3471582
         _cons |  -.0983715   .0764794    -1.29   0.201    -.2497954    .0530524
------------------------------------------------------------------------------
* travelxpcst = proportion travel expenditure from establishment expenditure
(standardised)
* supradistservop1pcst = supra-district specialist services first outpatient attendances
from total (standardised)
* otheppcst = proportion of other inpatient episodes (not medical, surgical, maternity)
(standardised)
* pct_ownoccst = derived from PCT matrix - owner occupied households (standardised)
* pct_poppucarst = derived from PCT matrix - unpaid care providers in population
(standardised)
* prop_adminst = proportion of administrative from WTE staff (standardised)
```

Hospital cleanliness is associated with two of the deprivation measures, namely a higher proportion of unpaid care providers in the population and a lower proportion of owner occupied households. Hospital cleanliness is also associated with a higher proportion of administrative staff, more travel expenditure and fewer specialist services.

Table 32: Descriptive statistics for explanatory variables

```
    Variable |     Obs       Mean   Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    hosclean |     156   62.38612    5.36745        51.2          72
    travelxpc |     156    284.278   108.6569    53.68177    870.0168
 supradists~c |     156   .0005826   .0058337          0    .0725916
      otheppc |     156   .0355398   .0962128          0    1.130479
  pct_ownocc |     127   .6743272   .1008413    .334574    .7865255
 pct_poppucar |     127   .0977228   .0112244   .0706012    .1243055
   prop_admin |     155   1.698081   .6516171   .5189701    3.861662
```

39

5.3.7. Improving working lives

The following table shows the logistic results for the target improving working lives. A higher number means achieving the target or the improved working lives standard. Whilst the R-squared is very high, some caution is warranted with attributing too much significance to these results, since there is very little variation in the dependent variable. Only 9 out of 156 Trusts did not achieve the standard (=0), the other 147 did (=1).

Table 33: Logistic regression results for improving working lives

```
Ordered logit estimates                      Number of obs   =         123
                                             Wald chi2(5)    =       28.28
                                             Prob > chi2     =      0.0000
Log likelihood = -5.4677316                  Pseudo R2       =      0.7385


------------------------------------------------------------------------------
             |               Robust
    impwlive |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  officexpcst |   4.527825   1.370359     3.30   0.001     1.841971    7.213679
 pct_workag~t |  -1.489449   .5276982    -2.82   0.005    -2.523718   -.4551792
 pct_arsdnt~t |   3.637663   1.396109     2.61   0.009     .9013404    6.373986
        rcist |  -5.073338   1.065253    -4.76   0.000    -7.161195   -2.985481
 prop_mri_s~t |   9.242777   2.999594     3.08   0.002      3.36368    15.12187
-------------+----------------------------------------------------------------
       _cut1 |  -11.69081   2.868268            (Ancillary parameter)
------------------------------------------------------------------------------
* officexpcst = proportion office expenditure from establishment expenditure
(standardised)
* pct_workagrist = derived from PCT matrix - population employed in agriculture
(standardised)
* pct_arsdnt75st = derived from PCT matrix - residential places per person over 75
(standardised)
* rcist = reference cost index - higher number higher costs (standardised)
* prop_mri_scansst = proportion of MRI scans from total imaging tests (standardised)
```

The results suggest improved working lives are significantly associated with more expenditure on office furniture and equipment, a less rural patient population, a higher proportion of MRI scans (suggesting possibly an association with more technology), a lower reference cost index (suggesting possibly a more efficient Trust) and a higher number of residential places for older people.

Table 34: Descriptive statistics for explanatory variables

```
    Variable |      Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    impwlive |      156   .9423077    .2339116         0          1
    officexpc |     156   343.4832    206.1054   49.21053   1231.868
 pct_workagri |    127   .0124667    .0106502   .0018855    .0572677
 pct_arsdnt75 |    127   .0887115    .0331401   .0216003    .1837753
         rci |      156   98.65139    7.850974   78.54555    126.174
  prop_mri_s~s |    151   .0244947    .0125118         0    .0688019
```

40

5.3.8. Number of inpatients waiting longer than the standard

The following table shows the ordered probit results for the number of inpatients waiting longer than the standard. For this variable the raw CHI data was transformed to the categorical variable constructed by CHI using the same thresholds. A higher number means fewer breaches or fewer patients waiting more than 15 months for an inpatient admission. The R-squared is 22 percent.

Table 35: Ordered probit results for inpatients waiting against the standard

```
Ordered probit estimates                      Number of obs   =        150
                                              Wald chi2(4)    =      41.79
                                              Prob > chi2     =     0.0000
Log likelihood = -38.963492                   Pseudo R2       =     0.2228

------------------------------------------------------------------------------
             |               Robust
  inwtgtst_s |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
thoracmedo~t | -1.582981     .64365    -2.46   0.014    -2.844512   -.3214504
gastroento~t |  1.472748   .3608666     4.08   0.000     .7654624    2.180033
tot_imagin~t | -.3894862   .1483021    -2.63   0.009     -.680153   -.0988194
vacy_nurs_~t | -.5521273   .1639166    -3.37   0.001    -.8733979   -.2308567
-------------+----------------------------------------------------------------
       _cut1 |  -2.40721   .3046337           (Ancillary parameters)
       _cut2 | -1.961545   .2394319
------------------------------------------------------------------------------
* thoracmedop1pcst = proportion of thoracic medicine first outpatient attendances from
total (standardised)
* gastroentop1pcst = proportion of gastro-entorology first outpatient attendances from
total (standardised)
* tot_imaging_testsst = total number of imaging tests - CT MRI ultrasound radiography
fluoroscopy (standardised)
* vacy_nurs_midw_hlthvisst = vacancy rate for nurses, midwives and health visitors
(standardised)
```

The results suggest Trusts that meet their inpatient waiting targets are more likely to have lower vacancy rates for nurses, midwives and health visitors, and are likely to do fewer diagnostic and imagining tests.

Table 36: Descriptive statistics for explanatory variables

```
    Variable |    Obs       Mean   Std. Dev.      Min        Max
-------------+--------------------------------------------------------
  inwtgtst_s |    156   1.871795   .4503468        0          2
thoracmedo~c |    156   .0078961   .0122798        0    .062906
gastroento~c |    156   .0145638   .0237509        0   .1752766
tot_imagin~s |    151   185652.3   85520.18    54272     611893
vacy_nurs_~s |    155   .0279923   .0332665        0   .1718064
```

5.3.9. Number of outpatients waiting longer than the standard

The following table shows the ordered probit results for the target the number of outpatients waiting longer than the standard. For this variable the raw CHI data was transformed to the categorical variable constructed by CHI using the same thresholds. A higher number means fewer breaches or fewer patients waiting more than 26 weeks for an outpatient appointment. The R-squared is 23 percent.

Table 37: Ordered probit results for outpatients waiting against the standard

```
Ordered probit estimates                      Number of obs   =         150
                                              Wald chi2(5)    =       32.91
                                              Prob > chi2     =      0.0000
Log likelihood = -49.313418                   Pseudo R2       =      0.2301


------------------------------------------------------------------------------
             |             Robust
  opwtgtst_s |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    inclapcst |  -.3755338   .1681732    -2.23   0.026    -.7051473   -.0459203
  urolop1pcst |   .4802618   .1354596     3.55   0.000     .2147659    .7457578
   agmedpcxst |  -.3046473   .1333894    -2.28   0.022    -.5660857   -.0432089
   ct_scansst |  -.4762714   .1116627    -4.27   0.000    -.6951262   -.2574166
  vacy_acut_~t |  -.2987511   .1226606    -2.44   0.015    -.5391614   -.0583407
-------------+----------------------------------------------------------------
        _cut1 |  -2.220558   .2753937          (Ancillary parameters)
        _cut2 |  -1.494712   .1717459
------------------------------------------------------------------------------
* inclapcst = percent income from local authority (standardised)
* urolop1pcst = proportion of urology first outpatient attendances from total
(standardised)
* agmedpcxst = percent medical expenditure on agency staff - higher number more locums
(standardised)
* ct_scansst = the number of CT scans performed (standardised)
* vacy_acut_gen_eldst = vacancy rate for nurses in acute general elderly (standardised)
```

The results are similar to the model for Trusts meeting inpatient waiting times targets. They suggest Trusts that meet their outpatient waiting targets are more likely to have lower vacancy rates for nurses and are likely to do fewer CT scans. Trusts are also more likely to meet outpatient waiting time targets if they spend a lower proportion of salary expenditure on agency medical staff such as locums.

Table 38: Descriptive statistics for explanatory variables

```
    Variable |    Obs       Mean   Std. Dev.      Min        Max
-------------+--------------------------------------------------------
  opwtgtst_s |    156   1.839744   .4613696         0          2
      inclapc |    156    .000167   .0008862         0    .009949
    urolop1pc |    156   .0369271   .0172078         0   .1121822
     agmedpcx |    156   .0522444   .0387201         0   .2090164
     ct_scans |    151   10986.06   6515.673      3240      51365
  vacy_acut_~d |    155   .0273189   .0324113         0   .1765844
```

5.4. Relationship between star ratings of acute Trusts and PCTs

This section examines the relationship between star ratings of acute Trusts and their main commissioners. One might expect a positive association between PCT star ratings and acute Trust star ratings, because commissioners' performance is assessed on aspects of provider performance such as A&E waiting times. We might expect commissioners to exert pressure on their local providers to reduce waiting times and improve their performance. Equally, it is more likely that Trusts can achieve better performance ratings if they are part of a strong local health economy where commissioners also provide good services.

For each acute Trust, the purchaser-provider matrix was used to calculate the mean weighted PCT star ratings for the acute Trust's five main purchasers. The following table shows that the overall mean weighted average PCT star rating is 1.58, and that the mean PCT star ratings increase across each category of acute Trust star rating, from zero to three.

Table 39: PCT star rating by acute Trust star rating

```
    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
pct_rating03 |     127    1.583624    .6498931    .0388785   2.963605

_____
-> pi_stars = 0

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
pct_rating03 |      11     .7191051   .4231427    .0532476   1.283601

_____
-> pi_stars = 1

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
pct_rating03 |      22    1.377006    .5052339    .2586448   2.353493

_____
-> pi_stars = 2

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
pct_rating03 |      49    1.527598    .6091513    .0388785   2.963605

_____
-> pi_stars = 3

    Variable |     Obs       Mean    Std. Dev.       Min        Max
-------------+-------------------------------------------------------
pct_rating03 |      45    1.956971    .536584     .8283088   2.890292
```

* pi_stars is the star ratings for acute Trusts
* pct_rating03 is the star ratings for PCTs

The following table shows the analysis of variance for PCT star ratings by acute Trusts, with zero stars as the omitted comparator group. Nearly 28 percent of the variation in acute Trust star ratings is explained by PCT star ratings. Compared to the omitted category zero stars with a mean value of 0.719 (which agrees with the above table), three star Trusts have a 1.238 (significantly) higher mean PCT star rating at 1.957. Two star Trusts have a 0.808 (significantly) higher mean PCT star rating than zero star Trusts at 1.527, while one star Trusts have a 0.658 (significantly) higher mean PCT star rating than zero star Trusts at 1.377.

Table 40: Analysis of variance of PCT star rating by acute Trust star rating, with zero stars as the base unit

```
      Source |       SS       df       MS              Number of obs =     127
-------------+------------------------------           F(  3,   123) =   16.98
       Model | 15.5867921      3  5.19559738           Prob > F      =  0.0000
    Residual | 37.6307031    123  .305940676           R-squared     =  0.2929
-------------+------------------------------           Adj R-squared =  0.2756
       Total | 53.2174953    126  .422361073           Root MSE      =  .55312


------------------------------------------------------------------------------
 pct_rating03       Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
       _cons      .7191051   .1667717     4.31   0.000     .3889908    1.049219
pi_stars_~c
       3star      1.237866   .1860416     6.65   0.000     .8696081    1.606124
       2star      .8084933    .184544     4.38   0.000     .4431999    1.173787
       1star      .6579008   .2042527     3.22   0.002     .2535951    1.062207
       0star     (dropped)
------------------------------------------------------------------------------
```

The results suggest that PCT star ratings are significantly associated with acute Trust star ratings across the four categories. PCT star ratings increase as acute Trust star ratings increase.

The following figure shows the PCT star ratings on the vertical axis plotted against the acute star categories on the horizontal axis. There is much greater variation within the two star category, but the positive association is clear.

Figure 2: Plot of PCT star ratings by acute Trust star ratings
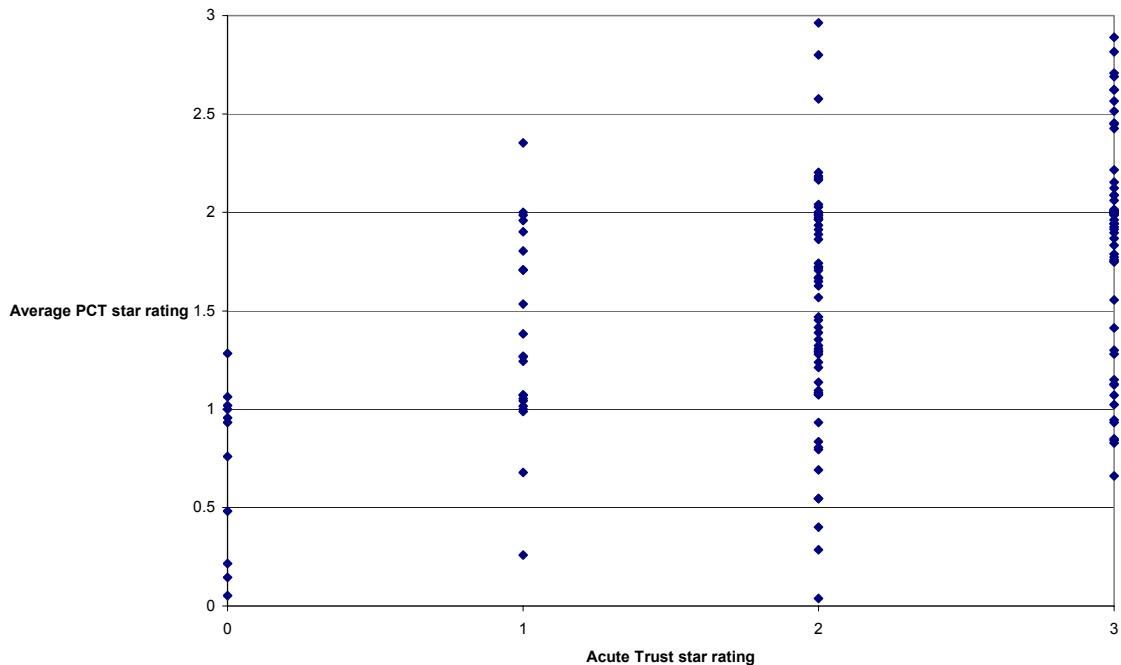
5.5. Summary of acute Trust Analysis

This section has examined the relationship between performance ratings for acute Trusts and the associated key targets, balanced scorecard indicators, and a range of managerial and socio-economic indicators. We have used a linear multivariate regression approach which does not seek to replicate the algorithm used to construct the star ratings but simply seeks to explore the nature of these relationships within this linear framework. The conclusions drawn on the nature and strength of these relationships rest on the modelling framework we have assumed. The findings from our analysis confirm the pre-eminence of the key targets and the CHI review in determining rating, explaining 61% of the variation. Analysis of the subsidiary balanced scorecard indicators included in the star ratings showed that only a small number of them materially influence the star rating, and when analysed in conjunction with the key targets, only one further indictor added significant explanatory power (six month inpatient waits from the patient focus variables). None of the clinical focus indicators were significant and the proportion of variation in star ratings explained increased only marginally to 62%.

Thus, given the current method of constructing the star ratings, it is clear they are determined to a large degree by whatever is included in the key targets, and the CHI review. The influence of the additional indicators may be important for fine-tuning within the rule-based ratings context, but appear to be marginal within this modelling context. If policy-makers wish to target other areas for improvement – such as clinical outcomes – they will need to consider incorporating them into the key targets or use an alterative methodology and weighting process if they are to influence the star ratings in a more significant way.

The second stage of the analysis explored the association of other explanatory factors with Trust star ratings and key indicators, including exogenous factors such as socio-economic characteristics of the population and deprivation. The latter were not significantly associated with the star ratings of acute Trusts. Some managerial indicators (e.g. expenditure on agency staff) were found to be associated with star ratings. The extent to which these are within the control of managers will vary, depending on factors such as local labour market conditions. Whilst there are no obvious explanations for some of the associations, others are plausible, for example, supporting the view that less use of agency nursing staff will produce better performance, or reflecting the important role of good financial management in achieving good performance more broadly.

Analysis of the association of other explanatory factors with performance on the key targets for Trusts highlighted the significance of a range of mainly organisational and activity variables that are (subject to budgetary constraints) within management control, such as occupancy rates and availability of day theatres. Whilst socio-economic or deprivation measures were significantly associated with performance on a few of the key targets, they did not play a major role.

From a policy perspective, this analysis suggests that there may be relatively few truly exogenous influences on acute Trust performance. There may be some organisational factors, such as budgetary limits or capital configuration, that constrain some organisations from improving. It is also a matter for debate whether Trust managers will in practice have a great deal of control over factors such as expenditure on agency staff and vacancy rates, given the important role of local labour markets in determining

supply. And some caution in interpreting our results is required owing to the methodological problems in directly estimating deprivation indicators for Trust populations. However, subject to careful audit of the reasons for failure to adopt more effective managerial practices, it seems broadly reasonable to hold Trust managers to account against their performance ratings.

6. Analysis of PCTs

Figure 3 shows the overall distribution of star ratings for PCTs. Of the 304 PCTs, 22 received the lowest rating (no stars) and 45 the highest (three stars). 98 PCTs were awarded one star and the remaining 139 received two stars. The average rating across all PCTs was 1.68 stars.

The PCT star ratings were analysed employing a large data set constructed by extracting information from various sources. It was not always possible to obtain values for all variables for all PCTs so the number of PCTs included in any part of the analysis that follows may fall short of the 304.

Figure 3: Star ratings for 2002/03 for PCTs
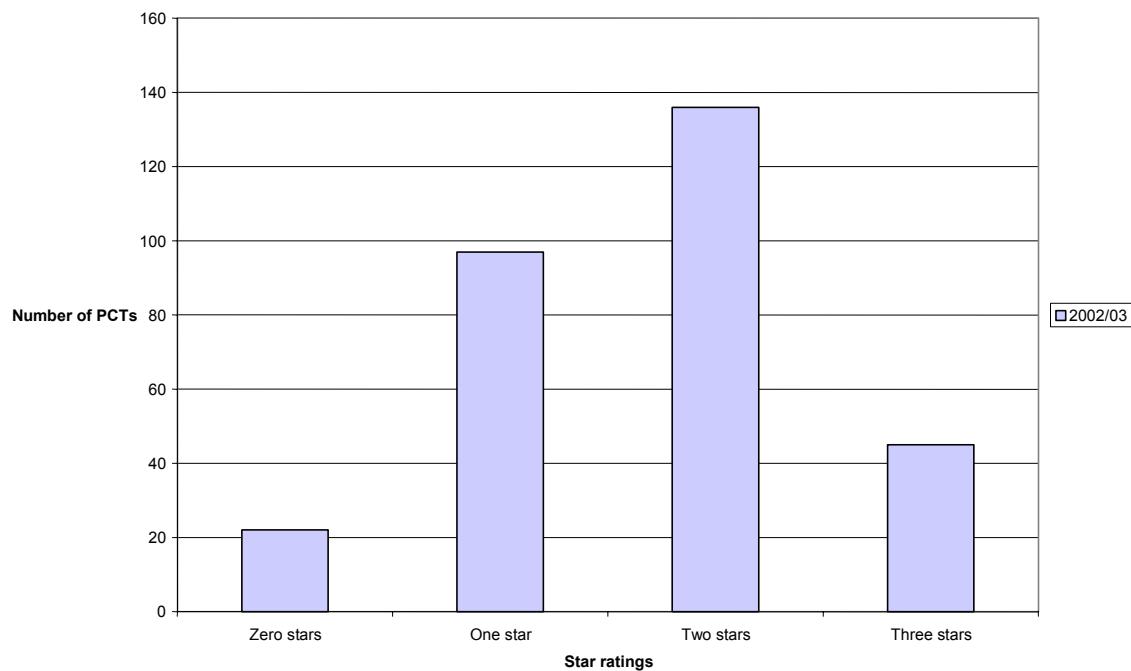
6.1. Regression of star ratings on key targets and indicators

This section examines the relationship between PCT star ratings on the one hand and PCT key targets and indicators in the balanced scorecard on the other. The objective is to see, once again within this linear multivariate modelling approach, which of these targets and indicators have the greatest impact on the star ratings. We first examine the impact of key targets alone on the star ratings and then consider the impact of the balanced scorecard indicators. Finally, we put the key targets and indicators together to examine the overall impact of these variables on the star ratings.

6.1.1. Regressions on key targets only

Regressing the PCT star ratings on the nine key targets yields the result shown in Table 41 below. All nine key targets are significant and have the anticipated sign.

Table 41: Ordered probit of star ratings on key targets

```
Ordered probit estimates                        Number of obs   =        298
                                                Wald chi2(9)    =     275.45
                                                Prob > chi2     =     0.0000
Log likelihood = -199.55353                     Pseudo R2       =     0.4398

------------------------------------------------------------------------------
             |               Robust
    rating03 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  accessgpstd |   .5114787    .101518     5.04   0.000     .3125071    .7104504
  accespcpstd |   .6022574   .1032057     5.84   0.000     .3999779    .8045369
       iwait2 |   1.194413   .1885364     6.34   0.000     .8248887    1.563938
       owait2 |   .6873381   .1867921     3.68   0.000     .3212324    1.053444
  ttimeaaestd |   .6969399   .0857748     8.13   0.000     .5288243    .8650555
     telaccen |   2.055275    .254288     8.08   0.000      1.55688     2.55367
  quitsmokstd |   .2300507   .0903753     2.55   0.011     .0529184     .407183
      impwldv |   2.232825   .2532443     8.82   0.000     1.736476    2.729175
       finman |   1.284212   .2686808     4.78   0.000      .757607    1.810816
-------------+----------------------------------------------------------------
       _cut1 |   5.275805   .5594597            (Ancillary parameters)
       _cut2 |   8.316037   .6642511
       _cut3 |   10.71593   .7250927
------------------------------------------------------------------------------
```
* accessgp = percentage of patients offered an appointment with a GP within two working days
* accespcp = percentage of patient offered an appointment with a PCP within one working day
* iwait2 = number of inpatients waiting longer than the standard (=0, 1, or 2 with 2 = best performance)
* owait2 = number of outpatients waiting longer than the standard (=0, 1, or 2 with 2 = best performance)
* ttimeaae = percentage of patients waiting less than four hours in A&E
* telaccen = provision of a single telephone access point to out of hours GP services (= 0 if no, = 1 if yes)
* quitsmok = number of smokers who had quit at four week follow-up divided by number of planned quitters
* impwldv = achievement of Improving Working Lives Standard (= 1 if achieved, = 0 if not achieved)
* finman = whether the PCT required unplanned financial support (= 0 if support, = 1 if no support)

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All of the continuous variables have been standardised so that they have a zero mean and unit standard deviation (and their names take the suffix *std)*. The estimated regression coefficients can therefore be interpreted as showing the relative size of the effect of each regressor on PCT performance as measured by observed star rating. Thus of the four standardised regressors (*accessgp*, *accesspcp, ttimeaae*, and *quitsmok*) the variable *ttimeaae* (the percentage of patients waiting less than 4 hours in A&E) has the greatest impact on the star rating. The impact of the *ttimeaae* regressor is about three times that of the variable *quitsmok*.

Table 42: Descriptive statistics for key targets

```
   Variable |     Obs        Mean    Std. Dev.       Min        Max
------------+--------------------------------------------------------
   accessgp |     300    88.54285    10.41777     26.794        100
   accespcp |     300    90.86832    8.888884     62.888        100
     iwait2 |     300    1.876667    .4187762          0          2
     owait2 |     300    1.856667    .3872408          0          2
   ttimeaae |     300    92.59136    5.089315   70.73631   99.71449
   telaccen |     299    .9130435    .2822437          0          1
   quitsmok |     300    85.72154    44.81145   5.294117   291.2409
    impwldv |     299    .9297659    .2559696          0          1
     finman |     300    .9066667     .291385          0          1
```

The following table provides some descriptive statistics for the key targets across the four PCT star rating categories (zero through three stars). Given that higher scores reflect better performance, it is to be anticipated that the mean value for each key target will increase as the star rating category increases. Thus the mean value of *accessgp* is 81.5 for zero star PCTs, 84.0 for one star PCTs, 91.2 for two star PCTs, and 93.4 for three star PCTs.

Table 43: Descriptive statistics for key targets across star ratings

```
_____
-> rating03 = 0

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-----------------------------------------------------
    accessgp |      22    81.56064    12.63483     55.575        100
    accespcp |      22    84.64709    11.68896     63.367        100
       iwait2 |      22    1.545455    .8004328          0          2
       owait2 |      22    1.636364    .5810872          0          2
     ttimeaae |      22    86.55314    7.412873   76.05965   96.17084
     telaccen |      21    .6190476    .4976134          0          1
      quitsmok |      22    62.74567    38.20131   16.04278        188
       impwldv |      22    .5909091    .5032363          0          1
        finman |      22    .7272727    .4558423          0          1


_____
-> rating03 = 1

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-----------------------------------------------------
    accessgp |      97    84.04922     12.0634     26.794        100
    accespcp |      97    86.46522    9.830523     62.888        100
       iwait2 |      97    1.783505    .5249366          0          2
       owait2 |      97    1.762887    .4737527          0          2
     ttimeaae |      97    90.98076    6.133179   70.73631   99.57983
     telaccen |      97    .8556701    .3532495          0          1
      quitsmok |      97    76.50653    49.46508   5.294117   291.2409
       impwldv |      96      .90625    .2930107          0          1
        finman |      97    .8659794    .3424442          0          1


_____
-> rating03 = 2

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-----------------------------------------------------
    accessgp |     136    91.24698    7.980728     57.883        100
    accespcp |     136     93.2141    6.513728     71.217        100
       iwait2 |     136    1.963235    .2247002          0          2
       owait2 |     136    1.919118    .2995094          0          2
     ttimeaae |     136    94.11037    2.984036   85.71429   99.71449
     telaccen |     136    .9705882    .1695823          0          1
      quitsmok |     136    91.10567    41.10569   18.93657    220.339
       impwldv |     136    .9779412    .1474179          0          1
        finman |     136    .9338235    .2495093          0          1


_____
-> rating03 = 3

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-----------------------------------------------------
    accessgp |      45    93.47018    5.662689     77.706        100
    accespcp |      45    96.31147     4.61347     83.128        100
       iwait2 |      45    1.977778    .1490712          1          2
       owait2 |      45    1.977778    .1490712          1          2
     ttimeaae |      45    94.42433    2.423864   90.04502   99.11661
     telaccen |      45           1           0          1          1
      quitsmok |      45    100.5456     40.7556         30   240.5405
       impwldv |      45           1           0          1          1
        finman |      45           1           0          1          1
```

6.1.2. Regressions on indicators only

The following table shows stepwise ordered probit results for the balanced scorecard indicators only. Of the 37 indicators considered, only seven emerged as significant. However, all seven had the anticipated sign with *aae12hwt* (patients waiting longer than 12 hours for admission from A&E) having by far the greatest impact of the six continuous variables in the final model.

Table 44: Ordered probit results for indicator variables

```
Ordered probit estimates                       Number of obs   =        201
                                               Wald chi2(7)    =      78.90
                                               Prob > chi2     =     0.0000
Log likelihood = -183.97757                    Pseudo R2       =     0.2351


------------------------------------------------------------------------------
             |               Robust
     rating03 |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 aae12hwtstd |  -1.621291   .3579897    -4.53   0.000    -2.322938   -.9196436
 deltrcarstd |  -.2968944   .0896341    -3.31   0.001    -.4725741   -.1212148
   cscreenstd |   .3313247   .0981485     3.38   0.001     .1389572    .5236922
  pctaandwstd |   .2721805   .1123249     2.42   0.015     .0520277    .4923332
   staffopistd |   .2255963   .0792313     2.85   0.004     .0703058    .3808868
   pctrelatstd |   .4287327   .1102331     3.89   0.000     .2126798    .6447855
      diabsern |   .5122537   .2016191     2.54   0.011     .1170875    .9074199
-------------+----------------------------------------------------------------
        _cut1 |  -1.435046   .2635624           (Ancillary parameters)
        _cut2 |   .2074374   .1987578
        _cut3 |   2.027943    .224775
------------------------------------------------------------------------------
* aae12hwt = number of patients waiting longer than 12 hours for admission from A&E
* deltrcar = percentage of patients whose discharge from hospital was delayed
* cscreen = percentage of women aged 25-64 screened for cervical abnormalities
* pctaandw = PCT survey of patients: score from access and waiting domain
* staffopi = PCT staff satisfaction with employer
* pctrelat = PCT survey of patients: score from building closer (patient-staff)
relationships domain
* diabsern = PCTs that have completed their assessment of diabetes services (0 =
incomplete, 1 = complete)
```

When the PCT star rating is regressed on all 37 indicators there are only 201 observations on all indicators for PCTs. Following this initial regression STATA 'freezes' the sample over which successive regressions are estimated so that, as the stepwise procedure unfolds and regressors are dropped, the sample of PCTs over which each regression is estimated is held constant. We re-estimated the same regression using the 290 PCTs for which there were data on the variables left in the stepwise regression on the initial sample of 201 PCTs. With the exception of *deltrcar*, all variables remained significant and with the same sign but the size of the coefficient on *aae12hwt* shrunk dramatically to about the same size as that on the *pctaandw*, *pctrelat*, and *cscreen* variables.

Table 45: Descriptive statistics for indicator variables

```
    Variable |     Obs       Mean   Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    aae12hwt |     300   21.66086   87.40935          0        892
     deltrcar |     297   .0491635   .0389942          0    .462682
      cscreen |     300   82.63139   3.642403   67.88193   89.37277
     pctaandw |     300   71.51154     3.2899     61.231     79.586
      staffopi |     297   3.358119   .2078077    2.28106    3.83269
      pctrelat |     300   88.78225   2.355676     80.631     92.984
      diabsern |     296   .7972973   .4026936          0          1
```

The following table provides some descriptive statistics for the indicators in the above regression result across the four PCT star rating categories (zero through three stars). With the exception of the *aae12hwt* and *deltrcar* variables, a higher score reflects better performance. Hence it is anticipated that the mean value for each variable will increase as the star rating category increases. Thus the mean value of *cscreen* is 80.7 for zero star PCTs, 81.1 for one star PCTs, 83.0 for two star PCTs, and 85.2 for three star PCTs.

Table 46: Descriptive statistics for indicator variables across PCT star rating categories

```
-> rating03 = 0

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    aae12hwt |      22    49.75182    73.88847           0         243
    deltrcar |      22    .0624612    .0326874     .027417     .169869
     cscreen |      22    80.77284    3.370769    73.80514    86.30619
    pctaandw |      22    69.68418    3.329898      61.231      73.445
    staffopi |      20    3.252653    .2670491     2.59744     3.55655
    pctrelat |      22    87.61232    3.236757      80.631      91.938
    diabsern |      21    .8095238    .4023739           0           1


-> rating03 = 1

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    aae12hwt |      97    40.17442    128.0222           0         892
    deltrcar |      97    .0516673    .0339227           0     .198527
     cscreen |      97    81.17864     4.23474    67.88193    87.59448
    pctaandw |      97     70.2045    3.207006      62.962      79.586
    staffopi |      97    3.359419    .2003767     2.38092     3.71293
    pctrelat |      97     87.8234    2.513848       80.83      92.706
    diabsern |      97    .7628866    .4275218           0           1


