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The economic determinants of home care provider quality

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DISCLAIMER

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1. Introduction

Many people in England are supported with their short and long term care needs by home care providers and the quality of this care is important (NICE, 2019). Given home care is predominantly service-based, staff will play a crucial role in the delivery of quality care (e.g. Donabedian, 1988; Brown Wilson and Davies, 2009; Malley and Fernandez, 2010). However, there is little empirical evidence as what drives quality in the delivery of home care. This study assessed the factors that determine home care providers' care quality, including staffing factors.

In terms of policy, it is important to understand the factors that affect the quality of care, and to what extent. This is so as to a) sustain and improve quality of home care services and workforce and b) ensure that public funds are spent efficiently. Currently staff working in home care tend to be low paid, often earning close to minimum wage, over half of direct care staff are working on non-guaranteed hours contracts (zero-hours contracts) and there are consistently high levels of staff turnover (Skills for Care, 2021). These factors could all have negative connotations for the delivery of care and outcomes for those supported. For example, the widespread use of zero-hours contracts in home care are seen as economically efficient for minimising the cost of care delivery and giving the employer flexibility in their staffing levels. However, there could be wider cost implications for health and social care if provider quality, and ultimately service user outcomes, are negatively affected by staffing factors such as contract type (e.g. Ravalier et al., 2019).

Currently, there is little evidence as to the effect of staffing on home care quality. There is a wider literature on care home staff and quality, particularly for the US (e.g. Konetzka et al., 2008; Dellefield et al., 2015; Cawley et al., 2006; Huang & Bowblis, 2019). There is also increasing evidence for England showing that staffing factors, including job vacancy rates

and staff retention levels and average wage, affect care home quality (Allan and Vadean, 2021; Towers et al., 2021).

In addition to staffing, other factors may play an important role in determining home care quality. In the US, for-profit providers have been found to have higher costs than non-profit providers, i.e. more expensive per unit of output (Grabowski et al., 2009; Cabin et al., 2014). There is also evidence that they have poorer patient outcomes. For example, for-profit agencies were significantly less likely to have patients return to the community rather than hospital following care and their patients had longer spells of care compared to not-for-profit agencies (Cabin et al., 2014; Basu et al., 2021). There are differences in quality of home care by location, such as urban/rural location (Wang, Spatz et al., 2017; Ma et al., 2022) and locations that vary by income, i.e. inequality of access to care (Wang, Leifheit-Limson et al., 2017; Wang, Spatz et al., 2017; Joynt Maddox et al., 2018). There is also evidence that access to quality care varies within location, i.e. inequity of access to care (Fashaw-Walters et al., 2022). In England, there is emerging evidence which suggests that quality of home care varies by location, i.e. through variation in access to care and implications for delayed discharges from hospital (Allan et al., 2021).

Further location factors that could influence quality include the competition that is faced by a home care provider and local labour market conditions. The number of home care providers in England has increased markedly in the last ten years to meet an increasing demand, and level of competition influences supply decisions (Allan, 2021). Evidence for the care homes market has found that competition between care home providers reduces quality (Forder and Allan, 2014) and that this may be linked to the dominant position local authorities have in the purchase of care (Allan, Gousia and Forder, 2021). Finally, labour

market conditions have been shown to influence quality of care in the US (Huang and Bowblis, 2019).

Using data from the national provider of staffing information in England, this work looked to extend the literature by examining the economic determinants of home care provider quality, including provider-level job characteristics, i.e. wage, training, job vacancy rate, staff turnover rate, number of staff (to service users) and contract type. We were also able to include other provider-level factors including sector and local market conditions such as needs level and income.

The rest of the paper is set out as follows. A theoretical model which underpins the statistical analysis is presented next, with data and data analysis described in section 3. Results are then presented in section 4, a discussion follows before section 6 concludes.

2. Theoretical considerations

We utilised a production of welfare approach to consider the inputs involved in producing the final output of social care which is the wellbeing of those that are supported by the service (Knapp, 1984; Malley and Fernandez, 2010). Figure 1 presents the production of welfare framework for home care, with arrows showing the direction of the relationships between the set of factors relevant to the production of home care. Both resource (e.g. staff, transport, medical supplies) and non-resource inputs (e.g. personal circumstance of client, such as their living arrangements, level of income, informal care and needs, and staff attitudes) go into the provision of home care, measured in a certain unit of time, e.g. hours. The quality of home care provision is influenced at some level by the resource and non-resource inputs, and will further determine the quality of life that clients receiving social care service will attain.

The cost of the resource will affect the level of service delivered. For example, a home care worker that can deliver a 'better' service, either by improving client outcomes to a greater extent in the same amount of time or delivering the same level of outcome improvement in a quicker time (per visit or over the length of the receipt of home care). The home care worker could achieve these, for example, through training and/or higher qualifications (e.g. Collier et al., 2011). Similarly, better medical equipment, such as for moving and handling clients, would also improve productivity.

However, for a given level of staff and equipment quality, there may also be another way that costs could influence outcomes. Efficiency wage theory postulates that a firm will improve productivity from paying a wage above the market equilibrium through a number of potential avenues: better morale, less shirking, lower staff turnover or better applicants for posts (Katz, 1986). This would mean that input costs would influence staff attitudes and the quality of staff. It is also possible that other employment conditions such as contract type may also influence staff attitudes and ultimately clients' quality of life.

In addition, provider-level factors and local market supply-side factors will also affect the quality level of the home care service, the latter through their effect on resource inputs. For example, providers that are for-profit may decide on a different level of staff input compared to a provider that is not-for-profit for a given level of care and client needs. Similarly, local supply factors including levels of unemployment and alternative employers will influence staffing decisions such as the employment of agency staff and rates of pay. We also note that one could also envisage local supply factors influencing client decisions and ultimately their quality of life. For example, a client that is unhappy with the care they are receiving but who has a lack of alternative options to choose from may have less improvement in their care quality of life than a similar client that can change care provider.

