

Exploring the use of micro data for estimating a Relative Needs Formula for older people's additional assessments following the introduction of a universal cap on social care expenditure¹

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2 Lay summary

2.1 Introduction

The cap on social care costs described in the Care Act 2014 will mean that all individuals with lifetime social care needs exceeding £72,000 will become eligible for state-supported care. It is expected that as a result the number of individuals requiring a needs-assessment by local authorities will increase significantly.

Relative needs formulae (RNFs) are used to determine the allocation of central government funding for social care. This report summarises the methods used for developing an RNF that measures the additional assessments for people aged 65 needed across local authorities in England following the introduction of a care cap.

2.2 Methods

Local authorities will need to carry out additional needs assessments for people with social care needs but that are currently excluded from financial support by the means-testing rules. The proposed formula therefore measured, for each local authority, the number of older people that have eligible care needs but that do not meet the local authority financial eligibility criteria. Unfortunately, there is no single source of evidence that measures for each local authority the numbers of older people with different combinations of social care needs, income and wealth. The study therefore explored the viability of a formula which combined several data sources.

The study used individual-level data to divide local authority populations into groups with different needs and income/wealth characteristics. It estimated the numbers of individuals with social care needs in the community and in residential care separately and then aggregated the two figures into an estimate of total local social care need.

The analysis assumed that all older residential care users in England (supported by a local authority or privately funded) would meet the eligibility criteria for social care. Residential care users in an authority were estimated as the sum of the care home residents supported by the authority (in the authority or in an out of area placement) and the number of privately funded care home residents living in the area. The number of supported residents was taken from LA returns. The number of privately-funded care home residents was estimated by subtracting the number of supported residents living in a given area from the number of older people in residential and nursing homes according to Census 2011.

We used two methods for estimating the number of supported and unsupported community residents with social care needs.

The first method used individual-level data from three waves of the English Longitudinal Survey of Ageing (ELSA) survey, collected in 2006-07, 2008-09 and 2010-11. ELSA contains detailed evidence

about income, wealth and social care needs for older people living in the community. These data were reweighted to simulate the characteristics of older people living in the community in each local authority in England, matching key local authority-level information from the 2011 Census. By comparing the characteristics of the local population with the characteristics of individuals receiving social care support in England (from the Adult Social Care Survey), the analysis identified the numbers of people in the community in each local authority that would meet the needs eligibility criteria for social care. The analysis also identified whether individuals would receive financial support from the local authority by using the information about income and wealth in the ELSA survey.

The second method for assessing social care need in the community was based on data from the 5% 2001 Census sample (the 2011 Census was not available at the time of the study). The 5% sample of the Census provides a large and representative sample of residents in each local authority in England. However, it contains limited information about dependency, income and wealth. The study used data from ELSA about the link between the indicators in the 5% Census sample and indicators of social care need, income and wealth in order to impute problems with Activities of Daily Living and Instrumental Activities of Daily Living counts, informal care receipt, pension credit receipt, income and wealth in the 5% Census dataset. The analysis used the imputed distributions of dependency, income and wealth for the different local authorities to estimate the number of older people with social care needs that would be excluded at present on financial grounds in each local authority.

Estimates of the total number of older people with social care needs in each local authority were calculated by adding the estimates of older people with social care needs in the community using the two methods to the estimated number of older people in institutions.

2.3 Results

The reliability of the estimates produced by the two methods were checked by comparing them against factors associated with local social care need and with the proportion of that need that would be entitled to financial support under the current funding rules. Both methodologies performed well, but we recommend the ELSA-based approach on the basis that it is simpler and more transparent.

Finally, a regression model was fitted to estimate a simple formula of relative needs across areas, as the existing older people's Personal Social Services RNF. This equation can be used with updated data to calculate future relative needs. The results of this equation defining the relative need formula for additional assessments are summarised in Table 1 below:

Table 1 Relative need formula for additional assessments

	Proportion older population receiving Attendance Allowance	x	0.040886
+	Proportion aged 85+	x	0.209282
+	Proportion population 65+ that owns home	x	0.016428
+	Proportion population 80+ receiving Pension Credit	x	-0.01513
-	0.0026		

2.4 Implications

The proposed methodology has some advantages: because it uses direct indicators of social care need, income and wealth, it relies less heavily on evidence about previous social care expenditure than formulae that use as proxies for social care need indicators of previous utilisation. Because it is based on individual level data, it is also useful for simulating the implications of policy changes (such as changes in means testing arrangements or eligibility criteria) before they are introduced and therefore before historical evidence about such policies emerges. A similar approach could be applied to some of the other social care RNFs.

The approach also has some limitations. In particular, it is constrained by the limited amount of individual-level data available. Also, in contrast with utilisation-based methods, the methodology cannot be used directly to compensate local areas for the effect of supply factors on demand, should one wish to do so. Overall, however, the estimates of relative needs for additional assessments using the individual-level data and methods proposed in this study are very strongly correlated (83% per capita; 99% overall) with the estimates derived using a hybrid utilisation approach.

3 Background

Relative needs formulae (RNFs) are used to calculate how central government grants should be distributed across local authorities in England on the basis of local needs-related characteristics. The RNF for Older people's Personal Social Services (PSS) helps determine the allocation of central government funding for adults aged 65 and over receiving care in institutions and in the community, and the associated costs of assessments, care management and administration.

The cap on social care costs described in the Care Act 2014 will mean that all individuals with social care needs will become eligible for state-supported care should the costs associated with their lifetime needs exceed £72,000. Progress towards the cap will be recorded in each individual's personal budget (for supported clients) or independent personal budget (for those meeting costs themselves). Consequently, it is expected that the number of individuals approaching local authorities to have their care needs assessed will increase significantly following the introduction of the cap.

Given that the ratio of publicly- to privately-funded social care recipients varies across authorities, the impact on care provision and expenditure of the introduction of the cap will be different across areas. As such, its impact cannot be calculated accurately on the basis of the existing social care RNF formula or of existing local authority (LA) social care activity.

The analysis described in this paper develops an allocation formula to identify the relative need for additional assessments for over 65s that might follow the introduction of the funding reforms. The paper includes two alternative methods for estimating relative local need. Both use individual-level data in an attempt to capture (as best as possible) interactions between population characteristics.

4 Methods

RNFs for older peoples' PSS are traditionally based on data aggregated at the geographical area covering factors such as population size, age and gender profiles, proxies of informal care provision and indicators of deprivation and wealth (see Forder and Vadean 2018 for details of a hybrid utilisation approach). While data of this type provide a good basis for comparing authorities, their aggregate nature limits the capacity for the analysis to capture potentially important individual-level interactions between for instance need and wealth factors. Eligibility decisions are largely determined on the basis of combinations of individuals' need, informal care receipt and income and wealth, and LA activity is generally concentrated on those with very high needs and low income and wealth. Accounting for such interactions, therefore, is particularly advantageous to approximate accurately the group of individuals targeted by local authorities.

Ideally, this aim would be achieved using individual-level (micro) data sources for each local authority containing indicators of income, wealth, informal care receipt and need for social care support. On this basis, a spending formula could be derived straightforwardly by “counting” or aggregating up for each LA the numbers of people with a target combination of characteristics – in the present case, the number of people with social care needs who are currently excluded from state support on the grounds of their income and wealth.

While the development of a micro-based, needs-driven formula is the preferred and most straightforward approach, the method has substantial data requirements. Unfortunately, no single individual-level data source exists that covers comprehensively, for each local authority in England, all relevant need, informal care, income and wealth indicators. To overcome this data availability constraint, the approaches explored in this report combine data from a number of sources. A second challenge for the analysis of local social care “need” is the lack of a commonly agreed measure of “eligibility” linking individual needs to the need for social care. In the absence of a normative link between individuals’ characteristics and the need for an assessment and/or service eligibility, modelling is required to approximate this relationship according to observed national patterns of eligibility.

The two methods described in the report make use of a range of data sources to derive an individual-level sample of adults aged 65 and above stratified by local authority. Although the resulting samples are similar in structure, there are fundamental differences in the methods used to combine data.

In broad terms, the first method (the ELSA-based method) uses as its underlying dataset pooled waves of the English Longitudinal Study of Ageing (ELSA), a nationally-representative sample of older people in England that includes detailed information about individual-level needs (including activities of daily living (ADLs), informal care, income and wealth but no local authority identifiers). The ELSA sample contains a sufficient level of detail to approximate likely eligibility for and uptake of public social care services at the individual, but does not allow for individuals to be identified according to local authority of residence. To derive authority-level estimates, the ELSA sample is ‘reweighted’ to approximate the characteristics of local authority populations according to aggregate-level indicators available from Census 2011 and other sources (described in more detail in section 4.1.2.1).

The second method is based upon a 5% individual sample of the 2001 Census. This dataset includes LA identifiers and broad indicators of individual-level need, but lacks the level of detailed data required to derive estimates about eligibility. According to this method, additional information (including detailed need indicators, income and wealth) are imputed at the individual level on the basis of correlations observed in ELSA.

Both methods quantify the numbers of individuals with social care needs in the community and in residential care separately, and then aggregate the two sets of estimates in order to produce a total indicator of local social care need, differentiating between self-payers and local authority supported individuals. In the following sections, we describe the strategy adopted for estimating local levels of

social care need in residential care and the approaches developed to estimate local social care need in the community.

4.1 Estimating local need for social care

The definition of what constitutes “need” is a particularly important but challenging element of the analysis. Whereas local authorities in England are free to decide their eligibility criteria, although within the minimum limits set by national policy, the development of an allocation formula requires that the same definition of “entitled need” is applied across all areas to prevent the indicators of relative need from reflecting differences in local policy preferences. Furthermore, the national minimum eligibility criteria are not such that specific associations can be made between combinations of individual characteristics and entitlement to care. The normative link between characteristics and ‘need’, therefore, was therefore approximated in the study on the basis of average patterns across local authorities in England.

4.1.1 Local need in residential care

According to the two proposed analysis methods, a two-step approach was taken to estimate the level of need across local areas. In the first instance, the analysis estimated the local level of social care need in residential care. The analysis assumed that all older people in residential care across England, either supported by a local authority or privately funded, would meet the “national” implicit minimum eligibility criteria for social care.

