**A002  Social Disparities in Alcohol Drinking: a cross-country comparison**

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**Submitting author’s institution:** OECD  
**Keywords:** Inequalities, Alcohol, Cross-country comparison

**Aims**  
This study deals with social disparities in alcohol consumption in 20 selected OECD countries. It aims to identify which population groups are most likely to engage in, and which are most affected by, harmful drinking, and to examine how these disparities have evolved over time.

**Methods**  
The study examines three drinking patterns: (i) any alcohol drinking in the past 12 months, (ii) hazardous drinking (above 140 grams of pure alcohol per week for women and 210 g for men), and (iii) heavy episodic drinking (HED) (have 6 or more drinks per occasion at least once a week). The social dimension is successively measured by education level and socioeconomic status (SES). Multivariate logistic regressions were used to provide an accurate picture of inequalities within countries. For the purpose of cross-country comparisons, social inequalities are quantified by the means of the concentration index.

**Data**  
Data were gathered from several waves of national health surveys for 20 OECD countries. Although the use of different national surveys for several years may be a source of data heterogeneity, all the variables are constructed in order to get the highest level of comparability across countries and over time.

**Results**  
Men and women who are more educated or have higher SES are more likely to be drinkers in all countries studied, but they often differ in their propensity to engage in high-risk drinking behaviours. Highly educated women are more likely than those with less education to engage in hazardous drinking and HED, while the opposite is observed for men. Although this pattern of inequalities is consistent for a large number of countries, findings also highlight some between-countries differences. Moreover, the analysis of disparities over time shows no major changes in social gradients, although rates of hazardous drinking across social groups appear to be converging in some countries.

**Conclusion**  
This study permits to identify the population groups the most affected by harmful drinking, and highlights some cross-country differences in social inequalities in alcohol drinking. Social patterns of drinking tend to differ across countries, as they are largely the result of cultural and environmental influences, and of national policies. This study contributes to design appropriate health prevention policies, and helps policy makers to target population groups for strategies to reduce harmful drinking.
A003  Being more economic with the collection of cost data in clinical trials

Authors: James Shearer; Sarah Byford
Submitting author's institution: King's College London
Keywords: Costs, clinical trials, over-inclusion, bias

It has become common practice in economic evaluations conducted within randomised controlled trials (RCTs) to include a wide range of non-programme costs in addition to the costs directly attributable to interventions under evaluation. This inclusive approach to the collection and analysis of cost data is intuitively appealing as it appears comprehensive, detailed and rigorous. In addition, over-inclusion should insure against the omission of important unexpected impacts of the intervention on resource use, whether positive or negative. It could also be argued, however, that the trend to over-inclusive collection and analysis of non-programme and non-condition, related cost data has added little or no value to economic evaluations. The inclusion of large amounts of largely irrelevant cost data is burdensome on patients and trialists, aggravates the problem of missing data endemic in cost data, potentially confounds analyses with irrelevant outliers, and is an inefficient use of scarce health economic research resources.

These problems are illustrated by a review of cost data collected in recently published RCTs in the NIHR HTA program. Exemplars of appropriate and meaningful inclusion of non-intervention related resource use were identified, but more often such costs introduced potential bias due to random variation in unrelated resource use. Statistical adjustments, where attempted, failed to alter the fundamental change in the direction of cost differences caused by this random variation. We propose an alternative approach which assesses the relevance of resource use to the economic question of whether a treatment represents value for money. A sharper focus on relevant programme-specific and condition-specific resource use could improve the quality of economic evaluations currently conducted within RCTs and at a lower cost.

We would welcome feedback from HESG members. Is our critique justified? Is the evidence appropriate and sufficient? Is our alternative approach feasible and appealing?
**A005  Modelling health states in the Spanish EQ-5D-5L valuation exercise**

**Authors:** Juan Manuel Ramos-Goñi; Jose Luis Pinto-Prades; Juan Cabasés; Oliver Rivero-Arias  
**Submitting author’s institution:** University of Oxford  
**Keywords:** EQ-5D-5L, value set, TTO, health valuation

**Background**

The EQ-5D-5L update to the original EQ-5D-3L instrument was necessary to improve limited sensitivity to change and known ceiling effects in the original version. The new version increased the number of severity levels from three to five (no problems, slight, moderate, severe and unable or extreme), and the number of health states to 3125. Therefore, new valuation exercises are necessary to obtain preferences from the general public for the health states derived from the EQ-5D-5L. The EuroQol group has developed a protocol to elicit preferences that has been used independently in research studies in Canada, China, Netherlands, Spain and UK to obtain preference-based valuations. In this paper we present the results of the EQ-5D-5L valuation exercise in Spain.

**Methods**

The Spanish EQ-5D-5L valuation project collected relevant data during June-July 2012 using face-to-face interviews and the EQ-VT valuation software. The designed included a composite time trade-off (cTTO) exercise and a discrete choice experiment to value a set of health states. Each respondent completed 10 c-TTO exercises and valued 7 DCE tasks. A two-step stratification procedure was designed to obtain a representative sample of the Spanish population. In this paper we present the results of modelling the cTTO responses to obtain a value set. Random effect models using main effects and interactions that accommodated different assumptions of the data were evaluated. The cTTO observed data showed that valuations were likely to be censored at the lowest value -1 and tobit random censored regression model was used. The random effect tobit model was compared with a random effect specification without censoring adjustment and linear regression. Models were evaluated in terms of logical consistency, goodness of fit and parsimony.

**Results**

A representative sample of 1000 individuals completed the interview but 43 individuals were removed from final analysis after applying exclusion criteria. The observed utility values from the cTTO exercise suggested a large number of responses in the values -1, -0.5, 0, 0.5 and 1 indicating a possible issue with the iterative process in the EQ-VT tool. The model showed the coefficients in levels 2 and 3 in self-care and 4 and 5 in usual activities not statistically significant different and were combined reducing the levels in self-care and usual activities to four levels. The data showed that respondents may have suffered a problem of diminishing sensitivity and a term called N45_2 (the number of dimensions at levels 4 or 5 squared) was also introduced. The model comparison suggested random effect tobit provided better data fit.

**Conclusions**

This study presents the results of the Spanish EQ-5D-5L valuation exercise and a possible value set for Spain. A hybrid method that combines cTTO and DCE responses may provide refinements and improvements to the value set using cTTO data alone. The results from this hybrid method using the Spanish responses will be presented in the meeting.
A006 The role of supply-side factors in the rise of informal payments for health care: the case of HIV-patients in Cameroon

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Keywords: Informal Payments, HIV-care, Multilevel Mixed-effects Model, Supply-side factors, Cameroon

Direct out-of-pocket payments for health care continue to be a major source of health financing in the context of low- and middle-income countries. Some of out-of-pocket expenditures take the form of “informal charges” or “illicit” fees paid by patients to access the needed health care services. Although several factors can explain at least some of the reasons for the presence of these payments (e.g., inefficiency, cronyism, corruption and the weak incentives and information), little is known about the extent to which these payments are exercised as well as their determinants in the context of Sub-Saharan Africa. This study relies on data from a nationally representative survey conducted among people living with HIV/AIDS in Cameroon with the aim of assessing their recent health care experiences including payments incurred during consultation and treatment. A multilevel mixed-effects logistic model is used to identify the supply-side factors that influence the incidence of these payments, while controlling for demand-side factors. About 3.05% of the surveyed patients paid an amount greater than the official consultation tariff. The average amount paid informally represented up to four times the official tariff. Factors related to the management of human resources in the health facilities (e.g., size of the health workforce and the implementation of task-shifting) significantly reduce the probability of incurring an informal payment. By contrast, the type of health care facilities (public vs. private) and the health professionals’ attitudes and perceptions with regard to the provision of HIV-care are associated with a higher risk of incurring informal payment. Some policy recommendations are advanced to help eliminate such type of payments and to enhance efficiency of health care provision.
A009 Welfarism versus extra-welfarism: does choice of economic evaluation approach impact on adoption decisions?

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Submiting author's institution: Health Economics Research Centre, Nuffield Department of Population Health, University of Oxford
Keywords: welfarism, extra-welfarism, economic evaluation.

Background
A long-running debate surrounds the equivalence of the welfarist and extra-welfarist approaches in the context of economic evaluation. Extra-welfarism was once strongly favoured: some health economists believed that both approaches would suggest the same adoption decisions, with extra-welfarism being more straightforward to implement. However, although decision-makers worldwide still favour this approach, there is a growing belief that a welfarist perspective may be more appropriate for so-called ‘complex’ interventions (e.g. treatment packages for problem drug users), which provide a range of important outcomes beyond health (e.g. reduction in crime/risk taking behaviour). As the number of complex interventions being evaluated increases, it is crucial that the most appropriate economic evaluation approach is used to enable decision makers to be confident in their adoption decisions. We therefore revisited this debate and evaluated the potential for choice of economic evaluation approach to impact on adoption decisions.

Methods
A structured literature review was conducted to identify: (a) methodological references considering the most appropriate economic evaluation approach to use when evaluating a healthcare intervention, and (b) references applying both welfarist and extra-welfarist approaches to tackle a single decision problem. Literature searches were undertaken in August 2013, limited to references published from 1990 onwards.

Results
23 references in each category met the inclusion criteria. The methodological references generally concluded that implausible assumptions are required for the two approaches to be equivalent (e.g. a single societal WTP for a QALY exists). Furthermore, the extra-welfarist approach does not currently provide all the information that decision-makers require in order to inform resource allocation decisions in certain contexts: while the welfarist approach has weaknesses, it may be the most appropriate evaluation framework in these situations. Moreover, 22% of the applied references showed limited or no concordance in their results: the different economic evaluation approaches suggested different adoption decisions, and there was no pattern to which approach provided the most convincing adoption evidence. Only 13% of these references indicated which results would best inform adoption decisions.

Conclusions
Few health economists consider the welfarist and extra-welfarist approaches to economic evaluation to be equivalent. The choice of approach can significantly impact on adoption decisions, with conflicting results creating confusion over whether or not interventions provide good value for money. Health economists rarely provide sufficient guidance to decision-makers to alleviate this confusion. Future work is planned by the authors to evaluate the most appropriate economic evaluation approach for complex interventions in genomics.
A010 Condition specific or generic preference based measures in oncology: the EORTC-8D or the EQ-5D

Authors: Paula Lorgelly; Brett Doble; Donna Rowen; John Brazier
Submiting author’s institution: Centre for Health Economics, Monash University
Keywords: condition-specific, generic, preference, validity, cancer

Background
It has been argued that generic HRQoL measures are not sensitive to certain disease specific improvements; condition-specific preference-based measures (CSPBMs) may offer a better alternative.