<Figure 1 about here>

From this model we therefore expected a range of factors to be important in determining home care agency quality, including staffing, employment conditions (wages, contract type), provider sector and local demand and supply factors.

In the section that follows, we outline the measures that were included in our analysis of care quality and develop the statistical model.

3. Methods

Data

We used Skills for Care's Adult Social Care Workforce Data Set (ASC-WDS), which is the main source of intelligence on the adult social care workforce in England (Skills for Care, 2021b). The ASC-WDS is voluntarily updated by providers with data held in two databases, one at employee-level and the other at provider-level. We used the provider-level database matched to quality indicators (see below) as of October for the years 2016 to 2018 to construct a panel of home care provider observations over time. For each wave, we only included home care providers that have updated their information in the prior six months. This gave us an unbalanced panel of 3,803 independent sector home care providers, with 7,636 observations in total and where 1,163 of the providers were present in the data for all three years. For each year there are approximately 2,500 provider observations. Whilst the home care sector was growing rapidly, each wave of the dataset included more than one in four of providers of home care registered to provide care in England.

Dependent variable

We measured quality using the CQC's quality rating system, which assesses people's experiences of care. The system is based on the 'mum test' (CQC, 2017a) and there is

increasing research evidence which shows a positive relationship between the overall CQC quality rating of a provider and service users' quality of life (Towers et al., 2019; Towers et al., 2021). The rating of a home care provider is centred on an inspection, including discussions with those who use the service and staff, as well as reviewing relevant records at the provider's registered office (CQC, 2017b). The rating is constructed around five key questions asking if the provider is: Responsive to people's needs, Safe, Caring, Effective and Well-led. To address these five key questions, key lines of enquiry (KLOE) are used and providers are given a rating for each of the five questions of either 'Inadequate', 'Requires improvement', 'Good' or 'Outstanding'. The overall rating for a provider uses the same four levels and is determined from consistent aggregation of the ratings for the five key questions (CQC, 2017a). Because of the low number of home care providers rated as 'Inadequate' and 'Outstanding', for the analysis we used a binary variable to indicate a provider of high quality (0 if a home care provider was rated as 'Inadequate' or 'Requires improvement', 1 if they were rated as 'Good' or 'Outstanding'). Care providers move between ratings over time, including between the binary indicator of quality used in the analysis (CQC, 2017a).

Independent variables

We created a number of individual staffing characteristics using the employee-level database, which were averaged to the provider-level. In terms of wages, we focussed on the hourly wages of care workers, which is the largest group of care staff (i.e. over 50 percent of total staff). Care workers are more homogenous in terms of qualifications and job tasks, and therefore have more comparable wages between providers. Care worker average hourly wage at the provider-level was calculated using wage data from the employee-level database. The data did not include any information whether hourly wage was inclusive or

exclusive of travel time, i.e. some workers are paid for all their working time whereas other workers are only paid for contact time with clients. For example, consider two home care workers who are paid the same hourly wage by different agencies. However, one of the wages is inclusive and one exclusive of travel time. It would take the worker whose earnings are exclusive of travel time longer to work one hour, i.e. the worker is not paid for their travel time between jobs, and so the hourly pay of these two workers is not commensurate. This is a disadvantage to the data, which we return to in the discussion. We calculated hourly wages which were not in the data for full time staff from annual or weekly salaries, assuming 52 weeks or 37 hours per week of work, respectively. We treated average hourly wage data as missing if either: the average wage reported was below the national minimum wage or was in the top 1% of wages for the given year. We also treated average hourly wage data as missing if care homes had less than 90% of staff with a reported hourly wage in the employee-level database (see multiple imputation below). The average hourly wage was weighted for inflation to October 2018 prices and the natural logarithm of this was used in the analysis.

From the employee-level database we further included the proportion of staff that have received dementia training and the proportion that have received training for person centred care or dignity. We also measured the proportion of employees that were employed on zero-hour contracts.

A number of other factors at provider- and local area-level were included which were likely to influence quality. At home care provider-level, we used the following variables available in the ASC-WDS: provider registered care type (e.g. dementia, older people), sector (private or voluntary), agency size (total number of staff), staff to service user ratio (and its square), the proportion of staff that are female and staff turnover (in the last year) and job vacancy

(current) rates. At the local area-level we matched characteristics to provider observations at postcode district-level (the first half of a UK postcode, e.g. SW1, n=2,301). On the supply-side we included a measure of home care competition, the postcode district average of the number of distance-weighted home care providers within 20km of where the provider was located (see also Allan, 2021). We also included the percentage of females that are claiming Job Seeker's Allowance (JSA; an unemployment benefit). On the demand side, as a proxy for care needs, we included the share of older population claiming Attendance Allowance (i.e. a needs-based benefit), while as controls for wealth and the share of people using a service who self-fund their care we included the percentage of the older population claiming Pension Credit (i.e. an income-based benefit) and the average house price. Finally, we included a measure of demand from LAs – specifically the average unit cost of an hour of home care, weighted to October 2018 prices.

Also included were binary variables indicating year of observation and region, the latter to capture potential regional differences in local care policy, commissioning, and care markets that could affect quality ratings. To further capture local commissioning decisions, we included the LA-level average hourly unit cost of home care, reported in the Adult Social Care Finance Returns.