The number of residential care users associated with a given authority was calculated as the sum of the care home residents supported by the authority (living in the authority or in an out of area placement) and the numbers of private residents living in the area.

The number of supported residents was taken from the S2 returns provided by the authorities. Since not all supported care home residents reside within the local authority responsible for funding their care, numbers of state-funded recipients were first redistributed to their area of residence on the basis of pooled Capturing Regulatory Information at a Local Level (CRILL) data collected between 2007 and 2009¹. This data provides a matrix showing the distribution of out-of-area placements between local authorities. The effect of out-of-area placements is particularly marked in a number of inner-London authorities that host a small number of care home residents relative to the number funded.

The number of privately-funded care home residents was estimated by subtracting the number of supported residents living in a given area from the number of older people in residential and nursing homes according to Census 2011.

¹ CRILL data stopped being collected in 2009.

4.1.2 Local need in the community

Whereas it can be assumed that all older people living in institutions are sufficiently dependent to meet the “national” minimum needs eligibility threshold, it is much more difficult to establish what proportion of older people in the community would do so. We describe below two strategies for estimating the numbers of community residents in need of social care drawing on evidence from the Census 5% Sample and the English Longitudinal Study of Ageing (ELSA).

The **5% sample of the Census** provides a range of relevant individual-level indicators including age and gender distributions, household size (a strong proxy indicator for receipt of informal care), limiting long-standing illness, home ownership and self-rated health. The very large size of this sample allows the evidence to be aggregated at the local authority level. Census data do not, however, provide indicators of physical dependency which differentiate accurately between different disability levels to determine likely eligibility for care services. Equally, the indicators of socio-economic status contained in the Census 2011 are limited proxies of whether an individual would be entitled to means-tested financial support from the local authority.

Individual level surveys such as the English Longitudinal Study of Ageing (ELSA), on the other hand, provide detailed indicators of need including ability to carry out physical tasks - Activities of Daily Living (ADLs) - and household tasks – Instrumental Activities of Daily Living (IADLs). ELSA also contains detailed information on income and wealth which allows the current means-testing arrangements to be replicated in the model. These surveys, however, are too small to allow estimates to be derived for each local authority.

In what follows, we use two approaches for combining these types of data in order to produce local authority level estimates of relative need.

4.1.2.1 *The ELSA-based estimates of need in the community*

The first method uses individual-level data from pooled ELSA waves to construct a representative sample of community-based older people in England. As a panel dataset, the ELSA sample allows for the observation of care pathways over time at the individual level. For the purposes of this analysis, however, the principle aim was to construct a maximally populated dataset representative of patterns of need prior to reform. To increase the size of the sample – an important consideration given the need to stratify subjects per their characteristics - data from three waves of ELSA data (collected in 2006-07, 2008-09 and 2010-11) were pooled together as a single, cross-sectional sample of 14,663 older people. Data from the 2006-07 and 2008-09 waves were reweighted and rescaled to match 2010-11 population distributions and income levels (Figure 1 provides details of the process undertaken). Adults aged below 65 and those that had moved into institutional settings were excluded from the ELSA analysis sample.

The pooled ELSA dataset provides a nationally-representative sample of older people in the community with information about many of their need and socio-economic characteristics, including:

- Age
- Gender
- Housing tenure
- Benefit receipt
- Income
- Asset wealth
- Receipt of informal care
- Receipt of formal care services
- Longstanding illness
- ADL dependency
- IADL dependency.

Local authority-level information from the 2011 Census was used to reweight the ELSA sample to reflect individual local authority profiles, according to weights reflecting:

- Age and gender distributions (from 2011 Census)
- Limiting longstanding illness stratified by age and gender (from 2011 Census)
- Receipt of pension credit stratified by age and gender (from DWP)
- Attendance allowance take-up (from DWP)
- Living alone stratified by home ownership (from 2011 Census).

To ensure that the derived local authority population distributions were aligned simultaneously with each of the above measures, a ‘raking’ process was applied, iteratively applying each weight until convergence is achieved across all measures. The resulting 151² local authority weights yield a ‘reshaped’ ELSA sample that reflects the characteristics of each local authority population, and provides estimates of the number of community-based residents in each local authority with particular combinations of characteristics in terms of needs, informal care, income and wealth and living arrangements.

To determine which proportion of the population of older people in each local authority would meet the social care eligibility criteria, we: (1) calculated the need characteristics of the current population of older people receiving local authority supported community care services in England (2) estimated “typical care packages” allocated to them (3) determined the assessable income of the population of community recipients in each local area and (4) identified the individuals within each area that would meet needs and/or means-testing eligibility criteria. The stages of the process are summarised in Figure 1.

Pooled data from the Adult Social Care Survey (ASCS) were analysed to determine the distribution of need characteristics of the population of older community-based state-funded care recipients in England. The total numbers of community-supported individuals in England with combinations of ADL count, 10-year age group, gender and informal care receipt were estimated by inflating the

² Results excluded the Isles of Scilly owing to data constraints due to small sample sizes.

ASCS distribution to national levels reported in Referrals Assessment and Packages of care returns (2012/13). The probability of care receipt for individuals with different characteristics was derived by comparing their numbers (on the basis of the ASCS data) against the total number of community residents in England with the same characteristics (on the basis of the reweighted ELSA sample). These probabilities were named “targeting ratios” and describe the likelihood that individuals with certain combinations of need-related circumstances will satisfy the needs eligibility threshold.

Care package data from ASCS and the Individual Budgets Service Evaluation Network (IBSEN) project were used to calculate the cost of care services corresponding to clients with combinations of the characteristics listed above.

Current means testing rules were applied to individuals in the ELSA sample in order to estimate their assessable income.

For each individual, their assessable income was compared against the size of their care package in order to determine their eligibility to local authority financial support (those individuals whose assessable income did not exceed the cost of care package were assumed to be entitled to local authority supported care). The value of disability-related disregards was adjusted to the needs of individuals, and set overall to ensure that (i) aggregated care packages costs were aligned with national-level expenditure on community-based services as reported in 2012/13 PSS EX1 data and (ii) the total numbers of recipients across authorities corresponded to levels reported in 2012/13 PSS RAP data at the national level.

The numbers of older people with care needs in the community in each local authority were estimated by applying the targeting ratios to corresponding cell counts from the ELSA-based model. In other words, the reweighted ELSA population of older people in each local authority was segmented by combinations of ADL count, 10-year age group, gender and informal care receipt. The number of older people in each of the segments was then multiplied by its corresponding targeting ratio as defined above in order to get numbers of individuals in each group that would satisfy the needs eligibility criteria. Furthermore, by replicating the existing means testing arrangements, the analysis was able to split the population of older people with social care needs between those that would receive financial support from the local authority and those that would need to fund independently their services.

4.1.2.2 The Census-based estimates of need in the community

An alternative method for estimating need levels in the community was developed using individual-level data with local authority identifiers from the 5% sample of the 2001 Census (the corresponding dataset for the 2011 Census was not available at the time of the study).

While the 5% sample of the Census provides a large and representative sample of residents in each local authority, it does not contain detailed indicators of dependency or income and wealth. We therefore conducted analyses of data from ELSA waves 1-5 to model the correlations between characteristics common to both datasets and more detailed indicators of need and wealth available

in ELSA and necessary to determine eligibility to local authority support. On the basis of these predictions, we synthetically imputed ADL and IADL counts, informal care receipt, pension credit receipt, income and wealth based on explanatory variables in the Census dataset, including:

- Age and gender
- Limiting longstanding illness (LLSI)
- Self-reported health status
- Availability of informal care
- Home ownership
- Household composition
- Marital status.

Where relevant, the analysis of the relationship between individual proxies of need and wealth available in Census and indicators of ADL, IADL, informal care and wealth were stratified. Due to limitations in the numbers of cases, we truncated the indicators of ADL to 3 problems, and defined the indicator in terms of difficulties, in line with ELSA. In order to improve the precision of predicted non-housing wealth, pension credit receipt was imputed as a first stage and rescaled at the local authority level within the Census sample to match expected figures. Additional imputations were conducted using data from the British Household Panel Survey (BHPS) waves 10, 11, 12, 13, 15, 16 and 17. Further details of the imputation process are provided in Fernandez & Snell (2013).

Unlike the ELSA-based model which categorises individuals in terms of likely eligibility in terms of physical dependency, eligibility in the Census-based model is defined in terms of combinations of ADL and IADL limitations. Assumptions are then required about the number of ADL activities that correspond to the current need threshold across England.