-> rating03 = 2

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    aae12hwt |     136    10.68764    61.47413           0         676
    deltrcar |     134    .0491427    .0459547    .0024624    .462682
     cscreen |     136    83.09696    2.962904    71.05049    89.33476
    pctaandw |     136    71.96932    3.034395      62.962      79.101
    staffopi |     135    3.355767    .2116221     2.28106     3.83269
    pctrelat |     136    88.99325    1.875949      81.837      92.843
    diabsern |     133    .7744361    .4195333           0           1


-> rating03 = 3

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    aae12hwt |      45       1.184    2.984486           0          14
    deltrcar |      44    .0370578    .0242813           0     .107143
     cscreen |      45    85.26443    2.128705    79.18396    89.37277
    pctaandw |      45    73.83876    2.438322       68.31      78.238
    staffopi |      45    3.409245    .1672623     3.05289     3.71652
    pctrelat |      45    90.78338    1.086049      88.072      92.984
    diabsern |      45    .9333333    .2522625           0           1
```

6.1.3. Regressions with key targets and indicators together

The following table shows the ordered probit regression results, using the stepwise procedure, for all key targets and indicators combined. The model includes all nine key targets with the 'correct' sign and ten balanced scorecard indicators. Of these ten, only one appears to have an 'incorrect' sign: the negative coefficient on *sumisuse* implies that an increase in the percentage of GP practices in a shared care scheme for drug misusers is associated with a lower PCT star rating.

Table 47: Ordered probit of star ratings on key targets and indicators

```
Ordered probit estimates                        Number of obs   =        200
                                                Wald chi2(19)   =     110.50
                                                Prob > chi2     =     0.0000
Log likelihood = -83.689004                     Pseudo R2       =     0.6503

------------------------------------------------------------------------------
             |               Robust
    rating03 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
 accessgpstd |   .7612545   .1632565     4.66   0.000     .4412776    1.081231
      finman |   2.195867   .4895141     4.49   0.000     1.236437    3.155297
     impwldv |    3.23732   .4803862     6.74   0.000     2.295781     4.17886
   demeradstd |   .6500136   .1238435     5.25   0.000     .4072848    .8927424
  accsforpstd |   .3211029   .1161389     2.76   0.006     .0934748     .548731
  ttimeaaestd |   1.110279   .1870997     5.93   0.000     .7435704    1.476988
       iwait2 |   1.437724   .3755057     3.83   0.000     .7017466    2.173702
       owait2 |   1.669442   .3993836     4.18   0.000     .8866647     2.45222
  chdauditstd |    .372246   .1086302     3.43   0.001     .1593348    .5851573
  quitsmokstd |   .3538693   .1193228     2.97   0.003      .120001    .5877376
  sumisusestd |  -.3704586   .1410081    -2.63   0.009    -.6468294   -.0940877
     diabsern |   .8602843   .2632498     3.27   0.001     .3443241    1.376245
     telaccen |   4.006281   .5821367     6.88   0.000     2.865314    5.147248
  accespcpstd |   .6867651   .1570255     4.37   0.000     .3790008    .9945294
  sickratestd |  -.3280331   .1282067    -2.56   0.011    -.5793135   -.0767527
  deltrcarstd |  -.4531254   .1650744    -2.74   0.006    -.7766652   -.1295856
  comequipstd |   .4213611    .120627     3.49   0.000     .1849366    .6577857
  pctscarestd |   .4144412   .1701291     2.44   0.015     .0809943     .747888
  pctrelatstd |   .6308497   .1799595     3.51   0.000     .2781355     .983564
-------------+----------------------------------------------------------------
        _cut1 |   9.926876   1.295301          (Ancillary parameters)
        _cut2 |   14.54615   1.690019
        _cut3 |   18.75613   1.990765
------------------------------------------------------------------------------
```

* accessgp = percentage of patients offered an appointment with a GP within two working days
* finman = whether the PCT required unplanned financial support (=0 if support, =1 if no support)
* impwldv = achievement of Improving Working Lives Standard (=1 if achieved, =0 if not achieved)
* demerad = percentage change in emergency admission rate
* accsforp = percentage of NHS funded abortions undertaken upto 9 weeks gestation
* ttimeaae = percentage of patients waiting less than four hours in A&E
* iwait2 = number of inpatients waiting longer than the standard (=0, 1, or 2, larger value implies better performance)
* owait2 = number of outpatients waiting longer than the standard (=0, 1, or 2, larger value implies better performance)
* chdaudit = percentage of practices with clinical audit data no more than 12 months old
* quitsmok = percentage of smokers who had quit at four week follow-up
* sumisuse = percentage of GP practices in a shared care scheme for drug misusers
* diabsern = PCTs that have completed their assessment of diabetes services (0= incomplete, 1= complete)
* telaccen = provision of a single telephone access point to out of hours GP services
* accespcp = percentage of patient offered an appointment with a PCP within one working day
* sickrate = the amount of time lost through absence as a percentage of staff time available for directly employed NHS staff
* deltrcar = percentage of patients whose discharge from hospital was delayed
* comequip = proportion of people benefiting from community equipment who had it delivered within 3 weeks
* pctscare = PCT survey of patients: safe, high quality, coordinated care
* pctrelat = PCT survey of patients: score from building closer (patient-staff) relationships domain

The following table shows the descriptive statistics for the key targets and indicators in the above regression. We also re-estimated the above regression over all of the available PCTs (n=230) and obtained a very similar result to that presented above.

Table 48: Descriptive statistics for key targets and indicators

```
    Variable |       Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    accessgp |       300    88.54285    10.41777      26.794         100
      finman |       300    .9066667     .291385           0           1
     impwldv |       299    .9297659    .2559696           0           1
     demerad |       275      .00566     .049187      -.1388        .144
     accsforp |      300    51.44663    12.56942    8.502633    79.34066
     ttimeaae |      300    92.59136    5.089315    70.73631    99.71449
       iwait2 |      300    1.876667    .4187762           0           2
       owait2 |      300    1.856667    .3872408           0           2
     chdaudit |      292    85.79434    27.47024           0         100
     quitsmok |      300    85.72154    44.81145    5.294117    291.2409
     sumisuse |      286    .2897206    .2971384           0           1
     diabsern |      296    .7972973    .4026936           0           1
     telaccen |      299    .9130435    .2822437           0           1
     accespcp |      300    90.86832    8.888884      62.888         100
     sickrate |      297    .0413266    .0134912        .005        .088
     deltrcar |      297    .0491635    .0389942           0     .462682
     comequip |      272    89.87436    19.08574           0         100
     pctscare |      300     79.2216     1.83447      73.403      83.717
     pctrelat |      300    88.78225    2.355676      80.631      92.984
```

The following table provides some descriptive statistics for the key targets and indicators in the above regression across the four PCT star rating categories (zero through three stars).

Table 49: Descriptive statistics for key targets and indicator variables across PCT star rating categories

```
_____
-> rating03 = 0

    Variable |       Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    accessgp |        22    81.56064    12.63483      55.575         100
      finman |        22    .7272727    .4558423           0           1
     impwldv |        22    .5909091    .5032363           0           1
     demerad |        20     .012745     .048758      -.0888       .0971
     accsforp |       22    53.19835    13.39595    32.89474    73.34852
     ttimeaae |       22    86.55314    7.412873    76.05965    96.17084
       iwait2 |        22    1.545455    .8004328           0           2
       owait2 |        22    1.636364    .5810872           0           2
     chdaudit |        21    74.39092    32.25575           0         100
     quitsmok |        22    62.74567    38.20131    16.04278         188
     sumisuse |        20    .2759445    .2875037           0    .916667
     diabsern |        21    .8095238    .4023739           0           1
     telaccen |        21    .6190476    .4976134           0           1
     accespcp |        22    84.64709    11.68896      63.367         100
     sickrate |        22    .0457273    .0171636        .023        .088
     deltrcar |        22    .0624612    .0326874     .027417    .169869
     comequip |        19    90.27408    21.59853    5.237555         100
     pctscare |        22      78.206    1.888021      73.816       80.83
     pctrelat |        22    87.61232    3.236757      80.631      91.938
```

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```
-> rating03 = 1

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    accessgp |      97    84.04922     12.0634       26.794         100
      finman |      97    .8659794    .3424442            0           1
      impwldv |      96     .90625    .2930107            0           1
     demerad |      86   -.0036174   -.0545903        -.1167        .144
     accsforp |     97    48.29718     13.6232      8.502633    77.35471
    ttimeaae |      97    90.98076    6.133179      70.73631    99.57983
      iwait2 |      97    1.783505    .5249366            0           2
      owait2 |      97    1.762887    .4737527            0           2
     chdaudit |     93    82.98282     31.3862            0         100
     quitsmok |     97    76.50653    49.46508      5.294117    291.2409
     sumisuse |     89    .3059692     .318981            0           1
     diabsern |     97    .7628866    .4275218            0           1
     telaccen |     97    .8556701    .3532495            0           1
     accespcp |     97    86.46522    9.830523        62.888         100
     sickrate |     94    .0420426     .013672         .013        .082
     deltrcar |     97    .0516673    .0339227            0      .198527
     comequip |     86    90.65501    15.70735            0         100
     pctscare |     97    78.23362    1.976167       73.403      82.391
     pctrelat |     97     87.8234    2.513848        80.83      92.706

-> rating03 = 2

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    accessgp |     136    91.24698    7.980728       57.883         100
      finman |     136    .9338235    .2495093            0           1
      impwldv |    136    .9779412    .1474179            0           1
     demerad |     125     .008648    .0435894        -.1388        .132
     accsforp |    136    52.10576    11.84914      21.39038    79.34066
    ttimeaae |     136    94.11037    2.984036      85.71429    99.71449
      iwait2 |     136    1.963235    .2247002            0           2
      owait2 |     136    1.919118    .2995094            0           2
     chdaudit |    134    85.41124    26.97116            0         100
     quitsmok |    136    91.10567    41.10569      18.93657     220.339
     sumisuse |    132    .2880259    .2968709            0           1
     diabsern |    133    .7744361    .4195333            0           1
     telaccen |    136    .9705882    .1695823            0           1
     accespcp |    136     93.2141    6.513728       71.217         100
     sickrate |    136    .0409853    .0121491         .005        .077
     deltrcar |    134    .0491427    .0459547     .0024624     .462682
     comequip |    126    87.88214    22.81073            0         100
     pctscare |    136    79.64454    1.457144        74.24      82.362
     pctrelat |    136    88.99325    1.875949       81.837      92.843

-> rating03 = 3

    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    accessgp |      45    93.47018    5.662689       77.706         100
      finman |      45           1           0            1           1
      impwldv |     45           1           0            1           1
     demerad |      44    .0120841    .0522704        -.1313       .1414
     accsforp |     45      55.387    10.56597      30.93525    73.14815
    ttimeaae |      45    94.42433    2.423864      90.04502    99.11661
      iwait2 |      45    1.977778    .1490712            1           2
      owait2 |      45    1.977778    .1490712            1           2
     chdaudit |     44    98.34615    4.792581           75         100
     quitsmok |     45    100.5456     40.7556           30    240.5405
     sumisuse |     45    .2686781    .2630961            0           1
     diabsern |     45    .9333333    .2522625            0           1
     telaccen |     45           1           0            1           1
     accespcp |     45    96.31147     4.61347       83.128         100
     sickrate |     45    .0387111    .0147565         .015        .083
     deltrcar |     44    .0370578    .0242813            0     .107143
     comequip |     41    94.17409    8.650245      64.00343         100
     pctscare |     45    80.56953    1.026414       77.945      83.717
     pctrelat |     45    90.78338    1.086049       88.072      92.984
```

6.2. Regression of star ratings on all other explanatory variables

We next examined the relationship between PCT star ratings and the many variables that we had been able to draw into our PCT database. These variables were divided into five groups. In each group we placed variables that were - broadly speaking - subject to the same degree of control by the PCT. In the first group we placed the socio-economic indicators constructed from, for example, the 2001 Population Census. This group contained those variables that were deemed to be the least under the control of the PCT. The second group contained various geographic variables reflecting local bed availability and the geographic distance to these beds. The third group contained a couple of financial variables reflecting the extent to which the PCT's budget was over or under target. The fourth group contained a battery of performance indicators for the local acute sector. Finally, the fifth group was based on a series of measures reflecting the characteristics of general practice within the PCT. The variables in this group were deemed to be the most controllable by the PCT.

Our modelling approach applied the stepwise procedure to each group of variables in turn, forcing into the regression those variables found to be significant at a previous stage. First, the stepwise procedure was applied to all of the socio-economic variables. This might identify four or five relevant indicators. These were then forced into the next stepwise procedure which would include all of the geographic variables. This might then identify, say, six variables including the socio-economic ones, to be taken forward to the next stage when the third group of variables would be added to the stepwise procedure. This process continued until it had been applied to all five groups of potential regressors. The following table shows the result of the application of this approach to the regression of star ratings on all of the other explanatory variables in our PCT database.

Table 50: Ordered probit of star ratings on all other explanatory variables

```
Ordered probit estimates                      Number of obs   =        290
                                              Wald chi2(17)   =     150.75
                                              Prob > chi2     =     0.0000
Log likelihood = -233.63122                   Pseudo R2       =     0.3245


-------------------------------------------------------------------------------
             |               Robust
    rating03 |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+-----------------------------------------------------------------
 adet_hltstd |   1.79727   .3093063     5.81   0.000     1.191041    2.403499
 ap_incbestd | -1.139708   .2969939    -3.84   0.000    -1.721805   -.5576106
 agpaccesstd | -1.027631   .1672641    -6.14   0.000    -1.355463   -.6997997
  apsycnr5std |  -.6324916   .1236569    -5.11   0.000    -.8748547   -.3901285
  abedpsycstd |   .3122841   .0770611     4.05   0.000     .1612471     .463321
  dftclosestd |   .2185551   .0967547     2.26   0.024     .0289193    .4081909
   gpcinwtg2 |    .697133   .1845571     3.78   0.000     .3354076    1.058858
    gpcopwtg2 |   .4051808   .1359432     2.98   0.003      .138737    .6716247
  gpcaewafstd |   .5590047   .0909859     6.14   0.000     .3806756    .7373337
  oldergpsstd |  -.2709451    .083112    -3.26   0.001    -.4338417   -.1080485
  salgppctstd |   .2123751   .0679532     3.13   0.002     .0791892     .345561
     chthpcstd |   .2493525   .0869146     2.87   0.004      .079003     .419702
  cntrlipcstd |   .1877725   .0724627     2.59   0.010     .0457483    .3297967
  mmr2copcstd |   .2991965   .1231468     2.43   0.015     .0578332    .5405599
  betablocstd |  -.4962609   .0946483    -5.24   0.000    -.6817681   -.3107537
  achldi01std |  -.3147181   .0717718    -4.38   0.000    -.4553883    -.174048
  acytol01std |   .4947927   .1186584     4.17   0.000     .2622266    .7273588
-------------+-----------------------------------------------------------------
        _cut1 |  -.5002629   .3509979           (Ancillary parameters)
        _cut2 |   1.642631   .3768393
        _cut3 |   3.713529   .4195933
-------------------------------------------------------------------------------
```
* adet_hlt = DETR index of health deprivation
* ap_incbe = proportion of the population claiming incapacity benefit/severe disability
allowance
* agpacces = accessibility score to general practitioners
* apsycnr5 = average distance from GP practice to 5 nearest psychiatric providers
* abedpsyc = average number of beds at nearest five psychiatric providers
* dftclose = PCT's closing distance from target (positive number implies budget exceeds
target)
* gpcinwtg2 = number of inpatients waiting longer than standard (=0, 1, or 2 with 2=best
performance)
* gpcopwtg2 = number of outpatients waiting longer than standard (=0, 1, or with 2=best
performance)
* gpcaewaf = percentage of patients waiting less than 4 hours in A&E
* NB variables with the 'gpc' prefix are constructed from key target scores recorded
* oldergps = proportion of GPs aged over 50
* salgppct = salaried GPs as a proportion of all GPs
* chthpc = proportion of all GPS offering child health surveillance services
* cntrlipc = number of GPs providing contraceptive services to list patients only
divided by number of GPs
* mmr2copc = MMR2 count divided by number of patients aged under two
* betabloc = indicator of prescribing volume for beta blockers (relative to national
average)
* achldi01 = childhood immunisation target achievement
* acytol01 = cervical screening target achievement

These results are rather mixed. There are a couple of pairs of variables that seem to reflect opposite effects. Thus the IMD health deprivation score is positively associated with the PCT star rating yet the proportion of those claiming disability allowance is also positively related to the star rating. Similarly, the achievement of the cervical screening target increases the probability of recording a higher star rating while the achievement of the childhood immunisation target has the opposite effect.

Despite these somewhat contradictory effects, there are several variables with the anticipated sign. Thus improved performance on inpatient, outpatient, and A&E waiting times is associated with a higher star rating. Similarly, a larger budget relative to the target allocation is associated with a higher star rating. And the positive coefficients on the two GP service variables - the proportion of GPs offering child health services and contraceptive services – suggest that more service provision is positively associated with the star rating achieved. The beta-blocker prescription rate is, as anticipated, negatively associated with the star rating achieved.

Finally, there are those variables where we have no strong priors. Thus the proportion of older GPs in the PCT is negatively associated with the star rating, while the proportion of salaried GPs is positively associated with the PCT's star rating.

The following table shows the descriptive statistics for the variables (unstandardised) in the above regression.

Table 51: Descriptive statistics for explanatory variables

```
    Variable |     Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    adet_hlt |     300    .1964227    .7469604   -1.631607    2.392997
    ap_incbe |     300    6.096786     2.76813    2.018546    20.17899
    agpacces |     300    .0001794    .0000576    .0000803    .0003344
    apsycnr5 |     300    32.12896    13.66274    12.83997    111.6201
    abedpsyc |     300    237.5056    78.46618    93.50063    538.7637
    dftclose |     300    .1809917     5.90876   -20.22751    31.12989
    gpcinwtg2 |    300    1.876667    .4187762           0           2
    gpcopwtg2 |    300    1.703333    .6081846           0           2
     gpcaewaf |    293    92.39097     5.04702    70.73631    99.29192
     oldergps |    300    .3108775    .1086858     .122449          .8
      salgppct |   300    .0246953    .0345458           0    .2280702
       chthpc |    300    .9488465    .0520695    .7241379           1
      cntrlipc |   300    .1178236    .0720962           0    .3898305
      mmr2copc |   300    .2917068    .2680342     .003046     2.41777
       betabloc |  300    10.01377    1.324786        4.87      14.622
       achldi01 |  300    1.825338    .2491621           0           2
       acytol01 |  300    1.891214    .1686527    1.156365           2
```

Having examined the extent to which star ratings are associated with variations in factors both within and outside the control of PCTs, we next consider the extent to which the nine key target scores are determined by factors within and beyond the control of the PCT.

6.3. Regressions of key targets on all other explanatory variables

Having regressed the star rating variable on five groups of regressors using the stepwise procedure outlined above, we now apply the same method to each of the nine key target variables. Some models are estimated using OLS while others employ ordered probit techniques depending on the nature of the dependent variable (e.g., whether it is categorical or continuous).

6.3.1. Access to a primary care professional

The following table shows the OLS regression result for the key target variable 'access to a primary care professional'. The dependent variable records the percentage of patients offered an appointment with a PCP within one working day. The London dummy has a negative sign implying that access is more difficult in London. Of the standardised variables, the proportion of the elderly claiming income support has by far largest coefficient and the negative sign implies that areas with more elderly poor tend to have poorer access to a PCP. The negative coefficient on the beta-blocker prescription rate implies that over-prescription is associated with poorer PCP access.

Table 52: Regression results for access to a primary care professional

```
Regression with robust standard errors          Number of obs =     295
                                                 F(  6,   288) =   13.39
                                                 Prob > F      =  0.0000
                                                 R-squared     =  0.2365
                                                 Root MSE      =  .88814


------------------------------------------------------------------------------
             |              Robust
  accespcpstd |    Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
  aincspt6std |  -.3510471   .0643654    -5.45   0.000    -.4777333   -.2243609
       london |  -.834879    .2483871    -3.36   0.001    -1.323763   -.3459947
  abedpsycstd |   .1471152   .047312      3.11   0.002     .053994     .2402364
  gpchosclstd |   .0988222   .0485        2.04   0.043     .0033628    .1942817
  salgppctstd |   .1215784   .0416433     2.92   0.004     .0396145    .2035423
  betablocstd |  -.1742438   .0614249    -2.84   0.005    -.2951425   -.0533452
        _cons |   .0796326   .0539651     1.48   0.141    -.0265833    .1858485
------------------------------------------------------------------------------
* aincspt6 = proportion of population aged over 60 claiming income support
* london = London dummy (=1 if PCT in London, =0 otherwise)
* abedpsyc = average number of beds at nearest five psychiatric providers
* gpcaewai2 = A&E patients waiting more than 12 hours for admission (=0, 1, or 2 with
2=best performance)
* gpchoscl = hospital cleanliness score
* salgppct = salaried GPs as a proportion of all GPs
* betabloc = indicator of prescribing volume for beta blockers (relative to national
average)
* NB variables with the 'gpc' prefix are constructed from key target scores recorded by
the top five acute Trusts serving the PCT
```

Table 53: Descriptive statistics for explanatory variables

```
    Variable |     Obs      Mean    Std. Dev.      Min        Max
-------------+-------------------------------------------------------
    accespcp |     300   90.86832   8.888884    62.888        100
    aincspt6 |     300   .1439688   .0531125   .0582449   .3632275
      london |     300        .1    .3005013         0          1
    abedpsyc |     300   237.5056   78.46618   93.50063   538.7637
    gpchoscl |     295   62.32982    4.56456   51.51614   71.18472
    salgppct |     300   .0246953   .0345458         0    .2280702
    betabloc |     300   10.01377   1.324786      4.87     14.622
```

6.3.2. Total time in A&E

The following table shows the OLS regression result with the percentage of patients seen within four hours in A&E as the dependent variable. Of the ten significant variables, the health deprivation score has the largest coefficient and implies that more health deprived areas tend to be associated with shorter waits in A&E. Quite plausibly, PCTs whose expenditure exceeds their target allocation also tend to be short wait areas as are rural areas (perhaps because patients are less inclined to visit A&E due to the greater travel distances involved). There is also some evidence that areas with more male GPs, with more UK qualified GPs, and with more male patients tend to have longer waits.

Table 54: Regression results for total time in A&E

```
Regression with robust standard errors          Number of obs =      295
                                                F( 10,   284) =     9.55
                                                Prob > F      =   0.0000
                                                R-squared     =   0.3035
                                                Root MSE      =   .85419

------------------------------------------------------------------------
            |              Robust
ttimeaaestd |    Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
------------+-----------------------------------------------------------
 adet_hltstd |  .4985566   .0707142     7.05   0.000    .3593662    .637747
 abedpsycstd | -.1694866   .0633067    -2.68   0.008   -.2940963   -.0448768
 dftclosestd |   .289025   .0603333     4.79   0.000    .1702679   .4077822
 gpcimpwlstd | -.1583889   .0410665    -3.86   0.000   -.2392223   -.0775554
  gpcchi_rstd |  .2055208   .0496925     4.14   0.000    .1077085   .3033331
  ruralitystd |  .2449936   .0743975     3.29   0.001    .0985532   .3914341
  mgppcentstd | -.1888009   .0642094    -2.94   0.004   -.3151876   -.0624142
  gpukqualstd | -.2852095   .0680342    -4.19   0.000   -.4191248   -.1512942
   malepatstd | -.2157379    .056365    -3.83   0.000    -.326684   -.1047919
  diabtspcstd |  .1226438   .0539698     2.27   0.024    .0164122   .2288754
        _cons |  .0010919   .0496933     0.02   0.982    -.096722   .0989057
------------------------------------------------------------------------
```
* ttimeaae = percentage of patients waiting less than four hours in A&E
* adet_hlt = DETR index of health deprivation
* abedpsyc = average number of beds at nearest five psychiatric providers
* dftclose = PCT's closing distance from target (positive number implies budget exceeds target)
* gpcimpwld = achievement of Improved working Lives Standard (0 to 1 but continuous: higher better)
* gpcchi_r = CHI inspection score
* rurality = rural patients as a proportion of all patients
* mgppcent = male GPs as a proportion of all GPs
* gpukqual = UK qualified GPs as a proportion of all GPs
* malepat = male patients as a proportion of all patients
* diabtspc = proportion of GPs offering diabetes services
* NB variables with the 'gpc' prefix are constructed from key target scores recorded by the top five acute Trusts serving the PCT

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Table 55: Descriptive statistics for explanatory variables

```
    Variable |      Obs        Mean    Std. Dev.        Min         Max
-------------+--------------------------------------------------------
    ttimeaae |      300    92.59136     5.089315    70.73631    99.71449
    adet_hlt |      300    .1964227     .7469604   -1.631607    2.392997
    abedpsyc |      300    237.5056     78.46618    93.50063    538.7637
    dftclose |      300    .1809917      5.90876   -20.22751    31.12989
    gpcimpwl |      295    .9599112      .164715    .0602595           1
    gpcchi_r |      295    2.830342     .6213078           2           4
    rurality |      300    .1060569     .1221497           0    .5394974
    mgppcent |      300    .6649174     .0790834    .4646465    .9090909
     gpukqual |     300    .8185845     .1478014          .2           1
      malepat |      300    .4975718     .0094566    .4699498     .535653
     diabtspc |      300    .7886673     .2287176           0           1
```

6.3.3. Single telephone access – implementation plans

The following table shows the ordered logit result for the target provision of a single telephone access point to out of hour GP services. This variable is constructed as a (0, 1) dummy with a score of one for the achievement of this target. There is little variation in this dependent variable with 273 out of 299 PCTs (over 90%) obtaining top marks. We found that the distance to mental health care was positively associated with the achievement of this target as was a measure of deprivation and, negatively, the proportion of male patients.

Table 56: Ordered logit results for single telephone access

```
Ordered logit estimates                        Number of obs   =       299
                                               Wald chi2(4)    =     19.38
                                               Prob > chi2     =    0.0007
Log likelihood = -77.047127                    Pseudo R2       =    0.1278

------------------------------------------------------------------------------
             |             Robust
    telaccen |     Coef.  Std. Err.      z    P>|z|    [95% Conf. Interval]
-------------+----------------------------------------------------------------
       v5std |  .8160325  .3445693    2.37   0.018    .1406891    1.491376
  apsycnr5std |  .8368089   .329074    2.54   0.011    .1918357    1.481782
  adistmntstd |  1.008287  .3808417    2.65   0.008     .261851    1.754723
   malepatstd | -.7443118   .243965   -3.05   0.002   -1.222474   -.2661492
-------------+----------------------------------------------------------------
       _cut1 | -2.814181  .2994689            (Ancillary parameter)
------------------------------------------------------------------------------
*telaccen = provision of a single telephone access point to out of hours GP services
*          (=0 if no, =1 if yes)
* v5 = a measure of deprivation based on claims for exemption from prescription charges
on the grounds of low income (LISI)
* apsycnr5 = average distance from GP practice to 5 nearest psychiatric providers
* adistmnt = beds weighted distance to mental health care
```

Table 57: Descriptive statistics for explanatory variables

```
    Variable |     Obs       Mean   Std. Dev.        Min        Max
-------------+--------------------------------------------------------
    telaccen |     299   .9130435   .2822437          0          1
          v5 |     300   10.04756   4.636896      3.428     28.242
    apsycnr5 |     300   32.12896   13.66274   12.83997   111.6201
    adistmnt |     300    .000781   .0002516   .0001405      .0015
     malepat |     300   .4975718   .0094566   .4699498    .535653
```

6.3.4. Access to a GP

The following table shows the OLS regression result for the percentage of patients offered an appointment with a GP within two working days. The Yorkshire Wolds variable is a (0, 1) dummy that takes the value of 1 for this particular PCT. Its significance reflects the fact that *accessgp* takes a value of 27% for this PCT but varies between 56% and 100% for all other PCTs.

Of the remaining eight significant coefficients, the largest two are on the *oldpat* and *voldpat* variables implying that areas with a relatively large proportion of over 75s tend to have better GP access. There is also evidence that more deprived areas have poorer GP access (the coefficient on *depclb4p* is negative) and, quite plausibly, that the number of GPs per patient is positively associated with access to a GP.

Table 58: Regression results for access to a GP

```
Regression with robust standard errors          Number of obs =      300
                                                F(  8,   290) =       .
                                                Prob > F      =       .
                                                R-squared     =  0.2771
                                                Root MSE      =  .86333

------------------------------------------------------------------------------
             |               Robust
  accessgpstd |     Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    ywoldsdv |  -5.78314   .1546615   -37.39   0.000    -6.087541   -5.478738
   awaitnr5std |  -.1197516   .0560561    -2.14   0.033     -.23008   -.0094232
    oldpatstd |  -.6642417   .2685675    -2.47   0.014     -1.19283   -.1356531
  gpperpatstd |   .120232   .0499751     2.41   0.017     .0218722    .2185918
  depclb4pstd |  -.1804555   .0372161    -4.85   0.000    -.2537034   -.1072076
   voldpatstd |   .6696686   .2569701     2.61   0.010     .1639057    1.175432
  genermanstd |  -.1770599   .0517573    -3.42   0.001    -.2789275   -.0751924
  acytol01std |   .2245633   .0634065     3.54   0.000     .0997679    .3493587
  salgppctstd |   .0899741   .0457245     1.97   0.050    -.0000197     .179968
        _cons |   .0192771   .0500803     0.38   0.701    -.0792899    .1178441
------------------------------------------------------------------------------
* accessgp = percentage of patients offered an appointment with a GP within two working
days
* ywoldsdv = dummy variable for Yorkshire Wolds PCT (=1 if PCT is Yorkshire Wolds, =0
otherwise)
* awaitnr5 = average inpatient waiting time at 5 nearest providers
* oldpat = over 65s as a proportion of all patients
* gpperpat = GPs per patient
* depclb4p = practice deprivation claims in band 4 (Jarman index > 50) divided by number
of patients
* voldpat = over 75s as a proportion of all patients
* generman = generics as a proportion of all items prescribed
* acytol01 = cervical screening target achievement (=0, 1, 2, with 2 being best
performance)
* salgppct = salaried GPs as a proportion of all GPs
```

Table 59: Descriptive statistics for explanatory variables

```
    Variable |      Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
    awaitnr5 |      300    90.10042    15.88352    56.47414   146.8097
      oldpat |      300     .159254    .0309863    .0857216   .2840365
     gpperpat |     300    .0005505    .0000601    .0004174   .0007527
     depclb4p |     300    .0007867    .0029731           0   .0287575
      voldpat |     300    .0760216    .0176076    .0365363   .1558985
     generman |     300    75.87102    2.957362      64.573      84.83
     acytol01 |     300    1.891214    .1686527    1.156365          2
     salgppct |     300    .0246953    .0345458           0   .2280702
```

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6.3.5. Four-week smoking quitters

The following table shows the OLS regression result for the key target 'smoking quitters'. The variable records the number of patients who have quit smoking at a four-week follow-up divided by the planned number of quitters. The division of a planned number of quitters by the actual number of quitters means that for some PCTs this ratio exceeds unity.

Of the nine significant standardised variables, the coefficient on the GP accessibility score is about three times the size of its nearest rival and the negative sign implies that GP accessibility is negatively associated with quit rates. There is also evidence of a deprivation effect with the permanent sickness rate positively associated with rates of giving up smoking.