Instrument for wage

We controlled for the likely endogenous relationship between wages and quality of home care providers. This may be due to an omitted variable (e.g. unobserved staff skills and work values could be related to both the quality of care provided and wages) or simultaneity bias. Simultaneity bias could result if home care providers rewarded staff with higher wages after a quality improvement. If wages were endogenous in a model of quality of home care providers then the wage effect is likely to be underestimated. We used as an instrument

exogenous changes to minimum wage rates, which is often used in the literature (Towers et al., 2021, and references therein). We used the impact of upcoming national minimum wage increases as an instrument for wage, specifically the proportion of workers employed by provider i that were being paid less than the future national living wage rate. The instrument was assumed to be exogenous of quality. However, this assumption may not hold if the national living wage increases have an effect on employment levels, i.e. a reduction in staff. We controlled for the staff size of the provider in the analysis, and there is evidence for the LTC sector that suggests no significant negative effect on employment of recent changes to minimum wage in the UK (Vadean and Allan, 2021).

Multiple imputation

The staffing data contained missing information (see Table 1). We have shown elsewhere that staffing information from ASC-WDS was unlikely to be missing completely at random (i.e. independent both of observable variables and of unobservable parameters of interest) (Allan and Vadean, 2021; see also Carpenter and Kenward, 2013). Because of this, any estimates using only complete cases are likely to be biased. Given the richness of the ASC-WDS, we instead assumed that the data was missing at random (i.e. independent of unobservable parameters). We used multiple imputation (n=50) to create predicted values for missing observations (White et al., 2011). Imputations were generated using a chained imputation method with ordered logit (quality) and predictive mean matching specifications (staffing measures). The chained imputation of quality omitted the instrument of wage. We assessed the size of the Monte Carlo error generated from the multiple imputation process and found this to be small enough to mean that the size of effect of the variables which significantly influenced the likelihood of a high quality rating are unlikely to change if the multiple imputation process was repeated (White et al., 2011).

Data analysis

For the data analysis we used a latent probability model of quality, subject to making a level of profit to remain in business (Allan and Forder, 2015). We assumed that each home care provider has an actual level of quality, q^a, which can be expressed in the following manner:

$$q_{it}^a = \alpha_1 + \alpha_2 \boldsymbol{S}_{it} + \alpha_3 \boldsymbol{X}_{it} + v_{it} \quad (1)$$

Actual quality for provider i in time t depends on a vector of staff characteristics, $\boldsymbol{S}_{it}$, including staff wages which may be endogenous, the vector $\boldsymbol{X}_{it}$ of other exogenous local demand and supply factors described above, and a random error. We assumed that the observed quality of home care providers at time of inspection, q^o, will measure actual quality with some level of error. As such, the outcome of the inspection, i.e. the rating, depends on the following decision rule:

$$q_{it}^o = 0 \; if \; q_{it}^a < 0$$

$$q_{it}^o = 1 \; if \; q_{it}^a \geq 0 \quad (2)$$

Where homes rated as $q^o = 0$ have a quality rating of 'Inadequate' or 'Requires improvement' and homes rated as $q^o = 1$ a quality rating of 'Good' or 'Outstanding'. Given the panel nature of the data and the use of instrument variables, we estimated a linear probability model of quality ratings (Wooldridge, 2010):

$$P(q_{it}^0 = 1) = \beta_1 + \beta_2 w_{it} + \beta_3 \boldsymbol{X}_{it} + \varepsilon_{it} \quad (3)$$

We estimated this model using complete cases and the multiple imputation dataset, assuming wages are a) exogenous and b) endogenous, using the instrument for care worker wage. In all the estimations we took advantage of the panel nature of the data and estimated LPM models of quality using random effects models, assuming that the random error term ε_{it} is composed of both a provider specific error (h_i) that does not vary over time and an error term which does (u_{it}). The use of random effects over fixed effects was

determined by a Mundlak test (Mundlak, 1978). We further assessed the robustness of the results by a) estimating a random effect probit specification and b) estimating the model of quality using the ratings for the five KLOE underlying questions to the overall rating. Stata 16 was used for the analysis, specifically using the xt*reg*, xt*ivreg* and *xtprobit* commands*,* with wage manually instrumented in the latter. We clustered standard errors by home care provider.

4. Results

Descriptive statistics on the complete cases of home care providers are presented in Table 1, along with information on missing data proportions. More than 84 per cent of providers had a quality rating of 'Good' or 'Outstanding'. The average hourly wage for care workers for the sample of home care providers was £8.34. This was larger than that found for care staff working in care homes of £7.85 per hour (Towers et al., 2021). Given wage levels for a care worker would be expected to be similar across different forms of social care provision, this provides indication that the average hourly wage for much of the home care sample was likely to be for client contact time only, i.e. exclusive of travel time. This would mean that home care workers were not paid for their travel between clients, i.e. this time was not included in their working hours, but they were compensated to some extent with a higher hourly wage for their time spent with clients.

<Table 1 about here>

Table 2 presents t-tests of the equality of means for providers by quality rating for the provider characteristics in the data, including staffing. A higher proportion of voluntary sector providers are rated as 'Good' or 'Outstanding' compared to private sector providers.

A higher proportion of those registered to provide care to both clients living with dementia and older people, as well as medium and large employers (greater than 50 staff) and those providers facing greater competition had a quality rating of 'Inadequate' or 'Requires improvement'. In terms of staffing characteristics, providers with a rating of 'Good' or 'Outstanding' had a higher care worker hourly wage, a greater staff to service user ratio, a higher proportion of staff trained in person centred care and/or dignity and a lower proportion of employees working on a zero-hour contract.