Aim
To assess the validity, responsiveness and sensitivity of a cancer specific preference based measure, the EORTC-8D, relative to the EQ-5D-3L.

Method
Using a large comprehensive cohort of cancer patients (Cancer 2015) the EORTC-8D (which is derived from the EORTC-QLQ-C30) is compared to a generic measure, the EQ-5D-3L. Initially a qualitative assessment of each instrument is undertaken, comparing domains given their maximal theoretical contributions to the final utility score. Ceiling effects for each instrument are quantified and compared, and construct validity is assessed using spearman rank correlations coefficients for both the domains and the utility scores. Agreement between the two measures at baseline is evaluated using a normalised Bland-Altman plot and the intra-class correlation coefficient. The sensitivity of each instrument to different demographic and disease indicators is assessed using t-tests and ANOVAs. QALYs are estimated using the area under the curve method, and the effect of demographics, disease and disease progression on QALYs are evaluated using a seemingly unrelated estimation approach to compare regression coefficients.

Data
Cancer 2015 is a large-scale prospective longitudinal population-based molecular study. It enrols cancer patients who are treatment naïve. All cancer tumour sites both localised and metastasised are included, except leukaemia. Patients are followed for three, six and twelve months. Patients completed the EORTC-QLQ-C30 and the EQ-5D-3L at baseline and each follow-up.

Results
Complete case analysis of 957 patients found that at baseline the EQ-5D-3L values are significantly lower than the EORTC-8D values (0.749 v 0.832, p<0.001). Over time EQ-5D-3L scores are found to marginally decline (average incremental change = -0.001) while the EORTC-8D reports a larger decrement (-0.029), the difference between the two measures is significant (p=0.003). For patients whose disease remains stable across time (using ECOG status) the EORTC-8D reports a decline in utility (-0.014) while the EQ-5D-3L reports an increase (0.011), this difference is significant (p=0.04). Other sensitivities are also found when patient demographics, the site of the tumour, the stage of the disease and treatment regime are controlled for. Analyses of QALYs, controlling for baseline HRQoL scores, finds similar results.

Conclusion
Divergences in utility values between the generic measure and the condition specific measure will be problematic in an economic evaluation if it means that the funding decision changes depending on the instrument employed.
A013 Exploring the relationship between primary care expenditure, outcomes and overall NHS expenditure

Authors: James McDonald; Mat Sutton
Submitting author's institution: Manchester
Keywords: primary, secondary, expenditure, health,

Background
The recent NHS reforms offer new opportunities to change the balance of expenditure on primary and secondary care. Little is known on the relationship between primary and secondary care expenditure. In addition, the existing literature suggests mixed evidence on the effect of increasing primary care expenditure on population health and does not reflect the current context for England.

Aim
To examine the impact of variations over time in primary care expenditure on population health and secondary care expenditure.

Data
We created a longitudinal Primary Care Trust (PCT) level data set using data published by the NHS Information Centre and the Department of Health. Our measures of primary care expenditure were the number of GPs within a PCT and the PCT’s primary care prescribing costs. Population health was measured through rates of overall mortality, child mortality and deaths amenable to health care. Total secondary care costs were available for each PCT.

Methods
The availability of repeated observations over time for each PCT (2006 to 2009) allows us to use a fixed effects estimation method, this controls for time-invariant PCT characteristics that may be correlated with our explanatory variables.

Results
An increase in primary care expenditure whether through increasing the number of GPs within a PCT or a PCT’s expenditure on primary care prescribing was associated with reductions in all measures of mortality. However, it was also associated with increases in secondary care expenditure. For example, a unit increase in the number of GPs per 100,000 of the population was associated with a reduction of 0.241 deaths amenable to health care per 100,000 of the population, but also an increase in secondary care expenditure of £18.58 per capita. An increase of £10 per capita on prescribing expenditure was associated with a reduction of 0.071 deaths amenable to health care, but also an increase in secondary care expenditure of £17.81 per capita.

Implications
Our results suggest that increases in primary care expenditure do have positive effects on population health but are also associated with higher secondary care expenditure. These results raise questions on the cost-effectiveness of increasing primary care expenditure on mortality.
A015 Regional variation in health care system performance: A dual-level efficiency approach in NHS pathology in England

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Submitting author's institution: University of Leeds

Keywords: stochastic frontier, dual-level, heterogeneity, panel data

[Work in progress] Measuring regional imbalance in the performance of the health care system is of high importance to policy makers. There is a debate in the literature about how best to do this; despite well-defined micro and macro measures, there is uncertainty about which approach to take at the regional level. In this paper, the efficiency of the healthcare system is our performance metric. We apply a dual-level stochastic frontier (DLSF) (Smith and Wheat, 2012) to isolate inefficiency at two vertically distinct organisational levels: an upper level representing the effect of central management and policy; and a lower level representing the performance of individual production units, given that they have a degree of autonomy. In addition, we control for cross-unit heterogeneity, which remains an issue for healthcare performance analysis. We apply this approach to estimate regional performance in pathology services within the NHS. We use a panel on 57 pathology laboratories over a five year period. We find variation in performance at two organisational levels in pathology services: Strategic Health Authority (SHA) level (upper) and laboratory level (lower). We further compare our results to measures at a single-level and for which no control for heterogeneity is made to demonstrate the extent that these issues take effect on performance measures and thus underline the importance of accounting for these features.
A017 Fast efficient computation of Value of Information from a Probabilistic Sensitivity Analysis sample: a non-parametric regression approach

Authors: Mark Strong; Alan Brennan; Jeremy E. Oakley; Penny Watson

Submitting author’s institution: University of Sheffield, ScHARR

Keywords: Value of Information, Economic Evaluation, Expected Value of Perfect Information, Expected Value of Sample Information, Non-parametric Regression

Background
Health economic models are used to estimate the expected net benefits of competing decision options. The true values of the input parameters of such models are rarely known with certainty, and it is often useful to quantify the value of undertaking further data collection in order to reduce uncertainty. An upper bound on the value of learning a subset of input parameters is quantified by its partial Expected Value of Perfect Information (EVPI). The value of a particular data collection exercise is quantified by its Expected Value of Sample Information (EVSI).

Problems when computing partial EVPI and EVSI
The standard approach to computing both partial EVPI and EVSI is via a nested two-level Monte Carlo scheme that includes at each inner loop step both parameter sampling and model evaluation. This scheme can be prohibitively slow for complex models, particularly those that require for each model run a large number of patient-level simulation steps. Additional problems arise if the two-level Monte Carlo scheme results in an inner loop conditional distribution that is difficult to sample from. This most commonly occurs when computing EVSI for a problem in which the parameter distribution is not conjugate to the data likelihood, but can also occur when computing partial EVPI where parameters are correlated. In either case we typically need to resort to Markov Chain Monte Carlo methods, implemented for example in WinBUGS. In practice, these difficulties have resulted in the restriction of Value of Information analyses to only a small subset of health economic evaluation studies.

Proposed solution
To overcome the problems above we present novel, fast and efficient non-parametric regression based methods for computing partial EVPI and EVSI. The methods require only the “probabilistic sensitivity analysis” (PSA) sample: a single set of samples from the model parameters, along with the corresponding model evaluations. The new methods allow Value of Information measures to be computed for models of any complexity, and hence be made more widely available to modellers and decision makers.

Layout of paper
In our paper we will begin by explaining the theory that underpins the method for computing partial EVPI, and then show how this extends to EVSI. Next we will illustrate, step by step, the application of the methods in an exemplar case study. In this section we will also discuss software implementation. Finally, we will review the strengths and limitations of the method in comparison with other methods.
A018 Are Heavier Drinkers Less Responsive to Price? A Quantile Regression

Authors: Robert Pryce

Submitting author’s institution: Lancaster University

Keywords: alcohol, demand, quantile regression, elasticity

Abstract

This study provides further evidence on the link between the price of alcohol and alcohol consumption. The responsiveness to price, or price elasticity, is important to policymakers for two reasons. First, it gives an idea of any impact of alcohol tax changes on alcohol tax receipts. Second, it allows policymakers to know the impact of alcohol tax changes (or other cost-based measures) on alcohol consumption.

While several studies have estimated price elasticities for alcohol, they are often done at the mean level of consumption. The mean level of consumption is mostly determined by moderate drinkers, who make up a substantial proportion of the population, and so the elasticity at the mean does not reflect very well the response to a change in price for heavier drinkers. Heavier drinkers are most important for policymakers for it is they who are most likely to cause health and social externalities. The studies which do look at the differential response to price tend to split the population into subgroups, conditional on how much alcohol is consumed. This presents the problem of endogenous selection, which may bias the results.

Quantile regression is used, which does not require the population to be split and thus removes the endogenous selection problem. Quantile regression also allows estimates at the highest tail of the drinking distribution. Data are from the Expenditure and Food Survey (EFS) from 2001 to 2010 which includes quantity information, allowing prices to be constructed. A price index is constructed that varies by month and region. The dependent variable is the number of units of alcohol consumed. Total alcohol consumption is also split into on- and off-premise consumption, and regressed on the corresponding split prices. This allows an estimate of the impact of raising prices in either the on- or off-premise market, as the minimum unit price (MUP) would.

It is found that heavier drinkers are indeed less responsive to price, with the 25th percentile having an estimated price elasticity of -0.7, whilst the 75th percentile has an elasticity of -0.35. These are significantly different (p<0.001) from each other. All price elasticities are significantly different to zero (p<0.01). This compares to a mean elasticity estimate (using OLS) of around -0.59.

In policy terms, this is important as it shows that taxes will reduce consumption amongst moderate drinkers proportionately more than heavier drinkers.
A020 Mapping the EORTC QLQ-C30 onto the EQ-5D-3L: Assessing the External Validity of Existing Mapping Algorithms

Authors: Brett Doble; Anthony Harris; Paula Lorgelly

Submitting author’s institution: Monash University

Keywords: mapping, cancer, quality of life, utility, EQ-5D

Background
Mapping responses from the non-preference based cancer specific outcome measure EORTC QLQ-C30 onto the EQ-5D-3L is commonly used to estimate utilities for trials that have not included a utility instrument.

Aims
To determine the external validity of the existing mapping algorithms for predicting EQ 5D 3L utilities from EORTC QLQ-C30 responses and to establish the impact of using different EQ-5D-3L country-specific tariffs on predictive accuracy.

Methods
Errors between observed and predicted EQ-5D-3L utilities were calculated for the overall sample and across subsets of the EQ-5D-3L range. Standardized root-mean squared error (RMSE) was used to assess the predictive accuracy of the identified algorithms across 13 EQ 5D-3L country-specific tariffs. OLS regression was used to examine the influence of various patient characteristics on predicted EQ-5D-3L utilities.