Figure 1: Overview of the main stages of the weighted ELSA-based dataset

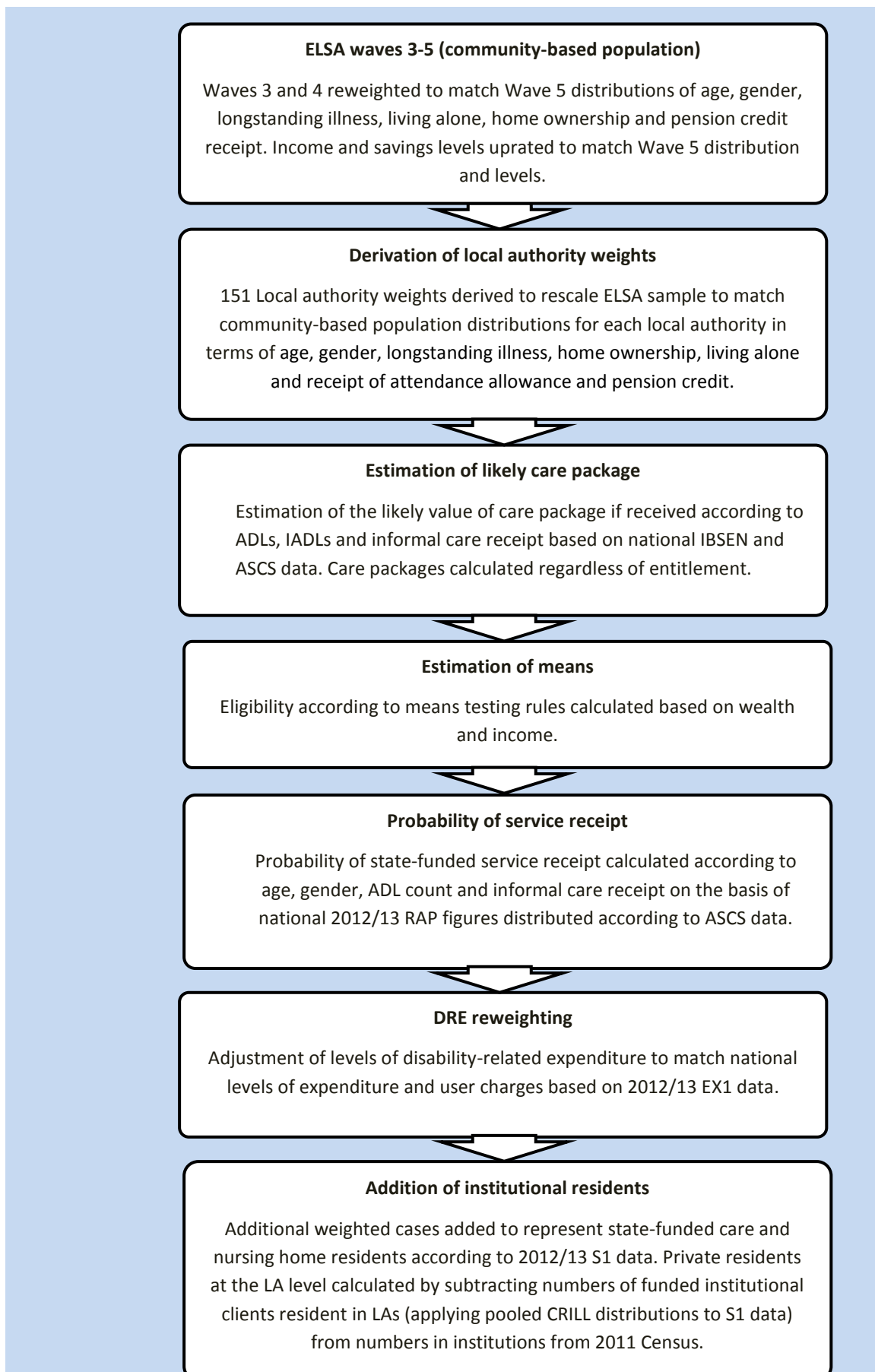


Figure 2 Overview of sources used in constructing the Census-based dataset

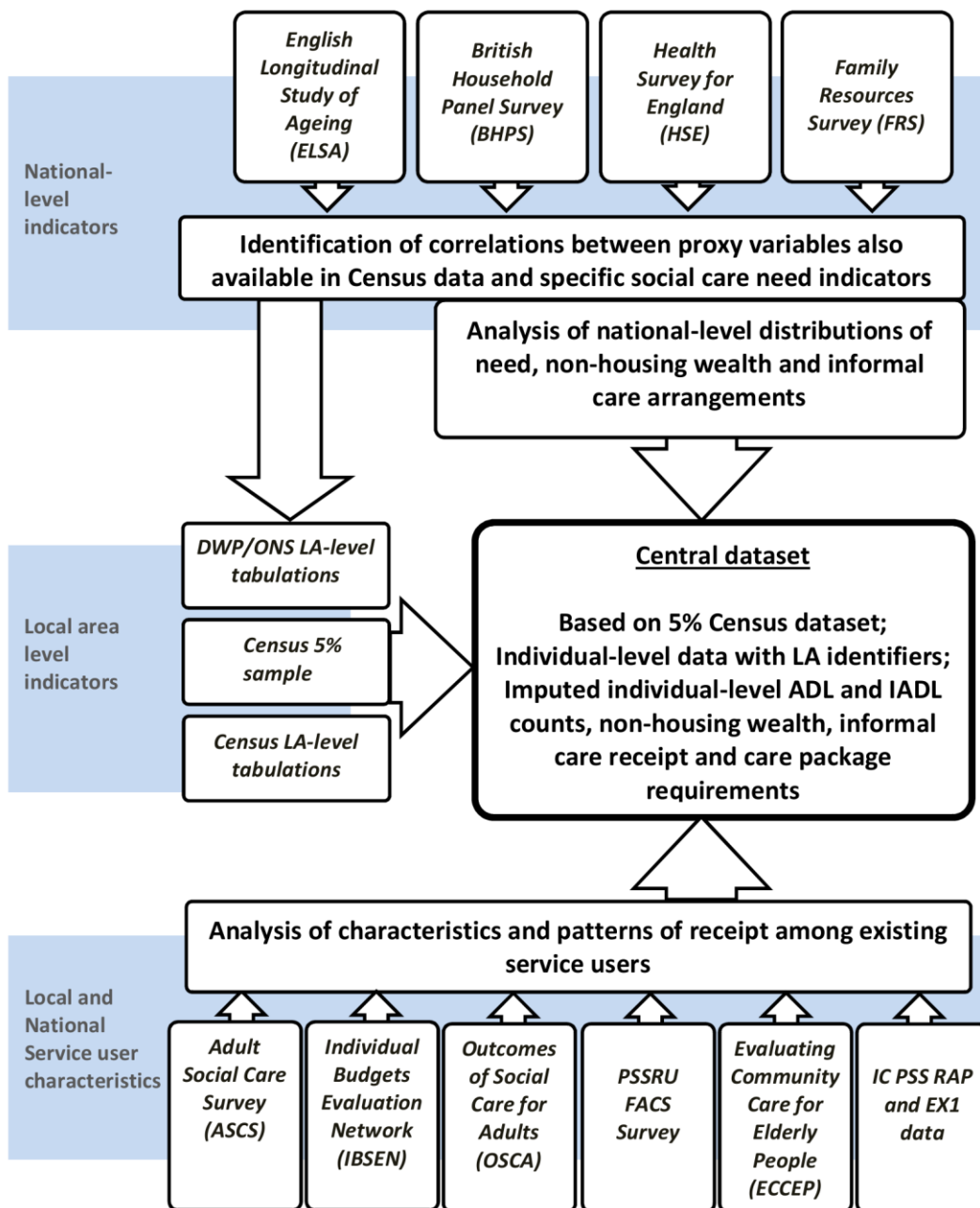
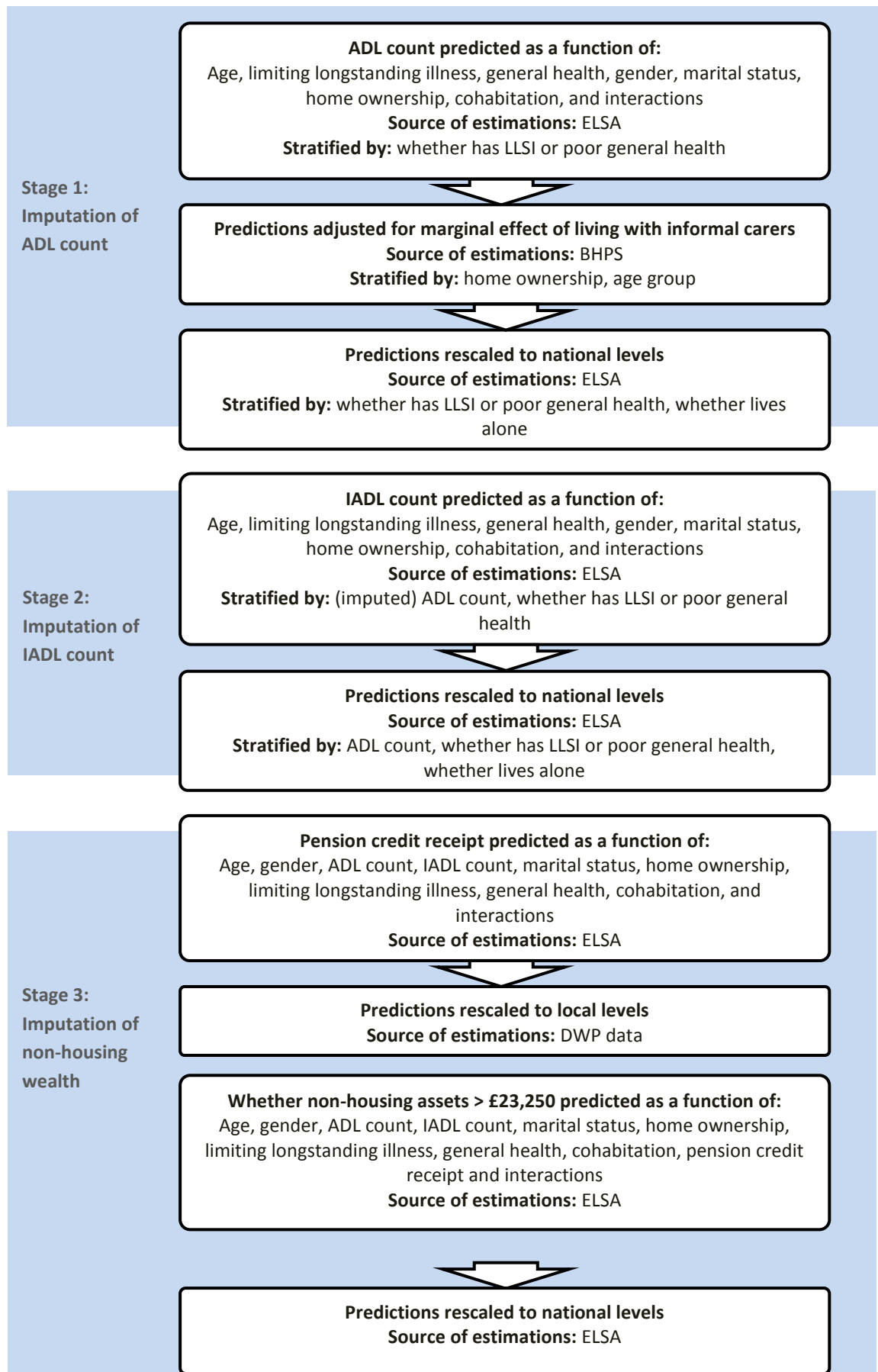


Figure 3: Overview of the main stages of imputation of variables in Census-based dataset



4.2 Estimating additional need for assessments

In the analysis we make the assumption that, post-reform, the total number of assessments in a given area will be proportional to the total number of individuals in the LA that would meet the national needs eligibility criteria. Following the discussion above, this figure can be estimated by summing the numbers of individuals in residential care and in the community with care needs, using one of the two methodologies developed.