Table 60: Regression results for smoking quitters

```
Regression with robust standard errors          Number of obs =     295
                                                F( 10,  284) =   17.95
                                                Prob > F      =  0.0000
                                                R-squared     =  0.3221
                                                Root MSE      =  .83786

------------------------------------------------------------------------------
             |               Robust
  quitsmokstd |    Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  permsickstd |   .2523129   .0502987     5.02   0.000     .1533073    .3513184
  agpaccesstd |  -.7364423    .085246    -8.64   0.000    -.9042364   -.5686482
  adstacutstd |  -.2119676   .0779883    -2.72   0.007     -.365476   -.0584592
 aacutebestd |  -.1633786    .049873    -3.28   0.001    -.2615461   -.0652111
  gpchosclstd |  -.1210564   .0524555    -2.31   0.022    -.2243073   -.0178056
    gpcopwtg2 |   .2259687   .0803912     2.81   0.005     .0677306    .3842069
  genermanstd |   .2393959   .0558345     4.29   0.000     .1294939    .3492978
  mmr2copcstd |  -.1263039   .0411304    -3.07   0.002     -.207263   -.0453448
   inhcorv2std |   .1628275   .0610813     2.67   0.008     .042598    .2830571
     chthpcstd |  -.1208814   .0529003    -2.29   0.023    -.2250079   -.0167549
        _cons |  -.3980758   .1390605    -2.86   0.005    -.6717957   -.1243558
------------------------------------------------------------------------------
```

*quitsmok = number of smokers who had quit at four week follow-up divided by number of planned quitters
* permsick = proportion of the population aged 16-74 that are permanently sick
* agpacces = accessibility score to general practitioners
* adstacut = average distance to acute providers used
* aacutebe = average number of beds at 5 nearest acute providers
* gphoscl = hospital cleanliness score
* gpcopwtg2 = number of outpatients waiting longer than standard (=0, 1, or 2 with 2 = best performance)
* generman = generics as a proportion of all items prescribed
* mmr2co = MMR2 count divided by number of patients aged under two
* inhcorv2 = cost per daily dose indicator for inhaled corticosteroids relative to national average
* chthpc = proportion of all GPS offering child health surveillance services

Table 61: Descriptive statistics for explanatory variables

```
    Variable |       Obs        Mean    Std. Dev.        Min        Max
-------------+--------------------------------------------------------
    quitsmok |       300    85.72154    44.81145    5.294117    291.2409
    permsick |       300    .0538405    .0231027    .0194167    .1626286
    agpacces |       300    .0001794    .0000576    .0000803    .0003344
    adstacut |       300    24.70742    9.979284    11.82351    72.49022
    aacutebe |       300    506.8469    128.0926    229.3225    928.4964
    gpchoscl |       295    62.32982     4.56456    51.51614    71.18472
    generman |       300    75.87102    2.957362      64.573      84.83
    mmr2copc |       300    .2917068    .2680342     .003046     2.41777
    inhcorv2 |       300    .6607733    .1231135        .424       1.361
      chthpc |       300    .9488465    .0520695    .7241379          1
```

6.3.6. Number of outpatients waiting longer than the standard

The following table shows the ordered probit results for the outpatient waiting time key target variable. This is based upon the number of outpatients waiting longer than 26 weeks for an appointment. Each PCT is awarded a rating, either 0, 1, or 2, according to the number of outpatients that breach this target (with a rating of 2 denoting best performance).

Of the seven significant variables, two reflect inpatient waiting times and imply that inpatient waits are positively associated with outpatient waits. Quite plausibly, outpatient waiting time performance is positively related to the proportion of GPs providing minor surgery, and the coefficient on the private bed accessibility variable implies that this variable too is positively associated with outpatient waiting time performance.

Table 62: Ordered probit results for outpatients waiting against the standard

```
Ordered probit estimates                         Number of obs   =        300
                                                 Wald chi2(7)    =      50.97
                                                 Prob > chi2     =     0.0000
Log likelihood = -103.17668                      Pseudo R2       =     0.1990


------------------------------------------------------------------------------
             |               Robust
      owait2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  abedprivstd |   .3622831   .1257888     2.88   0.004     .1157417    .6088246
 pmspcentstd |   .2636934   .1181011     2.23   0.026     .0322196    .4951673
    gpcinwtg2 |   .7260399   .1904433     3.81   0.000     .3527779    1.099302
  ain3mnthstd |   .5684362   .1225171     4.64   0.000      .328307    .8085653
   antibactstd |    .319629   .1258148     2.54   0.011     .0730366    .5662214
 mgppcentstd |   .2445935   .1231488     1.99   0.047     .0032264    .4859606
  minisupcstd |   .3190521   .0954206     3.34   0.001     .1320311    .5060731
-------------+----------------------------------------------------------------
        _cut1 |  -1.461361   .3885442          (Ancillary parameters)
        _cut2 |  -.0612913   .3610082
------------------------------------------------------------------------------
*owait2 = number of outpatients waiting longer than the standard (=0, 1, or 2 with 2 =
best performance
* abedpriv = accessibility to private beds
* pmspcent = proportion of all GPs that are in PMS practices
* gpcinwtg2 = number of inpatients waiting longer than standard (=0, 1, or 2 with 2=best
performance)
* ain3mnth = proportion of inpatients seen within 3 months at providers used
* antibact = cost per item indicator for antibacterials (relative to national average
costs)
* mgppcent = proportion of GPs that are males
* minisupc = proportion of GPs providing minor surgery
```

Table 63: Descriptive statistics for explanatory variables

```
    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+--------------------------------------------------------
      owait2 |     300    1.856667    .3872408          0          2
     abedpriv |    300    38.59089    14.24498    14.80005   113.6585
     pmspcent |    300    .2188023    .2231079          0    .9705882
    gpcinwtg2 |    300    1.876667    .4187762          0          2
     ain3mnth |    300    .5212993    .0772591    .3510385    .8048751
    gpcaewai2 |    300        1.67    .6752431          0          2
      antibact |    300     4.48063    .4475028       3.401      5.813
     mgppcent |    300    .6649174    .0790834    .4646465    .9090909
     minisupc |    300     .844574    .1137331    .2672414          1
```

6.3.7. Number of inpatients waiting longer than the standard

The following table shows the ordered probit results for the inpatient waiting time key target variable. This is based upon the number of inpatients waiting longer than 15 months for admission. Each PCT is awarded a rating, either 0, 1, or 2, according to the number of inpatients that breach this target (with a rating of 2 denoting the best performance).

Of the four significant standardised variables, the coefficient on the limiting long term illness variable is the largest and implies that deprived areas tend to record a better inpatient waiting time performance. Quite plausibly, the financial variable *dftclose* implies that PCTs with relatively large budgets also tend to have shorter inpatient waits. The significance of the positive coefficient on the *mhprovider* variable implies that PCTs that are also providers of mental health care tend to perform better on inpatient waiting times.

Table 64: Ordered probit results for inpatients waiting against the standard

```
Ordered probit estimates                       Number of obs   =        300
                                               Wald chi2(5)    =    1913.71
                                               Prob > chi2     =     0.0000
Log likelihood = -89.378824                    Pseudo R2       =     0.1767


------------------------------------------------------------------------------
             |               Robust
      iwait2 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  pcwalltistd |   .9202724   .1840971     5.00   0.000     .5594487    1.281096
   aacutebestd |  -.2335201   .1109185    -2.11   0.035    -.4509163   -.0161239
   dftclosestd |   .6267453   .1534983     4.08   0.000     .3258942    .9275965
    aptrnpctstd |  -.2118768   .1021256    -2.07   0.038    -.4120392   -.0117143
    mhprovider |   7.514829   .3476214    21.62   0.000     6.833504    8.196155
-------------+----------------------------------------------------------------
        _cut1 |  -2.245804   .1953645           (Ancillary parameters)
        _cut2 |  -1.645753   .1480553
------------------------------------------------------------------------------
* pcwallti = proportion of the working age with a limiting long term illness
* aacutebe = average number of beds at 5 nearest acute providers
* dftclose = PCT's closing distance from target (positive number implies budget exceeds
target)
* aptrnpct = proportion of GPs that are approved trainers
* mhprovider = whether the PCT is also a mental health Trust
```

Table 65: Descriptive statistics for explanatory variables

```
    Variable |      Obs       Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
      iwait2 |      300    1.876667   .4187762          0          2
    pcwallti |      300    .1140389   .0277193   .0659015   .2266909
    aacutebe |      300    506.8469   128.0926   229.3225   928.4964
    dftclose |      300    .1809917   5.90876   -20.22751   31.12989
    aptrnpct |      300    .1309975   .0674585          0   .3181818
  mhprovider |      300    .0566667   .2315909          0          1
```

6.3.8. Financial management

PCTs were awarded a rating of either -2, -1, or 1 depending on their financial management performance. However, due to the small number of PCTs with a rating of –1 or –2 , these PCTs were merged into a single category with a rating of 0. Thus in the regression model presented below the financial management variable takes either a value of one (n=272), denoting no need for unplanned financial support, or a value of zero (n=28), denoting the opposite.

The results suggest that better financial management is positively associated with the number of beds at the nearest acute providers, the beds weighted distance to mental health care, and the financial management of acute service providers. At the same time, better financial management is negatively associated with the beds weighted distance to private health care, anti-bacterial prescription costs, and whether the PCT is also a mental health care provider.

Table 66: Probit results for financial management

```
Ordered probit estimates                          Number of obs   =        295
                                                  Wald chi2(7)    =    1515.30
                                                  Prob > chi2     =     0.0000
Log likelihood = -65.125297                       Pseudo R2       =     0.2964


------------------------------------------------------------------------------
             |             Robust
      finman |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  abedacutstd |   .4249179   .2078452     2.04   0.041     .0175489    .8322869
  adistmntstd |   .7163355   .2078247     3.45   0.001     .3090066    1.123664
  adistpristd |  -.7423064   .1803816    -4.12   0.000    -1.095848    -.388765
  gpcfinmastd |     .27759   .1077277     2.58   0.010     .0664476    .4887325
  mgppcentstd |  -.4312103   .1662579    -2.59   0.009    -.7570698   -.1053508
   antibactstd |  -.364234   .1417457    -2.57   0.010    -.6420505   -.0864174
    mhprovider |   7.705442   .2687624    28.67   0.000     7.178678    8.232207
-------------+----------------------------------------------------------------
        _cut1 |  -1.938585   .1899305              (Ancillary parameter)
------------------------------------------------------------------------------
* finman   = whether the PCT required unplanned financial support
*            (=0 if support, =1 if no support)
* abedacut = average beds at 5 nearest acute providers
* adistmnt = beds weighted distance to mental health care
* adistpri = beds weighted distance to private health care
* gpcfinma = achievement of financial plan without need for unplanned financial support
(from -2 to 1 but continuous and higher value better)
* mgppcent = male GPs as a proportion of all GPs
* antibact = cost per item indicator for anti-bacterials (relative to national average
costs)
* mhprovider = whether the PCT is also a mental health Trust
* NB variables with the 'gpc' prefix are constructed from key target scores recorded by
the top five acute Trusts serving the PCT
```

Table 67: Descriptive statistics for explanatory variables

```
    Variable |     Obs        Mean    Std. Dev.       Min        Max
-------------+--------------------------------------------------------
      finman |     300    .9066667     .291385         0          1
     abedacut |    300    826.1952    336.2205    382.9106   2505.237
     adistmnt |    300     .000781    .0002516    .0001405      .0015
     adistpri |    300    .0003109    .0001734    .0000618   .0010531
     gpcfinma |    295    .4121657    1.005189         -2          1
     mgppcent |    300    .6649174    .0790834    .4646465   .9090909
     antibact |    300     4.48063    .4475028       3.401      5.813
   mhprovider |    300    .0566667    .2315909         0          1
```

6.3.9. Improving working lives

The following table shows the ordered logit results for the improving working lives (IWL) key target variable. The variable takes either a value of zero, if the IWL standard is not achieved (n=21), or a value of 1 if it is achieved (n=278).

Of the six significant standardised variables, the *popucar* variable has the largest coefficient and its positive sign implies that the achievement of the IWL standard is positively associated with the proportion of the population providing unpaid care. There is evidence of a deprivation effect with the positive coefficient on the *hhnocar* variable implying that the achievement of the IWL standard is positively associated with the proportion of the population with no car.

There are two significant prescribing indicators – *statins* and *betabloc* – and both suggest that greater prescribing of these drugs is likely to reduce the probability of the PCT achieving the IWL standard. There is also evidence that PCTs with responsibility for the provision of mental health services are more likely to achieve the IWL standard.

Table 68: Logistic regression results for improving working lives

```
Ordered logit estimates                        Number of obs   =        299
                                               Wald chi2(7)    =    4404.46
                                               Prob > chi2     =     0.0000
Log likelihood = -57.317024                    Pseudo R2       =     0.2460

------------------------------------------------------------------------------
             |             Robust
     impwldv |     Coef.  Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   hhnocarstd |   .8380207   .2886376     2.90   0.004     .2723015    1.40374
  poppucarstd |   1.111612   .305676      3.64   0.000     .5124978   1.710726
  pmspcentstd |    .784555   .3008283     2.61   0.009     .1949424   1.374168
   statinsstd |  -.5924539    .254291    -2.33   0.020    -1.090855  -.0940527
  betablocstd |  -1.037935   .2871375    -3.61   0.000    -1.600714  -.4751558
    chthpcstd |   .8064941    .266092     3.03   0.002     .2849634   1.328025
   mhprovider |   33.44427   .5634371    59.36   0.000     32.33996   34.54859
-------------+----------------------------------------------------------------
        _cut1 |  -3.440298   .3963128              (Ancillary parameter)
------------------------------------------------------------------------------
* impwldv  = achievement of Improving Working Lives Standard
*            (=1 if achieved, =0 if not achieved)
* hhnocar = proportion of households with no car
* poppucar = proportion of the population providing unpaid care
* pmspcent = proportion of GPs that are on PMS sites
* statins = volume indicator for the prescription of statins
* betabloc = volume indicator for beta blockers
* chthpc = proportion of GPs offering child health surveillance services
* mhprovider = whether the PCT is also a mental health Trust
```

Table 69: Descriptive statistics for explanatory variables

```
    Variable |     Obs       Mean   Std. Dev.       Min        Max
-------------+--------------------------------------------------------
     impwldv |     299   .9297659   .2559696         0          1
      hhnocar |     300   .2608052   .1033092  .0922091   .5762327
     poppucar |     300   .1004441    .011003  .0695421    .128395
     pmspcent |     300   .2188023   .2231079         0   .9705882
      statins |     300     7.7236   1.817625     4.592     15.306
      betabloc |     300   10.01377   1.324786      4.87     14.622
       chthpc |     300   .9488465   .0520695  .7241379          1
   mhprovider |     300   .0566667   .2315909         0          1
```

6.4. Relationship between star ratings of PCTs and acute Trusts

This section examines the relationship between the star ratings awarded to commissioners and the ratings gained by their service providers. Given that some of the same variables are used to assess the performance of both commissioners and providers (e.g., A&E waiting times and inpatient waiting times) one might expect a positive association between the two sets of ratings. We might also expect a positive relationship as the better commissioners exert more pressure on their local providers to improve their performance. Finally, both commissioners and providers will tend to operate in the same geographical area and be part of the same local health economy. Although it is not impossible to imagine a circumstance where the local health economy adversely affects acute services but positively affects primary care, it seems more likely that both types of service will be affected in a similar way by the local health economy and, again, this would generate a positive relationship between PCT and acute Trust star ratings.

For each PCT we calculated a weighted average of the star ratings awarded to each of its five largest acute providers (with the weights based on the number of HES all specialty spells for 2001-02 'commissioned' by the PCT from each acute provider). The following table shows a positive association between the PCT star rating and the acute Trust star rating, with the mean acute Trust star rating increasing from 1.21 for zero star PCTs to 2.26 for three star PCTs. Across all PCTs, the mean acute Trust rating is 1.93 stars.

Table 70: Acute Trust star rating by PCT star rating

```
    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-------------------------------------------------------
acuterati~03 |     295    1.934629    .8449831          0          3
```
_____

```
-> rating03 = 0

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-------------------------------------------------------
acuterati~03 |      22    1.216989    .8862858          0   2.892674
```
_____

```
-> rating03 = 1

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-------------------------------------------------------
acuterati~03 |      97    1.604336    .8310954          0          3
```
_____

```
-> rating03 = 2

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-------------------------------------------------------
acuterati~03 |     134    2.187507    .6782332          0          3
```
_____

```
-> rating03 = 3

    Variable |     Obs        Mean    Std. Dev.        Min        Max
-------------+-------------------------------------------------------
acuterati~03 |      42    2.266555    .8670355    .1205189          3
```

* acuterating03 is the star rating for acute Trusts
* rating03 is the star rating for PCTs

The following table shows the analysis of variance for acute Trust star ratings by PCT, with zero star PCTs as the omitted comparator group. It confirms the results in the previous table, showing that the mean acute Trust rating increases with the category of PCT star rating. The coefficient on the constant (1.2169) is the mean acute Trust rating for PCTs with zero stars. To obtain the mean acute Trust rating for PCTs with one star, we add the coefficient on the *1star* variable (0.3873) to the coefficient on the constant (1.2169) to obtain a value of 1.6042. The coefficient on the *1star* variable is significantly different from zero. This implies that the average acute rating for one star PCTs is significantly greater than the average acute rating for zero star PCTs. Similar results hold for both the two star and three star PCTs.

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Table 71: Analysis of variance of acute Trust star rating by PCT star rating, with zero stars as the base unit

```
      Source |       SS       df       MS              Number of obs =     295
-------------+------------------------------           F(  3,   291) =   19.48
       Model | 35.1085303      3  11.7028434           Prob > F      =  0.0000
    Residual | 174.806442    291  .600709421           R-squared     =  0.1673
-------------+------------------------------           Adj R-squared =  0.1587
       Total | 209.914972    294  .713996503           Root MSE      =  .77505


------------------------------------------------------------------------------
acuterati~03        Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
------------------------------------------------------------------------------
_cons            1.216989   .1652422     7.36   0.000     .891768    1.542211
rating03
       3star     1.049566   .2039794     5.15   0.000    .6481041    1.451028
       2star     .9705179   .1782916     5.44   0.000    .6196135    1.321422
       1star     .3873465   .1830242     2.12   0.035    .0271275    .7475655
       0star    (dropped)
------------------------------------------------------------------------------
```

These results suggest that acute Trust ratings are significantly positively associated with PCT star ratings across the four categories. Acute Trust star ratings increase as PCT star ratings increase although when the analysis is repeated with three star PCTs as the comparator group, the acute rating for two star PCTs (2.19) is not significantly different from the acute rating for three star PCTs (2.27).

The following figure shows the acute Trust star ratings on the vertical axis plotted against the PCT star categories on the horizontal axis.

Figure 4: Plot of acute Trust star ratings by PCT star ratings
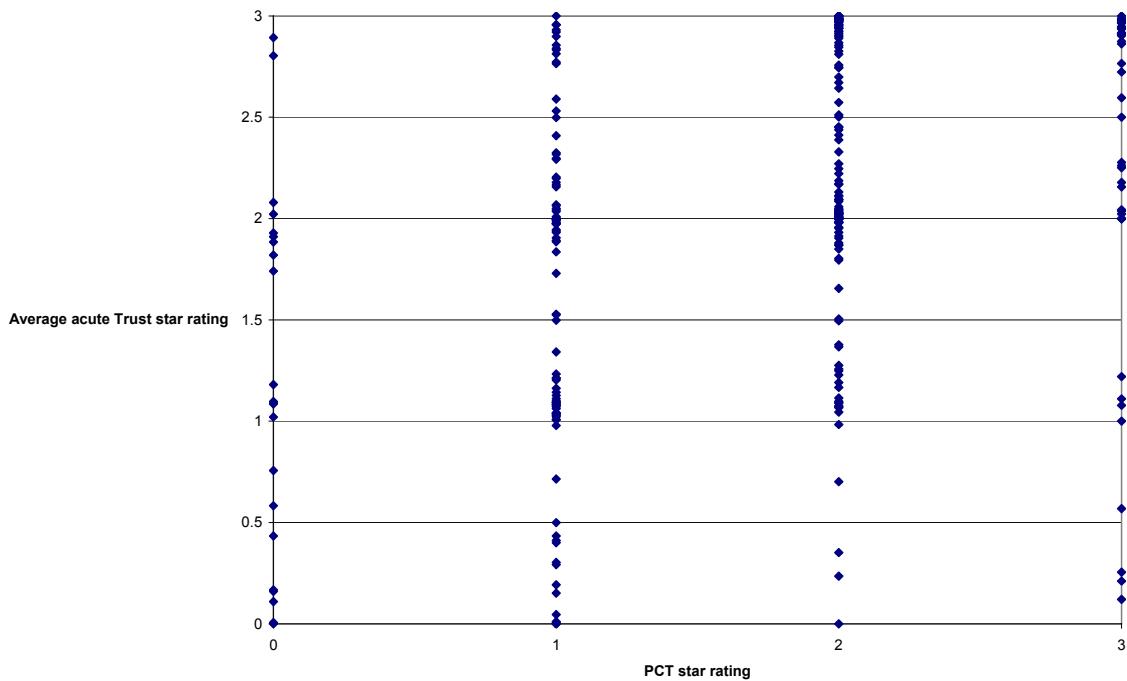
6.5. Summary of PCT Analysis

Regressing the key targets on the PCT star rating revealed that all nine key targets were statistically significant and had the 'correct' sign. They accounted for 44% of the variation in star ratings. However, it was difficult to determine which of these key targets had the largest effect as five of the nine were categorical variables. Of the remaining four, the coefficient on the A&E waiting time variable was the largest, being about three times the size of the smallest coefficient (on the quit smoking variable).

The balanced scorecard indicators were less able to explain variations in the star ratings. From a total of 37 indicators, our preferred model identified seven significant indicators which, together, explained just 23% of the variation in star ratings.

Together, the key targets and balanced scorecard indicators were able to explain almost two-thirds of the variation in the star ratings. This model contained all nine key targets together with ten balanced scorecard indicators. Of the 13 continuous variables in this model, the coefficient on the A&E waiting time variable is almost 50% greater than the second largest coefficient (which is on the GP accessibility variable).

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Finally, we undertook a stepwise analysis of the star ratings employing all of the other variables in our PCT database (that is excluding all key targets and balanced scorecard indicators). We found that 17 variables accounted for almost one-third of the variation in the star ratings. This model was rather difficult to interpret but suggested that:

- deprivation
- the accessibility of psychiatric beds
- health care expenditure and
- short waits

all have a positive effect on star ratings.

In the second part of this section we analysed the determinants of the key targets. Regressors were divided into five groups with the first group almost wholly outside the control of the PCT and the fifth group well within the control of the PCT. For each key target we employed stepwise regression methods to obtain a preferred model. Our interest lay in the extent to which key targets were determined by variables outside the control of PCT management.

Summarising the results in a few sentences is not a straightforward matter. However, to highlight broad themes the table below reports the number of significant variables in each regression and the distribution of these significant variables across the spectrum of PCT controllability. As before we view socio-economic conditions as the least controllable and factors captured by the GMS data as the most controllable.

Table 72: Significant variables in the key target regressions

```
------------------------------------------------------------------------------------
Key target     Number of significant regressors in the key target regression
------------------------------------------------------------------------------------
            socio-     geographical financial   acute Trust    GMS data
            economic                            performance
            (n=43)     (n=19)      (n=1)        (n=17)         (n=47)
------------------------------------------------------------------------------------
accesspcp    1 (-ve)      2          -           1              2
ttimeaae     1 (+ve)      1          1           2              5
telaccen     1 (+ve)      2          -           -              1
accessgp     1 (-ve)      -          -           1              6
quitsmoke    1 (+ve)      3          -           2              4
owait        -            1          -           2              4
iwait        1 (+ve)      1          1           -              2
finman       -            3          -           1              3
impwl        2 (+ve)      -          -           -              5
------------------------------------------------------------------------------------
----------------
* accessgp = percentage of patients offered an appointment with a GP within two working
days
* accespcp = percentage of patient offered an appointment with a PCP within one working
day
* iwait = number of inpatients waiting longer than the standard (=0, 1, or 2 with 2 =
best performance)
* owait = number of outpatients waiting longer than the standard (=0, 1, or 2 with 2 =
best performance)
* ttimeaae = percentage of patients waiting less than four hours in A&E
* telaccen = provision of a single telephone access point to out of hours GP services
(= 0 if no, = 1 if yes)
* quitsmok = number of smokers who had quit at four week follow-up divided by number of
planned quitters
* impwldv = achievement of Improving Working Lives Standard (= 1 if achieved, = 0 if not
achieved)
* finman = whether the PCT required unplanned financial support (= 0 if support, = 1 if
no support)
```

There is some evidence from the table that socio-economic conditions do affect key target scores. However, this effect is not consistent across all key targets. There are two key targets – access to a GP and access to a primary care professional – where deprivation appears to have a negative effect on the key target score. However, there are five other key target variables where deprivation apparently has a positive effect on the key target score. Therefore on the basis of these results alone we cannot say whether deprivation has a positive or negative effect on key target scores and hence on PCT star ratings.

7. Conclusions

This study has sought to add to the understanding of the performance ratings for acute Trusts and PCTs. It comprises a series of initial exploratory analyses of two main issues: first, the influence of key targets and indicators on the star ratings; and second, (and more importantly) the association of other explanatory variables with the ratings

and key indicators, including factors that may to a greater or lesser extent be outside managerial control.

We have used a linear multivariate regression approach which does not replicate the rule-based algorithm used to construct the star ratings in any way. The conclusions we draw on the nature and strength of the relationships between the star ratings and the performance indicators, are within this linear modelling framework.

For acute Trusts, we find that eight of the nine key targets (hospital cleanliness was the exception) plus the CHI review are significant in explaining star ratings, explaining 61% of the variation in star ratings. This is unsurprising given the nature of the algorithm used to construct the ratings. Analysis of the balanced scorecard indicators included in the star ratings showed that four of the seven capacity and capability variables were statistically significant; as were five of the nineteen patient focus variables, but none of the clinical focus indicators. When all key targets and balanced scorecard indicators were combined into a single model, the results were virtually identical to those obtained when using the key targets alone. Only one balanced scorecard indictor was significant (six month inpatient waits from the patient focus variables) and the proportion of variation in star ratings explained increased only marginally to 62%.

The main policy message to emerge is that given the current method of constructing the star ratings, they will be determined to a large degree by whatever is included in the key targets, plus the results of the CHI review. The influence of the balanced scorecard indicators may be important for fine-tuning within the rule-based ratings context, but appear to be marginal within this modelling context. Thus if policy-makers wish to target other areas for improvement – such as clinical indictors – they will need to incorporate them into the key targets or use an alternative methodology and weighting process in order to influence the star ratings in a more significant way.

The second stage of the analysis explored the role of other explanatory factors on acute trust star ratings and key indicators, including factors that are beyond the control of Trust managers, such as socio-economic characteristics of the population and deprivation. The latter did not influence significantly the star ratings of acute Trusts.

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However, a degree of caution is required as population deprivation for Trusts was calculated from measures for their 5 main PCTs and may not reflect accurately the characteristics of the population served by the Trust.

Many other factors significantly associated with star ratings are within the control of managers to some extent (e.g. expenditure on agency staff) although these will also be influenced by budgetary constraints and local labour market factors. Whilst there are no obvious explanations for some of the statistical associations detected, many are intuitively plausible, for example, supporting the view that less use of agency nursing staff will produce better quality care or reflecting the important role of good financial management in achieving good performance more broadly.

Analysis of the impact of other factors on the key targets highlighted the significance of a range of mainly organisational and activity variables that subject to budgetary constraints do appear to be within management control, such as occupancy rates, or availability of day theatres. Labour market variables also feature prominently, and it is a matter for debate how much control managers have over factors such as expenditure on agency staff and vacancy rates. Whilst socio-economic or deprivation measures were significant in explaining a few of the key targets, they did not appear to play a major role. The proportion of variation explained in the model varied greatly from 74% to only 14%.

For PCTs, all nine key targets were statistically significant and had the 'correct' sign in explaining star ratings, accounting for 44% of the variation, somewhat less than the result for acute Trusts. The balanced scorecard indicators were less successful in explaining variations in the star ratings, but still accounted for 23% of the variation, somewhat greater than the equivalent for acute Trusts. Together, the key targets and balanced scorecard indicators were able to explain almost two-thirds of the variation in the star ratings

Amongst PCTs, the key difference from acute Trusts was the increased association of deprivation with performance on key targets and overall ratings. However, this relationship was not necessarily as expected, with some deprivation exhibiting a

positive association with star ratings and the key targets. This is clearly an area meriting further research.

We also explored the association between PCT and Trust star ratings using the purchaser-provider matrix supplied by CHI, which indicated the 5 main PCT purchasers for each acute Trust. We found that 28% of the variation in acute Trust star ratings is explained by PCT star ratings; and conversely, 16% of the variation in PCT ratings is explained by the star ratings of acute Trusts. This is not unexpected given that some of the PCT ratings depend both directly or indirectly on the performance achieved by their local acute Trusts. Similarly, the ability of Trusts to meet some of their targets, such as waiting times, depends on both the performance of PCTs as commissioners and as providers (e.g. GP referral policy). Achieving better performance is likely to be easier for all organisations when they are part of a high performing local health economy.

This preliminary analysis has therefore provided some clues as to the potential determinants of performance at Trust and PCT level. Without claiming to offer definitive answers, the results are of interest for a number of policy questions. For example, to what extent is the measured performance of NHS organisations the result of managerial competence, and to what extent does it result from uncontrollable external forces? Are there managerial polices that lead to generally improved performance? And are there specific policies that can contribute to improvements in particular areas of activity?

Given the demanding time constraints and the major effort required to assemble and link a wide range of data, our approach in this report has necessarily focused on the use of exploratory statistical techniques rather than on construction of models with a strong underlying theoretical basis. We believe that the next stage should be the development of theoretical models that address more specific research questions. One obvious issue is the relationship between acute Trust and PCT performance and its implications for performance management. The data set we have assembled can serve as a major resource for testing a range of carefully constructed statistical hypotheses derived from explicit models of Trust behaviour and the effects of exogenous factors outside the control of Trusts.

8. References

Audit Commission (2001) *Brief Encounters*, Audit Commission Report: London.

Department of Health (2001) *NHS Performance Ratings: Acute Trusts 2000/01*,
    Department of Health: London.
    http://www.doh.gov.uk/performanceratings/2001/index.html

Jacobs, R. & Smith, P.C. (2003) *A descriptive analysis of Trust star ratings: A report
    for the Commission for Health Improvement*, Centre for Health Economics,
    University of York, June 2003.

Sutton, M. Gravelle, H. Morris, S. Leyland, A. Windmeijer, F. Dibbin, C. and
    Muirhead, M. (2002) *Allocation of Resources to English Areas (AREA):
    Individual and Small Area Determinants of Morbidity and Use of Health Care*,
    Report for the Department of Health.