Data
Cancer 2015 is a large-scale prospective longitudinal population-based molecular study. It enrolls cancer patients who are treatment naïve. All cancer tumour sites both localized and metastasized are included, except leukaemia. Patients are followed for three, six and twelve months. Patients completed the EORTC QLQ-C30 and the EQ-5D-3L at baseline and follow-up.

Results
Twelve mapping algorithms were identified. EQ-5D-3L and EORTC QLQ-C30 responses from Cancer 2015 were pooled to create an external validation sample of 1,597 observations from 982 patients. Predicted mean EQ-5D-3L utilities for the overall sample were overestimated for 8 out of the 12 algorithms and underestimated for the remaining 4 when compared to the observed EQ-5D-3L utilities, with differences of means ranging from 0.0322 (95% CI 0.0238-0.0406) to 0.157 (95% CI 0.147-0.166) and 0.0315 (95% CI 0.0223-0.0408) to 0.383 (95% CI 0.361-0.405) respectively. When estimating errors across subsets of the EQ-5D-3L range, inconsistent patterns of over- and underestimation were observed. The Danish and German EQ-5D-3L tariffs consistently resulted in the lowest (best) and highest (worst) standardized RMSE respectively. OLS regression results showed that observed EQ 5D-3L utilities, age and ECOG performance scores significantly influenced predicted EQ-5D-3L utilities for the majority of the 12 mapping algorithms; the results were largely insensitive to tumour site and cancer stage.

Conclusions
The predictive accuracy of the 12 algorithms varied when applying an external validation data set. Accuracy was also dependent on the country-specific tariff used to estimate the observed utilities. This suggests that if a mapping algorithm is to be used to estimate utilities for input into a cost-utility analysis the sensitivity of using different algorithms should be tested extensively in scenario analyses in order to quantify parameter uncertainty.
A021 Testing the bed blocking hypothesis: delayed hospital discharges and the supply of nursing and care homes

Authors: James Gaughan; Hugh Gravelle; Luigi Siciliani
Submitting author's institution: Centre for Health Economics, University of York
Keywords: delayed discharges, long-term care, nursing and care homes, bed blocking, substitution.

Aims
Bed blocking occurs when patients, though clinically ready, cannot be discharged from hospital to a care home. It is a major policy concern since it results in hospitals acting as a more expensive substitute for social care. The objective of this study is to determine how much impact the supply of long term care has on delayed discharge.

Data
We analyse English monthly data on delayed discharges at Local Authority (LA) level for 2010-11 and 2011-12. We measure the number of care home beds, their price, and the quality of care homes in LAs and allow for LA socio-economic and demographic characteristics.

Methods
We develop a theoretical model of delays, using queuing theory with stochastic but endogenous demand, to motivate the empirical analysis. We estimate the model using a variety of methods: ordinary least squares, two stage least squares, random and fixed effect panel data, and spatial regressions.

Results
The cross-section analyses indicate that an increase in prices or reduction in the number of care home beds increases the number of delayed discharges. In 2010-11, an increase in care home beds by 10% reduces delayed discharges by 6%. In 2011-12, an increase in care home prices by 10% increases delayed discharges by 7%. Instrumenting for care home beds and prices increases these estimated effects to 12% and around 14%. Panel data results suggest a smaller effect of a 3% increase in delays if the supply of beds decreases by 10%. The spatial econometric models indicate a spill-over effect of population and care home beds from other LAs. An increase of 10% in care home beds in other LAs reduces delays within an LA by 25%.

Conclusions
We find evidence for a link between the supply of long term care and the number of delayed transfers in an LA, supporting the bed blocker hypothesis. The supply of beds in neighbouring LAs is also important.
A022 Eliciting societal preferences for burden of illness, therapeutic improvement and end of life for value based pricing

Authors: Donna Rowen; John Brazier; Clara Mukuria; Sophie Whyte; Anju Keetharuth; Arne Rise Hole; Aki Tsuchiya; Phil Shackley

Submitting author’s institution: University of Sheffield

Keywords: Value-based pricing, Societal preferences, DCE, Burden of illness, End of life

Aims
Value-based pricing (VBP) aims to assess the cost-effectiveness of medicines taking into account a broader scope of value, including the severity of disease and wider societal benefits. This paper reports on a study eliciting societal preferences for VBP across: (1) burden of illness (BOI) from a medical condition, defined as QALY loss due to premature mortality and morbidity; (2) therapeutic improvement (TI) defined as preferences for large QALY gains that are disproportionately larger than the size of gain; and (3) end of life (EOL) defined by NICE as expected survival of less than 2 years and expected survival gain of 3 months or more.

Methods
A survey using Discrete Choice Experiments (DCE) was conducted with an online general population sample using an existing panel. Respondents were asked to choose whether they thought the NHS should treat patient group A or B, who differed in terms of four attributes: life expectancy without treatment, health-related quality of life (HRQOL) without treatment, survival gain from treatment and HRQOL gain from treatment. These attributes were used to derive BOI, QALY gain and EOL. The questionnaire had four variants, each variant with a different normal life expectancy without a medical condition (5, 20, 40 and 80 years). Each respondent made comparisons between groups with the same normal life expectancy. Choices were analysed using conditional logistic regression with a range of specifications. Robustness across the four normal life expectancies and to various exclusions was examined.

Data
In total, 3669 respondents completed the survey. The age distribution was similar to the UK general population, but there were some differences in other characteristics.

Results
Regression results indicated that respondents preferred to treat patients with larger QALY gains, but at a diminishing rate and there was no support for TI. Respondents preferred to treat patients with a shorter life expectancy (EOL). Results suggested some support for BOI but results were less robust across alternative model specifications. Regressions estimated excluding respondents who seemed to have misunderstood the DCE task (1442 respondents) had positive, significant and robust coefficients for BOI.

Conclusions
The results support the argument that the social value of a QALY is not equal between recipients, but also depends on the burden of their illness and expected survival. However, there are concerns about the reliability of using an online sample.
**A024 Valuing Preferences for the process and outcome of Clinical Genetics Services: a Pilot Study**

**Authors:** Ewan Gray; Martin Eden; Caroline Vass; Jordan Louviere; Katherine Payne  
**Submitting author’s institution:** University of Manchester  
**Keywords:** Stated preferences, discrete choice experiment, clinical genetics

**Background**  
Clinical genetics services continue to evolve, in part, as a response to technological advances in genetic-based diagnostics. Clinical genetics services are complex interventions; outcomes are multifaceted and various process attributes also shape the service users’ experience of care. A necessary piece of information for service providers seeking to improve, or modify, clinical genetics services is to understand whether process or outcome attributes are the key driver of preferences. The nature of the outcome attribute for clinical genetics services (informed decision making), which cannot be readily quantified introduced a considerable challenge for this stated preference study.

**Aim**  
To identify if a linked conjoint analysis (CA) and discrete choice experiment (DCE) can be used to quantify the relative importance of process and outcome attributes for a ‘generic’ clinical genetics service.

**Methods**  
A two-step stated preference survey, using CA followed by a DCE, was administered (on-line) to a pilot sample of service users (completed face to face) with experience of clinical genetic services and members of the public (via remote electronic completion). The CA component was designed to elicit which of 13 attributes influenced preferences on ‘ability to make an informed decision’, using a rating scale ranging from 1 to 9. The DCE that followed comprised six attributes (location of the service; pre-consultation contact; turnaround time for a test result; follow-up contact; cost of services; and a scale rating the ability to make an informed decision). The discrete choice task asked respondents to choose a service and then which, if any, they felt they would actually use in real life. An orthogonal main effects design was used to generate choice sets for the CA and DCE. A three-step approach was taken to analyse data (i) random effects probit regression to identify preferences for the preferred service (ii) standard logit model to identify preferences for the services they would actually use and (iii) estimation of the value of the 13 service characteristics in the CA relative to other attributes in the DCE.

**Preliminary Results**  
The stated preferences of respondents (n=37) revealed most would prefer a service better at helping them make an informed decision, to wait less time, pay less and receive pre-consultation contact. Therefore, an outcome rather than process attribute was the key driver of preferences. The implications of the design and findings of this pilot study will be discussed in the context of designing stated preference surveys of complex interventions.
A026 The effect of chronic pain on life satisfaction: evidence from Australian data

Authors: Paul McNamee and Silvia Mendolia
Submiting author's institution: University of Wollongong
Keywords: life satisfaction, Chronic Pain, Fixed effects

Aims
This paper investigates the relationship between chronic pain and life satisfaction. In this study, we provide an estimate of the economic consequences of chronic pain by looking at the negative impact on life satisfaction and by examining the persistence of the effect over multiple years. Chronic pain is associated with poor health conditions, disability, decreased participation in the labour market and lower quality of life.

Methods
We calculate the compensating income variation of chronic pain, based on the measurement of chronic pain, the life satisfaction of individuals and the income of households. Out model is tested across a variety of different specifications, including linear probability model, ordered probit, LPM with random effects and LPM and Logit with fixed effects and individual threshold (Ferrer-i-Carbonell and Frijters, 2004). Further, we investigate whether individuals who experience chronic pain exhibit adaptation and recovery in life satisfaction after 3 or 5 years.

Data
This paper uses data from ten waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, which is a representative longitudinal study of the Australian population that started in 2000.

Results
Our results show that chronic pain has a large negative effect on life satisfaction and that the compensating income variation is substantial. A gender difference is observed however, with the negative effect on life satisfaction persisting amongst men, with some adaptation found for women.

Conclusion
The negative association between chronic pain and life satisfaction is not entirely unexpected if one considers the various transmission channels through which chronic pain can affect individual well-being. These findings suggest a need for development of effective chronic pain prevention strategies, as well as better chronic pain management, through encouragement of self-management approaches which teach adaptation.
A028 Systematic review and meta-regression of food price elasticities – do methods of demand analysis matter?

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Submitting author’s institution: London School of Hygiene and Tropical Medicine

Keywords: food price elasticity, meta-regression, demand system, systematic review, methods

Aims
The aim of this work is to analyse how food price elasticities of demand are affected by the differences in methodological approaches to estimate food demand systems. To do this we utilise a database of food price elasticities collected from a systematic literature review.