Because the models allow the decomposition of the population of older people in each local authority between those that meet the needs and/or financial eligibility criteria, the additional burden of assessments can be approximated by the number of individuals in an authority that would meet the needs eligibility criteria but that are not entitled to local authority financial support. In the following sections, we refer to this quantity as the additional burden of assessments, which is expressed either overall or per capita (per number of older people).

Let:

- O^i represents the population over 65 in area i
- N^i represent the number of individuals in area i that meet the national needs eligibility criteria
- N_S^i represent the number of individuals in area i that meet the national needs eligibility criteria and that would receive financial support from the local authority
- N_P^i represent the number of individuals in area i that meet the national needs eligibility criteria and that would pay privately for their care

Based on the results of the models, we can define the following quantities

- Total relative need for assessment index, $I_T^i = \frac{N^i}{\sum_{j=1}^{151} N^j}$
- Per capita relative need for assessment index $I_R^i = \frac{N^i}{O^i}$
- Total relative need for additional assessment index $I_{TA}^i = \frac{N_P^i}{\sum_{j=1}^{151} N_P^j}$
- Per capita relative need for additional assessment index $I_{RA}^i = \frac{N_P^i}{O^i}$
- Total relative need for supported assessment index $I_{TS}^i = \frac{N_S^i}{\sum_{j=1}^{151} N_P^j}$
- Per capita relative need for supported assessment index $I_{RS}^i = \frac{N_S^i}{O^i}$

Whereas all indices are useful from the point of view of checking the validity of the modelling results, the central indicators for the analysis are I_{RA}^i and I_{TA}^i .

5 Key assumptions and caveats

The model makes a number of important simplifying assumptions that need to be borne in mind.

Behavioural homogeneity: The model assumes that the likelihood that somebody will present him/herself for an assessment is the same among private clients and supported care recipients, other things being equal. Whether this is true will depend, among other things, on whether and when self-payers will feel it is to their advantage to get assessed in order to start metering towards the care cap.

Equivalence of the intensity of assessments: the analysis makes the assumption that all assessments will require identical resources to be carried out, regardless of the level of need of the individual and whether the individual is currently a self-payer or supported by the local authority. This might not be the case if, for instance, local authorities develop different systems (e.g. telephone assessments or self-assessments) to deal with the additional number of assessments.

Patterns of out of area placement: With no recent data available for the distribution of out-of-area placements (care home clients funded by one local authority but resident in another), assumptions have been based upon pooled data collected in CRILL returns from 2007 to 2009.

Area level reweighting: The central dataset in the model comprises individual-level data, with the aim of capturing inter-dependencies and interactions between individual-level characteristics. However, these data are reweighted on the basis of aggregate local authority indicators (age distributions, proportion of older people with limiting longstanding illness, etc). The aggregate data used to create local authority weights have two limitations: firstly, they are limited in their capability to capture variation across the entire need distribution, and in particular to reflect differences between local authorities in terms of the number of people with the highest levels of dependency. Secondly, the stratification of local authority indicators is limited according to the cross-tabulations provided on the basis of 2011 Census data (limiting longstanding illness, for example, is available at the local authority level broken down by of age and gender; but not by home ownership and household size). Availability of the 2011 5% Census sample (not published at the time of writing) would improve the potential for further interactions to be explored, although cell-count issue may constrain the potential to expand significantly the reweighting process.

Continuing Health Care users: at present, approximately 50,000 individuals in England are receiving Continuing Health-Care. Around one half of them will be supported in residential and nursing care homes. Ideally, the analysis would exclude individuals who receive continuing healthcare in institutions, as they are unlikely to require a social care assessment. However, the analysis was unable to do so due to the lack of good quality data about the take-up of continuing care across English local authorities.

Homogeneity of relationship between individual characteristics and local resource need: the analysis uses individual level data about the needs, income and wealth of individuals to derive

estimates of need for social care services at the local level. In doing so, it assumes that the relationship between individual characteristics and local resource requirements is the same across all local authorities. It might be, however, that the service requirements associated with certain needs varies depending on local factors such as population density or deprivation.

6 Quality assessment of the models

A series of tests were conducted to assess the reliability and face validity of the two proposed modelling methods. In particular, we performed the following tests:

- Consistency between ELSA and CENSUS based estimates.
- Correlation between per capita relative need for supported assessment index (defined as I_{RS}^i in Section 4.2) and the 2014/15 RNF for older people's PSS.
- Correlation between estimates of supported and additional assessments and local indicators of need and wealth.

6.1 Consistency between ELSA and CENSUS-based estimates

Although using different methodologies, the ELSA and CENSUS-based approaches should generate indicators that are very highly correlated. This hypothesis is confirmed by Figure 4 and Figure 5, which show a very high correlation between the two sets of estimates at the population level (97.7%) and at the per capita level (86.6%), respectively.

Figure 4: Correlation between the total relative need for supported assessment index according to the ELSA-based and the Census-based model: local authorities in England

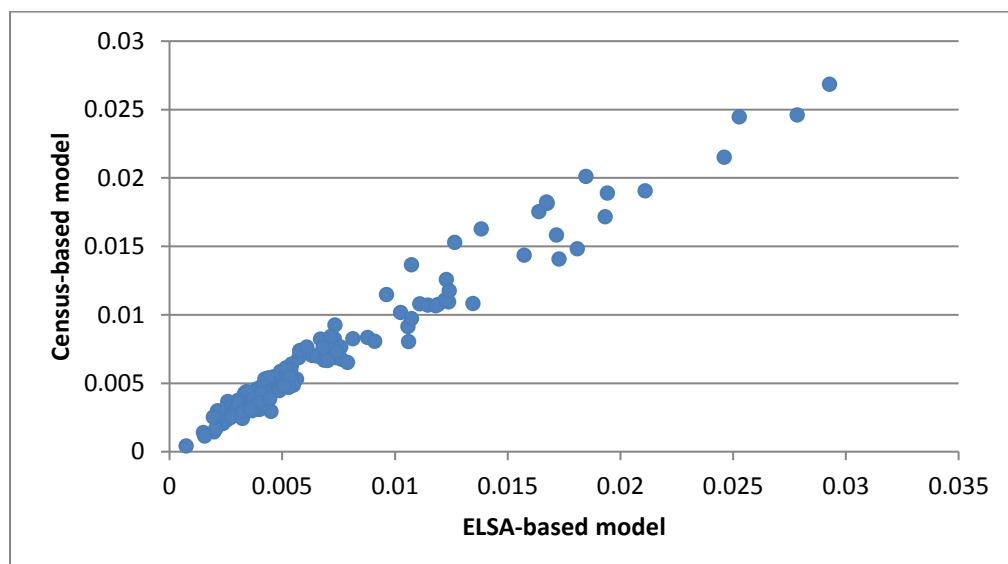
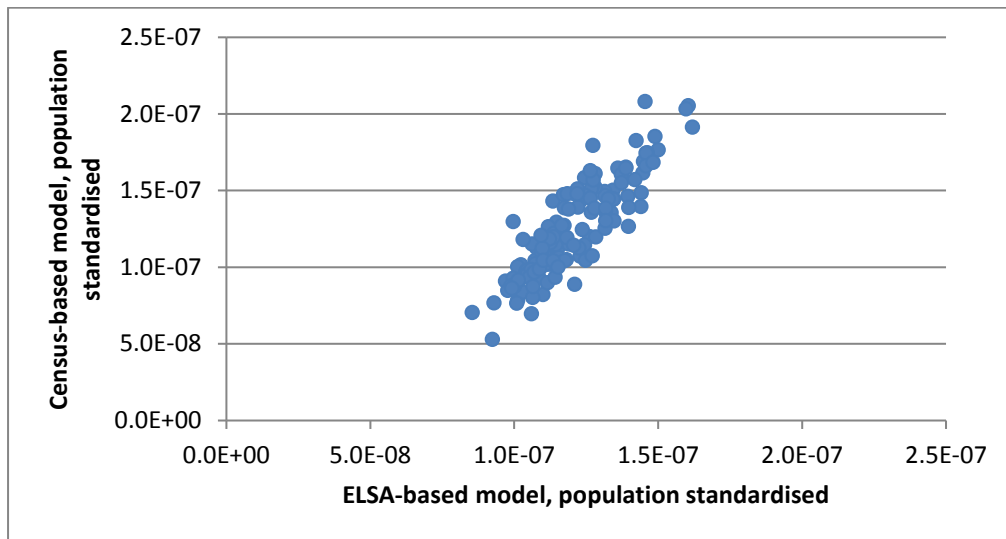


Figure 5: Correlation between the per capita relative need for supported assessment index according to the ELSA-based and the Census-based model: local authorities in England



6.2 Correlation between per capita relative need for supported assessment index and the 2014/15 RNF for older people's PSS

The models' estimates of the number of supported individuals with social care needs should have a strong (if not perfect) correlation with the overall social care RNF estimate for older people. We therefore test the correlation between the two indicators: overall, per capita, and after controlling for area inflation effects in the RNF estimates (using the Area Cost Adjustment - ACA).

It should be noted that a perfect correlation with 2014/15 RNF figures should not be expected for a number of reasons. Existing RNF formulae use a somewhat different set of proxy indicators for wealth, dependency and informal care with a different baseline year for estimates. Moreover, the 2014/15 RNF figures include adjustments to allow for varying costs of service provision between authorities and between types of support, rather than simply reflecting underlying levels of eligible individuals.