Figure 2 presents a box plot of home care agency average hourly wage for care workers by sector and quality rating. There was little evidence of a difference in wage within the voluntary sector by quality rating (median wage of £8.28 per hour and £8.30 per hour, respectively) nor between private and voluntary sector providers with a high quality rating (median wage of £8.24ph and £8.30ph). However, private sector providers with a low quality rating had significantly smaller care worker average hourly wage than providers with a high quality rating (average wage of £8.26ph and £8.37ph, ρ=0.001). There was also weak evidence of a difference in wage between private and voluntary sectors at lower quality (average wage of £8.26ph and £8.40ph, ρ=0.096).

<Table 2 about here>

<Figure 2 about here>

Table 3 presents the results from estimating equation 3. The first four columns present the results from estimating using a linear probability model (LPM), the final column presenting the results when estimating the quality ratings model using probit. Complete cases only are included in the estimations presented in the first column, with the data derived from

multiple imputation used in the latter four columns. The fourth column presents the findings when only including those providers that were registered to support older people. The findings in the first two columns present specifications where wage was assumed exogenous, the latter three columns present findings when wage was treated as endogenous using instrumental variables (IV). The Mundlak test confirmed that the time-invariant unobservables (h_i) were not related to our regressors and the REIV estimation of the model of home care agency quality was appropriate. We assessed for the endogeneity of wage and exogeneity of the instrument – both that the instrument was uncorrelated with h_i and u_{it}, respectively – using relevant variable addition tests (Wooldridge, 2010). Weak identification tests showed the instrument was a very strong (negative) predictor of average hourly wage. The test for strict exogeneity, i.e. the inclusion of the one year lead of the excluded instrument, was not statistically significant suggesting that the instrument was not correlated with quality ratings in an unidentified way. Overall, the instrument appeared to be strong. However, there was no indication of the endogeneity of wage in the estimations. As in previous research of care homes (Forder and Allan, 2014; Towers et al., 2021) those providers in the voluntary sector and facing lower competition were more likely to be rated as 'Good' or 'Outstanding'. In particular, a voluntary home care provider was around 6 per cent more likely to have a high quality rating. The average provider facing a 1% increase in average postcode competition would find their likelihood of being rated 'Good' or 'Outstanding fall by 0.03 percentage points. An increase in one provider within a 20km radius of the average provider in the postcode district would reduce the likelihood of having a high quality rating by 0.1%. This effect may be small due to the nature of the measure, i.e. the average level of competition at postcode district level.

<Table 3 about here>

There was indication that providers registered to support older people were significantly less likely to be rated as 'Good' or 'Outstanding'. The size of the effect was quite strong, around 7.5%. This is a new finding for social care in England, as care home analysis to date has not included services to younger adults (i.e. 18 to 64). This could be linked to needs levels, as nursing homes have been found to have significantly lower quality than residential homes, and homes registered to support those living with dementia had lower quality. In contrast to this, we found some evidence that home care providers registered to provide dementia care had higher quality ratings.

Of the staffing characteristics, wage did not significantly affect quality rating and there was no evidence that the relationship was endogenous. The staff to service user ratio had a significant positive effect across all estimations. A 1 unit rise in the ratio would increase the probability of a high quality rating by 5.4 percentage points. We consistently found that the higher the proportion of staff on zero-hour contracts the significantly less likely the home care provider to have a 'Good' or 'Outstanding' quality rating. At the mean level of zero-hours contracts (44%), a 1 percentage point rise in the proportion of staff on zero-hour contracts would decrease the likelihood of a 'Good'/'Outstanding' rating by around 7 percentage points.

Whilst there was a significant bivariate difference in LA-level average hourly unit costs by provider quality, with 'Inadequate' and 'Requires improvement' providers being located in LAs with significantly lower average hourly unit cost, there was no significant effect of average hourly unit cost on quality ratings once included in the main multivariate estimations.

As a robustness check, the results of the IV probit specification (column 5) were consistent with the LPM specification of the quality rating model. We further estimated quality ratings models for the five key questions used to assess care home quality (i.e. Safe, Effective, Caring, Responsive and Well-led) using a RE IV specification. Findings are presented in Table 4 and were generally consistent with the main findings. We again found a) no effect of wage on any of the underlying ratings and b) that the share of staff on zero-hours contracts significantly reduced the probability of a good quality rating on all KLOEs (with the exception of Caring). Further to the main findings, there was some indication that larger providers were less likely to be rated as high quality for 'Caring' and 'Responsive'. In addition, providers with high competition and providers registered to support older people did not have significantly lower likelihood of a high quality rating in 'Effective' and 'Caring'.

We found limited evidence that demand factors, i.e. pension credit and attendance allowance uptake, average house price and LA average unit cost had any effect on quality ratings in the main findings. Average house price had a positive effect in the probit model (column 5) at the 10% significance level. There was also some evidence that pension credit (negative effect on 'Safe' and 'Responsive', at 10% and 5% significance, respectively) and LA average unit cost (positive effect on 'Caring' and 'Well-led' at 5% significance, although negative effect on 'Safe' at 10% significance) influenced underlying quality ratings. House price and pension credit influencing quality ratings may be due to the likely presence of more self-funders in more affluent areas. Service users self-paying for their care usually pay higher fees, but may be also more demanding with respect to the quality of their care. The latter may indicate the effect of better income for home care providers to support those receiving their care through public funding.

Finally, as an additional extension, we additionally tried as an instrument for wage a spatial lag of wage, the average hourly wage for women in the bottom quartile of wages at LA District level (n = 326). This data was available from the Annual Survey of Hours and Earnings (from ASHE), and we used the annual hourly wage for 2016-2018. Inclusion of this spatial wage instrument did not change the finding for wage reported above, and the instrument was not a good indicator of average hourly wage of care workers in home care.