Methods
The systematic literature review included published and grey literature (with English abstract), estimating food price elasticities of demand using data from 1990 onward and applying multiple equation methods. It includes studies with cross-sectional, cohort, experimental and quasi-experimental design, and use nationally representative aggregate, cross-sectional or panel data. The database includes both own- and cross-price elasticities which are extracted for nine categories of food – fruits and vegetables, meat, fish, cereals, dairy, eggs, fats and oils, sweets and sweetened beverages, or other foods. We will use meta-regression models to estimate the impact of methodological approaches on the uncompensated food price elasticity estimates. Methodological aspects that will be considered are data type or frequency, functional form of the demand model, estimation methods, whether estimated elasticities are conditional or unconditional on the expenditure at the group level, whether elasticities relate to only a sub-set of foods within a food group, if and how censored data is dealt with, whether study uses unit prices and if so how are price endogeneity, quality and measurement bias dealt with. In addition, the model will control for the income level of the country where elasticities originate, data years, whether the study is published or grey literature and remaining study effects.

Results
The database includes 136 studies estimating own-price elasticities (n=3,694) for the nine food groups and 79 studies reporting cross-price elasticities (n=3,639). Whilst the data on elasticities and general methodological details have already been extracted, we are currently finishing the data extraction on detailed methods used in these studies in order to perform the meta-regression analysis.

Conclusion
Food prices are increasingly in the center of public health policies relating to malnutrition in countries of all income levels. The results of the systematic literature review showed that there is an abundance of individual studies estimating price elasticities of food demand across the globe. However, only a few have attempted to synthesise this information which can be used in the global health policy context. In addition to exploring the impact of methodological choices on the estimated elasticities we provide predicted elasticities that mitigate these specific effects.
A029 Barriers and drivers to the use of health economics within healthcare organisations

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Submitting author's institution: The University of Sheffield
Keywords: Commissioning, uptake, pathways, modelling

Aims
The organisation of long-term conditions requires high-quality care pathways, in order to keep costs down. This in turn requires evidence-based planning and commissioning. We believe that health economic modelling is ideally placed to support commissioning decisions within healthcare organisations, but its use for this purpose has to-date been limited. We carried out this work to see if we could identify and overcome the barriers to adopting health economic modelling within healthcare organisations.

Methods
We have already developed an economic model of the local pathways of care for people with long-term depression (http://clahrc-sy.nihr.ac.uk/theme-iquests-introduction.html). This was developed as part of a research project which investigated the potential impact of different interventions. Care pathways were based upon local services (in Sheffield, part of South Yorkshire), and were based on the perspective of those providing the services. For this study we conducted two workshops. The first workshop included commissioners from across South Yorkshire, the second included a multidisciplinary team from Rotherham, Doncaster and South Humber. We sought, through facilitated discussions, their opinions of the economic modelling process and how it may be used to inform commissioning decisions for long-term conditions. We used the depression economic model as a case-study.

Results
During the workshops we found that there was limited interest in the implemented economic model. However, there was a lot of interest in two specific health economic methods; conceptual modelling and whole-pathway modelling. The importance of local context was also stressed. Conceptual modelling involves translating existing knowledge about care pathways into a quantifiable and visual model structure. By modelling whole-pathways, we can see how proposed service re-design at one point in the care pathway affects services later on in the pathway. These findings were incorporated into a training course, which is currently being piloted across Yorkshire.

Conclusions
The adoption of innovative ideas within healthcare organisations is very important. Health economic modelling is ideally suited to help inform commissioning decisions, but to date is seldom used. We sought to understand the reasons for this. We found that whilst there was little enthusiasm for health economic models, there was interested in the health economic methods of conceptual modelling and whole-pathway modelling. Both of these methods are very useful for the process of evidence-based commissioning, and by raising awareness about these methods, we hope to also change attitudes towards health economic modelling.
A033 Identifying differences in performance when choice of provider is endogenous: application of the Hausman-Taylor estimator to unbalanced panel data

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Submitting author’s institution: Manchester Centre for Health Economics, University of Manchester

Keywords: Provider performance, PROMs, endogeneity, independent sector treatment centres, Hausman-Taylor estimator

Background
In England patients can receive treatment for NHS elective procedures either at independent sector treatment centres (ISTCs), which are privately operated, or with the NHS. In line with the intention of ISTC contracts, patients’ assignment to providers is not exogenous. ISTCs differ from NHS providers in terms of patient case-mix, workforce profile, and the regulatory framework they operate in. However, none of the previous studies in this area have allowed for this endogeneity in patient assignment.

Study Question
To compare patient reported outcomes after elective surgery for hip replacement in independent sector treatment sector centres (ISTCs) and NHS providers allowing for endogeneity.

Methods and Data
While we partially control for the difference between providers by introducing a time-invariant indicator for provider type, a part of this difference likely remains unexplained. Accounting for the unbalanced panel nature of the data, we use a range of methods (Random Effects (RE), Mundlak and Hausman-Taylor) to control for the correlation between the unobserved provider effect and the explanatory variables. We apply these to a sample of 43,258 hip replacement patients admitted for treatment in the financial years 2009/10 and 2010/11, and recorded in the Patient Reported Outcome Measures (PROMs) data set.

Results
Patients treated at ISTCs were healthier and had less severe symptoms. After risk-adjusting and accounting for provider endogeneity we find larger improvements in outcomes for ISTC patients. However, depending on the assumptions made regarding the exogeneity of different types of covariates, the magnitude and significance of results change. The ISTC effect can increase up to a factor of 2.2 compared to the RE case which assumes exogeneity of all covariates with respect to the unobserved provider effect.

Conclusions
There is a definite lack of evaluation of the effects of ISTCs on patient outcomes. As the NHS moves towards greater involvement of the independent sector in the provision of health services, it is important to develop an appropriate methodological framework to ensure that their performance is correctly evaluated.
Using discrete choice experiments (DCEs) within a cost-benefit analysis (CBA) framework to estimate benefits of Woods in and Around Town (WIAT) project for mental well-being

Authors: Willings Botha
Submiting author’s institution: University of Glasgow
Keywords: Natural environments, cost-consequences analysis, cost-utility analysis, cost-benefit analysis, discrete choice experiments

Recent years have seen increasing interest in environmental interventions for mental well-being. It has been found that mental health is a serious public health problem and improving it at societal level has been a priority. There is growing evidence that suggests that natural environments sustain or improve mental well-being through three possible behavioural mechanisms: they may encourage physical activity; they may promote social interactions; and they may reduce stress through exposure. Experimental and observational studies seem to suggest that these three mechanisms are closely linked and have a synergistic effect on a psycho-biological link that leads to psychological restoration which could potentially benefit the society. The restoration process is believed to be a psycho-evolutionary response to nature known as the biophilia phenomenon that is explained through stress reduction and attention restoration theories.

This paper discusses an economic evaluation of an environmental intervention for mental well-being in Scotland: Woods in and Around Town (WIAT) project. The project aims to regenerate, improve and promote green spaces to increase contact with nature which would potentially improve mental well-being of the society. The economic analysis begins with cost-consequences analysis (CCA) which is a presentation of the cost and outcomes data, observed between the intervention and control sites, in a disaggregated format of a balance sheet. A top-down approach is used to assess costs because of the limited nature of resources committed. A CCA allows flexibility on the use of relevant economic evaluation technique. A cost utility analysis (CUA) could be undertaken using EQ-5D to estimate health improvements resulting from the intervention measured by quality-adjusted life years (QALYs). This would assess whether the project represents good value for money. The major drawback with CUA is that it fails to capture non-health outcomes and compares only interventions that produce similar units of outcomes such as QALYs. Given that this kind of environmental intervention is expected have a broad range of benefits beyond health, an economic evaluation technique that is broader in focus would be appropriate.

A considerable amount of literature indicates that cost-benefit analysis (CBA) could be used because of its ability to capture broad range of outcomes that accrue to society which earns it its basis in welfare economics. Both costs and outcomes are in monetary terms which permit questions of allocative efficiency to be addressed within and across different sectors of the economy. The key problem with this method is its willingness to pay (WTP) method which is considered to have conceptual and methodological flaws. Recent studies have focused on attribute-based measure of outcomes known as discrete choice experiments (DCEs) which appear to be able to offer a credible conceptual and methodological framework that may result in CBA’s wide acceptance and use. This paper aims to develop an optimal DCE that could be used within a CBA framework for WIAT project. The paper is intended as a contribution towards the application of DCEs within a CBA framework in healthcare economic evaluations which is scarce.
A036 Exploring behavioural rules and preference heterogeneity in a choice experiment in the context of prioritisation of health service innovations

Authors: Seda Erdem; Danny Campbell; Carl Thompson
Submitting author's institution: University of York
Keywords: Discrete Choice Experiments; elimination by aspects; selection by aspects; latent class logit model; health service innovations.

Aims
Priorities for public health innovations are typically not considered equally by all members of the public. When faced with a choice between various innovation options, it is, therefore, possible that some respondents eliminate and/or select innovations based on certain characteristics. This paper aims to explore and accommodate choice behaviours in which respondents within a stated choice context make decisions based on certain elimination and/or selection criteria, whilst addressing preference heterogeneity.

Methods
We began our analysis under the assumption that all respondents adopted the conventional Random Utility Maximisation (RUM) decision rule, then, allowed for behaviours resembling elimination-by-aspects (EBA), selection-by-aspects (SBA), and finally permitted a combination of all behavioural rules. Following this, we replicated the analysis, but accommodated for taste variation by using a latent class logit specification.

Data
The data is obtained from a discrete choice experiment (DCE) survey which aims to elicit the general public’s preferences for health service innovations in West Yorkshire, UK. We conducted a paper-pen survey and collected data from a representative sample of 594 respondents, each of whom answered 12 choice tasks. Within DCE, participants were asked to choose between alternative innovation options that they thought the NHS should invest the most in. Innovations differed in terms of six characteristics: target population, target age group, implementation time, how certain we are that it will work, the potential health benefits, and the cost to the taxpayer.

Results
The findings reveal a significant portion (60%) of respondents exhibited SBA-like behaviour as they only selected among alternatives that ensured ‘cancer patients' would be targeted. Similarly, 17% of respondents showed EBA-like behaviour: they eliminated from their choice sets all alternatives targeting either ‘obesity' or ‘drug addiction'. The results also showed that accommodating both choice behaviours concurrently proved to give a richer insight into respondents' behaviour, and suggested that as few as 40% of respondents adopted the conventional random utility maximisation decision rule. In line with previous studies, we found that assuming homogeneous preferences was inappropriate. Going beyond this, we showed that each segment of respondents differed in their preferences and decision-making rules. The exploration of choice predictions for a range of scenarios also revealed that naïvely assuming that respondents adopt the conventional RUM rule is misguided and have impacts on WTP estimates.

Conclusions
Allowing for behavioural rules in choice modelling leads to substantial improvements in model fit and, importantly, has implications for WTP estimates and policy scenario analysis.
A040 Covariate adjustment in cost-effectiveness results: an exploration of the performance of proposed methods using data from a randomised controlled trial.