6.2.1 Population level correlation

Figure 6 illustrates the correlation between the local estimates of overall relative need for supported assessments based on the ELSA-based model and the 2014/15 RNF for older people's PSS. The correlation coefficient was extremely high (99.0%), driven largely by the correlation between the two indices and local levels of older population. The most visible outliers tended to be large authorities, where discrepancies between formula shares according to different methods are most amplified. Controlling the RNF estimates for local prices using ACA values increased the level of correlation with the ELSA-based estimates from 99.0% to 99.3%.

In terms of the Census-based estimates, setting in the model an eligibility level equivalent to at least two ADLs and one IADL provides the closest correlation to 2014/15 RNF figures. Under these assumptions, the correlation coefficient is 97.8% (Figure 7), rising to 98.2% after controlling for ACA.

Figure 6: Correlation between the 2014/15 RNF for older people's PSS and the total relative need for supported assessment index for older people according to the ELSA-based model: local authorities in England

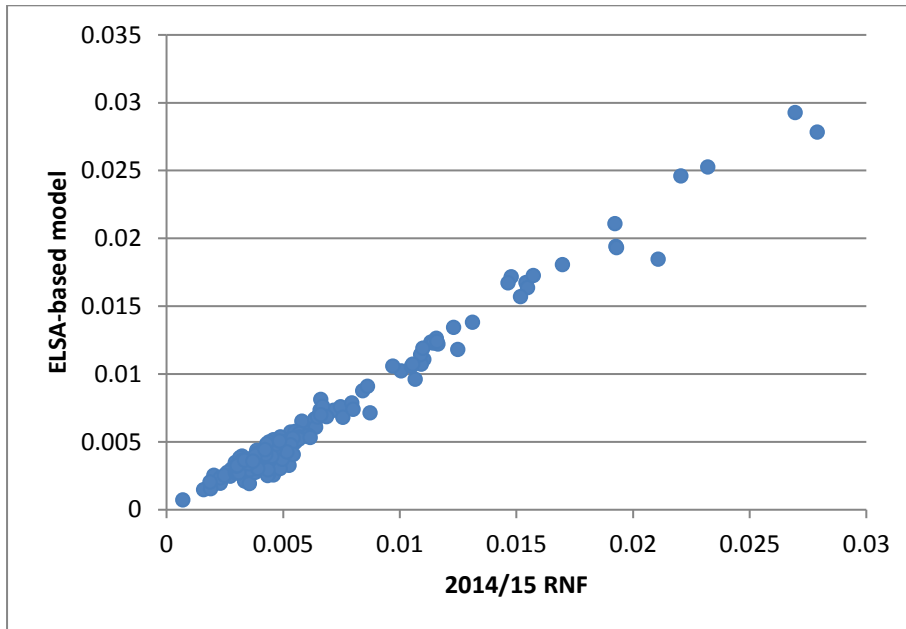
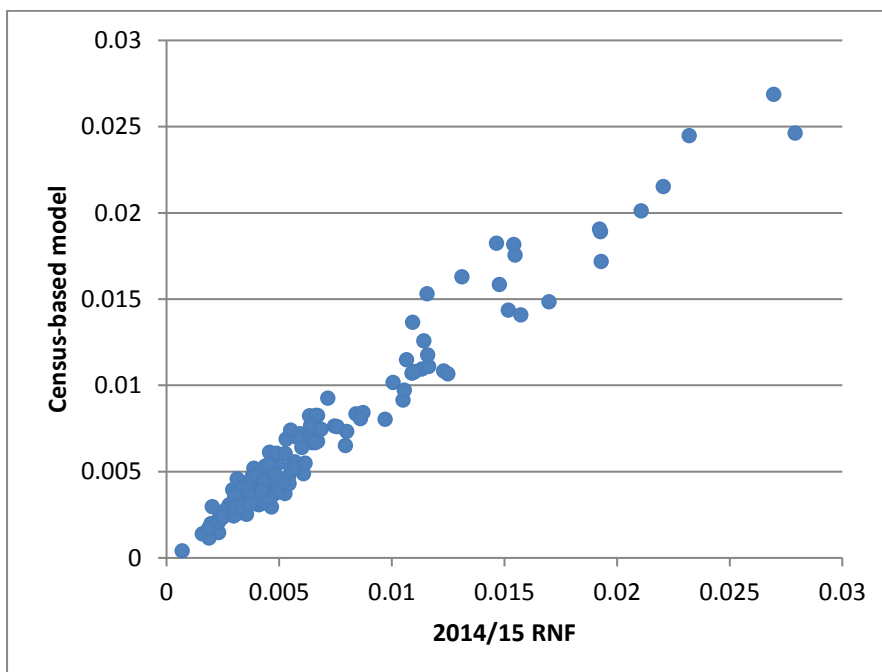


Figure 7: Correlation between the 2014/15 RNF for older people's PSS and total relative need for supported assessment index according to the Census-based model: local authorities in England



6.2.2 Per capita level correlation

Controlling for the size of local authorities, the correlation coefficient between the 2014/15 RNF and the per capita ELSA-based estimates was 67.7%, rising to 78.7% when controlling for ACA (Figure 8). The correlation coefficient with the per-capita Census-based estimates based on an eligibility level equivalent to at least two ADLs and one IADL was 72.0%, rising to 79.3% after controlling for ACA (Figure 9).

Figure 8: Correlation between the 2014/15 RNF for older people's PSS and the per capita relative need for supported assessment according to the ELSA-based model: local authorities in England

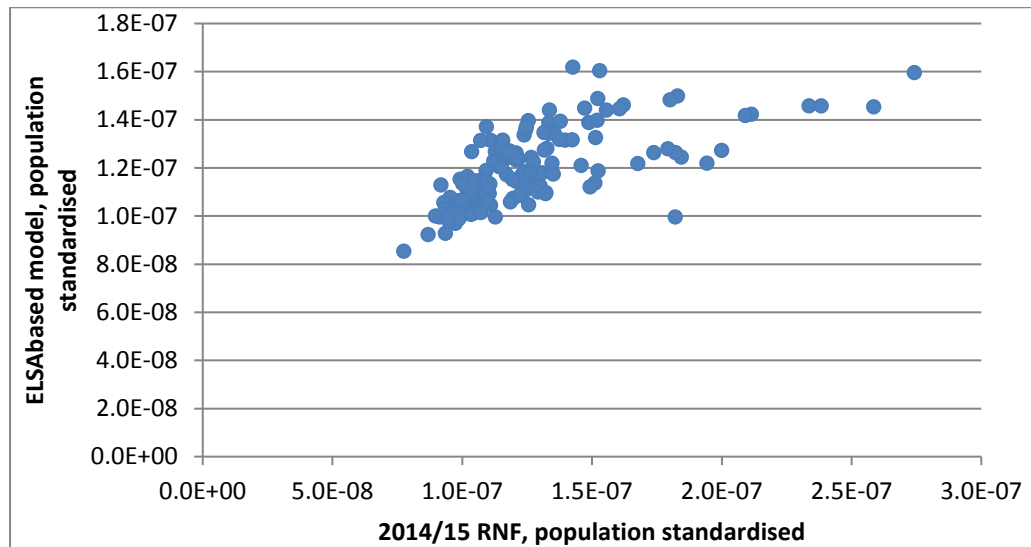
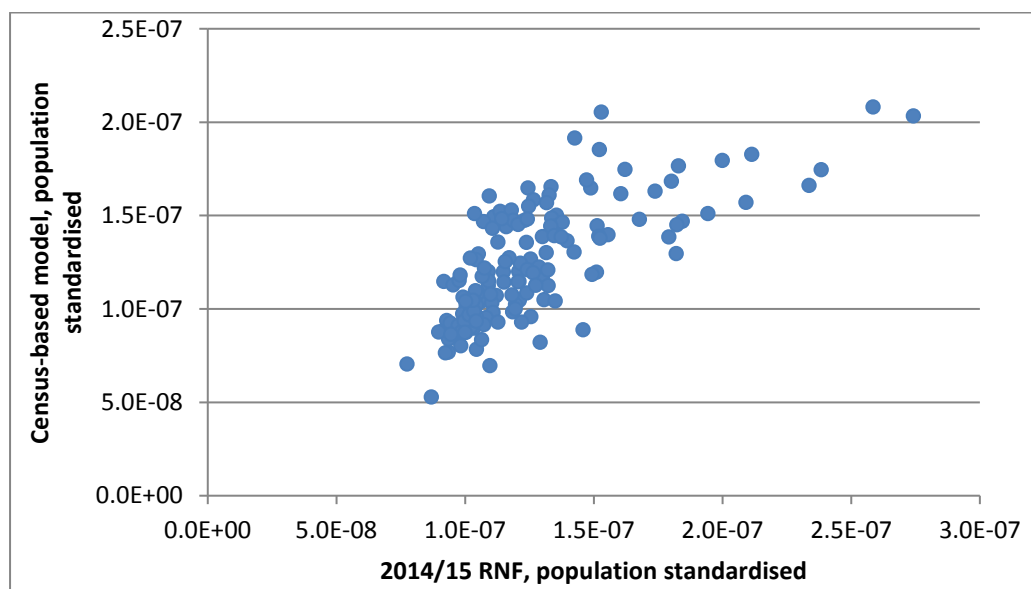


Figure 9: Correlation between the 2014/15 RNF for older people's PSS and the per capita relative need for supported assessment index according to the Census-based model: local authorities in England



Implications: Both the ELSA-based and CENSUS-based methods show a high level of correlation against existing formulae, particularly in terms of total numbers of supported individuals within each local authority. In addition to providing the closest alignment to existing RNF shares in terms of overall numbers of eligible adults, however, the ELSA-based model has the advantage of greater simplicity and transparency relative to the Census-based approach. In particular, it uses weighting in place of imputation to triangulate data from different sources – imputation being a method that, while statistically sound, is not as readily understood or as easily replicated.

For these reasons, *we recommend the ELSA-based model over the CENSUS-based method*, and concentrate exclusively in the remainder of this report on estimates derived from the ELSA model.

6.3 Correlation between model estimates and local characteristics

The ELSA-based estimates underwent a number of additional checks to ensure that they accurately reflected observed distributions in terms of demographics, dependency, income and wealth and levels of service utilisation at national and local levels. Regression models were run using the model's estimates of supported and additional assessments to check the face validity of their relationships with indicators of local need and wealth.