<Table 4 about here>

5. Discussion

We have assessed the economic factors that influence the quality of home care providers, including staffing as well as other provider level characteristics and local area factors. Given home care is a service, staffing will play a crucial role in the delivery and quality of the service. Yet staff in social care tend to be low paid and there are high levels of staff turnover. Better quality is important from a policy perspective as it could lead to prevention or an improvement of outcomes which may reduce public spending in other areas, e.g. preventing a move into more expensive institutional care or increased health care utilisation.

The findings suggested that, of the staffing factors included in the analysis, staff to service user ratio, and the proportion of staff on zero-hour contracts had an influence on home care quality. Extra quality of care in the provision of home care is likely to come from longer or more frequent visits. Providers with a greater number of staff to service users will be more likely to be able to do this. This may also link to a safety aspect in CQC ratings, e.g. lifting and moving clients with multiple conditions which would ideally require more than one

carer, i.e. double-up care. The strength of effect for care worker to service user ratio was higher when performing the analysis for the key question 'Safe'.

A greater prevalence for the use of zero hours contracts by a provider was found to significantly decrease their quality, providing a strong indication that employment conditions influence staff motivation. This effect can potentially be explained by the extra pressure being employed on a zero-hours contract adds to an already challenging job role (Ravalier et al., 2019).

We found no significant effect of average care worker wage on the likelihood of a home care provider having a high quality rating of either 'Good' or 'Outstanding'. This may highlight that there is limited scope for providers to reward staff in home care for good performance. However, we believe the most likely reason for this finding is that it is data driven, i.e. we were unable to separate providers that paid for travel time from those that did not. We further outline the potential reasons and implications for the previous care home analysis below.

As with various other studies of the care homes market (e.g. Grabowski, 2004; Forder and Allan, 2014), we found that competition in home care provision reduces quality. This has important implications in a growing market, where for certain areas competition is high (Allan, 2021). We also found some indication that size of provider had a quality effect, with employers of 50 or more staff having a negative effect on certain underlying aspects of the quality delivery of home care. This could have important implications as the market consolidates and some providers acquire larger shares of local markets.

As with previous US research, we found that for-profit providers had significantly lower quality (Cabin et al., 2014, Basu et al., 2021). As our analysis controlled for staffing factors, including wages and training, we might tentatively conclude that this finding indicates that

lower quality will come from shorter care visits or total length of care receipt (see also Grabowski et al., 2009). We also found limited evidence that average hourly unit cost paid by LAs affected the quality of care. A more nuanced analysis at provider-level would be required to fully assess this, however.

Importantly, the quality of the analysis depends on how well the data controlled for needs levels (Malley and Fernandez, 2010). We have included measures of local population needs in the analysis and we would expect that this would be a useful measure of needs that providers delivering care within a similar location could face. However, individual providers may deliver care to specific groups within the population, e.g. those with lesser or greater needs. This has the possibility of biasing the results found. We did control for client type in the analysis, i.e. older people, dementia, and this should mitigate for the bias, at least to some extent, but needs could still differ extensively within these broad categories. A further mitigation is that the quality rating itself is concerned not with level of needs but with meeting the needs of those receiving care (CQC, 2017c). Overall, we note this caveat as a potential limitation to the analysis.

A further issue is that the staffing factors may be endogenous to the model of home care agency quality. In the analysis we specifically controlled for an endogenous relationship between wage and quality. However, other staffing factors, in particular staff to service user ratio, are likely to be important factors in inspections which determine an agency's quality rating and therefore are also likely to be endogenous. Two points help to mitigate this problem. First, we note that the size of effect for some of the key factors to 'Responsive to people's needs' KLOE quality rating are generally smaller than for the main findings, but remain significantly different from zero. Second, contracts are not mentioned in the key

lines of enquiry (CQC, 2017c). We therefore expect that the finding for zero hours contracts is truly exogenous to the model of home care agency quality.

Comparison to care home analysis

Unlike for a similar analysis of care homes (Towers et al., 2021), we found no significant effect of average care worker wage on the likelihood of a home care provider having a high quality rating of either 'Good' or 'Outstanding'. We can suggest a number of reasons for the alternative wage finding between care homes and home care agencies: a) the quality of the wage data, particularly for home care, i.e. exclusion of travel time (as noted above); b) that there is less variation in wage between home care providers than care homes; c) the CQC rating system is less likely to identify differences in the quality of care from staff providing the service; and d) that there is a self-funding effect that is being captured in the care home analysis by higher wages which is less apparent in home care.

In terms of data quality, we have already noted above that the data does not discern between whether wage is exclusive or inclusive of travel time and that the evidence of the much higher average hourly wage in the home care data when compared to the care home sample suggests that the majority of the wage data will be exclusive of travel time. Importantly, given we cannot discern which providers' wage data is exclusive or inclusive of travel time, it may be difficult to identify a wage effect on home care quality.

In terms of wage variation, it might be that home care providers do not vary care worker wage, either because they are unable, e.g. because of LA commissioning decisions, or unwilling. The data does not fully support this hypothesis, however. When we compared home care to care home provision, care worker average hourly wage had a smaller variance (0.41 vs. 0.65) but a larger inter-quartile range (0.79 vs. 0.54). We note that any higher

dispersion in wage rates could again be linked to travel time, i.e. there is a dispersion in distances travelled between clients across the country, e.g. rural and urban.

If, for example, CQC's quality rating system only identified better quality of service at home care provider-level (e.g. more frequent or longer visits) rather than differences in quality of care from staff providing the service, then that would also be a potential explanation for the absence of a wage effect. However, the underlying key questions that drive the quality rating system includes many areas where staff have the ability to drive quality (CQC, 2017c). The finding for zero-hours contracts also further highlights that staff employment conditions do determine care quality.