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Submitting author’s institution: University of Bristol
Keywords: trial-based economic evaluation, regression methods, covariate adjustment, bayesian regression

Background and aims
The availability of data collected alongside randomised clinical trials has led to a steady increase in the number of economic evaluations conducted on the basis of patient-level data. At the same time, and as a result of this, a number of uncertainties have emerged, many of which relate to the most appropriate way of analysing the available data. Prominent amongst them are issues around the methods of adjusting cost-effectiveness results for important covariates. Three main approaches to covariate adjustment have emerged in the literature: OLS regression, seemingly unrelated regression (SUR) and Bayesian regression. This paper aims to discuss these methods and explore how they perform in analysing patient-level cost-effectiveness data.

Methods
Ordinary least squares regression of net monetary benefits, SUR, and Bayesian regression analysis (with normal and gamma distributed costs) were applied to patient-level data obtained from the TASMINH2 trial. Each of the methods was employed to adjust for two sets of covariates, with the first set including covariates used to stratify the randomisation process in the trial, and the second set consisting both stratification factors and covariates which were correlated with costs and outcomes. The robustness of the estimates was assessed through an examination of the obtained Akaike Information Criterion and standard error of the incremental net monetary benefits for each model.

Results and conclusions
Results suggest that, in situations where the nature of the distribution of costs is not taken into account, SUR perform better than the remaining models. In contrast, when accounting for the skewed distribution of costs, the Bayesian model with gamma distributed costs reports the most robust estimates. With regard to covariate adjustment, using the first set of covariates (i.e. stratification factors only) improved the precision in the parameters and the model fit as compared to no adjustments. Further adjustments using the second set of covariates (i.e. stratification factors and strong predictors of costs and benefits) did not appear to improve the precision of the obtained estimates. This may be due to the relatively low or moderate correlations between the adjusted covariates and the trial endpoints. Further work to explore the generalisability of these findings would be highly useful and we would welcome comments from HESG members for suggestions on taking this research forward.
A046 Does higher quality primary care for people with dementia affect hospital admission?

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Submitting author's institution: Centre for Health Economics, University of York
Keywords: Dementia, Primary Health Care, Patient Admission, Pay for Performance

Aims
Described as “one of the biggest challenges we face today”, dementia is a high-level government priority for action. One in three people over 65 will develop dementia and the condition costs the UK around £19 billion annually. General practices are paid to identify and review patients with dementia as part of the Quality and Outcomes Framework (QOF). The reviews are a ‘health MOT’ with four components:

1. Physical and mental health review
2. Carer’s needs for information
3. Impact of caring on carer
4. Communication and coordination arrangements with secondary care

Compared with their peers, people with dementia are at a higher risk of depression and are less likely to report physical conditions. Therefore, the dementia health check should increase planned care. It may reduce unplanned hospital admissions, but this has not previously been tested.

Methods
We run count data models to test the impact of primary care quality, measured by practice performance on the dementia QOF indicator, on hospital admissions. The unit of analysis is the GP practice. Our four response variables are the number of people with dementia in a practice who were admitted to hospital at least once during the year, either for dementia (planned or unplanned) or for other conditions (planned/unplanned). As people with dementia often have complex health and social care needs, we adjust for an array of potential confounders. We also test a modified quality indicator to exclude exception-reported patients.

Data
Our practice-level dataset covers around 8,000 practices from 2006/7 to 2010/11. Admissions data from the Hospital Episode Statistics are merged with QOF data. The GMS dataset is used to model practice characteristics, and the Attribution dataset is used to derive practice population characteristics. Small area characteristics including ethnicity, rurality, the prevalence of informal care, and deprivation, are estimated from ONS data, and we use Attendance Allowance data from the DWP to model local need.

Results
In both the random and fixed effects models, better quality care is associated with a higher probability of having at least one planned admission for dementia, and of having one or more unplanned admission for other conditions. However, the effect for planned care is insignificant when exception-reported patients are excluded from the quality measure.

Conclusions
These preliminary results suggest the QOF may affect hospital use by dementia patients. We plan further refinements to the model, including adding distance data, GP survey data, and frequency of admission.
A047 Decision-making for healthcare resource allocation: Joint versus separate decisions on interacting interventions

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Keywords: Health technology assessment, economic evaluation, allocation of healthcare resources, medical decision-making

Standard guidance for allocating healthcare decisions based on cost-effectiveness recommends using different decision rules for independent and mutually-exclusive alternatives. However, the definition of “mutually-exclusive” varies. Within this paper, I review the definitions used in the literature and show that interactions are the defining feature of mutually-exclusive alternatives: in other words, treatments cannot be considered independent if the costs and/or benefits of one treatment are affected by whether or not the other is also given. In practice, many interventions given to the same population will have non-additive effects, including prevention, screening and treatment of the same disease, interventions targeting the same goal or clinical event, or life-saving interventions given to overlapping populations. I demonstrate that making separate decisions on interventions that actually have non-additive effects can prevent us from maximising health benefits from the budget. By contrast, treating different combinations of independent options as though they were mutually-exclusive makes the analysis more complicated, but still gives the correct conclusion.

I also discuss the implications for decision-making. Health technology assessment organisations, such as NICE, currently make numerous independent decisions on treatments that are likely to have non-additive effects. For example, NICE conduct numerous separate single technology appraisals on treatments used to treat the same condition and independently consider screening and prevention of diseases such as cervical cancer. By ignoring interactions between these treatments, such decisions may not be optimal. Conversely, the World Health Organisation takes account of such interactions within generalised cost-effectiveness analysis when allocating resources across an entire healthcare system, but often relies upon weak evidence about interactions. Within the UK context, more efficient use of healthcare resources could be achieved through greater use of multiple technology appraisals and taking account of interactions when selecting, prioritising and appraising healthcare technologies.
A049 How do financial incentives to improve the quality of care lead to better patient outcomes?

Authors: Yiu-Shing Lau; Matt Sutton
Submitting author's institution: The University of Manchester
Keywords: P4P Quality

Background
Pay-for-Performance (P4P) schemes typically reward improvements in specific process measures of the quality of care and result in small improvements in these measures. They may not result in significant improvements in patient health outcomes because the expected direct health effects of the incentivised measures are small and/or because providers exclude many patients from the reported measures. Alternatively, they may result in significant outcome improvements if the incentives lead to positive spillovers onto unmeasured quality dimensions for the included patients and/or onto the quality of care for excluded patients.

We consider a P4P scheme introduced in one region of England in 2008 that incentivised 28 process measures for five health conditions and has been shown to have led to substantial improvements in health outcomes. We analyse how these gains relate to the improvements in process quality reported by participating providers using a unique patient-level linked dataset. Specifically, we examine whether the outcome gains are attributable directly to the improvements in the quality of care delivered at individual patient level and/or indirectly at organisational level.

Aim: To examine whether the improvements in health outcomes associated with introduction of P4P can be linked to improvements in the quality of care received at patient and/or organisational level.

Data: Six datasets linked at individual level containing a rich set of provider, area and patient characteristics derived from hospital care records, twenty-eight process measures of quality, Patient Experience Measures (PEMS) and various health outcomes including Patient Reported Outcome Measures (PROMs), emergency readmissions and mortality. Our final sample consists of over 27,000 individuals spanning 18 quarters from 2008-2012.

Methods
Cross section and panel data models.

Results
Some of the process quality measures are significantly associated with better health outcomes at patient level but the magnitudes of the estimated coefficients are too large to represent clinically plausible direct consequences of these process measures.

Conclusion
Our findings suggest that these financial incentives to improve quality did not lead to improved patient outcomes through their direct effects on the process measures that were incentivised. Instead, this P4P scheme appears to have led to improved patient outcomes by inducing positive spillovers in terms of wider improvements in care quality across unmeasured dimensions and improvements in care for all patients.
A051 Variations in performance in mental health providers in the English NHS: an analysis of the relationship between readmission rates and length of stay

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Submitting author's institution: Centre for Health Economics, University of York  
Keywords: Mental health, performance, multi-level modelling, length-of-stay, readmission rates

Background and aims
The relative performance and resource use of mental health providers in England is comparatively under-researched.

Length-of-stay (LOS) is a key driver of resource use and there are wide variations in LOS. While much of this variation may be explained by differences in patient and provider characteristics, residual variation suggests there is scope for providers to improve performance. The hospital emergency readmission rate can serve as a measure of the quality of mental health care. Evidence on the broader relationship between LOS and readmission is inconclusive. We explore the determinants of LOS for inpatient care, focusing on the impact of readmission rates.

Data and methods
We analyse Hospital Episode Statistics (HES) data for 2009/10, using 127,700 inpatient mental health admissions for the 67 mental health providers in England. We compare results from a three-level random effects generalized linear multi-level Poisson model with those from a cross-classified model, which allows a patient to have an admission to more than one provider. We control for various patient-level characteristics including age, gender, ethnicity, marital status, carer support, psychiatric history, co-morbidity, legal status and deprivation. We also control for provider characteristics such as provider type, capacity, readmission rates, staffing, occupancy, proportion of formal admissions and mortality rates. We obtain Empirical Bayes (EB) estimates of the provider-level random effects, which capture the unexplained residual variation among hospitals.

Results
The models give broadly similar results for patient covariates, although findings for the provider-level variables are less consistent across the models – which warrants further investigation. Most of the variation in LOS is explained by individual characteristics. At an admission-level, the main drivers of LOS are a primary diagnosis of psychosis, formal detention, older age and black ethnicity, while at a provider-level, the hospital proportion of formal admissions is a strong determinant of increased LOS. Preliminary results suggest that LOS is not significantly associated with the hospital re-admission rate. Ranking providers by residual variation reveals significant differences, suggesting there is scope for some providers to improve their performance.

Conclusions
Understanding the reasons for variations in LOS and the relationship between LOS and readmission rates can provide valuable insights into differences in performance across hospitals. In acute care, providers are not reimbursed for emergency readmissions within 30 days and despite the trade-offs, both a high LOS and a high re-admission rate may have implications for a future prospective payment system for mental health providers.
A056 The impact of competition in English NHS hospitals

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Submitting author's institution: London School of Economics
Keywords: Competition, quality, hospital, NHS, policy

We look at the effect of competition in acute hospitals on a range of outcome measures - in particular the quality of care. Our aim is to test the robustness of the assumptions made by other key papers on this topic, using the most recent English Hospital Episode Statistics (HES) data to explore alternative models of assessing the impact of competition.

We start by replicating the results produced by Cooper et al. in their Economic Journal paper of 2011. This has entailed reconstruction of their dataset and approach to the modelling. We look at the robustness of the results to the assumptions made, and also refine these results based on additional years of HES data that have become available since the original research.