Table 1 shows the equation predicting per capita relative need for supported assessments standardised by older population. The correlations are in keeping with a priori expectations: after standardising for the size of the older population, higher rates of attendance allowance receipt and higher levels of receipt of pension credit are significantly correlated with an increased share of supported clients. Higher proportions of older people living alone, higher proportions of females in the older population and higher density levels (older people per square km) are also significantly correlated with an increased share of supported assessments. The regression shows a close fit to the data with an adjusted R-squared of 85%.

A corresponding model predicting the share of additional assessments per capita is reported in the results section (Table 4). These results also show the expected effects, and in particular a reversal of the effect of pension credit, which becomes negatively associated with the share of additional (and therefore unsupported) assessments.

Table 1: Linear model predicting per capita relative need for supported assessment index

Source	SS	df	MS	Number of obs	
				F(8, 142)	151
Model	0.010779	8	0.001347	Prob > F	0
Residual		142		R-squared	0.859
	0.00177		1.25E-05	Adj R-squared	0.851
Total	0.012548	150	8.37E-05	Root MSE	0.00353

	Coef.	Std. Err.	T	P>t	[95% CI]
Proportion receiving AA	0.0745	0.0181	4.110	0.000	0.0387 0.1104
Proportion with high LLSI (85+)	-0.0219	0.0140	-1.570	0.119	-0.0496 0.0057
Proportion own home	-0.0028	0.0061	-0.460	0.643	-0.0148 0.0092
Proportion receiving PC (80+)	0.0645	0.0089	7.210	0.000	0.0468 0.0821
Proportion live alone	0.0920	0.0127	7.230	0.000	0.0669 0.1171
Proportion female	0.1173	0.0312	3.760	0.000	0.0557 0.1790
Density (65+/km2)	0.0000	0.0000	-3.410	0.001	0.0000 0.0000
Population 65+	0.0000	0.0000	-0.630	0.530	0.0000 0.0000
Constant	-0.0450	0.0173	-2.610	0.010	-0.0791 -0.0109

6.4 English-level triangulation

A grossing weight for England was created by adding together the 151 local authority weights in the ELSA sample. Applying these weights, we compared implied levels of service use and corresponding charges and expenditure in the model to 2012/13 figures from PSS RAP and EX1 data published by the Health and Social Care Information Centre (HSCIC). As Table 2 shows, the modelled levels (calculated at the individual level on the basis of ADL and IADL counts, informal care receipt and assessable income and wealth) were all broadly in keeping with HSCIC figures, the greatest disparity being in terms of the total value of charges, which was 12.9% higher than the EX1 total on the basis of the weighted model. These figures are sensitive in particular to assumptions around the distribution of disability-related disregards by level of dependency in the model (for which data are not available).

Table 2: Target and modelled numbers of supported community care recipients and corresponding expenditure, charges and care packages

	Target	Modelled results	Modelled results relative to target (%)
Number of community recipients of state-funded care	417,740	428,933	102.7%
Total gross expenditure on community care (£m)	£2,705m	£2,960	109.4%
Average value of community care package (£)	£6,476	£6,900	106.5%
Total value of charges (£m)	£434m	£490m	112.9%

Correlations between model estimates and Information Centre data are also reported in terms of numbers of clients (Figure 10) and expenditure (Figure 11) at the local authority level. Importantly, however, some inconsistency between the two measures is to be expected; whereas observed behaviour (RAP and EX1) is driven in part by local targeting decisions, modelled results assume national average behaviours in terms of provision and care package cost according to individual-level characteristics.

Figure 10: Correlation between numbers of supported community care recipients according to RAP (2012/13) and ELSA-based model: local authorities in England

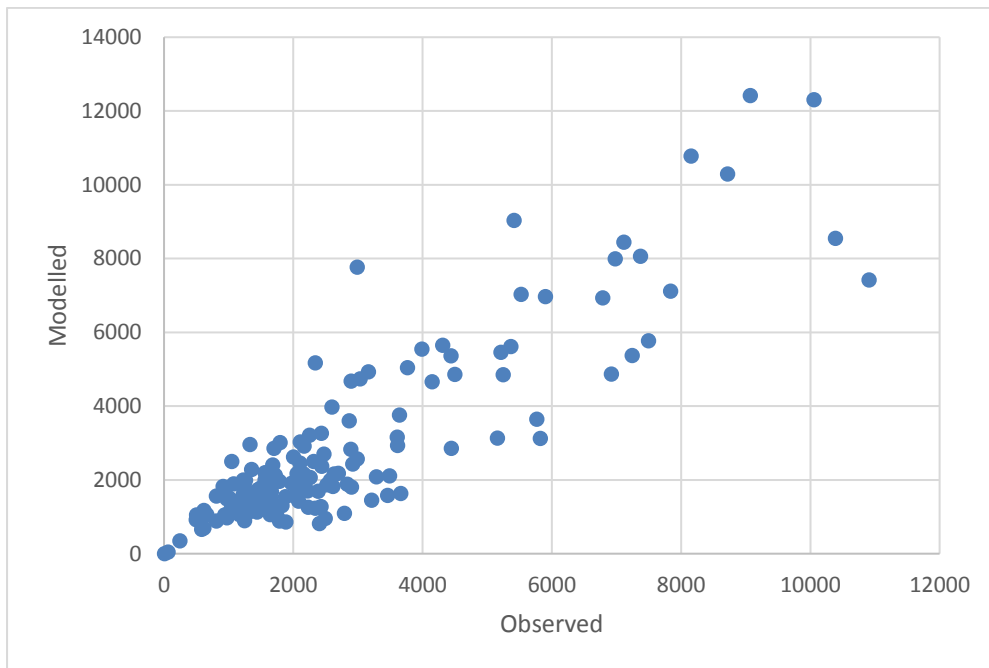
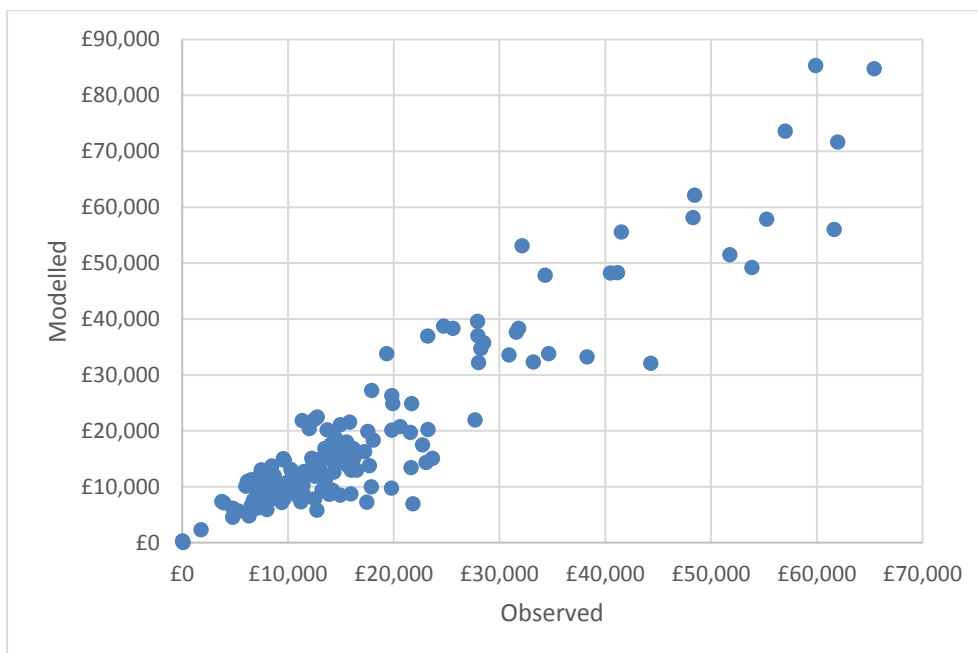


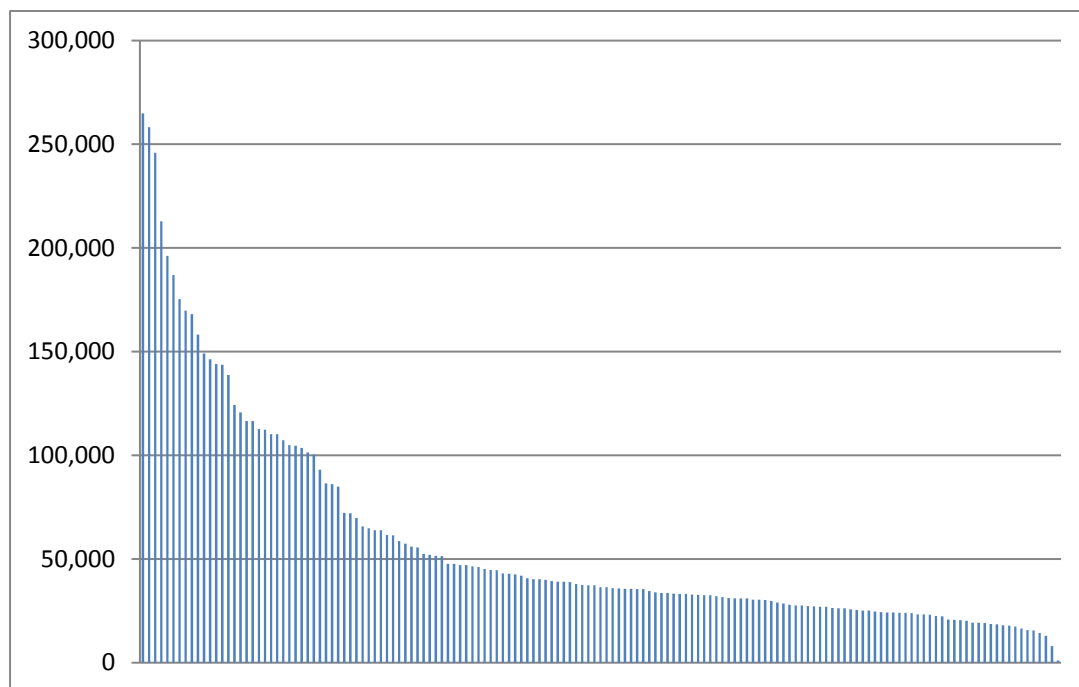
Figure 11: Correlation between community care gross current expenditure according to EX1 (2012/13) and ELSA-based model: local authorities in England



Further checks confirmed that the weighted ELSA sample was consistent at the local authority with observed distributions of age and population, longstanding illness, pension credit and attendance allowance receipt, living alone and home ownership according to the target levels reported in ONS, Census, and DWP sources. Weights were applied using an iterative raking process with a total of five cycles in order to achieve convergence.