Finally, in terms of a self-funding effect, the care home analysis controlled for care home-level factors that change over time. Self-funding proportion is likely to be relatively constant over time for care homes. (Although, we do note that the level of self-funding in general will have been increasing over time as means test capital limits have not changed to reflect general price inflation.) Both studies also controlled for local area level income and wealth factors, and there was some indication that these factors influenced quality ratings of home care providers. It could be argued that the relationship between local area affluence and care quality is more likely to be identified in an analysis of home care since most providers will support people within the local area. On the other hand, care home residents can move into care homes from outside the local area as well. The extent to which this is the case would require further research, although data utilised in Allan et al. (2021) showed that around one in seven residents supported through public funding were by a different LA to the one in which the care home was located. If so, it may be that the wage variable in a care home analysis better captures the income and wealth levels of residents than the local area controls. Again, however, both analyses controlled for factors at provider level which do not

change over time. One might also expect that the (average) previous location of a resident in a particular care home may be fairly consistent, e.g. if care homes are promoted through word of mouth. Overall, therefore, we believe that measurement issues in home care wage is the most likely explanation for the difference in findings for wage on quality between home care and care homes.

6. Conclusion

The quality of service delivered by home care providers is important for those that are using their services, or who may use them, and this could potentially influence overall public health and social care spend. It is also important that there are a range of services available with a range of quality in any LA. We have shown that staffing conditions of employment, such as contract type and number of staff to service users, have a significant influence on home care quality. At the provider level, sector, size and levels of competition also influence provider quality. The findings are important for policy, with a growing home care market in England expected to support an increasing number of people in managing their care needs.

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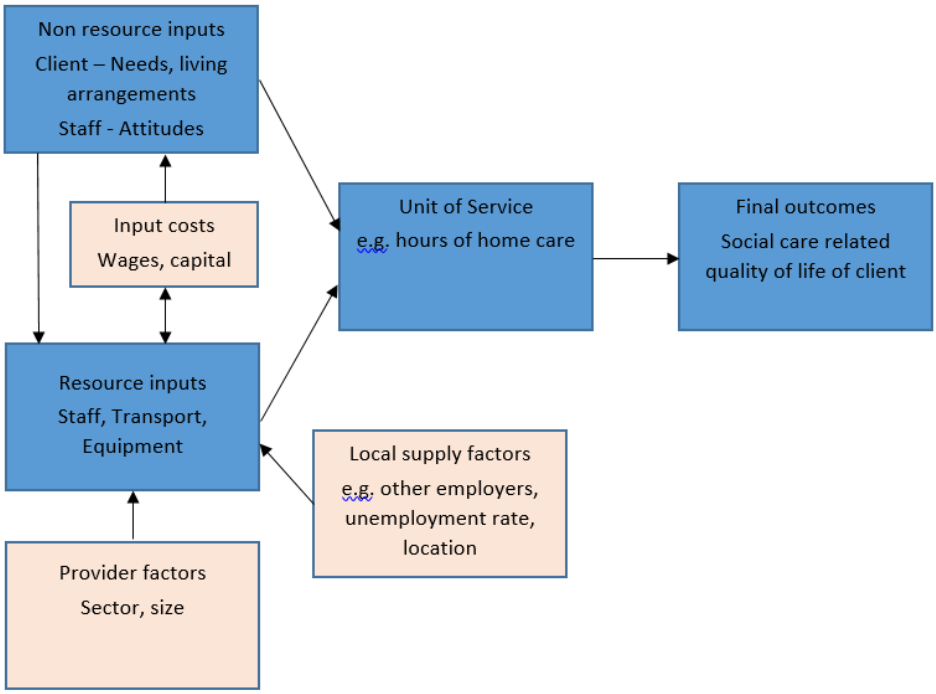
Figure 1: Production of Welfare Framework for home care



Source: Adapted from Knapp (1984)

Figure 2: Box plot of home care agency average hourly wage of care worker, by sector and CQC quality rating