9. Appendix A

9.1. Variable definitions for acute Trust database

Table 73: Variable definitions for acute Trust database

```
CHI DATA (KEY TARGETS AND INDICATORS FOR 2003)
pi_stars      Star rating (zero to three) awarded to PCT in July 2003
pi_spec       Dummy variable =1 for specialist hospitals = 0 for acute
Key targets and CHI review
aewait12_s    A&E emergency admission waits (12 hours);
              2=9 breaches or less, 1= 9-50 breaches; 0=more than 50 breaches
aewait12      Number of patients waiting more than twelve hours for admission via A&E
              as an emergency following decision to admit
cancop28      Percentage of patients not readmitted within 28 Days of operation
              cancelled for non-clinical reasons on the day of surgery
finman        Achievement of the financial position shown in the 2002/3 Plan without
              the need of unplanned financial support; -2=worst financial management,
              -1=next, 1=best
hosclean      Whole trust score of hospital cleanliness, formulated against Patient
              Environment Action Team (PEAT) visits
impwlive      Dummy variable for achievement of Improving Working Lives (IWL) Standard
              'practice' or 'pledge' status by the end of Q4 2002/03; 1=achieved, 0=not
inwtgtst_s    Number of inpatients waiting longer than the standard;
              2=2 breaches or less, 1= 2-10 breaches; 0=more than 10 breaches
inwtgtst      Number of patients who were waiting more than 15 months throughout the
              year, or more than 12 months at end March 2003, for inpatient admission
opwtgtst_s    Number of outpatients waiting longer than the standard;
              2=5 breaches or less, 1= 5-50 breaches; 0=more than 50 breaches
opwtgtst      Number of patients who were waiting more than 26 weeks throughout the
              year, or more than 21 weeks at end March 2003, for outpatient appointment
aetotwait     Total time in A&E - Percentage of patients waiting less than 4 hours in
              A&E from arrival to admission, transfer or discharge
cancwait      Percentage of patients seen within two weeks of urgent GP referral for
              suspected cancer to outpatient appointment with a specialist
chi_review    CHI review score (1=lowest, 4=highest)
Capacity and capability
consappr      Percentage of consultants who have completed annual appraisal, including
              the appraisal meeting and signing off their personal development plan
hesdataq      Summary measure of Hospital Episode Statistics (HES) data quality for NHS
              trusts with in-patient activity
firehsaf      Fire, health & safety backlog (£/m²)
infogov       Information governance & Data Accreditation
jdochrs       Percentage of junior doctors complying in full with the New Deal on
              Junior Doctors' Hours
sickrate      The amount of time lost through absences as a percentage of staff time
              available for directly employed NHS staff
staffopn      Responses from NHS-employed staff opinion survey on satisfaction with
              employer
Clinical focus
clinnegl      Level of compliance against Clinical Negligence Scheme for Trusts (CNST)
              risk management standards
dea30hbo      Deaths within 30 days of surgery for heart bypass operation, (which
              includes deaths in hospital and after discharge) - rate per 100,000
dew30sur      Deaths within 30 days of selected surgical procedures (which includes
              deaths in hospital and after discharge) - rate per 100,000
emredisc      Emergency readmission to hospital following discharge, as a percentage of
              live discharges - for patients aged 16 years or over
emredisk      Emergency readmission to hospital within 7 days of discharge for children
              as a percentage of live discharges for children
emrefhip      Emergency readmissions to hospital within 28 days of discharge following
              treatment for a fractured hip, as a percentage of live hip fracture
              discharges (age and sex standardised)
emrestro      Emergency readmissions to hospital within 28 days of discharge following
              a stroke, as a percentage of live stroke discharges (age and sex
              standardised)
infectco      Infection control - Self-assessment scores by standard/criteria (average
              of scores)
mrsascor      Methicillin Resistant Staphylococcus Aureus (MRSA) bacteraemia:
```

	Improvement score
thrombtt	Percentage of eligible patients treated with thrombolysis within 30 minutes of hospital arrival

Patient focus

aewait4	The percentage of patients admitted to hospital via A&E within 4 hours of decision to admit
betterfood	Whole trust score of hospital food, formulated against Patient Environment Action Team (PEAT) visits; red=below average, amber=average, green=above average
betterfood_s	Score achieved for better hospital food
brcancwt	Number of patients treated within one month of diagnosis of breast cancer divided by number of patients treated with a diagnosis of breast cancer
cancops	Percentage of elective admissions cancelled at the last minute for non-clinical reasons
dcasbook	Percentage booking of day cases (to reach 80% by March 2003)
trancare	Percentage of patients whose transfer of care from hospital was delayed
hartwait	Nine month heart operation waits: Revascularisation: Percentage of elective patients waiting less than 9 months
opsacces	Outpatient/A&E survey - access & waiting
opschoic	Outpatient/A&E survey - better information, more choice
opsbrela	Outpatient/A&E survey - building relationships
opsclean	Outpatient/A&E survey - clean, comfortable, friendly place to be
opssafec	Outpatient/A&E survey - safe, high quality, co-ordinated care
pedopdna	Paediatric outpatient did not attend rates (%)
patcompl	Percentage of written complaints for which a local resolution was completed within 20 working days
privacy_colour	Compliance (as at 31 December 2002) with objectives set to support the elimination of mixed sex accommodation in general wards; red=below average, amber=average, green=above average
privacy_score	Score achieved for privacy
inpwt6mo	Number of patients who had been waiting less than 6 months for inpatient treatment at quarter end divided by the number of patients on inpatient's waiting list, expressed as a percentage
ouwt13wk	Number of outpatients seen within 13 weeks of GP written referral divided by the total number of outpatients seen following GP written referral, expressed as a percentage
totwtinp	Total number of patients waiting for an inpatient appointment (Percentage of planned target achieved)
wtchescl	Proportion of patients with new onset chest pain thought to be angina seen in a Rapid Access Chest Pain Clinic (RACPC) within 2 weeks of GP making a referral

PCT performance data
9 key targets for PCTs and PCT star rating listed in PCT database in Appendix B aggregated to Trusts using purchaser-provider matrix for 5 main PCT commissioners for each Trust (all variables prefixed with pct_)

Census 2001 data
All census data listed in PCT database in Appendix B aggregated to Trusts using purchaser-provider matrix for 5 main PCT commissioners for each Trust (all variables prefixed with pct_)

Socio-economic variables and data from the AREA project
All variables in these categories listed in PCT database in Appendix B aggregated to Trusts using purchaser-provider matrix for 5 main PCT commissioners for each Trust (all variables prefixed with pct_)

Workforce census data
Each of the specialties listed below has data on the following grades of medical staff. The staff type is added as a suffix in the dataset (given in brackets):

Associate specialist (_assocspec)
Clinical Assistant (-ca)
Clinical Medical Officer (_cmo)
Consultant (_consult)
Dental Assistant Clinical Director (_dacd)
Dental Clinical Director (_dcd)
Dental Officer (_do)
House Officer (_ho)
Hospital Practitioner (_hp)
Other [salaried dental practitioner] (_other_dent)
Other [medical practitioner doing part-time work] (other_med)
Registrar Group (_reg)
Senior Clinical Medical Officer (_scmo)
Senior Dental Officer (_sdo)
Senior House Officer (_sho)

Staff Grade (_stafgrad)

The above data is available for all of the following specialties:

```
a_and_e          accident and emergency
add_dental       additional dental medicine specialty
anaesthetics     anaesthetics including intensive care
audiological     audiological medicine
cardiology       cardiology
cardio_surg      cardiothoracic surgery
chem_path        chemical pathology
child_ad_psych   child and adolescent psychiatry
clin_cyto        clinical cytogenetics and molecular
clin_gen         clinical genetics
clin_neuro       clinical neurophysiology
clin_onc         clinical oncology
clin_phar        clinical pharmacology and therapy
clin_radio       clinical radiology
dental_pubhealth dental public health
dermatology      dermatology
endoc_and_diab   endocrinology and diabetes mellitis
endodontics      endodontics
forensic_psych   forensic psychiatry
gastro           gastroenterology
gen_psych        general psychiatry
gen_surg         general surgery
geriatric_med    geriatric medicine
gum              genito urinary medicine
haematology      haematology
histopath        histopathology
immu_allergy     immunology with allergy
infect_dis       infectious diseases
learn_disab      learning disabilities
med_microbio     medical microbiology and virology
med_oncol        medical oncology
med_ophal        medical ophalmology
neurology        neurology
neurosurgery     neurosurgery
nuclear_med      nuclear medicine
obst_and_gynae   obstetrics and gynaecology
occup_health     occupational health
old_age_psych    old age psychiatry
opthalmology     opthalmology
oral_facial_surge oral maxillo facial surgery
oral_surge       oral surgery
orthodontics     orthodontics
otolaryngology   otolaryngology
paed_cardio      paediatric cardiology
paed_dent        paediatric dentistry
paed_surge       paediatric surgery
paediatrics      paediatrics
pallia_med       palliative medicine
periodontics     periodontics
plastic_surge    plastic surgery
prosthodontics   prosthodontics
psychotherapy    psychotherapy
pubhealth_med    public health medicine
rehab_med        rehabilitation medicine
renal_med        renal medicine
resp_med         respiratory medicine
restor_dent      restorative dentistry
rheumatology     rheumatology
surg_dent        surgical dentistry
trauma_surg      trauma and orthopaedic surgery
urology          urology
```

Hospital Episodes Statistics (HES) data
```
totipep          Total inpatient episodes
totspells        Total inpatient spells
propfem          Proportion of female patients
waitlist         Total number on the waiting list
meanwait         Mean waiting time
medianwait       Median waiting time
alos             Average length of stay
medianlos        Median length of stay
prop15u          Proportion of patients under 15 years
```

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```
prop60p          Proportion of patients over 60 years
electives        Number of elective admissions
daycase          Number of daycase admissions
totipd           Total inpatient days
emergadm         Total emergency admissions
```

Hospital activity statistics
```
avbeds           Average number of available beds
acutebeds        Average number of acute beds available
geriatricbeds    Average number of geriatric beds available
maternbeds       Average number of maternity beds available
occupanc         Occupancy rate
acuteocc         Occupancy rate for acute beds
geriatricocc     Occupancy rate for geriatric beds
maternocc        Occupancy rate for maternity beds
a_eatt           Number of A&E attendances
totop1           Total first outpatient attendances
totop            Total outpatient attendances
totop_priv       Total outpatient attendances for private patients
totop1_dna       Total first outpatient attendances that DNA (do not attend)
totop_dna        Total outpatient attendances that DNA (do not attend)
tot_imaging_tests Total number of imaging tests
ct_scans         Total number of CT scans
mri_scans        Total number of MRI scans
obs_ultra_sound  Total number of ultra-sound scans for obstetrics
oth_ultra_sound  Total number of ultra-sound scans for other
radio_isotopes   Total number of radio-isotopes
radio_graphs     Total number of radio-graphs
fluoro_scopy     Total number of fluoroscopy scans
oper_theatres    Total number of available operating theatres
daycase_theatres Total number of available daycase theatres
complain         Number of complaints received
resolve          Number of complaints resolved
sitestotal       Total number of hospital sites
```

Vacancy rate survey
WTE staff number (prefix wte_) and vacancy rates (prefix vacy_) for the following staff categories:

```
med_dent         Medical and dental staff
consultant       Consultants
oth_doc_dent     Other doctors and dentists
nurs_midw_hlthvis Nurses, midwives and health visitors
acut_gen_eld     Acute, general and elderly nurses
paeds            Paediatrics nurses
midwives         Midwives
dis_nurs         Districst nurses
hlth_vis         Health visitors
ahp              Allied Health Professionals
occthep          Occupational therapists
physio           Phsyiotherapists
radiog_diag      Radiographers (diagnostic)
radiog_ther      Radiographers (therapeutic)
psychol          Psychologists
pharm            Pharmacists
theatre          Theatre staff
hcas             Healthcare Assistants
admin            Administrative staff
```

CIPFA data
```
hosp_typ         Hospital type or family grouping
stha_code        Strategic Health Authority code
stha_name        Strategic Health Authority name
reg_code         Region code
london           Dummy variable for London
teaching         Dummy variable for teaching
surplus          Retained financial surplus or deficit for the financial year
assets           Total assets employed
incha            Income from activities from Strategic Health Authorities
inctrust         Income from NHS Trusts
incpct           Income from PCTs
incla            Income from local authorities
incdoh           Income from Department of Health
incpriv          Income from non-NHS private patients
incact           Income from Road Traffic Act
inconnhs         Income from non-NHS other sources
```

```
totinc          Total income
siftr           Service Increment for Education, Training and Research
incchar         Charitable and other contributions to expenditure

For the following specialties, data is available for:
the number of inpatient days (suffix d)
the number of inpatient episodes (suffix ep)
the amount of inpatient expenditure (suffix x)
the number of first outpatient attendances (suffix op1)
the number of total outpatient attendances (suffix op)
the amount of outpatient expenditure (suffix opx)


paed            Paediatrics
geriatric       Geriatrics
cardio          Cardiology
derm            Dermatology
medonc          Medical oncology
neurol          Neurology
rheumat         Rheumatology
gastroent       Gastroentorology
haemat          Haematology
thoracmed       Thoracic medicine
nephrol         Nephrology
rehabm          Rehabilitative medicine
othmed          Other medicine
med             Total medicine
gensur          General surgery
urol            Urology
ortho           Orthopaedics
ent             Ear, nose and throat
opthalm         Ophthalmology
gynae           Gynaecology
neurosur        Neurosurgery
plasticsur      Plastic surgery
cardiothsur     Cardio-thoracic surgery
paedsur         Paediatric surgery
sur             Total surgery
mat             Maternity
psych           Psychiatry
radioth         Radiotherapy
radiol          Radiology
anaesthd        Anaesthetics
oth             Other
supradistserv   Supra-district services
supraregserv    Supra-regional services


totipx          Total inpatient expenditure
totopx          Total outpatient expenditure
a_ex            Total A&E expenditure
dayatten        Number of day attendances


mansal          Expenditure on management salaries
conssal         Consultant salaries
allregsal       Registrar salaries
sho_hosal       SHO and HO salaries
mtotsal         Total Medical salaries
dentsal         Dental salaries
nurssal         Nurse salaries
sttsal          Scientific, technical and therapeutic staff salaries
adminsal        Administrative staff salaries
hcasal          Healthcare assistant salaries
maintsal        Maintenance staff salaries
ambulsal        Ambulance staff salaries
totnhsal        Total NHS staff salary and wages
agencymedx      Non-NHS staff (agency) expenditure on medical staff
agencynursx     Non-NHS (agency) expenditure on nursing staff
agenc ysttx     Non-NHS (agency) expenditure on scientific, technical, therapeutic staff
agencyadminx    Non-NHS (agency) expenditure on administrative staff
agencyhcax      Non-NHS (agency) expenditure on healthcare assistant staff
nonnhsal        Total non-NHS staff salary and wages
totsal          Total expenditure staff salary and wages


wtestaff        Number of WTE staff
nursstaff       Number of nursing staff
sttstaff        Number of Scientific, Therapeutic and Technical staff
adminstaff      Number of administrative staff
```

```
hcastaff         Number of healthcare assistant staff

clinsupp         Clinical supplies and services
gensupp          General supplies and services
estabexp         Establishment expenditure
transportexp     Transport expenditure
clinneglx        Clinical negligence expenditure
drugsx           Expenditure on drugs (including gases)
dressingsx       Expenditure on dressings
kitchenx         Expenditure on provisions and kitchen
cleaningx        Expenditure on contract hotel services including cleaning
laundryx         Expenditure on laundry and cleaning
gensuppx         Expenditure on general supplies
stationeryx      Expenditure on printing and stationery
postagex         Expenditure on postage
telephonex       Expenditure on telephones
travelx          Expenditure on travel, subsistence and removal expenses
transportx       Expenditure on transport including moveable plant
electricityx     Expenditure on electricity
gasx             Expenditure on gas
waterx           Expenditure on water and sewerage
officex          Expenditure on furniture, office and computing equipment
plantexp         Expenditure on plant and fixed premises
depreciation     Total depreciation
hlthxnonnhs      Total purchase of healthcare from non-NHS bodies
nonsalx          Total non-pay revenue expenditure
nonhlthx         Total expenditure non-healthcare
totcost          Total revenue expenditure
```

Reference Cost Index data
```
mff              Market Forces Factor
rci_excessbdays  Reference Cost Index including excess bed days
rci              Reference Cost Index excluding excess bed days
rci_elec_dc      Reference Cost Index for elective daycases
rci_nonelec      Reference Cost Index for emergencies
rci_critcare     Reference Cost Index for critical care
rci_op           Reference Cost Index for outpatients
rci_othacute     Reference Cost Index for other acute care
rci_comm         Reference Cost Index for community care
rci_mh           Reference Cost Index for mental health
rci_paramed      Reference Cost Index for paramedics
```

9.2. Descriptive statistics for acute Trusts

Table 74: Descriptive statistics of Trust variables by star rating for 2002/03 for NHS acute Trusts in England

Trust variables	Year	0 star			1 star			2 star			3 star		
		n	Mean	Std. dev	n	Mean	Std. dev	n	Mean	Std. dev	n	Mean	Std. dev
Star rating variables													
Key target													
A&E waits (12 hours)	2002/03	14	125.86	233.4	30	35.97	128.09	59	3	7.48	52	0.44	1.11
Cancelled ops not admitted 28 days	2002/03	11	0.0021	0.0017	28	0.003	0.0041	59	0.0012	0.0013	53	0.0008	0.0011
Financial management	2002/03	14	-1.71	0.83	30	-0.3	1.37	59	0.51	1.06	53	1	0
Hospital cleanliness	2002/03	14	60.17	4.9	30	60.29	5.78	59	62.34	5.25	53	64.21	4.82
Inproving Working Lives	2002/03	14	0.86	0.36	30	0.8	0.41	59	0.98	0.13	53	1	0
Inpatient wait against standard	2002/03	14	46.21	151.34	30	14.3	67.84	59	0.12	0.38	53	0.11	0.58
Outpatient wait against standard	2002/03	14	20.21	36.59	30	8.23	21.06	59	8.81	40.9	53	0.21	0.6
Total time in A&E	2002/03	14	0.77	0.16	30	0.87	0.11	59	0.89	0.09	52	0.93	0.1
Two week cancer waits	2002/03	14	96	4.12	30	95.26	5.61	59	97.3	3.52	53	98.4	2.34
Capacity and capability													
Consultant appraisal	2002/03	9	0.73	0.32	22	0.86	0.25	49	0.87	0.19	47	0.86	0.22
Data quality	2002/03	14	94.41	3.38	30	92.66	4.18	59	94.64	2.75	53	95.08	2.47
Fire,health and safety	2002/03	14	41.35	73.58	30	39.9	50.44	57	26.56	34.34	53	11.89	17.53
Information governance	2002/03	14	50.71	14.79	30	46.87	14.15	59	52.08	13.28	53	57.25	13.32
Junior doctors' hours	2002/03	14	0.67	0.16	30	0.78	0.14	59	0.74	0.17	53	0.81	0.14
Sickness absence rate	2002/03	14	0.042	0.0076	29	0.045	0.0088	59	0.0457	0.0071	52	0.0451	0.007
Staff opinion survey	2002/03	14	3.16	0.14	28	3.11	0.17	56	3.2	0.15	52	3.28	0.16
Clinical focus													
Clinical negligence	2002/03	14	1.071	0.475	30	1.1	0.548	59	1.034	0.642	53	1.264	0.593
Death within 30 days of heart bypass	2002/03	2	1639.3	199.51	4	2494.2	755.97	9	2390.1	469.63	8	2260.7	619.72
Death within 30 days of surgery	2002/03	13	4902.3	1095.6	21	5262.7	657.42	48	5251.5	817.4	42	5049.1	925.21
Emergency readmission	2002/03	13	5.08	0.55	21	5.27	0.55	50	5.4	0.67	42	5.59	0.7
Emergency readmission children	2002/03	13	4.18	1.1	20	4.51	1.79	47	4.32	1.62	39	4.62	1.4
Emergency readmission hip fracture	2002/03	13	7.68	2.45	21	8.23	2.41	49	8.66	2.67	41	8.36	2.77
Emergency readmission stroke	2002/03	13	6.52	1.57	21	8.15	2.71	49	8.02	2.32	42	7.76	2.1
Infection control procedures	2002/03	14	74.43	8.43	30	78.87	11.49	59	80.97	12.56	53	84.55	8.6
MRSA improvement score	2002/03	14	0.08	1.25	29	-0.17	1.53	59	0.02	1.23	53	-0.08	1.29
Thrombolysis treatment time	2002/03	9	0.66	0.14	21	0.59	0.2	41	0.66	0.19	49	0.64	0.22
Patient focus													
A&E waits (4 hours)	2002/03	14	84.55	8.35	30	92.64	5.78	59	93.62	3.2	52	94.49	2.48

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		N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Better hospital food	2002/03	14	28.54	3.41	30	28.54	1.93	59	28.91	2.97	53	29.45	2.64
Breast cancer waits	2002/03	14	94.51	9.6	29	94.71	9.16	57	97.33	3.55	51	96.71	6.48
Cancelled operations	2002/03	12	0.02	0.01	27	0.02	0.01	59	0.01	0.01	53	0.01	0.01
Daycase booking	2002/03	14	0.72	0.2	30	0.68	0.23	59	0.75	0.2	53	0.78	0.16
Delayed transfers of care	2002/03	14	0.05	0.03	30	0.05	0.03	59	0.05	0.03	53	0.05	0.03
Nine month heart operation waits	2002/03	3	95.32	2.31	3	92	2.1	9	95.79	2.98	10	97.78	1.97
Oupatient survey - access	2002/03	14	0.15	0.89	28	-0.28	0.89	59	-0.19	0.86	53	0.19	0.79
Oupatient survey - information, choice	2002/03	14	0.18	0.83	28	-0.36	0.77	59	-0.2	0.93	53	0.22	0.77
Oupatient survey - build relationships	2002/03	14	0.28	0.76	28	-0.4	0.8	59	-0.19	0.92	53	0.14	0.7
Oupatient survey - clean, friendly	2002/03	14	0.1	0.83	28	-0.4	1.01	59	-0.18	0.93	53	0.24	0.68
Oupatient survey - safe, quality	2002/03	14	0.18	0.71	28	-0.33	0.98	59	-0.22	0.97	53	0.22	0.75
Paediatric outpatient DNA	2002/03	14	0.12	0.03	28	0.13	0.04	55	0.12	0.04	52	0.13	0.06
Patient complaints procedure	2002/03	14	0.65	0.15	30	0.58	0.16	59	0.61	0.19	53	0.7	0.15
Privacy and dignity	2002/03	14	2.57	0.85	30	2.77	0.63	59	2.76	0.63	53	2.87	0.48
Six month inpatient waits	2002/03	14	78.91	6.18	30	78.32	6.36	59	81.65	6.24	53	85.35	7.82
Thirteen week outpatient waits	2002/03	14	76.41	9.4	30	72.57	6.95	59	75.85	6.92	53	79.33	6.19
Total inpatient waits	2002/03	14	-0.06	0.16	30	-0.01	0.17	59	0.03	0.09	53	0.06	0.09
Waiting time chest pain clinic	2002/03	11	0.7	0.31	26	0.78	0.26	53	0.84	0.26	49	0.87	0.2
Other variables													
CHI review	2002/03	14	2.43	0.51	29	2.24	0.44	56	2.66	0.67	49	3.31	0.47

Table 75: Descriptive statistics for acute Trust database

```
    Variable |       Obs        Mean    Std. Dev.        Min         Max
-------------+-------------------------------------------------------------
    pi_stars |       176    2.022727    .9255395          0           3
  aewait12_s |       158    1.816456    .5274456          0           2
    aewait12 |       158    19.24684    94.08938          0         892
    cancop28 |       169    .0013547    .0021537          0    .0209281
      finman |       176    .3806818    1.164951         -2           1
     hosclean |      176    62.63543    5.428671       51.2          72
     impwlive |      176    .9488636    .2209043          0           1
  inwtgtst_s |       176    1.880682    .4309081          0           2
     inwtgtst |      176    6.204545    51.29882          0         571
  opwtgtst_s |       176    1.852273    .4418086          0           2
     opwtgtst |      176    6.289773     27.7116          0         288
    aetotwait |      158    92.97098    5.023928    70.73631    99.71449
     cancwait |      167    97.20116    3.927988    76.47059         100
     consappr |      143    .8658549    .2150082          0           1
     hesdataq |      176    94.46491    3.121455    83.33311     98.8965
     firehsaf |      174    26.36751    51.35432          0     463.597
      infogov |      176    52.69886    14.04056         24          72
      jdochrs |      176    .7748482    .1601733    .3026316           1
     sickrate |      174    .0445345    .0076955       .015        .064
     staffopn |      170    3.221047    .1796294    2.64538     3.73048
     clinnegl |      176    1.107955    .6092096          0           3
     dea30hbo |       25    2307.502    555.0811    1498.18     3514.92
     dew30sur |      124    5148.223    862.6548    3250.87     8002.42
     emredisc |      140    5.354291    .7892745    2.22599     8.11949
     emredisk |      123    4.437382    1.500925    .524428     8.26541
     emrefhip |      124    8.384287     2.62699    2.36958      15.373
     emrestro |      125    7.795574    2.276396    1.70386     16.5475
     infectco |      176    81.42614    11.23541         27         100
     mrsascor |      166   -.0701379    1.296779   -3.39467     2.69195
     thrombtt |      120    .6417155    .2007596          0           1
      aewait4 |      158    .8910127    .1122297    .463459           1
    betterfood |     176    29.10258    2.720404       20.3          32
  betterfood_s |     174     4.15849    1.321366          1           6
      brcancwt |     155     96.2886    6.760013    54.51505         100
       cancops |     169    .0123789    .0081001    .0008309    .0428528
       dcasbook |    175    .7411944    .2041063    .0232908           1
       trancare |    172    .0445504    .0286042          0    .1390819
       hartwait |     28     96.232     2.828952    89.81878         100
       opsacces |    170    .0462059    .9295299     -3.031       2.551
       opschoic |    170    .0464588    .9382896     -3.025       2.809
       opsbrela |    170    .0703353    .9545948     -3.237       2.806
       opsclean |    170    .0486294    .9345979     -3.179       2.241
       opssafec |    170    .0554353    .9655007     -3.319       2.881
       pedopdna |    158    .1225987    .0459406    .0252197    .356589
        patcompl |   176    .6501076     .175844    .1538462    .9868421
  privacy_sc~e |     176    2.806818    .5728716          1           3
        inpwt6mo |   176    82.89207    8.152099    57.2449         100
        ouwt13wk |    176    77.21937    8.878972    52.66187         100
        totwtinp |    176    .0326552    .1221559   -.601022    .3513514
        wtchescl |    140    .8284986    .2451444    .0410959           1
      chi_review |   168    2.785714    .6933634          2           4
        provneed |    155     .88967     .2036436    .1973065     1.30845
   pct_accessgp |    144    87.58366    6.514607    68.68803     99.6919
   pct_accespcp |    144    89.43014    7.300833    66.27596    99.80925
   pct_iwaitstd |    144    1.920794    10.78544          0    125.5768
   pct_iwaits~s |    144    1.819444    .4826033          0           2
   pct_owaitstd |    144    5.396507    25.26059          0    294.3195
   pct_owaits~s |    144      1.8125    .4091395          0           2
   pct_ttimeaae |    144    92.79046    4.527494    73.17088    99.33518
   pct_teleaces |    137    .9195787    .2131434          0           1
   pct_quitsmok |    144    76.57625    35.59901    17.13911    203.4684
    pct_impwldv |    141    .9242666    .2014544    .0425244           1
     pct_finman |    144    .7972888    .4726256   -1.342229           1
   pct_grosneed |    155    1.014287    .1514903    .7750082    1.414734
   pct_bornexeu |    144    .0847252    .0835625    .0110275     .351154
    pct_whiteeg |    144    .8883553    .1200547    .4030103    .9900715
   pct_pcwallti |    144    .1138783    .0262299    .0719242    .1757738
   pct_poppucar |    144    .0978544    .0112513    .0706012    .1243055
   pct_poppuca1 |    144     .066861    .0069923    .0478914    .0829245
   pct_poppuca2 |    144    .0108745    .0026041    .0067433    .0174186
   pct_poppuca3 |    144    .0201188    .0052291    .0116348    .0325237
```

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pct_nqual174 |	144	.2861133	.0619713	.1618588	.4180582
pct_ftstuden |	144	.0736481	.0236462	.0400242	.1563225
pct_hhnocar |	144	.2837864	.1020182	.132986	.5594159
pct_ownocc |	144	.6686597	.1000129	.334574	.7865255
pct_laharent |	144	.2067573	.0800863	.1041083	.4858338
pct_privrent |	144	.0924861	.0377646	.0365825	.2539647
pct_lonepenh |	144	.1408347	.0161	.1000316	.197786
pct_loneparh |	144	.0671866	.0183844	.0387334	.1179974
pct_permsick |	144	.0540483	.0226073	.0231257	.1139635
pct_pc74ltun |	144	.0108127	.0053119	.0032783	.0245278
pct_workagri |	144	.0118726	.0104611	.0018855	.0572677
pct_profoccu |	144	.2799118	.0660874	.1746827	.4441462
pct_rating03 |	144	1.562209	.6362795	.0388785	2.963605
pct_popwimd |	142	26.67291	12.30372	8.390542	56.98394
pct_lisi |	144	11.05401	4.623376	5.023963	26.85134
pct_adet_imd |	144	26.44191	11.85048	8.450654	56.04192
pct_adet_inc |	144	22.8024	8.344347	9.691598	46.51002
pct_adet_emp |	144	12.18094	5.490109	4.039825	26.7407
pct_adet_hlt |	144	.2121137	.7157893	-1.242206	1.802741
pct_adet_edc |	144	.1978703	.4481881	-.8100404	1.257699
pct_adet_hse |	144	.333011	.642473	-.9648663	2.172529
pct_adet_acc |	144	-.3959861	.4469151	-1.639138	.4930017
pct_adet_chl |	144	32.10911	10.85203	13.58657	65.22517
pct_aprivnr5 |	144	21.62301	7.11597	12.08646	44.62821
pct_abedpriv |	144	40.64369	13.3795	16.00362	106.7065
pct_apjobsee |	144	4.835033	2.808683	1.002682	14.07018
pct_ap17noun |	144	84.59983	3.839201	74.08959	90.96284
pct_arsdnt75 |	144	.0896558	.0328255	.0216003	.1837753
pct_asev_dis |	144	97.74352	44.81397	38.03176	229.752
pct_azattalw |	144	92.67558	34.38096	48.3313	199.1266
pct_aplwbwgt |	144	7.431813	.87509	5.99624	9.70048
pct_aattal60 |	144	.1024771	.0227317	.0624016	.1645975
pct_aincspt6 |	144	.1553453	.0532189	.078219	.320676
pct_ap_attal |	144	5.288827	1.899388	2.608337	10.89969
pct_ap_incbe |	144	6.227064	2.774423	2.468132	14.23293
london |	176	.1818182	.386795	0	1
a_and_e |	175	19.06857	11.70744	0	75
add_dental |	175	.8114286	4.066104	0	38
anaesthetics |	175	46.56	31.92836	0	170
audiological |	175	.3028571	1.20093	0	13
cardiology |	175	8.828571	10.64982	0	72
cardio_surg |	175	3.537143	8.259967	0	47
chem_path |	175	1.257143	1.799471	0	12
child_ad_p~h |	175	1.091429	3.604385	0	32
clin_cyto |	175	.0285714	.3112557	0	4
clin_gen |	175	.9028571	2.900008	0	17
clin_neuro |	175	.6228571	1.366909	0	8
clin_onc |	175	4.434286	8.928514	0	44
clin_phar |	175	.7085714	2.559788	0	25
clin_radio |	175	14.28571	13.49494	0	75
dental_pub~h |	175	.7085714	3.370031	0	33
dermatology |	175	6.062857	5.867458	0	30
endoc_and_~b |	175	5.811429	6.181534	0	41
endodontics |	175	.0114286	.1065969	0	1
forensic_p~h |	175	.0228571	.1498768	0	1
gastro |	175	7.605714	8.052912	0	57
gen_psych |	175	1.074286	3.085035	0	20
gen_surg |	175	30.06286	18.62521	0	115
gum |	175	4.051429	6.45343	0	46
geriat~c_med |	175	13.40571	10.51714	0	72
haematology |	175	5.794286	6.691303	0	43
histopath |	175	7.782857	8.090632	0	57
immu_allergy |	175	.6457143	1.572088	0	10
infect_dis |	175	1.354286	4.057089	0	34
learn_disab |	175	.04	.1965215	0	1
med_microbio |	175	3.182857	3.958222	0	25
med_oncol |	175	2.822857	7.103305	0	62
med_ophal |	175	.0914286	.6276079	0	7
neurology |	175	4.354286	8.652963	0	64
neurosurgery |	175	2.628571	6.515612	0	30
nuclear_med |	175	.32	1.022955	0	6
obst_and_g~e |	175	24.41143	17.86095	0	134
occup_health |	175	1.097143	1.663241	0	11
old_age_ps~h |	175	.28	1.152907	0	8
opthalmology |	175	12	16.42748	0	179
oral_facia~e |	175	6.131429	7.338286	0	47