Population size is by far the single greatest determinant of formula share, and varies substantially across local authorities: The largest authority in terms of population aged 65+ contains over 250,000 older people, whereas the smallest contains little over 1,000 (Figure 12).

Figure 12: Population aged 65+ by local authority



Over and above population size, numbers of adults with eligible needs that fall within current means testing rules range from 5% to 10% of older people (Figure 13). The modelled distribution on the basis of the ELSA-based model does not account for local preferences in targeting policies, and therefore shows less variation than numbers of supported residents per capita as reported in RAP and S1 returns for 2012/13 (Figure 14).

Figure 13: Proportion of older population with supported needs according to the ELSA model

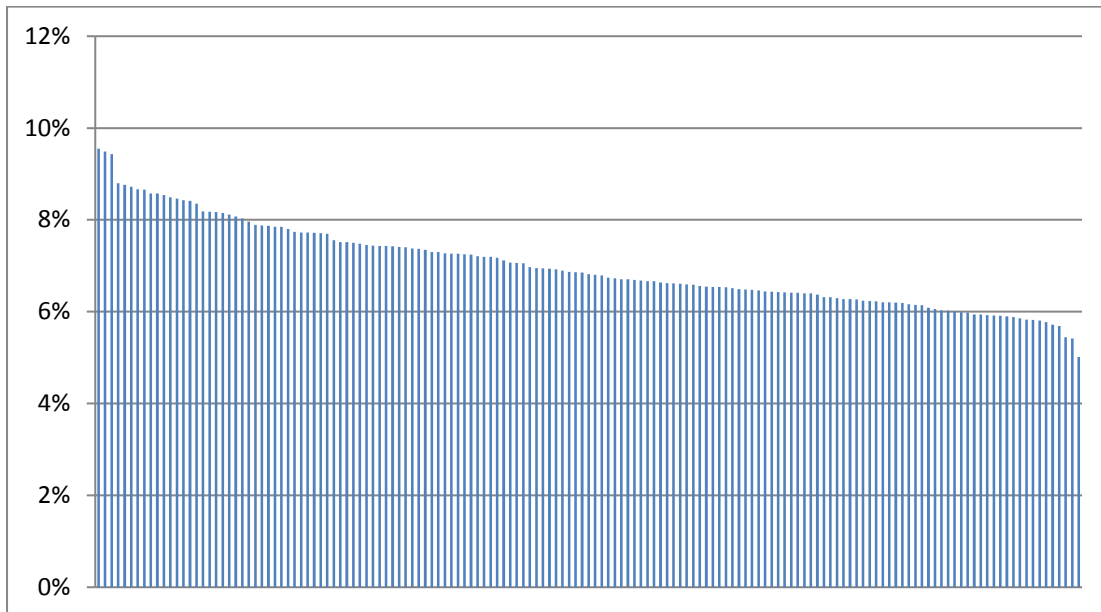
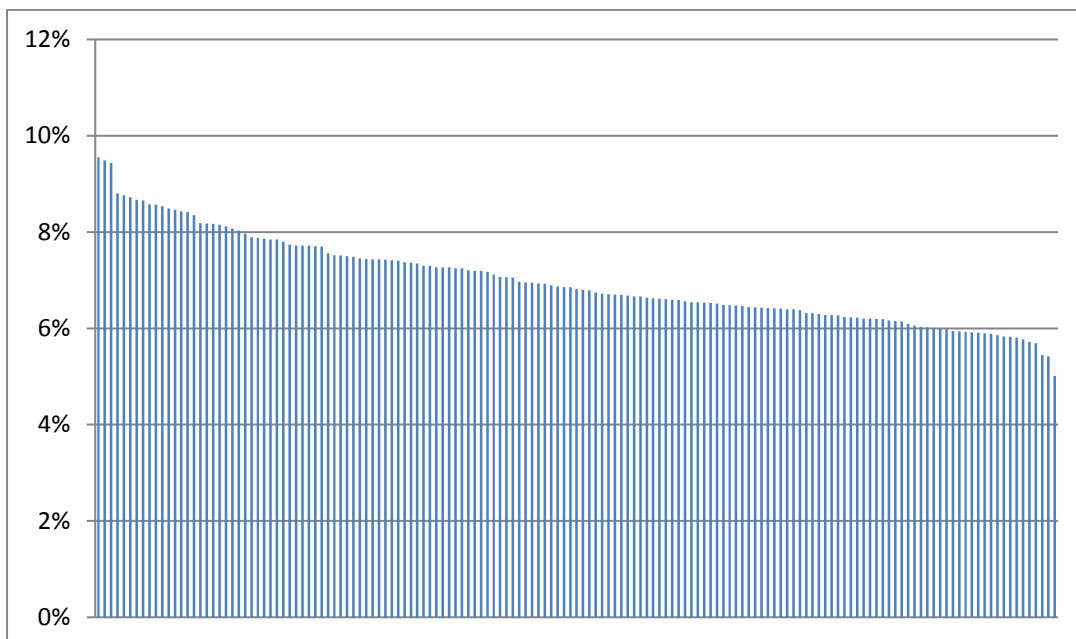
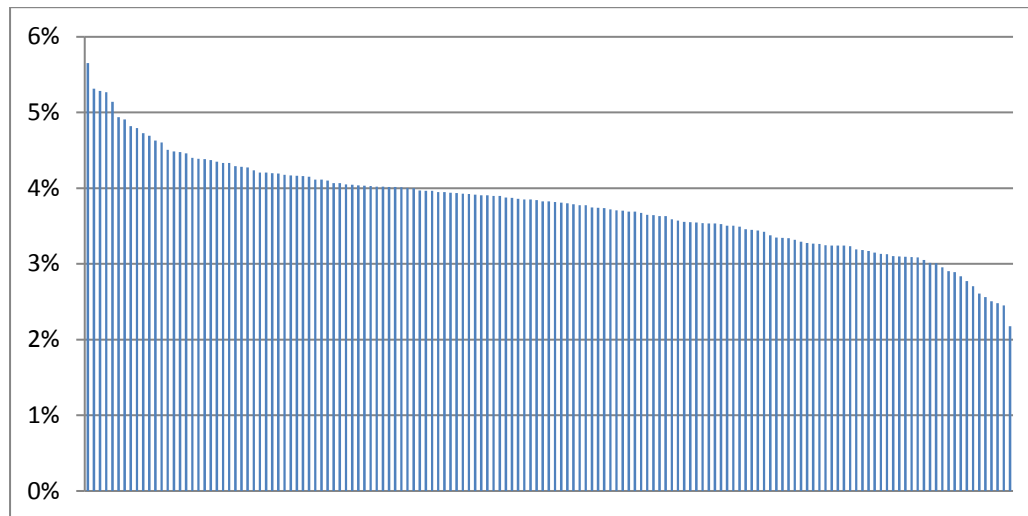


Figure 14: Proportion of older population in receipt of a state-funded care package according to 2012/13 RAP and S1 data



A greater level of variation between local authorities is evident in terms of the proportion of the older population estimated to have eligible needs and excluded by current means testing rules (corresponding to the need for additional assessment). Estimates of the additional burden of assessments range from 2.2% to 5.7% of older people at the local authority level (Figure 15).

Figure 15: Proportion of older population need for additional assessment according to the ELSA model



7 Estimates of relative needs

The reweighting method followed by the ELSA-based model allows for the simulation of local authority characteristics while maintaining the integrity of interactions between effects. Estimates of the per capita need for additional assessments can be derived directly using the reweighted local authority samples by aggregating the numbers of individuals with eligible needs but ineligible for financial support. Using these “direct” estimates has the advantage that it minimises the loss of information associated with further statistical manipulation of the data.

Traditionally, however, relative needs estimates are calculated on the basis of a linear formula that links local characteristics to estimates of relative needs by applying a set of coefficients. This method has a number of advantages. Specifying a regression-based model affords greater transparency by explicitly expressing the relative effect of different local characteristics on the estimates of needs. Moreover, eliciting formulae directly from the weighted model is impractical in that it does not allow for formulae to be updated as new data became available (updated population distributions, pension credit data, etc.). To address this, a regression model was fitted to estimate coefficients for predicting relative needs across areas. This allows for revised formulae to be calculated on the basis of an equation much in the same way as the existing older people’s PSS RNF for 2014/15.

Explanatory variables within the regression model (Table 3) were broadly aligned with those used to weight the ELSA dataset – both by necessity (in that the same data availability limitations applied) and by design (maximising consistency between weighed and regression-based estimates). These variables included proxies of need (AA receipt per capita and proportion of the older population aged 85+) and wealth (home ownership per capita and pension credit receipt among adults aged 80+). The development of the model also tested the sensitivity of including and excluding predictor variables using forward and backward selection techniques.