We next explore alternative models for assessing the impact of competition that have not so far been considered. This involves varying the underlying difference-in-difference model assumptions, examining a variety of outcome measures, and considering alternative hypotheses as explanations of any observed shift in quality over time and between hospitals. The hypotheses that we consider include:

- Alternatives to competition as the explanatory variable, for example mapping the path of important changes in medical interventions over the 12-year period of observation of AMI;
- An examination of the path of alternative quality measures over this period;
- Other policy changes and how these might be measured over this period, for example the implementation of a new consultant contract.

We analyse how and the extent to which findings based on the econometric methods employed can be used to inform competition policy in the NHS. For example, if competition has positive effects according to the econometric analysis, could that be translated into a policy that would have positive effects for the NHS as a whole, rather than just areas where competition is possible? If it can, then how do the costs of maintaining a market compare with the benefits? If competition does not have positive effects, is there a non-competition alternative that is better than just not having competition? Such questions have obvious relevance in terms of competition policy as pursued by the OFT and Competition Commission.
A059 Does national policy have an impact on NHS productivity?

**Authors**: Chris Bojke; Adriana Castelli; Katja Grasic; Andrew Street  
**Submitting author’s institution**: University of York  
**Keywords**: Productivity, NHS policy, health production function

**Aims**
Over the last 14 years the NHS has been subject to numerous policy changes: substantial funding increases, austerity, successive re-organisations, reform of payment arrangements between commissioners and providers, waiting time initiatives, revisions to staff terms and conditions, and investments in the capital stock. In this paper we consider the impact (or lack of) of these policy changes on the overall productivity of the English NHS.

**Methods**
Productivity change is measured by comparing year-on-year growth in output against growth in inputs. Output comprises the total volume of services provided to all NHS patients treated in all settings. Quality of care is measured by waiting times, survival rates, health outcomes and blood pressure control. Inputs include the staff, equipment and capital resources that contribute to the production of care.

**Data**
Data come from the Hospital Episode Statistics, Reference Costs returns, Patient and Household Surveys, Prescription Pricing Authority, Electronic staff record and NHS organisational accounts.

**Results**
Between 1998/99 and 2011/12 the volume of NHS activity has increased by 92% from 1998/99 to 2011/12. Survival rates after hospitalisation increased from 96.9% to 98.1% and blood pressure management has improved in primary care. Waiting times reached their lowest levels in 2008/9, but have increased subsequently. On the input side there have been increases in staffing levels, though these have flattened out recently, and large increases in the use of intermediate and capital inputs. Overall, input growth increased by 85% between 1998/99 and 2011/12.

While year-on-year productivity growth rates are sometimes positive and sometimes negative, looking over a succession of years reveals that output growth and input growth track each closely. Over the full 14 years, output growth outstripped input growth, with NHS productivity increasing by around 5%.

**Conclusions**
The NHS is in a permanent state of flux and it is difficult to isolate the impact of any particular policy. The data suggest that productivity growth has remained largely unchanged: increases in inputs leading to corresponding increases in outputs (possibly with a lag), suggesting constant returns to scale. The NHS appears to respond to direct targets such as waiting time targets, but the theory based changes (e.g. provider/commissioner split) appear to have no observable impact on productivity.
Eliciting value judgements about health inequality aversion: testing for framing effects

Authors: Shehzad Ali; Richard Cookson; Aki Tyschiya; Miqdad Asaria; Ruth Helstrip
Submiting author's institution: University of York
Keywords: Health inequality, inequality aversion, value judgments, framing effects, distributional cost-effectiveness

Background
Economists have developed questionnaire methods to quantify how much people care about health inequality. The resulting estimates of health inequality aversion can be used in distributional cost-effectiveness analysis (DCEA) to help decision makers assess trade-offs between improving total health and reducing health inequality. However, these estimates are likely to be influenced by framing effects which have not yet been documented.

Aim
The aim of this study is to test for the existence of four potential framing effects, each of which we hypothesised would reduce health inequality aversion: (1) small versus unrealistically large health inequality reductions; (2) individual-level versus population-level descriptions of health inequality reductions; (3) concrete versus abstract intervention scenarios; and (4) online versus discussion group mode of administration.

Methods
Data were collected from two different samples during discussion group and online value elicitation exercises, respectively. Respondents were presented with inequality in years of life in full health between the richest and poorest fifths of the population, and asked to choose between one intervention that improved the health of the rich more and another intervention that improved the health of the poor more. Questions were designed to elicit inequality aversion for the median respondent and to classify respondents according to five different views about health justice: (1) pro-rich, (2) maximise health, (3) weighted priority to the worse off, (4) maximin and (5) strict egalitarian. The ratios of gains to the richest and poorest fifth were maintained across trade-off questions, to allow comparison across questions.

Preliminary results
A total of 29 respondents, who were age/sex quota sampled, participated in a one day citizens’ panel meeting involving small group discussions. Separately, a convenience sample of 156 respondents completed the online questionnaire. Preliminary analyses indicate the existence of all four types of framing effects in the expected directions. However, the median respondent still exhibited substantial aversion to health inequality after each of the framing effects.

Conclusion
In order to develop estimates of public aversion to health inequality that are sufficiently reliable for decision makers to use as benchmarks in distributional cost-effectiveness analysis, we need a better understanding of the nature and extent of these and other framing effects.
A065 Discrete choice experiment response rates: A meta-analysis

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Keywords: discrete choice experiment, response rate, survey design

Aims
Discrete choice experiments (DCEs) are used to elicit patients’, the public’s or healthcare professionals’ preferences for health and healthcare. DCEs are a survey method and therefore are prone to survey error (coverage, sampling, non-response, and measurement error). While most DCE methodology papers focus on minimising measurement error, e.g. by reducing hypothetical bias, improving question format/framing and refining econometric analysis, research focusing on non-response error in DCEs in healthcare is lacking. Most researchers aim to maximise a survey’s response rate, which may reduce non response error. This study aims to add to the understanding of influences on response rates and tests the impact of various study design features on DCE response rates.

Methods and data
A systematic literature search for published DCE studies in healthcare updated an existing literature review for the period 2001 to 2008 to the end of 2011 and was used to identify the studies included in a meta-analysis. Studies resulting in more than one publication were included only once. Publications reporting results from more than one study were included as separate observations. For all identified studies we extracted the response rate and study design information. Not all studies reported complete data, we have contacted authors to obtain the missing information.

The response rate is the dependent variable in our analysis. The explanatory variables are chosen based on explanations of survey response rates and hypotheses about how DCE study characteristics may affect response rates. Our modelling strategy takes account of several issues presented by the data generating process. The response rate variable is bounded between zero and 100%. Categorical explanatory variables are grouped based on a-priori hypotheses and number of observations in each category. We test for multicollinearity in these data by estimating pairwise correlations between variables. We allow that the error term may be correlated across studies that use the same questionnaire for data collection in different populations.

Preliminary results and conclusions
The search identified 371 papers from these we identified 306 studies that met the inclusion criteria. Preliminary data analysis indicates that response rates have been decreasing over time, in line with anecdotal evidence. DCEs with more attributes have lower response rates, as do studies eliciting time preferences. However, the number of choice sets and presence of a cost or risk attributes do not affect response rates. Response rates are lower from the general public than from patients and health care professionals.
A066 Evolution of inequalities in fruits and vegetables purchases between 2002 and 2010 in the context of French National Health Nutrition Plan

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Submiting author's institution: French National Institue For Agricultural Research
Keywords: Decomposition analysis, Health inequality, Fruits and vegetables, policy impact

Background
French public health authorities are concerned with the increasing prevalence of obesity, which has been related to a decline in physical activity and an increase in sugar, fat and calories intake. In this context, the French National Health Nutrition Plan has been put in place to encourage the consumption of fruits and vegetables (F&V).

Aims
This paper aims to document the evolution of purchases in F&V between 2002 and 2010, with a focus on the analysis of the evolution of inequalities between households and between social groups.

Methods
"Recentered Influence Function" (RIF) is used to decompose the contribution of education and trends in prices to the changes in the purchased quantities of F&V into a composition effect (differences due to changes in the characteristics of the population) and a structure effect (differences due to a change in the educational gradient in F&V purchases).

Data
We use data from the 2002 and 2010 Consumer TNS Worldpanel. Household report their food purchases including fruits and vegetables scanning the barcode of any purchased product.

Results
The primary results show that in the absence of demographic and economic changes between 2002 and 2010, the average quantity of F&V purchased in 2010 would have reduced to about 9 kg for fresh fruits and 4kg for vegetables. However we observe a number of changes over the period including a rise in average income, ageing of population and a decrease in unit prices of fresh F&V. Consumers in the first decile particularly increase their fresh fruits consumption as a result of the price changes. Inequalities in F&V consumption between households reduce over the time period (from Gini2002=0.477 to Gini2010=0.463 for Fruits and from Gini2002=0.458 to Gini2010=0.437 for Vegetables).

Conclusion
Consumption of F&V has increased in France between 2002 and 2010; however, we cannot attribute this increase to a causal effect of the National Health Nutrition Plan. We note the importance of composition effects in relation with lower unit prices observed in our sample, however prices appear to have increased at the national level over the same period; it is therefore likely that households have changed their purchase towards cheaper items of potentially lower quality. In terms of inequalities the decrease in the Gini coefficients reflects a reduction in inequality between households, but inequalities between educational groups appear to increase.
A067 Addressing missing data in patient-reported outcome measures (PROMs): implications for the use of PROMs for comparing provider performance

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Submiting author's institution: LSHTM
Keywords: Missing data, PROMs, Provider performance, Multiple Imputation, Missing not at random

Background
Patient-reported outcome measures (PROMs) are now routinely collected in the English NHS and used to compare hospital performance. However, PROMs are prone to missing data. For example, providers may fail to administer the pre-operative questionnaire at hospital admission, or patients may refuse to participate or fail to return their post-operative questionnaire. A major problem is that individuals with complete information tend to be systematically different from those with missing data, and inferences based on the complete cases may not be valid for the population of interest. More importantly, provider response rate may be informative of its performance, and judgements about hospital performance based solely on observed PROMs may be biased and set perverse incentives.

Aim
This study critically assesses the different mechanisms that give rise to missing data in the national PROMs survey, and investigates its impact on comparative hospital performance.

Methods
We combined PROMs data for 200,000 patients undergoing hip replacement in 2009-2012 with routine inpatient data from Hospital Episode Statistics (HES). Pre- and post-operative outcomes (EQ-5D) were missing for approximately 50% of patients. We first estimated multilevel logistic models to identify potential missingness patterns across providers and over time. We then employed multiple imputation (MI) methods using patient-level socio-demographic and clinical variables as well as organisation-level factors to address the missing data, and contrasted the results with complete case analysis (CCA). All imputation models recognised the hierarchical structure and distribution of the data, and assumed that outcomes were missing at random (MAR). Finally, we analysed each imputed dataset to estimate risk-adjusted mean post-operative EQ-5D and combined the results using Rubin’s rules.