```
    oral_surge |      175    .3828571    1.358982          0          11
   orthodontics |      175    2.805714    3.802143          0          24
   otolaryngo~y |      175    7.771429    6.579687          0          42
    paed_cardio |      175    .6514286    2.671408          0          19
      paed_dent |      175    .3714286    1.544097          0          11
     paed_surge |      175        1.72    5.272614          0          36
    paediatrics |      175    27.69143    22.73477          0         128
     pallia_med |      175    1.497143    4.114558          0          47
    periodontics |      175    .0685714    .5732401          0           7
    plastic_su~e |      175    3.411429    7.183305          0          36
   prosthodon~s |      175    .0514286    .4706143          0           6
   psychother~y |      175    .0628571    .3580645          0           4
   pubhea~h_med |      175    1.342857     2.74116          0          17
      rehab_med |      175    .8971429    1.903035          0          11
      renal_med |      175    4.114286    7.130844          0          39
        resp_med |      175        6.28    7.134697          0          38
     restor_dent |      175    1.445714    5.873785          0          39
   rheumatology |      175    5.205714    4.574162          0          25
      surg_dent |      175    .0571429    .6132098          0           8
     trauma_surg |      175    22.74286    13.11957          0          64
         urology |      175    6.594286    6.572406          0          40
         zz_other |      175    26.51429     21.3191          0         169
     grand_total |      175    365.8743    249.4773         21        1501
    a_and_e_as~c |      175    .3542857     .844299          0           9
   add_denta~ec |      175    .0285714    .2497947          0           3
   anaesthet~ec |      175    1.234286    1.480514          0          11
   audiologi~ec |      175    .0114286    .1065969          0           1
   cardiolog~ec |      175    .0685714    .2534491          0           1
    cardio_su~ec |      175    .0114286    .1065969          0           1
    chem_path~ec |      175    .0171429    .1301761          0           1
    child_ad_~ec |      175    .0228571    .1842751          0           2
    clin_gen_a~c |      175    .0342857    .1824842          0           1
    clin_neur~ec |      175    .0057143    .0755929          0           1
    clin_onc_a~c |      175    .0742857    .2629878          0           1
    clin_phar~ec |      175    .0057143    .0755929          0           1
    clin_radi~ec |      175    .0857143    .3005195          0           2
    dermatolo~ec |      175    .2514286    .7765868          0           8
    endoc_and~ec |      175    .0685714    .3141961          0           2
    forensic_~ec |      175           0           0          0           0
    gastro_ass~c |      175    .0742857    .3035639          0           2
    gen_psych~ec |      175    .0057143    .0755929          0           1
    gen_surg_a~c |      175    .6571429     1.07058          0           8
    gum_assocs~c |      175    .1714286    .5511594          0           5
    geriatric~ec |      175    .1771429    .4388371          0           2
    haematolo~ec |      175    .1657143    .4560846          0           3
    histopath~ec |      175    .0914286    .2890446          0           1
    immu_alle~ec |      175    .0114286    .1065969          0           1
    infect_di~ec |      175    .0114286    .1065969          0           1
    learn_dis~ec |      175           0           0          0           0
    med_micro~ec |      175         .04    .1965215          0           1
    med_oncol~ec |      175    .0171429    .1301761          0           1
    med_ophal~ec |      175    .0057143    .0755929          0           1
    neurology~ec |      175    .0457143    .2353072          0           2
    neurosurg~ec |      175    .0057143    .0755929          0           1
    obst_and_~ec |      175    .5257143    .8697809          0           4
    occup_hea~ec |      175    .0285714    .1985167          0           2
    old_age_p~ec |      175    .0057143    .0755929          0           1
    opthalmol~ec |      175    .8628571    1.759553          0          20
     oral_faci~ec |      175    .2457143    .5053409          0           3
     oral_surg~ec |      175    .0171429    .1301761          0           1
    orthodont~ec |      175    .0742857    .2629878          0           1
    otolaryng~ec |      175    .3942857    .6512335          0           3
    paed_dent~ec |      175    .0114286    .1065969          0           1
    paed_surg~ec |      175    .0285714    .1670767          0           1
    paediatri~ec |      175    .4571429    .8822274          0           4
    pallia_me~ec |      175    .0114286    .1065969          0           1
     plastic_s~ec |      175         .08    .3464102          0           3
    psychothe~ec |      175           0           0          0           0
    rehab_med~ec |      175    .0057143    .0755929          0           1
    renal_med~ec |      175    .0571429    .2327814          0           1
    resp_med_a~c |      175    .0171429    .1686418          0           2
    restor_de~ec |      175    .0171429    .1301761          0           1
    rheumatol~ec |      175    .0857143    .3005195          0           2
    surg_dent~ec |      175    .0114286    .1511858          0           2
    trauma_su~ec |      175          .8    1.044966          0           6
    urology_as~c |      175    .1542857    .4209614          0           2
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zz_other_a~c	175	.3314286	.7833656	0	5
grand_tota~c	175	7.977143	5.926712	0	37
a_and_e_ca	175	.8628571	1.443791	0	10
add_dental_~a	175	.1257143	.6662396	0	6
anaestheti~a	175	.8342857	1.286969	0	7
audiologic~a	175	0	0	0	0
cardiology~a	175	.5085714	1.334203	0	13
cardio_sur~a	175	.0228571	.2131937	0	2
chem_path_ca	175	.0057143	.0755929	0	1
child_ad_p~a	175	.0171429	.1301761	0	1
clin_cyto_ca	175	.0057143	.0755929	0	1
clin_gen_ca	175	.0171429	.2267787	0	3
clin_neuro~a	175	.0171429	.1301761	0	1
clin_onc_ca	175	.2228571	.6960833	0	5
clin_phar_ca	175	.0285714	.2497947	0	3
clin_radio~a	175	.1428571	.5109635	0	4
dermatolog~a	175	1.805714	2.191145	0	12
endoc_and_~a	175	.5714286	1.1911	0	8
endodontic~a	175	.0057143	.0755929	0	1
forensic_p~a	175	0	0	0	0
gastro_ca	175	.3142857	.7416752	0	4
gen_psych_ca	175	.0571429	.4249988	0	5
gen_surg_ca	175	.8228571	1.549024	0	9
gum_ca	175	.9257143	1.52759	0	8
geriatric_~a	175	.7257143	1.756489	0	12
haematolog~a	175	.1771429	.7408777	0	8
histopath_ca	175	.04	.1965215	0	1
immu_aller~a	175	.0285714	.1670767	0	1
infect_dis~a	175	.0914286	.4706143	0	4
learn_disa~a	175	.0114286	.1065969	0	1
med_microb~a	175	.0057143	.0755929	0	1
med_oncol_ca	175	.1371429	.518112	0	5
neurology_ca	175	.2971429	1.309884	0	16
neurosurge~a	175	.0228571	.1842751	0	2
nuclear_me~a	175	.0228571	.1498768	0	1
obst_and_g~a	175	1.068571	1.919616	0	17
occup_heal~a	175	.2685714	.6268749	0	3
old_age_ps~a	175	.0114286	.1511858	0	2
opthalmolo~a	175	1.142857	1.642518	0	12
oral_facia~a	175	.7485714	1.440261	0	9
oral_surge~a	175	.0971429	.603384	0	7
orthodonti~a	175	.96	1.873469	0	12
otolaryngo~a	175	.5314286	.8827112	0	5
paed_dent_ca	175	.1085714	.6385019	0	7
paed_surge~a	175	.0057143	.0755929	0	1
paediatric~a	175	.3542857	.8166172	0	5
pallia_med~a	175	.0742857	.3558565	0	3
periodonti~a	175	.0171429	.2267787	0	3
plastic_su~a	175	.0742857	.3035639	0	2
prosthodon~a	175	.0228571	.3023716	0	4
psychother~a	175	.0114286	.1065969	0	1
rehab_med_ca	175	.0171429	.1301761	0	1
renal_med_ca	175	.0914286	.5171604	0	6
resp_med_ca	175	.2114286	.5929526	0	4
restor_den~a	175	.56	2.730332	0	22
rheumatolo~a	175	.7028571	1.195174	0	7
surg_dent_ca	175	.0171429	.2267787	0	3
trauma_sur~a	175	.4	.7878386	0	4
urology_ca	175	.1942857	.594004	0	4
zz_other_ca	175	2.017143	2.985548	0	21
grand_tota~a	175	18.58286	16.69857	0	134
child_a~_cmo	175	.0114286	.1511858	0	2
endoc_and~mo	175	.0057143	.0755929	0	1
gen_psy~_cmo	175	0	0	0	0
gen_surg_cmo	175	0	0	0	0
gum_cmo	175	.0171429	.1686418	0	2
geriatr~_cmo	175	.0057143	.0755929	0	1
obst_an~_cmo	175	.0971429	.7479803	0	8
occup_h~_cmo	175	.0057143	.0755929	0	1
old_age~_cmo	175	0	0	0	0
paediat~_cmo	175	.1428571	.52209	0	4
pallia_~_cmo	175	0	0	0	0
pubheal~_cmo	175	.4	1.044966	0	7
zz_other_cmo	175	.0342857	.2815626	0	3
grand_t~_cmo	175	.72	1.567046	0	12
a_and_e_co~t	175	2.982857	2.038352	0	12

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add_dental~t |      175    .2971429    1.532312       0          15
anaestheti~t |      175       21.92    15.22114       0          88
audiologic~t |      175    .1885714    .6728612       0           7
cardiology~t |      175    3.451429    3.208589       0          20
cardio_sur~t |      175        1.16    2.643056       0          11
chem_path_~t |      175    .9542857    .9931787       0           5
child_ad_p~t |      175    .5657143    1.672967       0          13
clin_gen_c~t |      175    .5885714    1.936309       0          12
clin_neuro~t |      175         .48      .99908       0           5
clin_onc_c~t |      175    1.788571    3.496449       0          19
clin_phar_~t |      175    .3314286    1.036066       0           6
clin_radio~t |      175    9.588571    6.108397       0          37
dental_pu~lt |      175    .0114286    .1065969       0           1
dermatolog~t |      175    2.188571     2.09649       0          13
endoc_and_~t |      175    2.662857    2.275694       0          14
forensic_p~t |      175           0           0       0           0
gastro_con~t |      175    3.382857    2.483681       0          11
gen_psych_~t |      175    .2171429    1.044274       0           7
gen_surg_c~t |      175        8.24    5.030893       0          24
 gum_consult |      175    1.285714    1.724926       0          12
geriatric_~t |      175    4.502857    3.407015       0          20
haematolog~t |      175    3.085714    2.586119       0          17
histopath_~t |      175        5.48    4.856374       0          32
immu_aller~t |      175    .4457143    1.117351       0           8
infect_dis~t |      175    .5371429     1.75104       0          15
learn_disa~t |      175    .0057143    .0755929       0           1
med_microb~t |      175    2.171429    1.998357       0          11
med_oncol_~t |      175    1.051429     2.10437       0          11
med_onco~tpc |      175    .0085732    .0303029       0   .3333333
med_ophal_~t |      175         .04    .2703765       0           3
neurology_~t |      175        2.08    3.948578       0          35
neurosurge~t |      175         .92    2.322899       0          10
nuclear_me~t |      175    .2457143    .7597424       0           4
obst_and_g~t |      175        7.32    5.003493       0          25
occup_heal~t |      175    .3828571    .7556248       0           5
old_age_ps~t |      175    .0628571    .4033521       0           3
opthalmolo~t |      175    4.051429    4.651373       0          43
oral_facia~t |      175    1.422857    1.915917       0          12
oral_surge~t |      175         .08    .3464102       0           2
orthodonti~t |      175    .9142857     1.21228       0           6
otolaryngo~t |      175    2.645714    2.336657       0          15
paed_cardi~t |      175         .36    1.482309       0          12
paed_dent_~t |      175         .12    .4823315       0           3
paed_surge~t |      175    .5942857    1.887945       0          14
paediatric~t |      175    7.914286    7.079887       0          39
pallia_med~t |      175    .6514286    1.038725       0           5
periodonti~t |      175    .0514286    .3755237       0           4
plastic_su~t |      175    1.142857    2.394232       0          10
prosthodon~t |      175    .0228571    .1842751       0           2
psychother~t |      175    .0114286    .1065969       0           1
pubhealth_~t |      175    .1485714    .5036484       0           4
rehab_med_~t |      175    .4628571    1.010032       0           6
renal_med_~t |      175    1.577143    2.450321       0          13
resp_med_c~t |      175    3.011429    2.326728       0          14
restor_de~lt |      175    .4457143    1.783117       0          11
rheumatolo~t |      175    2.428571    1.939986       0          11
trauma_sur~t |      175    7.542857    4.497399       0          21
urology_co~t |      175    2.542857    2.143459       0          14
zz_other_c~t |      175         .88    4.466015       0          56
grand_tot~lt |      175      129.64    88.88648       7         517
dental_p~acd |      175    .0171429    .1301761       0           1
grand_to~acd |      175    .0171429    .1301761       0           1
dental_p~dcd |      175    .0285714    .1670767       0           1
grand_to~dcd |      175    .0285714    .1670767       0           1
dental_p~_do |      175    .3885714    1.999392       0          19
grand_to~_do |      175    .3885714    1.999392       0          19
  a_and_e_ho |      175    .0742857    .3035639       0           2
add_dent~_ho |      175    .1885714      2.2778       0          30
anaesthe~_ho |      175    .1771429     .544083       0           3
cardiolo~_ho |      175    .3028571     .847405       0           6
cardio_s~_ho |      175    .0285714    .1670767       0           1
child_ad~_ho |      175           0           0       0           0
 clin_onc_ho |      175         .04    .2238637       0           2
clin_phar_ho |      175    .0342857    .2815626       0           3
dermatol~_ho |      175    .0228571    .1842751       0           2
endoc_an~_ho |      175    .4114286     1.41498       0          12
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    gastro_ho |        175    .4457143    1.19201           0           7
 gen_psych_ho |        175    .0228571   .1842751           0           2
  gen_surg_ho |        175    8.308571   5.173616           0          27
 geriatri~_ho |        175    .9771429   1.838147           0          11
 haematol~_ho |        175    .0342857   .2116477           0           2
  infect_d~_ho |       175         .12   1.029675           0          13
  med_oncol_ho |       175         .04   .2703765           0           2
  neurology_ho |       175    .0285714   .1985167           0           2
   neurosur~_ho |      175    .0057143   .0755929           0           1
    obst_and~_ho |     175    .0914286   .4049772           0           4
     oral_fac~_ho |    175    .0685714   .6305314           0           8
    otolaryn~_ho |     175    .1085714    .421663           0           3
    paed_dent_ho |     175    .0171429   .2267787           0           3
     paed_sur~_ho |    175         .04    .248212           0           2
    paediatr~_ho |     175    .2914286   .7355393           0           6
     pallia_m~_ho |    175    .0171429   .1686418           0           2
     plastic_~_ho |    175    .0114286   .1065969           0           1
    renal_med_ho |     175    .1257143   .5210196           0           3
     resp_med_ho |     175    .4628571   1.267427           0           9
     restor_d~_ho |    175    .0342857   .4535574           0           6
     rheumato~_ho |    175    .0914286   .3755237           0           3
    surg_dent_ho |     175    .0057143   .0755929           0           1
     trauma_s~_ho |    175    .9771429   1.850611           0          15
      urology_ho |     175    .6971429   1.395701           0          10
     zz_other_ho |     175    8.314286   6.793216           0          37
     grand_to~_ho |    175    22.61714   16.22035           0          93
       a_and_e_hp |    175    .2628571   1.481512           0          18
    add_dental~p |     175    .0114286   .1511858           0           2
    anaestheti~p |     175    .1657143   .7119436           0           6
    cardiology~p |     175    .1885714   .5507421           0           3
     cardio_sur~p |    175    .0057143   .0755929           0           1
     chem_path_hp |    175    .0114286   .1511858           0           2
    child_ad_p~p |     175           0          0           0           0
     clin_gen_hp |     175    .0057143   .0755929           0           1
      clin_onc_hp |    175    .0342857   .1824842           0           1
     clin_radio~p |    175         .04   .2238637           0           2
    dermatolog~p |     175    .3714286   .8538525           0           6
     endoc_and_~p |    175    .1885714   .5507421           0           5
     forensic_p~p |    175           0          0           0           0
        gastro_hp |    175    .2514286   .6649568           0           3
     gen_psych_hp |    175    .0057143   .0755929           0           1
      gen_surg_hp |    175          .2    .557086           0           4
           gum_hp |    175         .24    .802009           0           7
    geriatric_~p |     175    .0685714   .3803896           0           3
    haematolog~p |     175    .0342857   .1824842           0           1
     histopath_hp |    175    .0057143   .0755929           0           1
     infect_dis~p |    175    .0114286   .1065969           0           1
    learn_disa~p |     175           0          0           0           0
    med_oncol_hp |     175    .0342857   .2116477           0           2
    neurology_hp |     175    .0457143   .2353072           0           2
    obst_and_g~p |     175    .2571429   .6225115           0           4
     occup_heal~p |    175    .0685714   .2534491           0           1
     old_age_ps~p |    175           0          0           0           0
    opthalmolo~p |     175    .1542857     .54051           0           4
    oral_facia~p |     175    .1828571   .6871086           0           6
     orthodonti~p |    175    .1485714    .402129           0           2
    otolaryngo~p |     175    .1085714   .3934605           0           3
     paed_dent_hp |    175    .0057143   .0755929           0           1
     paediatric~p |    175    .1028571   .3567781           0           2
     pallia_med~p |    175    .0228571   .1842751           0           2
     plastic_su~p |    175    .0228571   .1498768           0           1
     psychother~p |    175           0          0           0           0
     rehab_med_hp |    175    .0228571   .1498768           0           1
     renal_med_hp |    175    .0228571   .1498768           0           1
      resp_med_hp |    175    .1028571   .8514645           0          11
     restor_den~p |    175    .0171429   .1301761           0           1
     rheumatolo~p |    175    .1885714   .5610804           0           3
     trauma_sur~p |    175         .16   .5546046           0           4
       urology_hp |    175         .04    .248212           0           2
      zz_other_hp |    175         .64    1.50157           0          10
     grand_tota~p |    175    4.451429   5.220064           0          32
     dental_pu~nt |    175    .0342857   .3197906           0           3
     grand_tot~nt |    175    .0342857   .3197906           0           3
    anaesthet~ed |     175    .0171429   .1686418           0           2
     gum_other_~d |    175    .0057143   .0755929           0           1
     geriat~r_med |    175    .0057143   .0755929           0           1
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obst_and_~ed |    175    .0171429    .1686418    0       2
occup_hea~ed |    175           0           0    0       0
paediatri~ed |    175    .0114286    .1065969    0       1
pubhea~r_med |    175    .1885714    1.195723    0      11
zz_other_o~d |    175    .0114286    .1511858    0       2
grand_tot~ed |    175    .2571429    1.329222    0      11
 a_and_e_reg |    175    1.954286    2.194081    0      12
add_dental~g |    175    .1028571    1.083175    0      14
anaestheti~g |    175    9.942857    12.85092    0      71
audiologic~g |    175    .0914286    .4944354    0       4
cardiology~g |    175    2.228571    3.739243    0      30
cardio_su~eg |    175    1.234286    3.031818    0      17
chem_path_~g |    175    .2057143    .6186483    0       4
child_ad_p~g |    175    .2514286    1.036509    0       9
clin_cyto_~g |    175    .0228571    .2386332    0       3
clin_gen_reg |    175    .2514286    .8608241    0       5
clin_neuro~g |    175         .12    .4578812    0       3
clin_onc_reg |    175    1.302857    3.818398    0      23
clin_phar_~g |    175    .2171429    .9214823    0       9
clin_radio~g |    175        4.32    8.021551    0      35
dental_pub~g |    175    .0114286    .1511858    0       2
dermatolog~g |    175    .7828571    1.796786    0      13
endoc_and_~g |    175    1.314286      1.85031    0      9
endodontic~g |    175    .0057143    .0755929    0       1
forensic_p~g |    175    .0228571    .1498768    0       1
   gastro_reg |    175    2.091429    3.705027    0      38
gen_psych_~g |    175    .2914286    1.155042    0       9
gen_surg_reg |    175    4.428571    4.202392    0      24
      gum_reg |    175         .56     1.79578    0      14
geriatric_~g |    175    2.097143    2.434603    0      16
haematolog~g |    175    1.388571    2.643119    0      12
histopath_~g |    175    1.634286    2.702271    0      19
immu_aller~g |    175    .1485714    .5367909    0       4
infect_dis~g |    175    .2285714    .7226116    0       4
learn_disa~g |    175    .0171429    .1301761    0       1
med_microb~g |    175         .84    2.067149    0      15
med_oncol_~g |    175    .8742857    2.843862    0      24
med_ophal_~g |    175    .0114286    .1511858    0       2
neurology_~g |    175    .9942857    2.653337    0      19
neurosurge~g |    175    .8114286    2.155956    0      14
nuclear_me~g |    175         .04    .2238637    0       2
obst_and_g~g |    175    5.737143    8.805663    0     102
occup_heal~g |    175    .2571429    .7006917    0       5
old_age_ps~g |    175    .1314286    .5465521    0       4
opthalmolo~g |    175    2.005714    7.336335    0      90
oral_facia~g |    175    .6628571    1.581336    0      12
oral_surge~g |    175    .0114286    .1065969    0       1
orthodonti~g |    175    .5657143    1.471949    0       8
otolaryngo~g |    175    1.234286    1.865282    0      13
paed_cardi~g |    175    .1771429     .756233    0       5
paed_dent_~g |    175    .0685714    .4094933    0       4
paed_surge~g |    175    .4628571    1.585691    0      11
paediatric~g |    175    6.028571    8.148358    0      51
pallia_med~g |    175    .5771429    3.572491    0      45
plastic_su~g |    175    1.017143    2.396056    0      16
prosthodon~g |    175    .0057143    .0755929    0       1
psychother~g |    175    .0171429    .1301761    0       1
pubhealth_~g |    175         .08    .9187698    0      12
rehab_med_~g |    175    .2514286    .8405565    0       7
renal_med_~g |    175    1.165714    2.414271    0      12
resp_med_reg |    175    1.468571    2.097586    0      11
restor_den~g |    175         .24    1.295261    0      14
rheumatolo~g |    175        1.08    1.730192    0      12
surg_dent_~g |    175           0           0    0       0
trauma_su~eg |    175    4.777143    4.149719    0      25
   urology_reg |    175    1.177143    1.799599    0      12
zz_other_reg |    175    .8914286    2.185292    0      16
grand_tota~g |    175    70.93143    80.37038    3     447
anaesthet~mo |    175    .0171429    .1686418    0       2
audiologi~mo |    175           0           0    0       0
child_a~scmo |    175    .0285714    .2497947    0       3
clin_radi~mo |    175    .0057143    .0755929    0       1
gen_psy~scmo |    175           0           0    0       0
gen_sur~scmo |    175    .0057143    .0755929    0       1
     gum_scmo |    175    .0057143    .0755929    0       1
geriatr~scmo |    175    .0114286    .1065969    0       1
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haematolo~mo |     175          0          0          0          0
infect_di~mo |     175          0          0          0          0
learn_dis~mo |     175          0          0          0          0
obst_an~scmo |     175        .08   .4847087          0          5
occup_h~scmo |     175   .0742857   .3219399          0          2
old_age~scmo |     175   .0057143   .0755929          0          1
opthalmol~mo |     175   .0228571   .2386332          0          3
otolaryng~mo |     175   .0057143   .0755929          0          1
paediat~scmo |     175   .1428571   .5329843          0          3
pallia_~scmo |     175          0          0          0          0
pubheal~scmo |     175   .5257143   1.168638          0         10
rheumatol~mo |     175   .0057143   .0755929          0          1
urology_scmo |     175   .0057143   .0755929          0          1
zz_othe~scmo |     175   .0171429   .1686418          0          2
grand_t~scmo |     175        .96   1.692988          0         10
dental_p~sdo |     175   .2171429   1.044274          0         10
grand_to~sdo |     175   .2171429   1.044274          0         10
 a_and_e_sho |     175   9.845714   6.374714          0         42
add_dent~sho |     175        .04   .3450804          0          4
anaesthe~sho |     175   8.502857   5.748437          0         27
audiolog~sho |     175   .0114286   .1511858          0          2
cardiolo~sho |     175   1.457143   2.817667          0         17
cardio_s~sho |     175   .8971429   2.516781          0         18
chem_pat~sho |     175        .04   .2703765          0          3
child_ad~sho |     175   .1314286   .7029378          0          8
clin_onc_sho |     175   .7257143   1.682968          0          9
clin_pha~sho |     175   .0742857   .6344256          0          8
clin_rad~sho |     175   .0285714   .2256172          0          2
dermatol~sho |     175        .36   .8915955          0          6
endoc_an~sho |     175   .4514286   1.333342          0         11
forensic~sho |     175          0          0          0          0
  gastro_sho |     175         .8   2.378061          0         26
gen_psyc~sho |     175   .4057143   1.264444          0          8
gen_surg_sho |     175   5.925714   4.875481          0         35
     gum_sho |     175   .4285714   1.648505          0         13
geriatri~sho |     175   3.965714    4.55351          0         29
haematol~sho |     175        .68    2.05678          0         23
histopat~sho |     175        .48   1.060471          0          6
immu_all~sho |     175   .0057143   .0755929          0          1
infect_d~sho |     175   .3314286   1.353533          0         14
learn_di~sho |     175   .0057143   .0755929          0          1
med_micr~sho |     175   .0914286   .3263975          0          2
med_onco~sho |     175   .5428571   2.206871          0         22
med_opha~sho |     175   .0285714   .3112557          0          4
neurolog~sho |     175   .6971429    1.72365          0         10
neurosur~sho |     175   .7485714   2.027026          0         12
nuclear_~sho |     175   .0114286   .1065969          0          1
obst_and~sho |     175   7.651429   5.222485          0         27
old_age_~sho |     175   .0514286   .3082873          0          3
opthalmo~sho |     175   2.274286   2.429269          0         15
oral_fac~sho |     175       2.08   2.841483          0         14
oral_sur~sho |     175   .1314286   .6863913          0          6
orthodon~sho |     175   .0914286   .5898429          0          7
otolaryn~sho |     175       2.16   2.033512          0          8
paed_car~sho |     175   .1142857    .623829          0          5
paed_den~sho |     175   .0228571   .1842751          0          2
paed_sur~sho |     175   .5485714   1.889683          0         13
paediatr~sho |     175   9.994286   7.546406          0         44
pallia_m~sho |     175   .0914286   .3435543          0          2
plastic_~sho |     175   .9028571   2.116368          0         11
psychoth~sho |     175   .0228571   .3023716          0          4
pubhealt~sho |     175          0          0          0          0
rehab_me~sho |     175   .0457143   .2353072          0          2
renal_me~sho |     175   .8857143   1.941255          0          8
resp_med_sho |     175   .8285714   1.922129          0         11
restor_d~sho |     175        .08   .5190619          0          5
rheumato~sho |     175   .4857143   .8960779          0          5
surg_den~sho |     175   .0228571   .2386332          0          3
trauma_s~sho |     175       6.56   4.285179          0         22
 urology_sho |     175   1.297143   1.685892          0          9
zz_other_sho |     175   11.85714   10.26976          0         50
grand_to~sho |     175   85.91429   54.53512          0        350
a_and_e_st~d |     175   2.731429   2.289879          0         10
add_dental~d |     175   .0171429   .1301761          0          1
anaesthet~ad |     175   3.748571   3.211811          0         15
cardiology~d |     175   .6228571   1.345722          0         11
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Variable	Obs	Mean	Std. Dev.	Min	Max
cardio_sur~d	175	.1771429	1.038092	0	11
chem_path_~d	175	.0228571	.1498768	0	1
child_ad_p~d	175	.0628571	.3416371	0	3
clin_gen_s~d	175	.0057143	.0755929	0	1
clin_onc_s~d	175	.2457143	.6883025	0	3
clin_phar_~d	175	.0171429	.1301761	0	1
clin_radio~d	175	.0742857	.2629878	0	1
dermatolog~d	175	.28	.9567666	0	9
endoc_and_~d	175	.1371429	.4201024	0	3
forensic_p~d	175	0	0	0	0
gastro_sta~d	175	.2457143	.7209281	0	4
gen_psych_~d	175	.0685714	.3952094	0	3
gen_surg_s~d	175	1.474286	1.809354	0	9
gum_stafgrad	175	.4114286	.9296432	0	7
geriatric~ad	175	.8685714	1.23171	0	6
haematolog~d	175	.2285714	.460242	0	2
histopath_~d	175	.0514286	.2460859	0	2
immu_aller~d	175	.0057143	.0755929	0	1
infect_dis~d	175	.0228571	.1498768	0	1
learn_disa~d	175	0	0	0	0
med_microb~d	175	.0342857	.237253	0	2
med_oncol_~d	175	.1257143	.5098697	0	4
med_ophal_~d	175	.0057143	.0755929	0	1
neurology_~d	175	.1657143	.8516188	0	10
neurosurge~d	175	.1142857	.623829	0	6
obst_and_~ad	175	1.565714	1.805156	0	12
occup_hea~ad	175	.0114286	.1065969	0	1
old_age_ps~d	175	.0114286	.1065969	0	1
opthalmolo~d	175	1.485714	1.938293	0	10
oral_facia~d	175	.72	1.333218	0	11
oral_surge~d	175	.0457143	.2585802	0	2
orthodonti~d	175	.0514286	.221504	0	1
otolaryngo~d	175	.5828571	.7676976	0	3
paed_dent_~d	175	.0171429	.1686418	0	2
paed_surge~d	175	.04	.2703765	0	3
paediatri~ad	175	2.251429	2.633708	0	14
pallia_med~d	175	.0514286	.221504	0	1
plastic_su~d	175	.16	.5546046	0	4
psychother~d	175	0	0	0	0
pubhealth~ad	175	0	0	0	0
rehab_med_~d	175	.0914286	.4455214	0	4
renal_med_~d	175	.1885714	.5072868	0	3
resp_med_s~d	175	.1771429	.8627295	0	10
restor_den~d	175	.0514286	.3905283	0	4
rheumatolo~d	175	.1371429	.3917876	0	2
trauma_sur~d	175	1.525714	1.754525	0	8
urology_st~d	175	.4857143	.749384	0	4
zz_other_s~d	175	1.52	2.481749	0	21
grand_tot~ad	175	23.13714	16.2344	0	100
a_and_e_no~n	175	3.085714	2.541285	0	12
a_and_e_tr~n	175	11.87429	7.849604	0	54
a_and_e_st~f	175	17.94286	10.85204	0	70
a_and_e_st~c	175	.0564882	.026956	0	.127783
a_and_e_no~c	157	.1803064	.1042323	0	.5
a_~_train_pc	157	.6495106	.1183203	.1818182	.9
add_d~ntrain	175	.0457143	.3183496	0	3
add_d~_train	175	.3314286	2.670375	0	30
add_dental~f	175	.6742857	3.525306	0	32
ad~ntrain_pc	16	.1510417	.3391421	0	1
ad~_train_pc	16	.2233054	.3606774	0	1
anaes~ntrain	175	4.982857	3.834919	0	18
anaes~_train	175	18.62286	16.3716	0	90
anaestheti~f	175	45.52571	31.66325	0	169
an~ntrain_pc	170	.1331943	.0954661	0	.5
an~_train_pc	170	.3754556	.1146888	0	.6086956
c~y_nontrain	175	.6914286	1.36318	0	11
card~y_train	175	3.988571	6.677281	0	48
cardiology~f	175	8.131429	10.15002	0	72
cardiology..	158	.088087	.1392848	0	.5
c~y_train_pc	158	.3358467	.2376295	0	1
c~g_nontrain	175	.1885714	1.047101	0	11
card~g_train	175	2.16	5.343123	0	35
cardio_sur~f	175	3.508571	8.223088	0	47
cardio_sur..	37	.0758603	.1899679	0	1
c~g_train_pc	37	.55956	.2029168	0	.8571429
child~ntrain	175	.0857143	.5125678	0	5