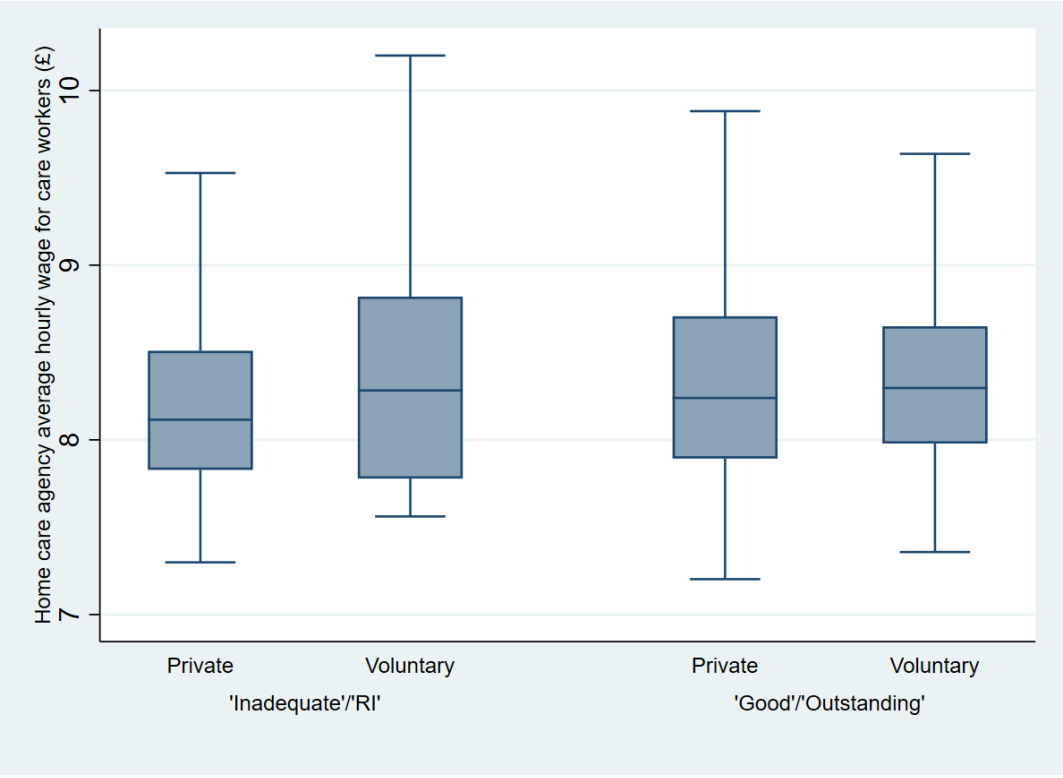


Table 1: Descriptive statistics

	Number of observations (N) and % of all observations	Number of home care providers (n) and % of all providers	Observations per home care provider	Mean	Range	Standard deviation		
						Overall	Between	Within
Provider-level characteristics								
High quality	5855 (76.7%)	3146 (82.7%)	1.861	0.842	0 to 1	0.365	0.344	0.180
Voluntary sector	7636 (100%)	3803 (100%)	2.008	0.130	0 to 1	0.336	0.323	0.025
Care for older people	7636 (100%)	3803 (100%)	2.008	0.852	0 to 1	0.355	0.345	0.039
Care for dementia	7636 (100%)	3803 (100%)	2.008	0.786	0 to 1	0.410	0.402	0.054
Agency size	7636 (100%)	3803 (100%)	2.008	0.364	0 to 1	0.481	0.454	0.149
Competition (Avg HC in PCD, 20km)	7631 (99.9%)	3802 (99.9%)	30.70	30.70	0 to 126.24	22.567	22.991	2.376
Provider employee characteristics								
Care worker mean hourly wage (£)	3532 (46.3%)	2042 (53.7%)	1.730	8.34	7.20 to 11.91	0.640	0.658	0.184
DC worker to service user ratio	6609 (86.6%)	3343 (87.9%)	1.977	0.711	0.119 to 3.67	0.668	0.660	0.165
Female employee proportion	4803 (62.9%)	2602 (68.4%)	1.846	0.868	0 to 1	0.127	0.128	0.032
Dementia trained staff proportion	4824 (63.2%)	2612 (68.7%)	1.847	0.277	0 to 1	0.334	0.318	0.090
Dignity/Person centred care trained staff proportion	4824 (63.2%)	2612 (68.7%)	1.847	0.152	0 to 1	0.269	0.254	0.091
Zero hours contracts proportion	3647 (47.8%)	2132 (56.1%)	1.711	0.444	0 to 1	0.407	0.405	0.064
Turnover rate	5511 (72.2%)	2928 (77.0%)	1.882	41.45	0 to 240	46.720	42.873	19.559
Vacancy rate	4664 (61.1%)	2448 (64.4%)	1.905	9.638	0 to 58.82	13.198	13.390	4.503
Local area characteristics (postcode district)								
LA average hourly unit cost (£)	7602 (99.6%)	3791 (99.7%)	2.005	16.209	12.5 to 41.44	2.513	2.395	0.922
Female Job Seekers Allowance claimant percentage	7636 (100%)	3803 (100%)	2.008	0.757	0 to 49.14	0.633	0.606	0.210
Average house price (million £)	7636 (100%)	3803 (100%)	2.008	0.210	0.03 to 2.18	0.122	0.128	0.014
AA uptake percentage	7636 (100%)	3803 (100%)	2.008	12.68	4.56 to 24.92	2.441	2.426	0.474
Pension credit uptake percentage	7636 (100%)	3803 (100%)	2.008	17.56	3.62 to 66.22	9.634	9.647	1.906
Instruments								
Proportion of employees below future MW	3628 (47.5%)	2133 (56.1%)	1.701	0.340	0 to 1	0.338	0.321	0.135

Table 2: Differences in mean sample characteristics of providers, by quality rating

Quality	'Inadequate'/'Requires improvement'	'Good'/'Outstanding'	Test statistic
Provider-level characteristics			
Voluntary sector	0.081	0.148	-5.48***
Care for older people	0.916	0.837	6.14***
Care for dementia	0.823	0.780	2.94***
Agency size (Medium/Large)	0.430	0.372	3.35***
Competition	34.83	29.38	6.79***
Provider employee characteristics			
Care worker mean hourly wage	£8.27	£8.37	-2.91***
DC worker to SU ratio	0.609	0.723	-4.54***
Female employee proportion	0.872	0.869	0.46
Dementia trained staff proportion	0.276	0.288	-0.80
Dignity/PCC trained staff proportion	0.124	0.161	-2.96***
Zero-hour contracts proportion	0.566	0.428	6.45***
Turnover rate	44.87	44.15	0.35
Vacancy rate	9.57	9.36	0.35

Notes: Test statistic presents result of t-test or z-test of difference in the mean of each independent variable between homes rated as 'Inadequate'/'Requires improvement' and those rated as 'Good'/'Outstanding, with null hypothesis that there is no difference.