Results
After risk-adjustment we found substantial variation in the likelihood of response across providers. Provider response rates are also correlated over time. This suggests that the probability of response may be associated with unobserved provider-specific factors, i.e. data are missing not at random (MNAR). Under MAR, MI provided more precise estimates of provider-specific mean EQ-5D than CCA, and identified different hospitals as high/low performers.

Conclusions
The probability of fully-observing PROMs outcomes varies significantly across providers. MI provides different conclusions about the relative provider performance when compared to CCA. These findings are highly relevant for the design of incentive schemes based on PROMs and other data collected directly from patients such as the ‘Friends and Family’ initiative. Ongoing sensitivity analysis is addressing potential MNAR mechanisms.
The National Institute for Health and Care Excellence (NICE) make recommendations using the extra-welfarist framework with its focus entirely on health and aim to maximise health. It is increasingly recognised that this school of thought is not suitable for certain conditions where benefits can additionally lie beyond health. It is the extent to which extra-welfarist measures do not capture these aspects that is important and with the remit of decision-makers broadening to include health and care excellence, this issue of how to incorporate benefits beyond health must be resolved.

In menorrhagia (or heavy menstrual bleeding), an assessment of quality of life (QoL) is the primary indicator of treatment success so it is particularly important to ensure that a suitable measure that accurately captures women's concerns and experiences is used. Menorrhagia is an interesting condition for two reasons; first, the condition is chronic but symptoms occur in episodes and second, the condition is known to greatly impact on non-health aspects as well as health aspects of women's lives. These are two properties that can make valuing outcomes in menorrhagia more problematic than other conditions.

This paper will present the findings from a 3-year PhD exploring outcomes in menorrhagia from two theoretical frameworks: 'welfarism' and 'extra-welfarism'. We will show how the extra-welfarist measures, EQ-5D and SF-6D produce results that imply a different treatment decision, followed by evidence of the use of willingness-to-pay (WTP) which show it to be both feasible and acceptable to the patient population. Discussion will focus on the implications of these findings particularly with respect to decision-making. We will provide a critical review of both approaches within the context of menorrhagia. Practice is unlikely to change instantaneously but the gradual accumulation of evidence against the use of current extra-welfarist measures in menorrhagia may encourage decision-makers to consider alternative techniques. This paper will develop a case for recommending that policy-makers should consider alternative approaches and provide recommendations for what future research needs to focus on.
A070 Better health in times of economic hardship?

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Keywords: macroeconomic conditions, health, England

There is increasing evidence of the procyclical relationship between good macroeconomic conditions and mortality rates. However, evidence is pretty much restricted to the US context with the exception of evidence from Germany which provides weaker support for the relationship between recessions and mortality. Cross-country comparisons show ambiguous results, with some evidence that procyclical fluctuations are not very strong.

Motivated by the deep and long-lasting economic recession originated in 2008, this paper examines the impact that economic hardship may have on individuals’ health. While most of the literature has focused mainly on mortality rates (for a wide range of causes), alcohol and drinking habits, the scope of this paper is to go beyond death as the only outcome and examine the effects of the recession on morbidity. To do so, we use intermediate health indicators, which constitute risk factors that may eventually trigger the final fatal outcomes identified in the literature (such as mortality due to cardiovascular disease).

We use data from the Health Survey for England for the period 2004-2011. This is a yearly survey taken from a representative sample of the population. In addition to socio-economic characteristics, the survey includes information on medication taken by individuals, blood pressure, cholesterol levels, body mass index (BMI) and dietary patterns. There is also information on general health and psychosocial health. Typically, a measure of regional unemployment has been used to capture macroeconomic conditions, which will also be included in the estimation strategy. However, unemployment figures can be imperfect and not reflect market dynamics. Thus, we will also include a variable that captures the growth in unemployment rate. This is to examine if individuals in regions that were already deprived suffered a bigger impact during economic hardship.

Although this is still work in progress, we anticipate that higher unemployment levels will be associated with higher stress-related morbidity indicators. We will analyse the strength of this effect and corroborate the results found in the literature using non-English data. We will also analyse whether individuals in more deprived areas have been more affected by economic hardship than those in less deprived regions or if, on the contrary, recession has affected more negatively those that were previously in middle income groups. Thus, we will be able to establish whether the recession has exacerbated health inequality or rather contracted it.
A071 Developing the EQ-5D-5L value set for England

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**Authors:** Nancy Devlin; Koonal Shah; Brendan Mulhern; Yan Feng, Aki Tsuchiya; Ben van Hout

**Keywords:** EQ-5D-5L, value set, health state valuation, TTO, DCE

**Aims**
The aim of this study is to test methods that will be used to develop the EQ-5D-5L Value Set for England. The value set produced will be used by health care decision makers such as the English Department of Health and the National Institute for Health and Clinical Excellence (NICE). In doing so, we address a number of methodological issues relating to the analysis of valuation data, including: what is the best method to generate a value set reflecting the stated preferences of the English general public, and how can conceptually different types of preference data – Time Trade Off (TTO) and Discrete Choice – be combined in modelling health state values?

**Methods**
The study design followed the EuroQol Group’s international protocol for valuing EQ-5D-5L. Respondents completed ten composite Time Trade Off and seven Discrete Choice tasks, and data were collected using face-to-face computer assisted personal interviews. In total 996 adult members of the general public in England were selected at random from postal addresses, and interviews were carried out by a team of 48 trained interviewers. Analysis to be reported in the paper includes a range of descriptive analyses to assess the face validity of the data. To test modelling methods that can be used to produce the value set, a range of models will be estimated for both TTO and DCE data. This will include ‘hybrid’ models estimated on the pooled preferences data, and also models incorporating data from the recently completed ‘Preparatory study for the re-valuation of the EQ-5D tariff (PRET)’ project.

**Results**
Analytical work is still ongoing. A range of descriptive statistics used to assess the face validity of the data and tests of models that can be used to estimate an EQ-5D-5L value set will be reported.

**Conclusions**
Conclusions based on the findings- which will contribute towards the production of the final EQ-5D-5L value set for England- will be reported in the paper. The value set produced, and any differences with the current EQ-5D tariff, will have implications for the economic evaluation of new treatments carried out by researchers and decision makers in England.
**A072 The right cot, at the right time, at the right place – evaluating the design and organisation of neonatal care**

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**Submitting author’s institution:** Exeter University  
**Keywords:** incremental analysis, discrete event simulation, neonatal care, predicted infant survival

**Aims**  
The aim of the project was to assess how we might improve design and organisation of neonatal care networks.

**Methods**  
There were two main components: firstly a computer simulation of the neonatal network using neonatal care data and secondly an evaluation of different referral patterns to assess impacts on costs and survival.

A discrete event simulation model was developed to simulate the care of infants in the South West neonatal network. Infants were stratified into seven categories according to gestational age at birth or the requirement for specialised surgical/cardiac care. The model was validated by comparing predicted and observed occupancy and length of stay. Some assumptions used in the model were validated against neonatal patient group representatives.

The economic evaluation moved beyond service level objectives and predicted infant survival as well as NHS and family costs. Predictions of infant survival were based on infant characteristics (gestation, gender and birth weight) and workload of the neonatal units (Manktelow et al. 2013, Tucker et al. 2002). Predictions of NHS costs were based on the level of care received and compared against micro costing based on nurse grade. The costs to families included travel time, vehicle operating costs and overnight stays.

The simulation was used to estimate the incremental costs and outcomes of stepwise moves towards greater compliance with workload guidelines. The simulation also explored the extent to which these ratios changed when referrals became more centralised.

**Data**  
The Badger dataset of neonatal care for the Peninsula Neonatal Network 2010-2012 was used, consisting of 9239 infants. Variables include length of stay in 4 levels of care, booked and actual place of birth, locations and times of transfers, GP postcode, gender, birth weight, gestational age at birth, mortality. Nursing data was available from a daily survey of ward nurses.

**Results**  
Preliminary analysis showed that the model produced a good prediction of occupancy, e.g. the average absolute error in the total workload (number of nurses required to meet BAPM guidelines) was 0.4 and the average absolute error in the number of infants in each care level in each hospital was 0.7. We are still in the process of analysing the results of the economic evaluation.

**Conclusions**  
The project has shown how models of service delivery may be developed to inform evaluation of different configurations of care. We discuss the challenges of applying incremental cost effective analysis to such models such as how best to assess the costs of units that close altogether. We also look at alternative approaches to evaluation such as cost benefit analysis.
A074 Inequality in Utilization and Incidence of Benefits of Free Personal Care in Scotland

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Keywords: Free Personal Care, Distribution, Inequality

Background
The Scottish Government introduced a free personal care (FPC) policy in July 2002, where personal care services are provided free of charge to people aged 65 years or over. One of the aims of the policy is to ensure greater socio-economic equity in personal care provision. Only a very limited amount of research has been conducted to examine the effectiveness of the policy in meeting this aim.

Aims
This study aims to examine: i) whether there has been any change in socio-economic inequalities in utilisation of personal care at home over the period 1999-2010, ii) whether there has been any change in the distribution of public spending on personal care across socio-economic groups, and iii) the major determinants of utilization of personal care at home.

Methods and Data
Data from the Scottish Household Surveys (SHS) for the years 1999-2000 (pre-FPC policy period) and 2003-04, 2005-06, 2007-08, 2009-10 (after-FPC policy period) are used. Concentration Curve and Indices are used to present the trend in inequalities in utilisation of personal care over the period. Logistic regressions were used to examine the determinants of utilisation of personal care.

Results and Conclusion
The policy of free personal care appeared to achieve greater reductions in inequalities in the later years than in earlier years. Regression analyses showed that health factors were more important determinants of receipt of in later years than in earlier years. Benefit incidence analyses are currently being undertaken and will illustrate the changes in the distribution of public spending on personal care across different income groups.
A078 Are the best-worst scaling and discrete choice experiment methods similar? A double empirical comparison

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Submitting author’s institution: Health Economics Research Unit - University of Aberdeen

Keywords: Discrete choice experiment; Best-worst scaling; Stated preferences; Discrete choice modelling

Aims
The Best-Worst Scaling (BWS) method has been introduced as an alternative to ‘standard’ Discrete Choice Experiments (DCEs). However it remains unclear if this approach is actually better than the DCE to state the individuals’ preferences in health. The main objective of this study is to compare the results of the BWS and DCE methods.