child~_train |	175	.3828571	1.631846	0	15
child_ad_p~f |	175	1.034286	3.407053	0	31
child_ad_p.. |	38	.0685892	.1879224	0	1
child_ad_p.. |	38	.3257419	.3628892	0	1
clin_onc_n~n |	175	.32	.795389	0	4
clin_onc_t~n |	175	2.068571	5.083881	0	30
clin_onc_s~f |	175	4.177143	8.609507	0	44
clin_onc_n~c |	64	.0980235	.163723	0	1
clin_onc_t~c |	64	.383398	.3065945	0	1
c~r_nontrain |	175	.0228571	.1498768	0	1
clin~r_train |	175	.3257143	1.554442	0	17
clin_phar_~f |	175	.68	2.39021	0	22
clin_phar_.. |	32	.125	.3360108	0	1
c~r_train_pc |	32	.3148843	.3496636	0	1
derma~ntrain |	175	.5314286	1.549151	0	17
derma~_train |	175	1.165714	2.482345	0	17
dermatolog~f |	175	3.885714	4.742638	0	30
dermatolog.. |	138	.1139651	.1833653	0	.75
d~y_train_pc |	138	.1717475	.2431266	0	1
endoc~ntrain |	175	.2057143	.5174778	0	3
endoc~_train |	175	2.177143	3.750485	0	29
endoc_and_~f |	175	5.045714	5.722327	0	41
endoc_and_.. |	160	.0307203	.076945	0	.4
e~b_train_pc |	160	.3004393	.2647878	0	1
gastro_non~n |	175	.32	.7734086	0	4
gastro_train |	175	3.337143	5.860009	0	44
gastro_staff |	175	7.04	7.825217	0	57
gastro_non~c |	158	.0417597	.0983368	0	.5
gastro_tra~c |	158	.3525587	.2183864	0	.88
gen_p~ntrain |	175	.0742857	.4422661	0	4
gen_p~_train |	175	.72	1.922761	0	10
gen_psych_~f |	175	1.011429	2.840569	0	20
gen_psych_.. |	46	.0389835	.1551047	0	1
g~h_train_pc |	46	.7828198	.3703146	0	1
gen_surg_n~n |	175	2.131429	2.299397	0	14
gen_surg_t~n |	175	18.66286	12.39974	0	85
gen_surg_s~f |	175	29.03429	17.936	0	112
gen_surg_n~c |	158	.0754067	.0698337	0	.4
g~g_train_pc |	158	.6338604	.0852602	.2	.8571429
geria~ntrain |	175	1.045714	1.346845	0	6
geria~_train |	175	7.04	7.043673	0	50
geriatric_~f |	175	12.58857	10.05284	0	70
geriatric_.. |	157	.0947064	.1359038	0	1
g~d_train_pc |	157	.4745188	.2421255	0	1
haema~ntrain |	175	.3942857	.6771911	0	4
haema~_train |	175	2.102857	4.068486	0	27
haematolog~f |	175	5.582857	6.42398	0	35
ha~ntrain_pc |	157	.0753395	.1226793	0	.5
ha~_train_pc |	157	.2139677	.2453226	0	1
infec~ntrain |	175	.0342857	.1824842	0	1
infec~_train |	175	.68	2.658839	0	29
infect_dis~f |	175	1.251429	3.716179	0	31
in~ntrain_pc |	36	.0761275	.2428977	0	1
in~_train_pc |	36	.4162923	.3671054	0	1
~ol_nontrain |	175	.1428571	.52209	0	4
med~ol_train |	175	1.457143	4.88925	0	46
med_oncol_~f |	175	2.651429	6.898166	0	61
med_oncol_.. |	75	.0917026	.2190649	0	1
~ol_train_pc |	75	.3650189	.3406705	0	1
neurology_.. |	175	.2114286	.881408	0	10
neu~gy_train |	175	1.72	4.275888	0	29
neurology_~f |	175	4.011429	8.116245	0	64
neurology_.. |	106	.0623354	.1590383	0	1
neurology_.. |	106	.236751	.3008143	0	1
~ry_nontrain |	175	.12	.6364413	0	6
neu~ry_train |	175	1.565714	4.035044	0	22
neurosurge~f |	175	2.605714	6.478876	0	30
neurosurge.. |	31	.0453846	.0880453	0	.3333333
~ry_train_pc |	31	.6070614	.2066311	0	1
obst_~ntrain |	175	2.091429	2.043404	0	12
obst_~_train |	175	13.48	12.12902	0	115
obst_and_g~f |	175	22.89143	16.91713	0	132
ob~ntrain_pc |	156	.1007667	.0788732	0	.4444444
ob~_train_pc |	156	.5730743	.1101759	0	1
oral_facia.. |	175	.9657143	1.429963	0	11
oral_facia.. |	175	2.811429	4.026334	0	24

oral_facia~f		175	5.2	6.709917	0	47
oral_facia..		118	.2773653	.2981027	0	1
oral_facia..		118	.4279459	.2940213	0	1
otola~ntrain		175	.9771429	1.108765	0	5
otola~_train		175	3.502857	3.562051	0	22
otolaryngo~f		175	7.125714	6.181747	0	39
ot~ntrain_pc		132	.1602304	.1621721	0	1
ot~_train_pc		132	.4415579	.198316	0	.7777778
p~t_nontrain		175	.0285714	.1985167	0	2
paed~t_train		175	.1085714	.5917884	0	5
paed_dent_~f		175	.2571429	1.102319	0	8
paed_dent_..		13	.1121795	.1964563	0	.5
p~t_train_pc		13	.2967949	.3121672	0	.75
paed_surge..		175	.0685714	.3319841	0	3
paed~e_train		175	1.051429	3.419465	0	23
paed_surge~f		175	1.714286	5.273941	0	36
paed_surge..		35	.073581	.1940455	0	1
paed_surge..		35	.5855796	.3399834	0	1
paedi~ntrain		175	2.708571	3.068319	0	16
paedi~_train		175	16.31429	14.59131	0	87
paediatric~f		175	26.93714	22.19432	0	124
paediatric..		161	.1188267	.1314348	0	1
paediatric..		161	.5809826	.1533997	0	1
palli~ntrain		175	.0628571	.2434023	0	1
palli~_train		175	.6857143	3.619642	0	45
pallia_med~f		175	1.4	4.028633	0	47
pallia_med..		76	.0696272	.2164858	0	1
pallia_med..		76	.2615015	.3540965	0	1
plast~ntrain		175	.24	.6777244	0	4
plast~_train		175	1.931429	4.380716	0	24
plastic_su~f		175	3.314286	7.077451	0	35
pl~ntrain_pc		46	.0739743	.0985317	0	.4
pl~_train_pc		46	.5461594	.2277881	0	1
renal~ntrain		175	.2457143	.599014	0	3
renal~_train		175	2.177143	4.282757	0	19
renal_med_~f		175	4	6.889939	0	33
renal_med_..		77	.0590429	.0975742	0	.5
renal_med_..		77	.4320853	.2570046	0	1
resp_med_n~n		175	.1942857	.938923	0	11
resp_med_t~n		175	2.76	4.455347	0	26
resp_med_s~f		175	5.965714	6.78309	0	37
resp_med_n~c		161	.0174153	.0576655	0	.34375
resp_med_t..		161	.322071	.2487477	0	1
resto~ntrain		175	.0685714	.4622356	0	5
resto~_train		175	.3542857	1.784406	0	15
restor_den~f		175	.8685714	3.773758	0	26
restor_den..		23	.0493569	.1184009	0	.5
r~t_train_pc		23	.2853606	.3503074	0	1
rheum~ntrain		175	.2228571	.4931052	0	2
rheum~_train		175	1.657143	2.303706	0	12
rheumatolo~f		175	4.308571	3.953274	0	19
rh~ntrain_pc		155	.0473041	.1041443	0	.5
rh~_train_pc		155	.272446	.2574767	0	1
traum~ntrain		175	2.325714	2.299968	0	11
traum~_train		175	12.31429	7.916124	0	46
trauma_sur~f		175	22.18286	12.73157	0	64
tr~ntrain_pc		163	.1102643	.0928812	0	.375
tr~_train_pc		163	.5469514	.095063	.2222222	.8181818
urology_no~n		175	.64	.8786091	0	6
urology_tr~n		175	3.171429	4.040639	0	20
urology_st~f		175	6.354286	6.312747	0	39
urology_no~c		140	.1259316	.1672351	0	1
ur~_train_pc		140	.4060937	.2439251	0	1
zz_other_n~n		175	1.851429	2.787634	0	21
zz_other_t~n		175	21.06286	15.77906	0	84
zz_other_s~f		175	23.79429	19.22471	0	156
zz_other_n~c		160	.0800624	.115947	0	1
zz_other_t~c		160	.8775872	.1671486	0	1
audio~ntrain		175	.0114286	.1065969	0	1
audio~_train		175	.1028571	.5976418	0	6
audiologic~f		175	.3028571	1.20093	0	13
au~ntrain_pc		24	.0833333	.2823299	0	1
au~_train_pc		24	.1706197	.2613526	0	.8
chem_~ntrain		175	.04	.2238637	0	2
chem_~_train		175	.2457143	.789421	0	5
chem_path_~f		175	1.24	1.731918	0	12

chem_path_..	119	.0168868	.0825572	0	.5
chem_path_..	119	.0798119	.173063	0	.6666667
~to_nontrain	175	0	0	0	0
cli~to_train	175	.0228571	.2386332	0	3
clin_cyto_~f	175	.0228571	.2386332	0	3
clin_cyto_..	2	0	0	0	0
~to_train_pc	2	1	0	1	1
clin_gen_n~n	175	.04	.1965215	0	1
clin_gen_t~n	175	.2514286	.8608241	0	5
clin_gen_s~f	175	.88	2.806479	0	17
clin_gen_n~c	24	.0760902	.2085455	0	1
clin_gen_t~c	24	.2869486	.27157	0	1
clin_neuro..	175	.0057143	.0755929	0	1
cli~ro_train	175	.12	.4578812	0	3
clin_neuro~f	175	.6057143	1.347186	0	8
clin_neuro..	49	.0068027	.047619	0	.3333333
clin_neuro..	49	.137415	.2555242	0	1
clin_radio..	175	.16	.3976945	0	2
cli~io_train	175	4.348571	8.03646	0	35
clin_radio~f	175	14.09714	13.34109	0	72
clin_radio..	173	.0186857	.0849984	0	1
clin_radio..	173	.1704393	.2007658	0	.6734694
denta~ntrain	175	0	0	0	0
denta~_train	175	.0114286	.1511858	0	2
dental_pub~f	175	.0228571	.1842751	0	2
dental_pub..	3	0	0	0	0
d~h_train_pc	3	.3333333	.5773503	0	1
endod~ntrain	175	0	0	0	0
endod~_train	175	.0057143	.0755929	0	1
endodontic~f	175	.0057143	.0755929	0	1
endodontic..	1	0	.	0	0
e~s_train_pc	1	1	.	1	1
foren~ntrain	175	0	0	0	0
foren~_train	175	.0228571	.1498768	0	1
forensic_p~f	175	.0228571	.1498768	0	1
fo~ntrain_pc	4	0	0	0	0
fo~_train_pc	4	1	0	1	1
gum_nontrain	175	.5828571	1.292215	0	10
gum_train	175	.9885714	3.302713	0	22
gum_staff	175	2.857143	5.628044	0	41
gum_nontra~c	109	.1842705	.2197278	0	.6666667
gum_train_pc	109	.1360873	.21445	0	.75
histo~ntrain	175	.1428571	.4112538	0	3
histo~_train	175	2.114286	3.568472	0	25
histopath_~f	175	7.737143	8.080738	0	57
hi~ntrain_pc	162	.0232433	.0739477	0	.5
hi~_train_pc	162	.1868868	.1805797	0	.625
immu_~ntrain	175	.0171429	.1686418	0	2
immu_~_train	175	.1542857	.5510402	0	4
immu_aller~f	175	.6171429	1.514961	0	10
im~ntrain_pc	39	.0192308	.0885671	0	.5
im~_train_pc	39	.1928571	.2844469	0	1
learn~ntrain	175	0	0	0	0
learn~_train	175	.0228571	.1498768	0	1
learn_disa~f	175	.0285714	.1670767	0	1
le~ntrain_pc	5	0	0	0	0
le~_train_pc	5	.8	.4472136	0	1
med_m~ntrain	175	.0742857	.3393222	0	3
med_m~_train	175	.9314286	2.201328	0	15
med_microb~f	175	3.177143	3.957757	0	25
med_microb..	148	.0177213	.0822611	0	.6666667
m~o_train_pc	148	.142091	.2306298	0	1
med_ophal_..	175	.0114286	.1065969	0	1
med~al_train	175	.04	.3769204	0	4
med_ophal_~f	175	.0914286	.6276079	0	7
med_ophal_..	7	.1632653	.3727866	0	1
med_ophal_..	7	.2040816	.3856009	0	1
nucle~ntrain	175	0	0	0	0
nucle~_train	175	.0514286	.2684261	0	2
nuclear_me~f	175	.2971429	.942449	0	6
nu~ntrain_pc	21	0	0	0	0
nu~_train_pc	21	.1404762	.2521338	0	1
occup~ntrain	175	.04	.2238637	0	2
occup~_train	175	.2571429	.7006917	0	5
occup_heal~f	175	.68	1.442539	0	10
oc~ntrain_pc	58	.0390805	.1491873	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
oc~_train_pc	58	.2956897	.3530887	0	1
old_a~ntrain	175	.0171429	.1301761	0	1
old_a~_train	175	.1828571	.7036382	0	5
old_age_ps~f	175	.2628571	1.05566	0	8
ol~ntrain_pc	18	.0740741	.2372378	0	1
ol~_train_pc	18	.7791667	.3579655	0	1
optha~ntrain	175	2.348571	2.937801	0	25
optha~_train	175	4.28	8.60676	0	99
opthalmolo~f	175	10.68	15.1377	0	167
op~ntrain_pc	132	.2368263	.1614444	0	1
op~_train_pc	132	.3594465	.2006831	0	1
oral_surge..	175	.0628571	.2867633	0	2
oral_surge..	175	.1428571	.7559289	0	6
oral_surge~f	175	.2857143	.9759001	0	6
oral_surge..	21	.297619	.4237493	0	1
oral_surge..	21	.297619	.4237493	0	1
ortho~ntrain	175	.1257143	.3493367	0	2
ortho~_train	175	.6571429	1.773737	0	13
orthodonti~f	175	1.697143	2.713259	0	17
orthodonti..	99	.0765913	.1905364	0	1
o~s_train_pc	99	.2386749	.30983	0	1
p~o_nontrain	175	0	0	0	0
paed~o_train	175	.2914286	1.25976	0	7
paed_cardi~f	175	.6514286	2.671408	0	19
paed_cardi..	13	0	0	0	0
p~o_train_pc	13	.3851598	.2076954	0	.6363636
perio~ntrain	175	0	0	0	0
perio~_train	175	0	0	0	0
periodonti~f	175	.0514286	.3755237	0	4
pe~ntrain_pc	4	0	0	0	0
pe~_train_pc	4	0	0	0	0
prost~ntrain	175	0	0	0	0
prost~_train	175	.0057143	.0755929	0	1
prosthodon~f	175	.0285714	.1985167	0	2
pr~ntrain_pc	4	0	0	0	0
pr~_train_pc	4	.25	.5	0	1
psych~ntrain	175	0	0	0	0
psych~_train	175	.04	.3280034	0	4
psychother~f	175	.0514286	.3435543	0	4
ps~ntrain_pc	6	0	0	0	0
ps~_train_pc	6	.6666667	.5163978	0	1
pubhe~ntrain	175	0	0	0	0
pubhe~_train	175	.08	.9187698	0	12
pubhealth_~f	175	.2285714	1.274996	0	16
pu~ntrain_pc	20	0	0	0	0
pu~_train_pc	20	.0875	.2723557	0	1
rehab~ntrain	175	.0971429	.4507246	0	4
rehab~_train	175	.2971429	.9605691	0	8
rehab_med_~f	175	.8571429	1.840522	0	11
rehab_med_..	52	.1051136	.257699	0	1
rehab_med_..	52	.2821179	.3459249	0	1
surg_~ntrain	175	.0114286	.1511858	0	2
surg_~_train	175	.0285714	.2497947	0	3
surg_dent_~f	175	.04	.3918714	0	5
su~ntrain_pc	3	.1333333	.2309401	0	.4
su~_train_pc	3	.8666667	.2309401	.6	1
totipep	176	70021.82	39427.32	2818	222622
totspells	176	62525.82	35024.92	2818	201155
ep_spell	176	1.11243	.0647997	1	1.30602
propfem	176	.5618847	.0537911	.3518226	.8790316
emerg_spell	176	.3340338	.0925913	.0022692	.546533
waitlist	176	23762.5	14383.89	898	96772
meanwait	174	100.7874	31.75349	17	205
medianwait	173	54.90173	21.90961	7	146
alos	176	6.082386	1.734911	1.6	20.7
medianlos	176	2.193182	1.10436	1	14
prop15u	174	.1452748	.1290335	.001185	.9422327
prop60p	172	.4078582	.0796821	.0327476	.6371939
daycase_sp~l	176	.4988451	.1003593	.0181818	.7284026
electives	176	40995.35	23587.03	2530	138282
daycase	176	20899.56	13003.69	46	69286
totipd	176	234916	131335.2	13013	789308
emergadm	176	21530.47	12373.31	13	62873
ipd_spell	176	3.861533	.922189	.5828891	7.790888
avbeds	175	760.6063	430.6106	50.67397	2669.77
acutebeds	175	588.2508	357.1162	10.57534	2141.794

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geriatricb~s |    175     114.077    100.3565          0    558.9507
   maternbeds |    175    52.09728    33.16478          0    179.0822
      occupanc |    175    .8453931     .063016    .573205    .9720087
        a_eatt |    176    74470.73    44404.96          0      232918
        totop1 |    176    70469.98    39448.21       2325      206476
  totop1_spell |    175    1.164948    .3777197   .1346889    3.484435
         totop |    176    236620.4    133062.9      12279      731464
   totop_spell |    175    4.074642    2.210403   .7113312    28.75097
    totop_priv |    175     1207.76    2679.066          0       20043
    totop1_dna |    175    .0965276    .0351412    .025325    .2060796
     totop_dna |    175    .1078583    .0338888    .024367    .2586064
 tot_imagin~s |    169    170916.4    91904.66       7164      611893
      ct_scans |    169    10346.17    7128.637          0       51365
  prop_ct_sc~s |    169    .0624413    .0451573          0    .3976804
      mri_scans |    169    4597.036     3689.51          0       25950
   prop_mri_s~s |    169    .0350436    .0748604          0    .868787
   obs_ultra_~d |    169    11708.96     7807.52          0       41874
   oth_ultra_~d |    169    20930.18    12792.45        174       96606
   prop_ultra~d |    169    .1919581    .0934048   .0188188    .9616361
   radio_isot~s |    169    3124.698    3737.852          0       34936
   radio_graphs |    169    112609.5    60947.67          0      381530
   fluoro_scopy |    169    7599.899     11147.9          0      136763
   oper_theat~s |    164    13.21951    8.083194          2          51
   daycase_th~s |    134    3.059701    1.945734          1          10
       dayatten |    116    5786.802    5586.776        102       39862
       complain |    175    390.5143    226.0979         39        1248
        resolve |    175    .6498381    .1763122   .1538462    .9868421
       wtestaff |    175    330.5409    220.3936     18.898    1393.113
    consultants |    175    119.2082    76.52583       5.91     473.016
   prop_consu~t |    175    .3688634    .0461337   .2065527    .6311641
    traincons_pc |    155    1.431314     .325251    .359405    3.466365
    train_oth_~c |    152    1.775774    .3016384   .8853065    3.841379
      registrars |    175    67.28526    73.76298          3       434.8
            shos |    174    85.35564     53.5353          3      348.45
             hos |    155    25.40277    14.93275        .44        91.8
    prop_train~s |    155     .508876    .0702198   .1906348     .715987
       assocspec |    167    7.446503    5.404912        .18      35.769
      staffgrade |    170    22.16922        15.0004          1        85.2
        hospprac |    167    6.655976    6.307376       .182       42.57
    prop_nontr~s |    160    .1236112    .0550033   .0161514    .2789475
   non_medica~f |    175    2840.066    1706.672   200.1451     12268.4
       nursstaff |    176     1035.21    610.4339      52.82     4055.84
       prop_nurse |    175    3.251235    .6127542   1.448043    6.220359
         sttstaff |    176    378.4555    257.9784   34.26513     1828.74
         prop_stt |    175    1.184227    .3500137   .4476834    3.424518
         ahpstaff |    175     148.019    95.01786      12.68       721.4
         prop_ahp |    175    .4851387    .2249927   .1278731    2.239661
       adminstaff |    176    530.9525    366.8987   34.27703     2509.62
       prop_admin |    175     1.67976    .6346313   .5189701    3.861662
    date_started |    170    1.99e+07    34433.27   1.99e+07    2.00e+07
       sitestotal |    168    9.059524    11.82644          1          86
    a_and_e~s_pc |    156    5.799776    2.720462   .7142857        16.5
    anaesth~s_pc |    170    1.106483    .3597526          0         2.8
    cardiol~s_pc |    157    1.167288    1.040056          0           6
    clin_ra~s_pc |    172    .3373058    .4474425          0      2.0625
    gen_sur~s_pc |    158    2.660885    .9762669   .8181818         9.5
    geriatr~s_pc |    154    1.890086    1.358036          0           9
    obst_an~s_pc |    154    2.203242    .8525025        .25          10
    opthalm~s_pc |    125    1.595966    .6825537          0         3.5
    paediat~s_pc |    158    2.561397    .9754058          0         6.8
    resp_me~s_pc |    160    .8357716    .9446667          0    5.666667
    trauma_~s_pc |    163     2.04639    .6237647   .5714286        4.75
    urology~s_pc |    136    1.447654     1.01228          0           7
    neurolo~s_pc |    101    .7619458     1.09933          0           6
    vacy_med_d~t |    174    .0403784     .038695          0    .2057837
     wte_med_dent |    176    160.5167    93.58912      6.534     549.892
     vacy_consu~t |    174    .0404889     .039032          0    .1884023
     wte_consul~t |    176    123.6142    78.88795      5.546     497.045
     vacy_oth_d~t |    156    .0413839     .073135          0    .5282191
      wte_oth_do~t |    176    36.90255    23.25646       .273     124.425
     vacy_nurs_~s |    175    .0299109    .0383415          0    .2064095
     wte_nurs_m~s |    176    1032.953    607.5772      52.82     4055.84
     vacy_acut_~d |    172    .0288886    .0375354          0    .2064095
      wte_acut_g~d |    176    807.0936    501.9935        .76     3107.87
       vacy_paeds |    156    .0397131    .0733237          0    .4961781
        wte_paeds |    176    78.61605    123.0361          0      948.66
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vacy_midwi~s	150	.0303682	.0565434	0	.274352
wte_midwives	176	100.4924	63.58197	0	367.15
wte_dis_nurs	176	.5490341	3.118952	0	37.31
wte_hlth_vis	176	.6569349	2.655832	0	25.1
vacy_ahp	175	.0502669	.0517104	0	.3242397
wte_ahp	176	148.0381	94.74633	12.68	721.4
vacy_occthep	122	.0450005	.0708134	0	.3757303
wte_occthep	176	21.80666	19.16843	0	94
vacy_physio	148	.0417552	.0622015	0	.3390071
wte_physio	176	48.99841	35.70929	0	200.32
vacy_radio~g	170	.0567481	.0702977	0	.3370341
wte_radiog~g	176	53.20249	33.37209	1	282.97
vacy_radio~r	46	.1027109	.125985	0	.4879227
wte_radiog~r	176	7.79642	14.77674	0	71.67
wte_psychol	176	3.137787	6.464609	0	36.19
vacy_pharm	148	.0644763	.0863196	0	.4240882
wte_pharm	176	20.84923	16.03453	0	105.02
vacy_theatre	138	.0356883	.0792138	0	.4247104
wte_theatre	176	24.32925	28.20527	0	286.57
prop_theatre	175	.0795556	.065275	0	.5028389
vacy_hcas	122	.0214194	.0462001	0	.3102753
wte_hcas	176	122.4898	162.9909	0	1061.63
vacy_admin	174	.0087772	.0182157	0	.116955
wte_admin	176	687.9118	405.6258	38.56703	2706.86
hosp_typ	176	160.5398	65.52913	111	313
surplus	176	-516.4034	4431.738	-44620	11668
assets	176	113338.3	77193.22	7494	533932
incha	176	7456.148	28575.84	0	229916
inctrust	176	710.517	2471.224	0	29282
incpct	176	121020	76418.54	0	462605
incla	176	13.91477	69.95426	0	816
inclapc	176	.000148	.0008357	0	.009949
incdoh	176	988.2955	2784.694	0	18872
incpriv	176	2072.716	3139.507	1	21017
incact	176	579.9318	403.4745	0	2657
inconnhs	176	404.1818	1068.291	0	10592
totinc	176	133245.7	76180.49	9748	492583
siftr	176	10641.29	15325.06	1071	80000
incchar	176	459.125	1139.819	0	12065
saltotx	176	94968.84	57287.11	7137	370752
clinsupp	176	24122.45	18979.75	508	120676
gensupp	176	3773.886	2904.911	112	15394
estabexp	176	2727.483	1545.544	271	7632
transportexp	176	475.5909	618.8263	0	3220
clinneglx	176	1160.784	736.8808	0	3710
saltotx1	176	80174.57	48380.09	6171	322780
agencyx	176	5309.443	4946.387	295	29705
hcastaff	176	394.9277	340.0473	0	1715
totstaff	176	3312.627	1983.003	275	13695
paedd	176	10967.55	11044.36	0	120505
geriatricd	176	34108.49	36173.07	0	217962
cardiod	176	5905.063	8137.689	0	41922
dermd	176	982.3182	1730.446	0	8780
medoncd	176	3867.818	7504.879	0	50766
neurold	176	2297.369	4781.642	0	35831
rheumatd	176	1821.466	2822.133	0	19322
gastroentd	176	3004.523	6165.012	0	42288
haematd	176	4125.705	4058.171	0	22803
thoracmedd	176	3196.426	7997.046	0	54481
nephrold	176	2807.585	5561.968	0	31489
nephroldpc	176	.0089628	.017763	0	.0945951
rehabmd	176	3124.415	7812.359	0	55381
othmedd	176	71847.81	57850.06	0	380721
medd	176	148789.8	93067.47	0	533792
paedep	176	3707.83	2729.41	0	14916
geriatricep	176	2810.506	4505.936	0	33857
cardioep	176	1714.466	2697.165	0	18954
dermep	176	360.9205	800.314	0	5862
medoncep	176	1833.926	3364.329	0	25299
neurolep	176	353.3125	726.9407	0	3824
rheumatep	176	470.5341	940.1756	0	10173
rheumateppc	176	.0091699	.0378127	0	.4748048
gastroentep	176	1559.216	2870.9	0	16652
haematep	176	1871.955	1773.843	0	10995
thoracmedep	176	552.0795	1370.967	0	9319
nephrolep	176	686.9205	2052.158	0	19064

rehabmep |	176	158.875	541.0806	0	4487
rehabmeppc |	176	.0032251	.011317	0	.0720369
othmedep |	176	14040.03	10266.52	0	62554
othmedeppc |	176	.1951232	.1258735	0	.9765795
medep |	176	30270.53	19212.19	0	99494
paedx |	176	4801402	3619206	0	2.61e+07
paedxpc |	173	.0578758	.0400381	0	.2989901
geriatricx |	176	5683334	5972211	0	3.50e+07
cardiox |	176	2883875	4656472	0	2.26e+07
dermx |	176	247930.8	434803.9	0	2918235
medoncx |	176	1600170	3365363	0	2.59e+07
neurolx |	176	751100.1	1600671	0	1.28e+07
rheumatx |	176	548853.8	720556.5	0	3378217
gastroentx |	176	891563.6	1641386	0	1.06e+07
haematx |	176	1643362	1972442	0	1.08e+07
thoracmedx |	176	817386.7	1995486	0	1.32e+07
nephrolx |	176	876230.4	1746363	0	9446860
rehabmx |	176	615327.8	1211116	0	6486049
othmedx |	176	1.54e+07	1.16e+07	0	8.21e+07
totmedx |	176	3.71e+07	2.43e+07	0	1.53e+08
paedop1 |	176	2156.25	1640.502	0	10218
geriatricop1 |	176	547.7386	637.9646	0	2856
cardioop1 |	176	2220.511	2778.466	0	16688
dermop1 |	176	4116.648	3351.298	0	19041
medoncop1 |	176	592.9205	1185.921	0	11378
neurolop1 |	176	1415.835	1760.646	0	12026
rheumatop1 |	176	1499.284	1277.337	0	6961
gastroentop1 |	176	1040.313	1829.265	0	10410
gastroento~c |	176	.0133312	.022808	0	.1752766
haematop1 |	176	855.4148	890.2241	0	7607
thoracmedop1 |	176	658.4659	1114.445	0	5773
thoracmedo~c |	176	.0153011	.0754996	0	.9380645
nephrolop1 |	176	222.7898	626.5479	0	7455
rehabmop1 |	176	158.7386	904.6674	0	9094
othmedop1 |	176	5586.824	4653.702	0	23126
medop1 |	176	25060.13	17062.5	0	92539
paedop |	176	7867.477	5407.925	0	29139
geriatricop |	176	2291.602	2642.651	0	12656
cardioop |	176	6981.727	7496.177	0	34793
cardiooppc |	176	.033255	.0625757	0	.5304519
dermop |	176	12461.86	10599.07	0	58745
medoncop |	176	4792.034	8576.508	0	56460
neurolop |	176	3687.239	5183.728	0	40179
rheumatop |	176	7204.051	5782.787	0	31032
rheumatoppc |	176	.0353029	.0881985	0	1.169104
gastroentop |	176	3270.295	5176.165	0	27797
haematop |	176	12660.9	14432.16	0	89455
thoracmedop |	176	2534.04	4419.258	0	22576
nephrolop |	176	2250.403	5085.622	0	47253
nephroloppc |	176	.0072899	.0169648	0	.1720468
rehabmop |	176	500.7045	1857.261	0	12521
othmedop |	176	23191.02	17758.43	0	86803
medop |	176	98805.48	66452.65	0	383395
paedopx |	176	1026293	826276.4	0	5196215
geriatricopx |	176	329595	399436.8	0	2741071
cardioopx |	176	663811.7	764893	0	5971524
dermopx |	176	825972.6	710932.8	0	4376697
medoncopx |	176	725043.2	1425630	0	8267544
neurolopx |	176	559634.9	824771.3	0	5488750
rheumatopx |	176	755701.4	598586.5	0	3320691
gastroentopx |	176	340511.3	555507.2	0	3426685
haematopx |	176	1205782	1910437	0	1.22e+07
thoracmedopx |	176	337193.1	726342	0	5452511
nephrolopx |	176	257768	559795.1	0	3980449
nephrolopxpc |	173	.0065428	.011363	0	.0560759
rehabmopx |	176	158583.9	683070	0	5941102
othmedopx |	176	2861488	3494619	0	3.95e+07
medopx |	176	1.13e+07	9702372	0	8.07e+07
gensurd |	176	29765.49	18957.35	0	97988
urold |	176	7797.994	6152.776	0	33284
uroldpc |	176	.0299049	.017077	0	.0710597
orthod |	176	27062.91	15589.36	0	74555
entd |	176	3200.869	2868.682	0	17328
opthalmd |	176	2758.307	2802.732	0	12366
gynaed |	176	7335.188	4756.24	0	28158
neurosurd |	176	2469.409	6267.271	0	29573