Table 3: Results from estimating model of quality ratings of home care providers

	CC RE LPM	MI RE LPM	MI RE IV LPM	MI RE IV LPM (OP providers)	MI RE IV Probit (ME)
	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)
Care home					
Voluntary sector	0.053**	0.060***	0.059***	0.059***	0.070***
	(0.027)	(0.015)	(0.015)	(0.020)	(0.019)
Care for older people	-0.034	-0.074***	-0.074***		-0.085***
	(0.040)	(0.023)	(0.023)		(0.025)
Care for dementia	-0.062	0.038*	0.038*	0.045*	0.035*
	(0.038)	(0.020)	(0.020)	(0.023)	(0.019)
Agency size	-0.006	-0.005	-0.004	-0.005	-0.003
(Medium/Large)	(0.023)	(0.012)	(0.012)	(0.014)	(0.012)
Competition	-0.022	-0.025***	-0.025***	-0.026***	-0.030***
(ln avg HC in PCD, 20km)	(0.015)	(0.008)	(0.008)	(0.009)	(0.009)
Care home staffing					
Mean hourly wage	-0.061	0.129	0.188	0.217	0.182
	(0.165)	(0.103)	(0.151)	(0.167)	(0.139)
DC worker to SU ratio	0.083	0.081***	0.081***	0.066*	0.080***
	(0.057)	(0.028)	(0.028)	(0.034)	(0.028)
DC worker to SU ratio	-0.035*	-0.019**	-0.019**	-0.011	-0.019**
Squared	(0.019)	(0.009)	(0.009)	(0.011)	(0.009)
Female employee	0.190*	0.121*	0.119*	0.150*	0.121**
proportion	(0.114)	(0.065)	(0.065)	(0.079)	(0.061)
Zero-hour contract	-0.062**	-0.072***	-0.072***	-0.070***	-0.068***
proportion	(0.029)	(0.021)	(0.021)	(0.022)	(0.020)
Dementia trained staff	0.003	0.022	0.023	0.023	0.021
proportion	(0.038)	(0.022)	(0.022)	(0.023)	(0.021)
Dignity/PCC trained staff	0.028	0.025	0.025	0.032	0.030
proportion	(0.043)	(0.023)	(0.023)	(0.027)	(0.025)
Turnover rate	-0.0001	-0.00004	-0.00003	-0.00001	-0.00002
	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Vacancy rate	0.001	0.0001	0.0001	0.0002	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Local Controls	Yes	Yes	Yes	Yes	Yes
Regions	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes
Observations	1,363	7,636	7,636	6,501	7,636
Number of providers	902	3,803	3,803	3,281	3,803
Average RVI		0.581	0.555	0.563	0.825
Largest FMI		0.673	0.671	0.663	0.673
Weakness test			1859.13***	1806.93***	1859.13***
Strict exogeneity test			-1.06^{NS}	-1.01^{NS}	
Endogeneity test			-0.50^{NS}	-0.67^{NS}	
Mundlak Test			15.13^{NS}	10.48^{NS}	

Notes: CC = Complete Cases; RE = Random Effects; LPM = Linear Probability Model; MI = Multiple Imputation; IV = Instrumental Variables; ME = Marginal Effects; OP = Older People; HC = Home Care; PCD = Postcode District; DC = Direct Care; SU = Service User; PCC = Person Centred Care.

Table 4: Results for quality ratings of underlying key questions

	Safe	Effective	Caring	Responsive	Well-led
	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)	Coefficient (S.E.)
Care home					
Voluntary sector	0.064***	0.049***	0.027***	0.052***	0.086***
	(0.018)	(0.014)	(0.006)	(0.013)	(0.019)
Care for older people	-0.063**	-0.012	-0.015	-0.057***	-0.054**
	(0.025)	(0.021)	(0.013)	(0.021)	(0.027)
Care for dementia	0.004	0.001	0.011	0.026	0.023
	(0.021)	(0.018)	(0.011)	(0.018)	(0.023)
Agency size	-0.018	-0.016	-0.018***	-0.046***	-0.009
(Medium/Large)	(0.013)	(0.010)	(0.006)	(0.011)	(0.013)
Competition	-0.020**	-0.006	-0.002	-0.012*	-0.017*
(ln avg HC in PCD, 20km)	(0.009)	(0.007)	(0.004)	(0.007)	(0.010)
Care home staffing					
Mean hourly wage	0.067	0.084	-0.053	0.002	0.202
	(0.157)	(0.127)	(0.073)	(0.122)	(0.154)
DC worker to SU ratio	0.103***	0.050**	0.023	0.093***	0.069**
	(0.030)	(0.025)	(0.014)	(0.024)	(0.032)
DC worker to SU ratio	-0.027***	-0.011	-0.005	-0.026***	-0.019*
Squared	(0.010)	(0.008)	(0.004)	(0.008)	(0.010)
Female employee	0.113*	0.089*	0.053*	0.101*	0.083
proportion	(0.065)	(0.054)	(0.030)	(0.054)	(0.063)
Zero-hour contract	-0.054***	-0.038**	-0.014	-0.038**	-0.052***
proportion	(0.020)	(0.017)	(0.009)	(0.016)	(0.018)
Dementia trained staff	0.018	0.020	-0.004	-0.001	0.011
proportion	(0.023)	(0.020)	(0.011)	(0.019)	(0.023)
Dignity/PCC trained staff	0.029	0.008	0.008	0.016	0.018
proportion	(0.025)	(0.021)	(0.012)	(0.020)	(0.026)
Local Controls	Yes	Yes	Yes	Yes	Yes
Regions	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes
Observations	5,857	5,856	5,856	5,856	5,855
Number of providers	3,147	3,146	3,146	3,146	3,146
Average RVI	0.137	0.121	0.140	0.121	0.132
Largest FMI	0.494	0.522	0.544	0.482	0.418

Notes: See notes for Table 3.

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