Methods
Three variants of the BWS (cases I to III) have been implemented. In this study we are interested in the most frequently used BWS I and II. We compare the BWS I vs. a binary choice DCE and BWS II vs. a pair-wise choice DCE on four criteria. First, theoretical validity investigated through the stability of observed choices and the ability to generate a preference ordering of the items. Second, the feasibility of each method using self-declared measures of tasks ease of completion. Third, the convergent validity of the methods is tested by comparing the preference estimates. Fourth, the discriminant validity is investigated by using the estimates of one method to predict the choices observed with the other method. Estimates are obtained at the sample and individual levels using logit models. The results are compared using Spearman correlation measures.

Data
The BWS I and binary DCE data are from a study investigating the preferences of 150 patients for the general practice care. The BWS II and pair-wise DCE data are from a study investigating the preferences of 293 patients for different dimensions of the Glaucoma symptoms.

Results
For the BWS I and binary DCE, the Spearman correlation of 0.825 suggested that both methods provided related results. Similarly, there is convergent validity between the estimates of the two methods (R²=81.4%). For the BWS II and pair-wise DCE, the preference ordering analysis showed low correlations between the methods and there is low convergent validity between their estimates (R²=3.4%). In this case, 32.9% of the choices observed in the DCE tasks are not correctly predicted by the BWS results and the DCE results predict only 2.1% of the best-worst pairs observed in the BWS tasks.

Conclusions
The results showed mixed evidence of agreement between the BWS and DCE methods. While the BWS II vs. pair-wise DCE comparisons suggest complementary approaches, the BWS I and binary DCE would be better describe as substitutes. Minor differences in the editing of the choice tasks may have a large influence on the respondents’ decision-making and partly explain these mixed results.
A082 The Impact of Breastfeeding on Childhood BMI: Evidence from the Millennium Cohort Study

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Submitting author's institution: University of Sheffield

Keywords: breastfeeding, childhood obesity, propensity score matching

Aim
The effects of breastfeeding on childhood obesity have been argued over in an extensive and inconclusive literature. Randomised controlled trials cannot be used because assigning breastfeeding behaviour is unethical and so analysis of observational data is required. Existing studies most commonly use regression models to investigate the influences of breastfeeding on childhood adiposity measures. However, these regression models make a number of idealistic assumptions.

This study investigates the relationship between breastfeeding and childhood BMI whilst accounting for a number of confounding factors which are likely to influence the likelihood of a mother breastfeeding and also the childhood BMI of her offspring. This study aims to find the true causal effect of breastfeeding on childhood BMI.

Methods
This study uses propensity score matching to investigate how breastfeeding impacts obesity during childhood. Propensity scores representing the likelihood of treatment for each of the treatment variables will be estimated using probit models. Binary treatment variables, each indicating a different duration of exclusive or partial breastfeeding, are used and in each case treated and untreated observations are matched using a nearest neighbour algorithm. In using this technique, this study avoids many of the unrealistic assumptions which are required when using regression models, allowing the relationship between breastfeeding and obesity to be investigated under a different set of assumptions to those used most commonly.

Data
The Millennium Cohort Study (MCS) is a longitudinal study representing children born in the UK around the year 2000. It contains detailed information on types and durations of infant feeding. This study used data on breastfeeding taken from the first wave of the MCS when the cohort was approximately nine months old. Information on BMI was taken from subsequent waves when the cohort was three, five and seven years old.

Results
The results show that despite being statistically significant, the reduction in childhood BMI as a result of breastfeeding is small. The effects of breastfeeding on BMI are statistically significant by the time the cohort reaches seven years old. A substantial increase in the proportion of mothers breastfeeding would be needed to have a good chance of producing worthwhile reductions in the childhood BMI of a population.

Conclusion
When applying methods that account for confounding factors, this study finds that the causal influence of breastfeeding on childhood BMI is statistically significant. However, the effects are small and are unlikely to solve the obesity problem without other interventions.
**A083 An integrated macroeconomic, epidemiological and demographic model framework for policy analysis**

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**Submitting author’s institution:** London School of Hygiene and Tropical Medicine

**Keywords:** macroeconomic, disease burden, malaria, modelling, integrated framework

**Aims**
To develop a macroeconomic modelling framework for health policy analysis which captures the feedback effects between health, economic and demographic impacts of infectious disease.

**Methods**
This study presents early results from an innovative modeling methodology which, for the first time, fully integrates a dynamic macroeconomic Computable General Equilibrium (CGE) model with malaria transmission and demographic population models but is generalisable to other health contexts by using other health models. The economic model is a dynamic macroeconomic simulation model with multiple sectors and multiple households. The households are distinguished by their geographical location in Ghana (ecological zones), by urban and rural location and by malaria prevalence. The malaria transmission model and demographic population model are fully integrated into the economic model such that health, demographic and economic changes feedback on each other dynamically. This modeling framework is therefore able to estimate the full macroeconomic impact of health related changes in labour supply, changes in exposure to malaria due to migration/urbanization and capture changes in the structure of the population in the short, medium and long term.

**Data**
Underlying the economic model is a social accounting matrix (SAM) for Ghana. Household and labour force survey data, together with geographical estimates of malaria from the Malaria Atlas Project (MAP) have been used to disaggregate the different labour and household types in the model but could be adapted to accommodate, for example, socio economic status. Clinical outcome data from the Swiss Tropical Institute’s Open Malaria model has been used in conjunction with the MAP data to parameterize the malaria transmission model and UN population statistics were also used to parameterize the demographic model.

**Results**
We illustrate the integrated framework in two ways. First, we present new and truly macroeconomic measures of society-wide costs of malaria illness. Second, we illustrate the potential combined health, macroeconomic and population effects of interventions to eliminate malaria. The macroeconomic malaria burden is estimated to be 0.92% of Ghanaian GDP, while large-scale malaria interventions increase GDP by up to 0.8%. Economic and health-impacts vary across regions depending on variations in transmission intensity, but family sizes generally increase due to lower infant mortality.

**Conclusions**
We conclude that a holistic health-economic-demographic approach to results assessment is necessary as interventions which have the greatest health benefits may not have the highest economic benefits.
A085 Value engineering and multicriteria decision making as a part of health technology assessment in medical devices

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Keywords: health technology assessment, value engineering, multicriteria decision making, medical devices

Aims
The presented methodology has been created with the aim to be applied for decision making when purchasing medical equipment for hospitals. The main challenge in assessing medical devices is to solve the problem how to evaluate the benefits of their effective components. They do not directly influence parameters associated with quality of life, but can affect the quality of the therapeutic and diagnostic process, the clinician’s convenience, the patient’s comfort. Methods of value engineering and multi-criteria decision making showed promising for this purpose.

Methods
The main applied method is the standard cost-effectiveness analysis. While costs are carefully calculated, we propose a solution for evaluation of the effects as a combination of value engineering methods and multi-criteria analysis. Functions’ importance determination is derived from the value engineering, using the pairwise comparison, the scale perturbation method, Saaty’s matrices, and fuzzy sets application – these methods are used to determine the weights of each function of the medical device. Subsequently, the multi-criteria evaluation is used: the weighted sum method, the ideal point analysis (IPA), the TOPSIS method, and the method of agreement and disagreement (CDA).

Data
These methods have been applied in three cases of medical technology selection: vital signs monitors, lung ventilators, and acute dialyses. Subsequently, the data were statistically evaluated and complemented with a sensitivity analysis. The data for the evaluations were obtained from two university hospitals, and from companies operating in the Czech Republic. To determine the weights, a group of experts was established in each hospital consisting of physicians, biomedical engineers and technicians, and economists from the particular hospital’s management.

Results
For selected pilot situations, the methodology of value engineering and multi-criteria evaluation was applied, and the ideal purchase option determined. Subsequently, it was calculated, how much money can be saved, while keeping the required quality level of the medical device at the lowest possible costs. The largest financial losses are due to service fees and spare parts. With a proper selection of the medical device, the hospital can save for another unit of the same category.

Conclusions
Based on these results, the ideal mixture of suitable methods has been recommended as the decision support in HTA applied to medical equipment purchase. Moreover, the results of our analyses and the suitability of the methods of value engineering and multi-criteria decision making were discussed with experts in the field.

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A086 Attitudes towards Healthy Eating, Fruit and Vegetable Consumption, and Health Outcomes in Scotland

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Keywords: Food choice, Attitudes, Self-assessed health

Aims

Five portions of fruit and vegetables should be consumed each day to reduce the risk of chronic diseases such as heart disease, cancers, diabetes, and obesity (WHO, 2003). 20% of Scottish adults reported eating at least five portions of fruit and vegetables despite almost 90% of Scottish adults being aware of the five-a-day recommended guidelines (The Scottish Health Survey, 2013). The gap between knowledge and action indicates individual attitudes towards healthy eating may play a key role in individual food choices. We investigate the association between health outcomes and eating five portions of fruit and vegetables a day within the Scottish Population. We hypothesise attitudes towards healthy eating is a mediating factor.

Methods

The health production function (Grossman, 1972) provides the theoretical basis to investigate the relationship between lifestyle behaviours, fruit and vegetable consumption in this case, and health outcomes. A recursive bivariate probit model is employed in this study as it is consistent with the health production framework. It also accounts for potential endogeneity and unobserved heterogeneity.

Data

The Scottish Health Survey (SHeS) from 2008-2011 is merged into a single cross-section (n=36,922). The SHeS utilises a multi-stage stratified probability sampling design to achieve a nationally representative sample. We defined a binary variable to indicate if the individual meets the five-a-day guideline. Binary health outcome variables include self-assessed health, cardiovascular diseases, diabetes, and mental health problems. Socioeconomic, demographic, and other lifestyle factors are controlled for in our analysis. Attitudinal variables towards healthy eating are incorporated into our analysis to investigate the determinants of fruit and vegetable consumption.

Results

Observable factors influencing self-assessed health are gender, age, income, education, smoking status, exercise, fruit and vegetable consumption, and attitudes towards healthy eating. Preliminary results indicate attitudes towards healthy eating mediate the effect of fruit and vegetable consumption, and socioeconomic factors on health outcomes. Reporting a lack of willpower and a lack of information decrease the probability of eating five-a-day and reporting good/very good health by 2.4% (p=0.000) and 3.4% (p=0.000) respectively.

The positive correlation coefficient suggests unobservable factors associated with increasing the probability of eating five portions of fruit and vegetables a day also increase the probability of reporting good/very good self-assessed health (p=0.0361).

Conclusions

Our results suggest a focus on individual attitudes towards healthy eating is a promising path towards increasing fruit and vegetable consumption and may consequently improve population health.