Variable		Obs	Mean	Std. Dev.	Min	Max
plasticsurd	|	176	2471.619	5099.266	0	32284
cardiothsurd	|	176	2831.506	6812.548	0	34491
paedsurd	|	176	704.4432	2104.158	0	11539
surd	|	176	87972.23	52610	0	285692
matd	|	176	14125.95	10867.15	0	58718
gensurep	|	176	7975.148	5001.04	0	27206
urolep	|	176	3414.898	2570.716	0	13019
orthoep	|	176	4886.983	2829.424	0	12998
orthoeppc	|	176	.0846893	.1196447	0	.998387
entep	|	176	1890.551	1545.716	0	8319
opthalmep	|	176	2460.193	2658.328	0	20896
gynaeep	|	176	3972.074	2762.406	0	15595
neurosurep	|	176	317.108	803.7733	0	4755
plasticsurep	|	176	1106.472	2183.333	0	14346
cardioths~ep	|	176	354.0795	836.9396	0	4164
cardiothsu~c	|	176	.0057282	.0214686	0	.2161399
paedsurep	|	176	290.9659	807.448	0	3985
surep	|	176	27845.54	16155.42	0	81790
matep	|	176	6311.835	4599.505	0	32722
gensurx	|	176	1.12e+07	6868537	0	3.58e+07
urolx	|	176	2680301	2008799	0	9795910
orthox	|	176	1.05e+07	6144766	0	2.92e+07
entx	|	176	1879771	1652392	0	9057243
opthalmx	|	176	1776683	1853064	0	1.23e+07
opthalmxpc	|	173	.0250351	.0729153	0	.9514785
gynaex	|	176	3254597	2174081	0	1.17e+07
neurosurx	|	176	1404709	3536275	0	1.95e+07
plasticsurx	|	176	1355033	2862657	0	1.98e+07
cardiothsurx	|	176	2194585	5378036	0	2.33e+07
paedsurx	|	176	468022.6	1344656	0	7537310
surtotx	|	176	3.75e+07	2.28e+07	0	1.33e+08
matx	|	176	5518090	3679459	0	2.01e+07
gensurop1	|	176	7435.92	4497.489	0	23778
urolop1	|	176	2452.585	1689.289	0	7493
urolop1pc	|	176	.0334696	.0194141	0	.1121822
orthoop1	|	176	10287.49	6222.204	0	27087
entop1	|	176	5367.386	3854.648	0	19891
opthalmop1	|	176	6748.432	7710.197	0	68510
gynaeop1	|	176	5062.682	3853.691	0	27547
neurosurop1	|	176	236.5227	556.5175	0	3251
plasticsur~1	|	176	1046.08	1822.159	0	10214
cardiothsu~1	|	176	254.8182	657.3533	0	5560
paedsurop1	|	176	250.0057	770.8592	0	6165
surop1	|	176	42619.94	25017.8	0	124300
matop1	|	176	3471.426	2902.779	0	13138
gensurop	|	176	19760	12504.32	0	74556
gensuroppc	|	176	.0816881	.0399123	0	.2316004
urolop	|	176	8255.301	5679.428	0	28714
orthoop	|	176	30356.02	17254.19	0	87387
entop	|	176	14295.01	11226.6	0	63809
opthalmop	|	176	26061.6	28520.25	0	289663
gynaeop	|	176	12600.22	8673.319	0	47709
neurosurop	|	176	726.2898	1698.123	0	8915
plasticsurop	|	176	4237.585	7762.876	0	41545
cardioths~op	|	176	803.6477	2085.497	0	16322
paedsurop	|	176	662.5568	2170.219	0	21387
surop	|	176	129946.5	76756.78	0	433675
matop	|	176	12990.51	11908	0	66510
gensuropx	|	176	1822900	1307674	0	1.05e+07
urolopx	|	176	706478.3	515020	0	2790667
orthoopx	|	176	2588594	1531268	0	8148326
entopx	|	176	1170406	1000466	0	7136390
opthalmopx	|	176	1590704	2062962	0	2.33e+07
gynaeopx	|	176	1157027	908738.9	0	6411736
neurosuropx	|	176	129250.9	331593.7	0	2148120
plasticsu~px	|	176	267739.4	507640.5	0	3248939
cardioths~px	|	176	99274.21	302514.9	0	2291497
paedsuropx	|	176	67703.82	201070.3	0	1237157
suropx	|	176	1.05e+07	6035515	0	4.09e+07
matopx	|	176	1178588	989913.2	0	4470051
psychd	|	176	1353.841	6639.375	0	60236
radiothd	|	176	2194.063	6231.775	0	42299
radiold	|	176	249.2273	1304.806	0	10979
anaesthd	|	176	1029.597	1633.624	0	9529
anaesthdpc	|	176	.0047874	.0129384	0	.1437693
othd	|	176	4941.432	7866.828	0	42299

psychep	176	50.60795	265.2475	0	2927
radiothep	176	844.6136	2258.872	0	12893
radiotheppc	176	.0145846	.0642306	0	.7385352
radiolep	176	123.7898	713.9307	0	7428
anaesthep	176	664.625	903.3637	0	6027
othep	176	2711.744	6795.77	0	79051
otheppc	176	.0409829	.1090213	0	1.130479
psychx	176	279695.2	1177461	0	8190888
radiothx	176	653918.8	1762040	0	1.09e+07
radiolx	176	107066.5	676629.8	0	6987500
anaesthx	176	572122.9	1209043	0	8722647
othx	176	1725111	2514021	0	1.17e+07
psychop1	176	191.7898	1077.607	0	13419
radiothop1	176	476.883	1069.444	0	6164
radiolop1	176	118.0341	615.7469	0	7648
radiolop1pc	176	.0015956	.0077701	0	.0960611
anaesthop1	176	575.892	560.5687	0	2477
othop1	176	4777.355	19458.43	0	194071
psychop	176	937.1534	3626.653	0	39967
radiothop	176	5424.47	14566.02	0	106910
radiothoppc	176	.0223028	.0850825	0	.8495506
radiolop	176	1691.881	7847.693	0	84369
radioloppc	176	.006858	.0275838	0	.2271717
anaesthop	176	2221.943	2415.702	0	15358
othop	176	15137.55	31247.94	0	221044
psychopx	176	160779.2	510569.9	0	4239669
radiothopx	176	988362.1	2302246	0	1.31e+07
radiolopx	176	97589.14	398857.4	0	3495841
anaesthopx	176	224673.7	267953.3	0	2081583
anaesthopxpc	173	.0088337	.0107879	0	.1134557
othopx	176	1874778	3745327	0	3.13e+07
supradists~d	176	8465.983	27664.38	0	161249
supraregse~d	176	288.858	1277.075	0	12789
supradist~ep	176	2087.369	7867.681	0	59686
supraregs~ep	176	46.92614	220.1699	0	2342
suprare~eppc	176	.0009791	.0048595	0	.044332
supradist~vx	176	1818074	4592395	0	3.03e+07
supraregs~vx	176	364367	1429439	0	1.11e+07
totipx	176	8.43e+07	5.28e+07	0	3.29e+08
supradists~1	176	65.36932	660.5488	0	8716
supradists~c	176	.0019654	.0193104	0	.2460215
supraregse~1	176	13.02273	71.86264	0	572
supradist~op	176	5585.136	26138.12	0	225521
supraregs~op	176	154.4886	685.5125	0	5755
suprare~oppc	176	.0008098	.0048971	0	.056187
supradist~px	176	561170.7	1951278	0	1.44e+07
supraregs~px	176	68036.21	382955.7	0	3901917
totopx	176	2.56e+07	1.74e+07	0	1.19e+08
a_ex	176	4841526	3435035	0	1.72e+07
mansal	176	4172633	2870157	448018	1.63e+07
mansalpc	176	.0447185	.0154515	.0118542	.1221998
conssal	176	1.20e+07	7667790	634549	4.74e+07
conssalpc	176	.1254704	.0167672	.0847466	.1985933
allregsal	176	4460709	4794349	34516	2.52e+07
sho_hosal	176	5271986	3064587	132972	1.64e+07
mtotsal	176	2.43e+07	1.55e+07	1351807	9.77e+07
mtotsalpc	176	.251269	.0231854	.1805394	.3156074
dentsal	176	323924.1	643125.6	0	3829526
nurssal	176	3.31e+07	1.93e+07	2383535	1.24e+08
nurssalpc	176	.3480112	.0412963	.1843022	.499507
sttsal	176	1.25e+07	8523252	1622848	6.17e+07
adminsal	176	9899381	5820791	668852	3.63e+07
hcasal	176	4855770	3768407	21261	2.12e+07
hcasalpc	176	.0515412	.0291946	.0003151	.1431505
maintsal	176	1020903	778538.7	0	4071579
ambulsal	176	15142.96	181792.8	0	2409257
totnhsal	176	9.03e+07	5.45e+07	6913377	3.63e+08
agencymedx	176	1069188	938996.1	0	4977857
agmedpcx	176	.0486542	.0385977	0	.2090164
agencynursx	176	2282575	2469641	0	1.43e+07
agnurspcx	176	.0711605	.065344	0	.3865399
agencysttx	176	955609.3	1269080	0	9442088
agsttpcx	176	.0740533	.0703936	0	.4035117
agencyadminx	176	484904.5	830533.9	0	5565557
agadminpcx	176	.0427454	.0521113	0	.3225332
agencyhcax	176	214256.1	492644	0	4541545

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     aghcapcx |    176    .0576558    .1195602            0    .728199
     agencypcx |   176    .0532946    .0338403    .0074012   .1833322
      nonnhsal |   176     5176209     4827784      240448    2.97e+07
        totsal |   176    9.55e+07    5.74e+07     7487603    3.71e+08
        drugsx |   176    1.02e+07     9754083      223102    6.10e+07
    dressingsx |   176    526192.9      403785            0    2495526
      clinsuppx |   176    2.42e+07    1.90e+07      508302    1.21e+08
       kitchenx |   176     1073579    969064.6       10874    6610688
      cleaningx |   176     1793576     2521116   -13677.98    1.48e+07
   cleaningxpc |   176    .3560657    .3172798   -.0074613   .9608104
       laundryx |   176      388573    454164.4            0    3346963
       gensuppx |   176     3762761     2902974    112261.5    1.54e+07
    stationeryx |   176    822355.4    519839.9       73122    3888868
    stationery~c |  176    304.3406    75.07903    175.2867   722.1667
       postagex |   176    217577.9    128449.2    19623.26     771466
      telephonex |  176    503550.7    350281.7            0    1758231
        travelx |   176    809964.5    623322.2       56849    3775003
       travelxpc |  176    289.7759    114.7174    53.68177   870.0168
      transportx |  176    474207.1    570236.3            0    3220488
     electricityx |  176    548834.5    446149.3            0    3641192
          gasx |   176    411181.6    355961.3            0    2006881
         waterx |   176    246185.5    166941.9            0    1096042
       waterxpc |   176    .0396069    .0200073            0   .1890102
        officex |   176    902783.6    722244.5       46762    3711396
      officexpc |   176    345.3969    204.4238    49.21053   1231.868
       plantexp |   176     6838235     5201422      595199    4.51e+07
   depreciation |   176     5687424     3949360      386459    2.14e+07
     hlthxnonnhs |  176    921310.3     1428281      -15323    1.05e+07
        nonsalx |   176    5.08e+07    3.45e+07     2193832    1.99e+08
       nonhlthx |   176     3631134     2949703            0    1.38e+07
        totcost |   176    1.51e+08    9.30e+07    1.08e+07    5.79e+08
       teaching |   176    .1420455    .3500928            0           1
           mff |   176    1.005511    .0828763    .8855281   1.322941
    rci_excess~s |  176    100.3644    10.90342    81.99214   155.9491
           rci |   176    100.3502    10.97773    78.54555   159.0981
    rci_elec_dc |   176    100.6069    14.62773     54.7927     168.13
     rci_nonelec |  174    103.0138    22.73466    66.85962    292.503
    rci_critcare |  169    101.2945    21.30155    43.04548   231.9023
        rci_op |   176    100.8039      18.701     54.5086   209.8544
    rci_othacute |  175    104.0346    24.17322    26.52056    195.219
       rci_comm |   129    114.7614    55.04218    25.13998   330.7899
         rci_mh |    30    142.8283    176.8048    27.20001   1038.567
```

9.3. Analysis of variance

Table 76: Analysis of variance of star ratings for acute Trusts relative to zero star Trusts

Trust variables	Year	0 star (dropped)	1 star	2 star	3 star	ANOVA regression statistics
		Constant Standard Error P > |t|	Coefficient Standard Error P > |t|	Coefficient Standard Error P > |t|	Coefficient Standard Error P > |t|	n Prob > F R-squared
Star rating variables						
Key target						
A&E waits (12 hours)	2002/03	**125.857** 23.699 0.000	**-89.890** 28.701 0.002	**-122.857** 26.361 0.000	**-125.415** 26.699 0.000	**155** **0.000** 0.145
Cancelled ops not admitted 28 days	2002/03	**0.002** **0.001** 0.001	0.001 0.001 0.238	-0.001 0.001 0.228	-0.001 0.001 0.053	**151** **0.000** 0.129
Financial management	2002/03	**-1.714** 0.245 0.000	**1.414** 0.297 0.000	**2.223** 0.273 0.000	**2.714** 0.276 0.000	**156** **0.000** 0.429
Hospital cleanliness	2002/03	**60.165** 1.386 0.000	0.129 1.678 0.939	2.174 1.541 0.161	**4.044** 1.559 0.010	**156** **0.004** 0.084
Inproving Working Lives	2002/03	**0.857** 0.059 0.000	-0.057 0.072 0.428	0.126 0.066 0.058	**0.143** 0.067 0.034	**156** **0.000** 0.116
Inpatient wait against standard	2002/03	**46.214** 14.236 0.001	-31.914 17.240 0.066	**-46.096** 15.835 0.004	**-46.101** 16.006 0.005	**156** **0.021** 0.062
Outpatient wait against standard	2002/03	**20.214** 7.735 0.010	-11.980 9.367 0.203	-11.400 8.603 0.187	**-20.009** 8.696 0.023	156 0.111 0.039
Total time in A&E	2002/03	**0.767** 0.028 0.000	**0.099** 0.034 0.004	**0.127** 0.039 0.000	**0.162** 0.031 0.000	**155** **0.000** 0.158
Two week cancer waits	2002/03	**96.002** 1.002 0.000	-0.747 1.213 0.539	1.297 1.114 0.246	**2.393** 1.126 0.035	**156** **0.003** 0.089
Capacity and capability						
Consultant appraisal	2002/03	**0.726** 0.074 0.000	0.136 0.088 0.126	0.146 0.081 0.074	0.131 0.081 0.107	127 0.349 0.026
Data quality	2002/03	**94.413** **0.814** 0.000	-1.749 0.986 0.078	0.226 0.905 0.803	0.669 0.915 0.465	**156** **0.006** 0.078
Fire,health and safety	2002/03	**41.347** 10.378 0.000	-1.449 12.568 0.908	-14.789 11.583 0.204	**-29.458** 11.668 0.013	154 **0.006** 0.079
Information governance	2002/03	**50.714** **3.633** 0.000	-3.847 4.400 0.383	1.370 4.042 0.735	6.531 4.085 0.112	**156** **0.009** 0.072
Junior doctors' hours	2002/03	**0.666**	**0.117**	0.171	**0.145**	**156**

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		0.041	**0.049**	0.045	**0.045**	**0.006**
		0.000	**0.019**	0.119	**0.002**	**0.079**
Sickness absence rate	2002/03	**0.042**	0.003	0.004	0.003	154
		0.002	0.002	0.002	0.002	0.434
		0.000	0.213	0.100	0.167	0.018
Staff opinion survey	2002/03	**3.164**	-0.051	0.038	**0.111**	**150**
		0.042	0.051	0.047	**0.047**	**0.000**
		0.000	0.325	0.421	**0.015**	**0.126**
Clinical focus						
Clinical negligence	2002/03	**1.071**	0.029	-0.004	0.193	156
		0.159	0.193	0.177	0.179	0.222
		0.000	0.882	0.832	0.283	0.028
Death within 30 days of heart bypass	2002/03	**1639.255**	854.900	750.856	621.480	23
		404.158	494.991	446.814	451.863	0.361
		0.001	0.100	0.109	0.185	0.152
Death within 30 days of surgery	2002/03	**4902.326**	360.415	349.126	146.773	124
		239.588	304.856	270.090	274.171	0.450
		0.000	0.239	0.199	0.593	0.022
Emergency readmission	2002/03	**5.078**	0.194	0.318	**0.508**	126
		0.181	0.23	0.203	**0.207**	0.067
		0.000	0.401	0.120	**0.016**	0.057
Emergency readmission children	2002/03	**4.182**	0.328	0.141	0.436	119
		0.425	0.546	0.479	0.490	0.751
		0.000	0.549	0.769	0.376	0.010
Emergency readmission hip fracture	2002/03	**7.675**	0.551	0.986	0.684	124
		0.732	0.933	0.824	0.841	0.671
		0.000	0.555	0.234	0.418	0.013
Emergency readmission stroke	2002/03	**6.518**	**1.631**	**1.498**	1.239	125
		0.626	**0.796**	**0.704**	0.716	0.166
		0.000	**0.043**	**0.035**	0.085	0.041
Infection control procedures	2002/03	**74.429**	4.438	**6.538**	**10.119**	**156**
		2.887	3.497	**3.212**	**3.247**	**0.009**
		0.000	0.206	**0.044**	**0.002**	0.073
MRSA improvement score	2002/03	0.075	-0.241	-0.052	-0.157	155
		0.351	0.428	0.391	0.394	0.904
		0.831	0.573	0.895	0.690	0.004
Thrombolysis treatment time	2002/03	**0.665**	-0.071	0.000	-0.026	120
		0.067	0.080	0.074	0.073	0.613
		0.000	0.381	0.996	0.721	0.015
Patient focus						
A&E waits (4 hours)	2002/03	**84.555**	**8.086**	**9.062**	**9.938**	**155**
		1.147	**1.389**	**1.277**	**1.293**	**0.000**
		0.000	**0.000**	**0.000**	**0.000**	0.290
Better hospital food	2002/03	**28.541**	-0.001	0.367	0.305	156
		0.730	0.884	0.812	0.821	0.439
		0.000	0.999	0.652	0.272	0.017
Breast cancer waits	2002/03	**94.513**	0.195	2.818	2.200	151
		1.757	2.140	1.961	1.984	0.233
		0.000	0.928	0.153	0.269	0.028
Cancelled operations	2002/03	**0.017**	0.000	-0.003	**-0.007**	**151**
		0.002	0.003	0.003	**0.003**	**0.000**
		0.000	0.960	0.132	**0.005**	**0.115**
Daycase booking	2002/03	**0.723**	-0.045	0.029	0.059	156
		0.052	0.063	0.057	0.058	0.126
		0.000	0.471	0.604	0.314	0.037
Delayed transfers of care	2002/03	**0.052**	-0.003	-0.003	-0.006	156

		0.007	0.009	0.008	0.008	0.862
		0.000	0.713	0.674	0.439	0.005
Nine month heart operation waits	2002/03	**95.323**	-3.323	0.469	2.454	**25**
		1.411	1.986	1.629	1.609	**0.013**
		0.000	0.111	0.775	0.142	**0.393**
Oupatient survey - access	2002/03	0.154	-0.433	-0.347	0.033	**154**
		0.226	0.277	0.251	0.254	**0.037**
		0.496	0.120	0.169	0.898	**0.155**
Oupatient survey - information, choice	2002/03	0.177	-0.533	-0.376	0.048	**154**
		0.224	0.274	0.249	0.252	**0.008**
		0.432	0.054	0.134	0.848	**0.076**
Oupatient survey - build relationships	2002/03	0.279	**-0.681**	-0.474	-0.144	**154**
		0.217	**0.266**	0.241	0.244	**0.009**
		0.199	**0.011**	0.051	0.557	**0.074**
Oupatient survey - clean, friendly	2002/03	0.095	-0.496	-0.280	0.147	**154**
		0.230	0.282	0.256	0.259	**0.007**
		0.680	0.081	0.276	0.569	**0.078**
Oupatient survey - safe, quality	2002/03	0.175	-0.504	-0.039	0.043	**154**
		0.236	0.288	0.262	0.265	**0.016**
		0.459	0.083	0.138	0.871	**0.067**
Paediatric outpatient DNA	2002/03	**0.115**	0.013	0.004	0.012	149
		0.013	0.015	0.014	0.014	0.685
		0.000	0.399	0.798	0.417	0.010
Patient complaints procedure	2002/03	**0.647**	-0.066	-0.039	0.056	**156**
		0.044	0.054	0.049	0.049	**0.004**
		0.000	0.217	0.422	0.266	**0.083**
Privacy and dignity	2002/03	**2.571**	0.195	0.191	0.296	156
		0.162	0.196	0.179	0.182	0.418
		0.000	0.320	0.289	0.105	0.018
Six month inpatient waits	2002/03	**78.910**	-0.594	2.736	**6.438**	156
		1.828	2.214	2.033	**2.055**	**0.000**
		0.000	0.789	0.180	**0.002**	0.138
Thirteen week outpatient waits	2002/03	**76.415**	-3.841	-0.568	2.917	156
		1.855	2.246	2.063	2.085	**0.000**
		0.000	0.089	0.783	0.164	**0.111**
Total inpatient waits	2002/03	-0.059	0.045	**0.093**	**0.122**	156
		0.032	0.038	**0.035**	**0.036**	0.002
		0.062	0.236	**0.009**	**0.001**	0.095
Waiting time chest pain clinic	2002/03	**0.700**	0.076	0.139	**0.168**	139
		0.074	0.088	0.081	**0.081**	0.137
		0.000	0.384	0.086	**0.041**	0.040
Other variables						
CHI review	2002/03	**2.429**	-0.187	0.232	**0.877**	**148**
		0.147	0.179	0.164	**0.167**	**0.000**
		0.000	0.298	0.161	**0.000**	**0.359**

10. Appendix B

10.1. Variable definitions for PCT database

Table 77: Variable definitions for PCT database

Indicator	Indicator_Short_Description	Indicator_Long_Description
CHI DATA (KEY TARGETS AND INDICATORS FOR 2003)		
RATING03	PCT Star rating, July 2003	Star rating (zero to three) awarded to PCT in July 2003
FLUVAC	Flu Vaccinations	Persons vaccinated against flu as a percentage of number of people aged 65 and over.
ACCESSGP	Access to a GP	Percentage of patients who are able to be offered an appointment to see a GP within two working days.
FINMAN	Financial Management	Achievement of the financial position shown in the 2002/3 Plan without the need of unplanned financial support (recoded =0 or 1)
IMPWLD	Improving Working Lives	Achievement of Improving Working Lives (IWL) Standard 'practice' or 'pledge' status (dependent on formation date of the organisation) by the end of Q4 2002/03.
DEMERAD	Change in rate of emergency admissions	Number of Primary Care Trust commissioned emergency admissions per 100,000 population (age and sex standardised). Change in rate.
EMERREAD	Emergency readmission to hospital following treatment for a fractured hip	Emergency readmissions to hospital within 28 days of discharge following treatment for a fractured hip, as a percentage of live hip fracture discharges (age and sex standardised).
PCTAANDW	PCT Survey - Access and waiting	PCT survey - Access and Waiting.
PCTBIMC	PCT Survey - Better information, choice	PCT survey - Better information, more choice.
PCTCCFRI	PCT Survey - Clean, comfortable, friendly	PCT Survey - Clean, comfortable, friendly place to be.
HOPWAITS	Twelve month heart operation waits	Number of patients waiting more than 12 months for a coronary artery bypass graft (CABG) and percutaneous transluminal coronary angioplasty (PTCA) throughout the year. The target is that no patients should have waited more than 12 months throughout the year.
BCANCERS	Breast Cancer Screening	Percentage of women aged 53-64 screened for breast cancer.
CSCREEN	Cervical Screening	Percentage of women aged 25-64 screened for cervical abnormalities.
DTEEPREG	Teenage pregnancy	Percentage change in the under-18 conception rate between 1998 and 2001.
DCANDEAT	Death rates from cancer, ages under 75	Percent change in mortality rate from all malignant neoplasms in people aged under 75 per 100,000 population (age and sex standardised).
ACCESPCP	Access to a Primary Care Professional	Percentage of patients offered an appointment to see a Primary Care Professional within one working day.
PCOMPLAI	Patient complaints procedure	Percentage of written complaints for which a local resolution was completed within 20 working days.
DELTRCAR	Delayed transfers of care	Percentage of patients whose transfer of care from hospital was delayed.
GENERICS	Generic prescribing	Number of generic prescription items as a percentage of all prescription items excluding those for dressings and appliances.
PCTSCARE	PCT Survey - Safe, high quality care	PCT Survey - Safe, high quality, coordinated care.
PCTRELAT	PCT Survey - Building closer relationships	PCT survey - Building closer relationships.

ABDRUGS	Prescribing rates of antibacterial drugs	Prescribing rate of antibacterial drugs (age & sex standardised).
PCMACUTE	Primary Care Management - Acute conditions (change in rate)	Emergency admissions rate for acute ear, nose and throat infection, kidney/urinary tract infection and heart failure per 100,000 population (age and sex standardised). Change in rate.
PCMCHRON	Primary Care Management - Chronic conditions (change in rate)	Emergency admissions rate for asthma and diabetes per 100,000 population (age & sex standardised). Change in rate.
SICKRATE	Sickness absence rate	The amount of time lost through absences as a percentage of staff time available for directly employed NHS staff.
GPAPPRAI	GP Appraisal	Appraisal for GP Principals.
QUITSMOK	Four-week smoking quitters	Percentage of smokers who had quit at four week follow-up with the NHS smoking cessation services (performance against plan).
ACCIDEAT	Death rates from accidents, all ages (change in rate)	Percentage change in mortality rate from accidents in persons of all ages per 100,000 population (age and sex standardised).
CIRCDEAT	Death rates from circulatory diseases, ages under 75 (change in rate)	Percentage change in mortality rate from all circulatory diseases in persons aged under 75 per 100,000 population (age and sex standardised).
ACCESSDN	Access to NHS Dentistry	Plans in place to enable people to obtain NHS dentistry within local standards, following request for help through NHS Direct and local enquiry points.
PRBENZO	Prescribing rates for benzodiazepine	Prescribing rates for drugs acting on benzodiazepine receptors (age and sex standardised).
PRAPSYCH	Prescribing of atypical antipsychotics	Prescribing of atypical antipsychotics as a proportion of all antipsychotics prescribed.
SUIAUDIN	Suicide audit	Local system for suicide audit implemented.
FHSBACKL	Fire, Health and Safety	Fire, health & safety backlog (£/m^2) related to all level 4 PCT buildings, including health centres and non-GP owned premises.
KIDEMADM	Emergency admissions to hospital for children	Number of emergency admissions of children aged under 16 with lower respiratory infections per 100,000 resident children (age and sex standardised). Change in rate.
STAFFOPI	Staff opinion survey	Responses from NHS-employed staff opinion survey on satisfaction with employer (only central PCT team and community staff).
DIABSERN	Diabetes services baseline assessment	Those PCTs who have completed their baseline assessment of diabetes services.
CHDAUDIT	CHD Audit	Percentage of practices with clinical audit data no more than 12 months old.
TTIMEAE	Total time in A&E	Total time in A&E: percentage of patients waiting less than 4 hours in A&E from arrival to admission, transfer or discharge.
AAE12HWT	A&E Emergency admission waits (12 hours)	Number of patients waiting more than twelve hours for admission via A&E as an emergency following decision to admit.
OWAITSTD	Number of outpatients waiting longer than the standard	Number of patients who were waiting more than 26 weeks throughout the year, or more than 21 weeks at end of March 2003, for an outpatient appointment.
ACCESSMH	Level of 24 hour access to specialist mental health services	Level of 24 hour services provided in area i.e. people on the CPA can, when necessary, see a mental health professional and urgent referrals from primary health care teams can be seen by a mental health professional at any time 24 hours a day, 365 days a year.
TELACCEN	Single Telephone Access	Appropriate implementation plan in place for local out of hours providers which will make available single telephone access to primary care out-of-hours services through NHS Direct by end 2004.
COMEQUIP	Community equipment	Proportion of people during the period benefiting from community equipment who had it delivered within 3 weeks.
IWAITSTD	Number of inpatients waiting longer than the standard	Number of patients who were waiting more than 15 months throughout the year, or more than 12 months at end of March 2003, for an inpatient admission.
SUMISUSE	Substance Misuse - Percentage of GP practices in a shared care scheme	Substance Misuse: The percentage of GP practices in a shared care scheme for problematic drug misusers.

ACCSFORP	Sexual health - Access to services for early unintended pregnancy	Percentage of NHS funded abortions undertaken at up to and including 9 completed weeks gestation.
DATAQLTN	HES data quality	HES data quality 0=fail, 1=pass

GMS DATA FOR 2002

PMSPCENT	Percentage of Practices that are PMS sites	Number of PMS Practice sites divided by total number of Practices
GPPERPAT	GPs per patient	Number of GPs divivded by number of registered patients
MGPPCENT	Male GPs as a proportion of all GPs	Number of male GPs divivded by total number of all GPs
GPUKQUAL	UK qualified GPs as a proportion of all GPs	Number of UK qualified GPs divided by total number of GPs
YOUNGGPS	Proportion of GPs aged under 40	Number of GPs aged under 40 divided by total number of GPs
OLDERGPS	Proportion of GPs aged over 50	Number of GPs aged over 50 divided by the total number of GPs
SALGPPCT	Salaried GPs as a proportion of all GPs	Number of salaried GPs divivded by the total number of GPs
RESTRPCT	Restricted GPs as proportion of all GPs	Number of GPs whose contract status was categorised as 'restricted' as a proportion of all GPs
CRSORPCT	GPs who are course organisers	Number of GPs who are course organisers divided by the total number of GPs
APTRNPCT	GPs who are approved trainers	Number of GPs who are approved trainers divided by the total number of GPs
MALEPAT	Male patients as a proportion of all patients	Number of male registered patients divided by total number of patients
YOUNGPAT	Young patients as a proportion of all	Number of registered patients aged under 4 divided by the total number of patients
OLDPAT	Over 65s as a proportion of all patients	Number of registered patients aged over 65 divided by the total number of patients
VOLDPAT	Over 75s as a proportion of all patients	Number of registered patients aged over 75 divided by the total number of patients
DEPCLB1P	Practice deprivation claims in bands 1 to 4	Practice deprivation claims in bands 1 to 4 (Jarman index > 20) divided by number of patients
DEPCLB2P	Practice deprivation claims in bands 2 to 4	Practice deprivation claims in bands 2 to 4 (Jarman index > 30) divivded by number of patients
DEPCLB3P	Practice deprivation claims in bands 3 - 4	Practice deprivation claims in bands 3 and 4 (Jarman index > 40) divided by number of patients
DEPCLB4P	Practice deprivation claims in band 4	Practice deprivation claims in band 4 (Jarman index > 50) divided by number of patients
CHHLTPRO	Child health patients	Number of child health patients divided by number of patients aged under 5
PATDRUGD	Patients for whom drugs are dispensed	Number of registered patients for whom drugs are dispensed divided by all registered patients
RURALITY	Registered rural patients	Number of registered rural patients divided by all registered patients
ASTHMAPC	Number of GPs offering asthma services	Number of GPs offereing astma services divided by number of all GPs
DIABTSPC	Number of GPs offering diabetes services	Number of GPs offereing diabetes services divided by number of all GPs
MINISUPC	Number of GPs offering minor surgery	Number of GPs offereing minor surgery divided by number of all GPs
CHTHPC	Number of GPs offering child health service	Number of GPs offereing child health surveillance services divided by number of all GPs
DEPSERPC	Number of GPs using deputising services	Number of GPs using deputising services divided by number of all GPs
HPROB3PC	GPs providing Health Promotion services (band 3)	Number of GPs providing Health Promotion services (band 3) divided by total number of GPs
HPROBNPC	GPs providing Health Promotion services (band N)	Number of GPs providing Health Promotion services (band N) divided by total number of GPs
OUTOFHPC	GPs providing out of hours cover	Number of GPs providing out of hours cover divided by total number of GPs
CNTRLIPC	GPs providing contraceptive services (list)	Number of GPs providing contraceptive services to list patients only divided by total number of GPs
CNTRABPC	GPs providing contraceptive services (all)	Number of GPs providing contraceptive services to anyone divided by total number of GPs

MATERNPC	GPs providing full maternity services	Number of GPs providing full maternity services divided by total number of GPs
DISPENPC	GPs providing dispensing services	Number of GPs providing dispensing services divided by total number of GPs
MMR2COPC	MMR2 count	MMR2 count divided by number of patients aged under 2
SHPPCT	Single handed Practices	Proportion of Practices that are single handed
GPPERPR	GPs per Practice	Number of GPs per Practice
PATPERPR	Patients per Practice	Number of Patients per Practice
TOT_PA	Patients	Number of Patients
ACHLDI01	Childhood immunisation achievement indicator	If higher target met =2, if lower target met =1, if neither target met =0 (from 2001 GMS)
APSYCH01	Pre-School booster target achievement	If higher target met =2, if lower target met =1, if neither target met =0 (from 2001 GMS)
ACYTOL01	Cervical screening target achievement	If higher target met =2, if lower target met =1, if neither target met =0 (from 2001 GMS)

CENSUS 2001 DATA

BORNEXEU	Residents born outside the European Union	Residents born outside the European Union divided by all residents (KS005008/KS005001)
WHITEEG	Residents in white ethnic group	Population in white ethnic group divided by total population (KS006002+KS006003+KS006004)/KS006001
PCWALLTI	Population of working age with illness	Proportion of population of working age with limiting long term illness divided by population aged 16-74 (KS008003/KS09A001)
POPPUCAR	Unpaid care providers in population	Proportion of population providing unpaid care (KS008007/KS008001)
POPPUCA1	Unpaid care (<20 hrs week) in population	Proportion of population providing unpaid care of 1-19 hours a week (KS008008/KS008001)
POPPUCA2	Unpaid care (20-49 hrs) in population	Proportion of population providing unpaid care for 20-49 hours per week (KS008009/KS008001)
POPPUCA3	Unpaid care (>50 hrs week) in population	Proportion of population providing unpaid care for over 50 hours week (KS008007/KS008001)
NQUAL174	Proportion aged 16-74 with no qualifications	Proportion of population aged 16-74 with no qualifications (KS013002/KS013001
FTSTUDEN	Proportion aged 16-74 full-time students	Proportion of population aged 16-74 that are full-time students ((KS013008+KS013009)/KS013001)
HHNOCAR	Households without a car	Proportion of households without a car (KS017002/KS017001)
OWNOCC	Owner occupied households	Proportion of households that are owner occupied (KS018002+KS018003+KS018004)/KS018001)
LAHARENT	Rented social housing	Proportion of households that are rented from LA or HA ((KS018005+KS018006)/KS018001)
PRIVRENT	Rented private housing	Proportion of households that are rented from private landlords (KS018007/KS018001)
LONEPENH	Lone pensioner households	Proportion of households that are one pensioner households (KS020002/KS020001)
LONEPARH	Lone parent housweholds	Proportion of households that are lone parent households with dependent children (KS020011/KS020001)
PERMSICK	Permanently sick of those aged 16-74	Proportion of population aged 16-74 that are permanently sick (KS09A010/KS09A001)
PC74LTUN	Long-term unemployed of those 16-74	Proportion of those aged 16-74 that are long-term unemployed (KS09A015/KS09A001)
WORKAGRI	Employed in agriculture	Proportion of those aged 16-74 in employment that are working agriculture (KS11A002/KS11A001)
PROFOCCU	People in professional occupations	Proportion of those aged 16-74 in managerial and professional occupations ((KS14A002+KS14A003+KS14A004)/KS14A001)

PRESCRIBING DATA

INHCORV1	Volume indicator for inhaled corticosteroids	Provides a measure of increased use towards that recommended by the British Thoracic Society. Calculated as defined daily doses divided by Star-PU (DDD/Star-PU).

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INHCORV2	Cost per daily dose indicator corticosteroids	Provides a measure of economy in the choice of inhalers prescribed as the prices of these vary significantly. Calculated as net ingredient cost of drug divided by defined daily doses (NIC/DDD).
ANTIBACT	Cost per item indicator for antibacterials	NIC/ITEM
ULCERHE1	Cost per daily dose indicator ulcer healers	Net ingredient cost divided by averafge daily quantity (NIC/ADQ)
ULCERHE2	Volume indicator for ulcer healers	Provides a measure of use relative to recommended levels (ADQ/STAR-PU)
CARDIOVA	Cost indicator for cardiovascular drugs	Compares the costs of drugs within the therapeutic area on a weighted population basis (NIC/STAR_PU)
BETABLOC	Volume indicator for beta blockers	Compares the extent of prescribing within a therapeutic area on a population basis. Shows the relative quantitity prescribed by different groups of prescribers (ADQ/STAR-PU).
STATINS	Volume indicator for statins	ADQ/STAR-PU)
GENERMAN	Generics as a proportion of all items prescribed	Number of generic items prescribed divided by total number of items prescribed, even when a generic is not available (excludes dressings and appliances)

OTHER SOCIO-ECONOMIC VARIABLES

POPWIMD	Index of multiple deprivation	Population weighted index of multiple deprivation based on ward level IMD 2000 scores
LISI2002	Exemptions from prescription charges	Low income supplement index (LISI). A measure of deprivation based on claims for exemption from prescription charges on grounds of low income. December 2001 to November 2002.
PWCPAGSC	Child poverty score	Population weighted index of child poverty as proposed by IMD 2000
PWUNEMSC	Employment deprivation score	Population weighted index of employment deprivation from IMD 2000

The following variables are based on patient weighted Practice data aggregated up to PCT level

adet_imd	DETR index of overall or multiple deprivation (ward level attributed to practices)	ID/AREA project
adet_inc	DETR index of income deprivation (ward level attributed to practices)	ID/AREA project
adet_emp	DETR index of employment deprivation (ward level attributed to practices)	ID/AREA project
adet_hlt	DETR index of health deprivation (ward level attributed to practices)	ID/AREA project
adet_edc	DETR index of education deprivation (ward level attributed to practices)	ID/AREA project
adet_hse	DETR index of housing deprivation (ward level attributed to practices)	ID/AREA project
adet_acc	DETR index of access deprivation (ward level attributed to practices)	ID/AREA project
adet_chl	DETR index of child poweverty (ward level attributed to practices)	ID/AREA project
apjobsee	Proportion eligible population claiming job seekers allowance	AREA project
ap17noun	Percentage of the population aged 17 not going to University	ID/AREA project
arsdnt75	Residential places per person over 75	DoH/AREA project
asev_dis	Incapacity/Severe disability allowance claimants	AREA project

azattalw	Standardised proportion of population with attendance allowance/Disability living allowance claims	AREA project
aplwbwgt	Percentage of babies who were low birthweight	ID/AREA project
aattal60	Attendance allowance claimants aged over 60	ID/AREA project
aincspt6	Proportion of population over 60 years old claiming income support	ID/AREA project
ap_attal	Proportion of population with attendance allowance/Disability living allowance claims	ID/AREA project
ap_incbe	Proportion population claiming incapacity benefit/sever disability allowance	ID/AREA project
acmf	Comparative mortality factor	ONS/AREA project
acmf74	Comparative mortality factor	ONS/AREA project
acmf64	Comparative mortality factor	ONS/AREA project
acute_an	acute & maternity needs index	DoH website: see section 5 at http://www.doh.gov.uk/allocations/2003-2006/index.htm

GEOGRAPHICAL/SUPPLY VARIABLES

adist2nd	Beds weighted distance to secondary care	OCS/AREA project
adistmnt	Beds weighted distance to mental health care	OCS/AREA project
adistmat	Beds weighted distance to maternity care	OCS/AREA project
adistpri	Beds weighted distance to private health care	OCS/AREA project
agpacces	Accessiblity score to general practitioners	OCS/AREA project
awaitnr5	Average inpatient waiting time at 5 nearest providers	HES/AREA project
adistnr5	Average distance from GP practice to 5 nearest providers	OCS/AREA project
aacutebe	Average beds at 5 nearest acute providers	OCS/AREA project
apsycnr5	Average distance from GP practice to 5 nearest psychiatric providers	OCS/AREA project
abedpsyc	Average beds at 5 nearest psychiatric providers	OCS/AREA project
amatnnr5	Average distance from GP practice to 5 nearest maternity providers	OCS/AREA project
abedmatn	Average beds at 5 nearest maternity providers	OCS/AREA project
aprivnr5	Distance from practice to nearest 5 private hospitals	OCS/AREA project
abedpriv	Accessiblity to private beds	OCS/AREA project
abedacut	Average beds at 5 nearest acute providers	AREA project
adstacut	Average distance to acute providers used	AREA project
ares_75	Residential places per person aged over 75	
London	Dummy for London PCTs	Dummy variable =1 if PCT in London, else=0
MHProvider	Dummy for mental health care PCTs	Dummy variable =1 if PCT also assessed by CHI for its provision of mental health services, else=0

dftopen	Distance from target - opening (not from Practice data)	Baseline budget less target divided by target (opening)
dftclose	Distance from target - closing (not from Practice data)	Baseline budget less target divided by target (closing)

THE PERFORMANCE OF ACUTE PROVIDERS

gpcimpwl	Achievement of Improved Working Lives directive	
gpcaewai2	Number of patients waiting more than 12 hours for admission (recoded =0, 1, or 2)	
gpccanco	% of elective admissions cancelled at last minute	
gpcfinma	Achievement of financial plan without need for unplanned support (NOT recoded, =-2, -1, 1)	
gpchoscl	Hospital cleanliness score	
gpcinwtg2	Number of inpatients waiting longer than standard (recoded =0, 1, or 2)	
gpcopwtg2	Number of outpatients waiting longer than standard (recoded =0, 1, or 2)	
gpcaewaf	% of patients waiting less than 4 hours in A&E	
gpccancw	% of patients seen within 2 weeks of cancer referral	
gpcrati	Acute Trust star rating, July 2003	
gpcchi_r	CHI inspection score	
aout4wk	Proportion of outpatients seen within 4 weeks at providers used	AREA project
aout13wk	Proportion of outpatients seen within 13 weeks at providers used	AREA project
ain3mnth	Proportion of inpatients seen within 3 months at providers used	OCS/AREA project
ain6mnth	Proportion of inpatients seen within 6 months at providers used	AREA project
ain12mnth	Proportion of inpatients seen within 12 months at providers used	AREA project

10.2. Descriptive statistics for PCTs

Table 78: Descriptive statistics for PCT database

Variable	Obs	Mean	Std. Dev.	Min	Max
rating03	300	1.68	.8163873	0	3
fluvac	300	68.62608	4.314525	49.16128	77.53877
accessgp	300	88.54285	10.41777	26.794	100
finman	300	.9066667	.291385	0	1
impwldv	299	.9297659	.2559696	0	1
demerad	275	.00566	.049187	-.1388	.144
emerread	271	.0875051	.0314584	.0157821	.196
pctaandw	300	71.51154	3.2899	61.231	79.586
pctbimc	300	74.40407	2.899503	64.854	81.428
pctccfri	300	81.68275	2.745054	72.119	87.643
hopwaits	300	.0066667	.081513	0	1
bcancers	300	76.06667	8.264087	35.95319	90.58257
cscreen	300	82.63139	3.642403	67.88193	89.37277
dteepreg	300	.1039024	.0979612	-.3914871	.3132118
dcandeat	300	-.0069275	.1133125	-.430341	.3015359
accespcp	300	90.86832	8.888884	62.888	100
pcomplai	296	64.5692	22.45672	0	100
deltrcar	297	.0491635	.0389942	0	.462682
generics	300	77.61997	2.62023	67.949	85.686
pctscare	300	79.2216	1.83447	73.403	83.717
pctrelat	300	88.78225	2.355676	80.631	92.984
abdrugs	300	1.066554	.140351	.5852106	1.482093
pcmacute	275	.011824	.1052736	-.3018	.3905
pcmchron	275	.0187116	.1378441	-.7211	.3469
sickrate	297	.0413266	.0134912	.005	.088
gpapprai	298	69.72973	39.49742	0	100
quitsmok	300	85.72154	44.81145	5.294117	291.2409
accideat	300	-.0332915	.3320546	-1.521149	.6444353
circdeat	300	.0300014	.1166592	-.3913055	.401452
accessdn	298	.9697987	.1714288	0	1
prbenzo	300	8.901538	2.766103	3.903605	18.58204
prapsych	300	48.57322	9.390663	19.521	71.47331
suiaudin	293	.6518771	.4771902	0	1
fhsbackl	282	15.94976	26.30087	0	171.509
kidemadm	275	-.1177182	.3088129	-1.2326	.5763
staffopi	297	3.358119	.2078077	2.28106	3.83269
diabsern	296	.7972973	.4026936	0	1
chdaudit	292	85.79434	27.47024	0	100
ttimeaae	300	92.59136	5.089315	70.73631	99.71449
aae12hwt	300	21.66086	87.40935	0	892
owaitstd	300	4.536667	24.88062	0	398
accessmh	278	2.730216	1.687463	0	5
telaccen	299	.9130435	.2822437	0	1
comequip	272	89.87436	19.08574	0	100
iwaitstd	300	1.87	13.59445	0	222
sumisuse	286	.2897206	.2971384	0	1
accsforp	300	51.44663	12.56942	8.502633	79.34066
dataqltn	300	.92	.2717465	0	1
pmspcent	300	.2188023	.2231079	0	.9705882
gpperpat	300	.0005505	.0000601	.0004174	.0007527
mgppcent	300	.6649174	.0790834	.4646465	.9090909
gpukqual	300	.8185845	.1478014	.2	1
younggps	300	.3014831	.0809117	.0571429	.5192308
oldergps	300	.3108775	.1086858	.122449	.8
salgppct	300	.0246953	.0345458	0	.2280702
restrpct	300	.0013219	.0041279	0	.0245902
crsorpct	300	.0086603	.0109822	0	.050505
aptrnpct	300	.1309975	.0674585	0	.3181818
malepat	300	.4975718	.0094566	.4699498	.535653
youngpat	300	.0540627	.0065738	.037531	.0908734
oldpat	300	.159254	.0309863	.0857216	.2840365
voldpat	300	.0760216	.0176076	.0365363	.1558985
depclb1p	300	.0636802	.0859942	0	.5434753
depclb2p	300	.0218417	.0417528	0	.3633767
depclb3p	300	.0051481	.0139789	0	.1518317
depclb4p	300	.0007867	.0029731	0	.0287575
chhltpro	300	.8144273	.1186534	.1438231	.963114

Variable					
patdrugd	300	.0763933	.112531	0	.5687052
rurality	300	.1060569	.1221497	0	.5394974
asthmapc	300	.7878348	.2296151	0	1
diabtspc	300	.7886673	.2287176	0	1
minisupc	300	.844574	.1137331	.2672414	1
chthpc	300	.9488465	.0520695	.7241379	1
depserpc	300	.7337743	.3258986	0	1
hprob3pc	300	.7939328	.2271519	0	1
hprobnpc	300	.2060672	.2271519	0	1
outofhpc	300	.984199	.028932	.7142857	1
cntrlipc	300	.1178236	.0720962	0	.3898305
cntrabpc	300	.8709727	.0752801	.5932204	1
maternpc	300	.9852229	.019649	.8842975	1
dispenpc	300	.1818052	.229124	0	1
mmr2copc	300	.2917068	.2680342	.003046	2.41777
shppct	300	.2439394	.1658383	0	.7
gpperpr	300	3.485409	.9543578	1.590909	6.625
patperpr	300	6291.406	1489.614	3540.102	12673.63
total_pa	300	168156.5	65527.32	69483	368394
achldi01	300	1.825338	.2491621	0	2
apschl01	300	1.637072	.3041031	0	2
acytol01	300	1.891214	.1686527	1.156365	2
bornexeu	300	.0601591	.0708638	.0066282	.3816195
whiteeg	300	.9217438	.1132181	.2912836	.9944757
pcwallti	300	.1140389	.0277193	.0659015	.2266909
poppucar	300	.1004441	.011003	.0695421	.128395
poppuca1	300	.0689155	.00781	.0472309	.0893894
poppuca2	300	.0108896	.0026675	.0059775	.0195931
poppuca3	300	.0206389	.0053609	.0095395	.039088
nqual174	300	.2939127	.0678776	.1301124	.4701251
ftstuden	300	.0671965	.0328594	.0372242	.2549183
hhnocar	300	.2608052	.1033092	.0922091	.5762327
ownocc	300	.6947672	.1029295	.2895963	.8719638
laharent	300	.1889638	.0872364	.0671215	.5353099
privrent	300	.0837966	.0387559	.0325926	.2963081
lonepenh	300	.1448194	.0199814	.0966615	.2195467
loneparh	300	.0631948	.0189661	.0347661	.1316937
permsick	300	.0538405	.0231027	.0194617	.1626286
pc74ltun	300	.0100045	.0053048	.0029613	.0318167
workagri	300	.0153897	.0151893	.0014742	.09651
profoccu	300	.2678399	.0681112	.124405	.4957857
inhcorv1	300	1.783103	.3236178	.954	2.76
inhcorv2	300	.6607733	.1231135	.424	1.361
antibact	300	4.48063	.4475028	3.401	5.813
ulcerhe1	300	.7483633	.0388898	.576	.832
ulcerhe2	300	1.31073	.2686252	.753	2.167
cardiova	300	2.099923	.2982222	1.571	3.094
betabloc	300	10.01377	1.324786	4.87	14.622
statins	300	7.7236	1.817625	4.592	15.306
generman	300	75.87102	2.957362	64.573	84.83
popwimd	299	25.29839	12.95251	4.89	65.77
lisi2002	284	10.0321	4.599729	3.428	28.242
pwcpagsc	297	30.96337	12.35299	9.16	73.6
pwunemsc	297	11.60697	5.556221	3.38	30.16
adet_imd	300	25.08892	12.30251	5.725538	65.32982
adet_inc	300	21.76739	8.595922	7.449749	51.55697
adet_emp	300	11.60782	5.363595	3.383473	31.70901
adet_hlt	300	.1964227	.7469604	-1.631607	2.392997
adet_edc	300	.1751093	.5758517	-1.503244	1.800969
adet_hse	300	.1522474	.6438008	-1.231612	2.430798
adet_acc	300	-.2608854	.4625538	-1.87504	.7973034
adet_chl	300	30.83742	11.67233	9.085431	73.55459
apjobsee	300	4.320372	2.64723	.7135037	14.36453
ap17noun	300	84.81941	4.525494	68.97962	94.49036
arsdnt75	300	.0951217	.042956	.0037559	.2572496
asev_dis	300	94.12599	44.40336	29.12329	308.2879
azattalw	300	90.31133	32.39929	39.43380	227.1087
aplwbwgt	300	7.264236	1.033927	5.341371	10.78827
aattal60	300	.1004569	.0216126	.0559077	.1766581
aincspt6	300	.1439688	.0531125	.0582449	.3632275
ap_attal	300	5.326256	1.795173	2.364276	12.58774
ap_incbe	300	6.096786	2.76813	2.018546	20.17899
acmf	300	100.7289	10.77793	78.65895	137.7996
acmf74	300	101.194	18.12639	70.80491	170.9597
acmf64	300	101.0625	19.89392	70.2017	186.9608
acute_an	300	1.00191	.1591024	.7387905	1.509359