Table 3: Derivation of local authority-level explanatory variables

Measure	Source	URL
Proportion receiving AA		
Number of AA cases in payment aged 65+ in LA	DWP November 2011 cases in payment	http://tabulation- tool.dwp.gov.uk/100pc/aa/ccla/cnage/a_carate_r_cc la_c_cnage_nov11.html
<i>divided by:</i>		
Number of adults in LA aged 65+	ONS mid- 2011 population estimates	http://www.ons.gov.uk/ons/rel/pop- estimate/population-estimates-for-england-and- wales/mid-2011--2011-census-based-/rft---mid- 2011--census-based--population-estimates-for- england-and-wales.zip
Proportion aged 85+		
Number of adults in LA aged 85+	ONS mid- 2011 population estimates	http://www.ons.gov.uk/ons/rel/pop- estimate/population-estimates-for-england-and- wales/mid-2011--2011-census-based-/rft---mid- 2011--census-based--population-estimates-for- england-and-wales.zip
<i>divided by:</i>		
Number of adults in LA aged 65+	ONS mid- 2011 population estimates	http://www.ons.gov.uk/ons/rel/pop- estimate/population-estimates-for-england-and- wales/mid-2011--2011-census-based-/rft---mid- 2011--census-based--population-estimates-for- england-and-wales.zip
Proportion own home (Household reference person aged 65+)		
Number of persons with ownership or shared ownership (Household Reference Person aged 65+)	Census 2011	http://www.nomisweb.co.uk/census/2011/lc4201ew
<i>divided by</i>		
Number of persons with any category of tenure (Household Reference Person aged 65+)	Census 2011	http://www.nomisweb.co.uk/census/2011/lc4201ew
Proportion receiving PC (80+)		
Number of claimants of pension credit in LA aged 80+	DWP May 2011 claimants	http://www.nomisweb.co.uk/query/114.1/advanced .aspx
<i>divided by:</i>		
Number of adults in LA aged 80+	ONS mid- 2011 population estimates	http://www.ons.gov.uk/ons/rel/pop- estimate/population-estimates-for-england-and- wales/mid-2011--2011-census-based-/rft---mid- 2011--census-based--population-estimates-for- england-and-wales.zip

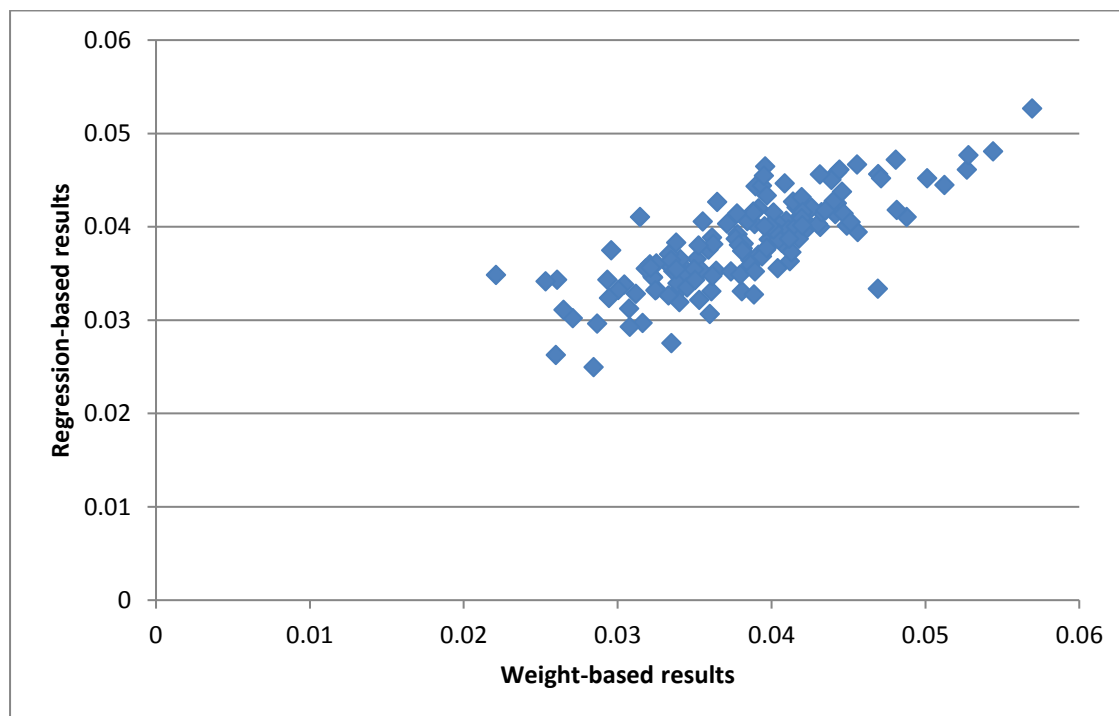
Table 4 describes results of the linear model on the basis of the explanatory variables detailed in Table 3. After standardising for population, authorities were found to have an increased formula share for additional assessments (corresponding to clients excluded on the basis of existing means testing rules) if they had higher levels of home ownership and lower levels of pension credit receipt among adults aged 80 and above. A significant positive correlation remained with levels of attendance allowance receipt and proportion of older people that were female.

Table 4: Equation predicting share of additional burden of assessments per population 65 plus

Source	SS	df	MS	Number of obs	151
Model	.003358394	5	.000839598	F(5, 145)	62.29
Residual	.001968004	146	.000013479	Prob > F	0.0000
Total	.005326398	150	.000035509	R-squared	0.6305
				Adj R-squared	0.6204
				Root MSE	0.0037
	Coef.	Std. Err.	t	P>t	[95% C.I.]
Proportion receiving AA	0.040886	0.018395	2.22	0.028	0.004531 0.077241
Proportion aged 85+	0.209282	0.025068	8.35	0.000	0.159739 0.258826
Proportion own home (HRP 65+)	0.016428	0.003449	4.76	0.000	0.009612 0.023244
Proportion receiving PC (80+)	-0.01513	0.006881	-2.2	0.030	-0.02872 -0.00153
Constant	-0.0026	0.005096	-0.51	0.611	-0.01267 0.007476

As expected given the commonalities in variables used for weighting and as predictors in the linear model, the correlation between the weighted and regression-based formula values is high (79.2%) as shown in Figure 16. By imposing a linear model, however, the regression results do not allow for interactions between explanatory variables or for non-linearities in the relationship between factors in the model, and therefore a degree of loss in the accuracy of the estimates should be expected.

Figure 16: Correlation between weight-based and regression-based formula values (population weighted)



7.1 Calculating local authority shares

The early assessments formula is calculated by multiplying relative need (*RN*) (according to the linear model) by the local authority population aged 65+ (*POP*) and the area cost adjustment (*ACA*) (Table 5).

Table 5: Early assessments formula calculation

The sum of	
-0.0026	plus
0.0409	multiplied by the number of attendance allowance cases in payment aged 65 and over <i>per person aged 65 and over</i> , plus
0.2093	multiplied by the number of people aged 85 and over <i>per person aged 65 and over</i> , plus
0.0164	multiplied by the number of home owner households (including mortgaged and shared ownership) aged 65 and over <i>per Census household aged 65 and over</i> , plus
-0.0151	multiplied by the number of people aged 80 and over claiming pension credit <i>per person aged 80 and over</i> ,
Multiplied by the projected population aged 65 and over,	
Multiplied by the Area Cost Adjustment.	

The share of the total allocation for each authority (LAA_i) is calculated by dividing the local authority formula by the sum of formulae for all local authorities in England, such that:

$$LAA_i = \frac{RN_i \times POP_i \times ACA_i}{\sum_1^{152} (RN_i \times POP_i \times ACA_i)}$$

8 Policy implications

In this report, we have tested the viability of using data sources with individual level information about needs, income and wealth to develop a formula for allocating social care resources across local authorities. The results suggest that it is indeed possible to use information from individual level surveys in order to estimate the level of social care needs in different authorities.

A number of quality checks have been carried out which showed that the distribution of additional burden of assessments across local authorities exhibit the expected correlations with local need, income and wealth characteristics. For instance, greater need at the local level (per capita and overall) was found to be positively correlated with the numbers of local additional assessments, *ceteris paribus*. Local levels of deprivation, indicated by the per capita take-up of pension credit, were positively correlated with social care need supported by local authorities, but negatively related to additional assessments, *ceteris paribus*.

The analysis has some important limitations. ELSA is the individual-level survey that provides the best combination of indicators about the needs and income and wealth of older people in England. However, even pooling several waves of ELSA does not provide enough cases to estimate directly levels of social care need for each local authority in England. Instead, the analysis reweighted for each of the 152 local authorities in England the sample data in order to reflect their characteristics. And whereas the reweighting process was able to reflect simultaneously differences in the local combinations of the needs and wealth, the range of indicators available for reweighting the data was limited. It is therefore possible that the reweighting procedure was unable to capture fully differences in local circumstances across authorities. There is also the potential for sampling bias within the ELSA sample, although the application of cross-sectional ELSA survey weights and calibration with authority-level data achieved through the raking process attempt to minimise this.

Another limitation of the approach presented is that it cannot directly be used to compensate local authorities for differences in local supply circumstances. In some cases, differences in the availability of services can affect local demand levels through what is termed supply-induced demand. A greater than average availability of residential care, for instance, could lead more individuals than expected to use the service. Whether a relative needs formula should aim to compensate for these effects is open to debate, but it is worth noting that trying to do so with the approach presented here would require additional, off-model, analysis to be carried out in order to amend the weights given to social care needs in different areas. Overall, the estimates of relative needs for additional assessments using the individual-level data and methods proposed in this study were very strongly correlated (83% per capita; 99% overall) with the estimates derived using hybrid utilisation methods (Forder & Vadean 2018).

The proposed methodology has some distinct advantages, however. It uses directly indicators of social care need, income and wealth and provides therefore a more normative approach to estimating local need compared to the use of regression analyses of historical patterns of expenditure. In addition, the fact that it is based on individual level data makes it particularly useful for testing the implications of policy changes, such as changes in means testing arrangements or eligibility criteria before they are introduced. This point is particularly salient where historical expenditure data relating to the cost of the policies does not exist. Furthermore, one of the advantages of using a re-weighting procedure is that it does not require necessarily the use of regression methods. As a result, it does not impose the loss of precision in the estimates associated with the use of regression models, which in the context of the development of allocation formulae have tended to reduce the complex relationships between factors linked to social care need to linear, additive relationships.

Finally, it is worth noting that although the analysis in this report develops a formula specifically for additional assessments, the same methodology could be applied to develop other types of formulae. A formula for overall social care need could be developed, for instance, by attaching intensity weights to different individuals to reflect their different needs and – on the basis of assumed or observed relationships between need and utilisation - infer likely resource requirements. As with all allocation formulae, validity decreases over time and revised estimates on the basis of updated local authority indicators would be warranted in the medium term.

9 References

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