```
     adist2nd |    300    .0026302    .0007498    .0011179    .0043678
     adistmnt |    300     .000781    .0002516    .0001405       .0015
     adistmat |    300    .0001877    .0000545    .0000636     .000323
     adistpri |    300    .0003109    .0001734    .0000618    .0010531
     agpacces |    300    .0001794    .0000576    .0000803    .0003344
     awaitnr5 |    300    90.10042    15.88352    56.47414    146.8097
     adistnr5 |    300    26.94163     10.4391    12.43924    89.00018
     aacutebe |    300    506.8469    128.0926    229.3225    928.4964
     apsycnr5 |    300    32.12896    13.66274    12.83997    111.6201
     abedpsyc |    300    237.5056    78.46618    93.50063    538.7637
     amatnnr5 |    300    31.49407    12.25422    13.47409    97.87633
     abedmatn |    300     55.8128    9.764017    33.67528    89.86462
     aprivnr5 |    300    24.61148    9.710539    11.47455    75.30508
     abedpriv |    300    38.59089    14.24498    14.80005    113.6585
     abedacut |    300    826.1952    336.2205    382.9106    2505.237
     adstacut |    300    24.70742    9.979284    11.82351    72.49022
      ares_75 |    300    .0083842    .0049256     .000343    .0311956
       london |    300          .1    .3005013           0           1
   mhprovider |    300    .0566667    .2315909           0           1
       dftopen |    300    .2056177    6.291329   -22.22751     31.6511
      dftclose |    300    .1809917     5.90876   -20.22751    31.12989
      gpcimpwl |    295    .9599112     .164715    .0602595           1
     gpcaewai2 |    300        1.67    .6752431           0           2
      gpccanco |    295     .012549    .0065771     .002803    .0423071
      gpcfinma |    295    .4121657    1.005189          -2           1
      gpchoscl |    295    62.32982     4.56456    51.51614    71.18472
     gpcinwtg2 |    300    1.876667    .4187762           0           2
     gpcopwtg2 |    300    1.703333    .6081846           0           2
      gpcaewaf |    293    92.39097     5.04702    70.73631    99.29192
      gpccancw |    295     96.7419    3.759471    79.20973         100
  acuterati~03 |    295    1.934629    .8449831           0           3
      gpcchi_r |    295    2.830342    .6213078           2           4
       aout4wk |    300     .34621    .0448318     .230136    .5359803
      aout13wk |    300    .7690357    .0451029    .6317772    .8836612
      ain3mnth |    300    .5212993    .0772591    .3510385    .8048751
      ain6mnth |    300    .7495015    .0609988    .5792573    .9615032
     ain12mth |    300    .9551357    .0228992    .8713819    .9951699
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10.3. Analysis of variance

Table 79: Analysis of variance of star ratings for PCTs relative to zero star group

Indicator	0 star dropped	1 star	2 star	3 star	ANOVA regression statistics
	Control Standard Error P>|t|	Co-efficient Standard Error P>|t|	Co-efficient Standard Error P>|t|	Co-efficient Standard Error P>|t|	n Prob > F R-squared
Flu vaccinations	**68.35** **0.86** 0.000	**-1.63** **0.95** 0.089	0.86 0.92 0.355	**2.74** **1.05** **0.010**	**304** **0.000** **0.121**
GP accessibility	**81.56** **2.03** 0.000	2.49 2.25 0.269	**9.59** **2.19** **0.000**	**11.9** **2.48** **0.000**	**304** **0.000** **0.156**
Financial management	**0.36** **0.14** **0.01**	**0.33** **0.15** **0.035**	**0.49** **0.15** **0.001**	**0.63** **0.17** **0.000**	**304** **0.000** **0.054**
Achievement of improved Working lives	**0.59** **0.05** **0.000**	**0.31** **0.05** **0.000**	**0.38** **0.05** **0.000**	**0.4** **0.06** **0.000**	**303** **0.000** **0.148**
Change in emergency admissions	0.012 0.01 0.247	-0.017 0.012 0.155	-0.004 0.011 0.729	0.000 0.013 0.960	279 0.145 0.019
Emergency readmissions	**0.069** **0.006** **0.000**	**0.015** **0.007** **0.042**	**0.027** **0.007** **0.002**	**0.014** **0.008** **0.090**	**275** **0.006** **0.043**
PCT: access	**69.68** **0.64** 0.000	0.52 0.71 0.464	**2.26** **0.69** **0.001**	**4.15** **0.78** **0.000**	**304** **0.000** **0.157**
PCT: better information	**72.55** **0.54** 0.000	0.51 0.6 0.396	**2.28** **0.58** **0.000**	**4.36** **0.66** **0.000**	**304** **0.000** **0.223**
PCT:clean	**80.18** **0.52** 0.000	0.23 0.57 0.688	**1.8** **0.56** **0.001**	**3.9** **0.63** **0.000**	**304** **0.000** **0.21**

Heart operation	**0.045**	**-0.045**	**-0.038**	**-0.045**	304
waits >	**0.017**	**0.019**	**0.018**	**0.02**	0.110
12 months	**0.009**	**0.017**	**0.039**	**0.031**	0.019
Breast cancer	**74.44**	-1.88	**3.29**	**4.57**	304
screening	**1.67**	1.85	**1.8**	**2.04**	0.000
	0.000	0.312	**0.069**	**0.026**	0.099
Cervical	**80.77**	0.35	**2.3**	**4.49**	304
screening	**0.71**	0.79	**0.77**	**0.87**	0.000
	0.000	0.657	**0.003**	**0.000**	0.158
Improvement	**0.072**	0.016	**0.039**	**0.047**	304
in teenage	**0.02**	0.023	**0.022**	**0.025**	0.087
conception rate	**0.001**	0.462	**0.076**	**0.065**	0.021
Improvement	0.007	-0.011	-0.017	-0.028	304
in cancer	0.024	0.027	0.026	0.029	0.768
death rate	0.751	0.644	0.515	0.335	0.003
Access to a	**84.64**	1.67	**8.57**	**11.66**	304
primary care	**1.7**	1.88	**1.82**	**2.07**	0.000
professional	**0.000**	0.375	**0.000**	**0.000**	0.207
Complaints	**60.26**	4.18	2.48	**11.88**	300
resolved	**4.74**	5.25	5.11	**5.81**	0.079
	0.000	0.427	0.627	**0.042**	0.012
Delayed	**0.062**	-0.011	-0.012	**-0.025**	301
transfer of	**0.008**	0.009	0.008	**0.01**	0.067
care	**0.000**	0.288	0.177	**0.013**	0.023
Generic	**76.85**	0.53	**0.98**	1.01	304
prescribing	**0.55**	0.61	**0.59**	0.67	0.252
	0.000	0.387	**0.099**	0.137	0.013
PCT: safe	**78.2**	0.000	**1.41**	**2.36**	304
care	**0.34**	0.38	**0.37**	**0.42**	0.000
	0.000	0.997	**0.000**	**0.000**	0.221
PCT: closer	**87.61**	0.21	**1.39**	**3.17**	304
relationships	**0.45**	0.5	**0.48**	**0.55**	0.000
	0.000	0.67	**0.009**	**0.000**	0.184
Prescribing rate for	**1.017**	0.049	**0.064**	0.011	**304**
antibacterial drugs	**0.029**	0.032	**0.032**	0.036	**0.054**
	0.000	0.132	**0.044**	0.751	**0.025**
Change in	**0.045**	-0.048	-0.03	-0.027	279
emergency acute	**0.023**	0.025	0.025	0.028	0.258
admissions rate	**0.052**	0.063	0.223	0.332	0.014

Change in emergency chronic admissions rate	0.009	0.016	0.002	0.018	279
	0.03	0.034	0.033	0.037	0.844
	0.76	0.627	0.94	0.63	0.003
Sickness rate	**0.045**	-0.003	-0.004	**-0.007**	301
	0.002	0.003	0.003	**0.003**	0.223
	0.000	0.241	0.128	**0.045**	0.014
GP appraisal	**52.19**	**18.23**	**16.6**	**29.75**	**302**
	8.3	**9.2**	**8.94**	**10.13**	**0.031**
	0.000	**0.048**	**0.064**	**0.004**	**0.029**
Smoking quiters	**62.74**	13.34	**27.7**	**37.79**	**304**
	9.3	10.29	**10.01**	**11.35**	**0.000**
	0.000	0.196	**0.006**	**0.001**	**0.055**
Change in death rate from accidents	-0.004	0.002	-0.041	-0.057	304
	0.07	0.078	0.076	0.086	0.675
	0.947	0.976	0.59	0.509	0.005
Change in death rate from circulatory diseases	0.012	0.012	0.027	0.009	304
	0.024	0.027	0.026	0.03	0.589
	0.622	0.651	0.302	0.749	0.006
Access to NHS dentistry	**1.000**	-0.03	0.028	-0.044	302
	0.037	0.041	0.04	0.045	0.807
	0.000	0.457	0.47	0.326	0.003
Prescribing rate for benzodiazepine	**7.47**	**1.33**	**1.77**	1.04	**304**
	0.58	**0.64**	**0.62**	0.71	**0.027**
	0.000	**0.038**	**0.005**	0.141	**0.029**
Prescribing of atypical anti-psychotics	**52.87**	-2.18	-4.76	**-9.01**	304
	1.93	2.14	2.08	**2.36**	0.000
	0.000	0.309	0.23	**0.000**	**0.07**
Suicide audit	**0.571**	0.063	0.05	0.063	**296**
	0.102	0.113	0.11	0.113	**0.042**
	0.000	0.574	0.647	0.574	**0.027**
Fire, health safety backlog	14.09	6.44	7.14	-6.97	286
	11.4	12.55	12.19	13.6	0.385
	0.217	0.108	0.559	0.609	0.01
Change in emergency admission rates for kids	**-0.263**	**0.159**	**0.158**	**0.14**	279
	0.068	**0.075**	**0.073**	**0.082**	0.179
	0.000	**0.036**	**0.033**	**0.090**	0.017
Staff opinion survey	**3.25**	**0.100**	**0.100**	**0.15**	**301**
	0.04	**0.05**	**0.04**	**0.05**	**0.045**

	0.000	**0.036**	**0.036**	**0.005**	**0.026**
Diabetes	**0.809**	-0.044	0.03	0.123	300
service	**0.086**	0.095	0.093	0.105	0.106
assessment	**0.000**	0.645	0.748	0.241	0.02
CHD	**74.39**	7.7	**11.15**	23.95	**296**
audit	**5.94**	6.57	**6.38**	7.22	**0.002**
	0.000	0.242	**0.082**	0.001	**0.048**
Patients waiting	**86.55**	**4.51**	**7.56**	7.87	**304**
< 4 hours in	**0.97**	**1.08**	**1.05**	1.19	**0.000**
A & E	**0.000**	**0.000**	**0.000**	0.000	**0.192**
Number waiting	**49.75**	-9.98	**-39.29**	**-48.56**	**304**
< 12 hours in	**18.25**	20.2	**19.65**	**22.28**	**0.009**
A & E	**0.007**	0.621	**0.046**	**0.030**	**0.0375**
Number out-	**9.59**	-0.52	-7.89	-8.72	**304**
patients waiting	**5.23**	5.79	5.63	6.38	**0.070**
longer than standard	**0.068**	0.927	0.162	0.173	**0.023**
Access to	**2.63**	0.16	0.04	0.12	282
MH services	**0.38**	0.42	0.41	0.46	0.951
	0.000	0.697	0.913	0.791	0.001
Telephone	**0.619**	**0.238**	**0.352**	**0.38**	303
access	**0.057**	**0.063**	**0.061**	**0.069**	**0.000**
	0.000	**0.000**	**0.000**	**0.000**	**0.123**
Availability of	**90.27**	0.38	-2.2	3.9	274
community	**4.36**	4.82	4.67	5.27	0.336
equipment	**0.000**	0.937	0.638	0.461	0.012
Number of	**5.09**	-1.05	-4.78	-4.84	**304**
inpatients waiting	**2.86**	3.16	3.08	3.49	**0.097**
> standard	**0.076**	0.741	0.122	0.166	**0.02**
GPs in	**0.275**	0.026	0.013	-0.007	290
substance	**0.067**	0.074	0.072	0.08	0.932
misuse scheme	**0.000**	0.717	0.856	0.928	0.001
Access to	**53.19**	**-5.04**	-1.31	2.18	**304**
early	**2.64**	**2.92**	2.84	3.22	**0.008**
abortion	**0.000**	**0.085**	0.645	0.498	**0.038**
HES Data	**0.909**	-0.021	0.018	0.068	304
quality	**0.057**	0.063	0.061	0.07	0.307
	0.000	0.738	0.760	0.329	0.011