Combining Bayesian Modelling and Qualitative Analysis to Examine Wages in the Social Care Sector

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ORIGINAL ARTICLE

WILEY Health and Social Care in the community

"We don't do it for the money" ... The scale and reasons of poverty-pay among frontline long-term care workers in England

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Abstract

Demographic trends escalate the demands for formal long-term care (LTC) in the majority of the developed world. The LTC workforce is characterised by its very low wages, the actual scale of which is less well known. This article investigates the scale of poverty-pay in the feminised LTC sector and attempts to understand the perceived reasons behind persisting low wages in the sector. The analysis makes use of large national workforce pay data and a longitudinal survey of care workers, as well as interviews with key stakeholders in the sector. The analysis suggests that there are at least between 10 and 13% of care workers who are effectively being paid under the National Minimum Wage in England. Thematic qualitative analysis of 300 interviews with employers, care workers and service users highlight three key explanatory factors of low pay: the intrinsic nature of LTC work, the value of caring for older people, and marketisation and outsourcing of services.

KEYWORDS
hierarchical Bayesian models, in-work poverty, mixed methodologies, social care workforce, wages

Why estimating underpayment in SC is challenging

Data Problems

ASHE and LFS: Relatively small samples; Likely to exclude certain very low-paid sub-groups – selection bias

Coverage: under-representation of certain types of contracts – information bias

Each source provides a partial view of the picture

Collectively they do not provide a whole view

Sector-related problems

Sector-specific data (SfC), employer data: reliability and validity issues – reporting bias

Contractual hours, Increase in zero hour contracts, precarious work arrangement – measurement errors

Monitoring and reporting 'working time' is problematic – data accuracy and observation bias.

Context

- Estimating the prevalence of underpayment is a highly sensitive topic (legal ramifications, policy/politics)
- Need to acknowledge existing estimates while accounting for their downfalls (due to coverage, methodology or the nature of data)
- More employer data became available at the national level (SfC)
- A new longitudinal care workers' study (LoCS) was undertaken at the time
- Need to contextualise findings, ensuring the perspectives of direct care workers, employers and service users' perspectives

Defining the problem

- Evidence of low pay in the care sector (especially for direct care jobs)
- Several reports estimate the levels of under-payment of the legal limit (National Minimum Wage at the time)
- Estimates range from 5-10 % of all care workers to be paid under NMW
  - Using different small-scale surveys or administrative data sources (4 estimates from the LPC (LFS) & ONS (ASHE))
- Inherent problems with calculating care workers' pay
  - Difficulties in establishing what constitutes working time, e.g. travel, sleep, on-call
- Understanding the underlying reasons for the underpayment of direct care workers is essential to develop policy and practice interventions

Data

- Existing published estimates (prior knowledge)
- Ability to judge the validity of the estimates based on published material and expertise in the field (expert opinion)
- Large data set, including pay data (collected from employers – SfC ASC-WD)
- Survey of direct care workers collecting information on unpaid working time (LoCS, n=1,342)
- Qualitative interviews with care workers & employers (n=240); service users & carers (LoCS, n=60)
- Primary data collection (two-time points 2010-2013)

Challenge & innovative solution

- How to formally account for all quantitative estimates and the new data (two sources SfC national data & LoCS survey)
  - Treat previous estimates as arising from a random process governed by hyperparameters to account for dependency.
  - Assign different values to each of these estimates (expert opinion)
  - Utilise data from the LoCS survey (from care workers) to adjust for data provided by employers (SfC , ASC-WD)
  - Employ a Hierarchical Bayesian approach to formally account for prior knowledge and expert opinions
  - Utilise in-depth qualitative data to understand the reasons behind the underpayment of direct care workers

LoCS Data

TABLE 2 Breakdown of LoCS interviews with service users by study site

Study site	Number of interviews with users/carers[a]
Site A	18
Site B	11
Site C	15
Site D	16
Total	60

TABLE 1 Breakdown of LoCS interviews with frontline staff and employers/managers in T1 (2010–2011) and T2 (2012–2013) by interview group and study site

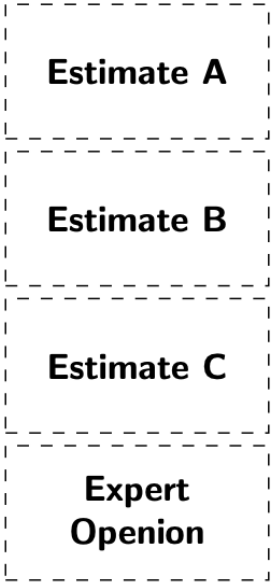
Interview group and study site	T1		T2		
	Female	Male	Female	Male	Total[a]
Frontline staff	47	6	51	15	119
Site A	12	0	13	5	30
Site B	13	1	14	5	33
Site C	8	3	13	3	27
Site D	14	2	11	2	29
Employers/ managers	59	12	38	12	121
Site A	13	7	5	6	31
Site B	11	3	10	3	27
Site C	16	2	9	2	29
Site D	19	0	14	1	34
Total	106	18	89	27	240

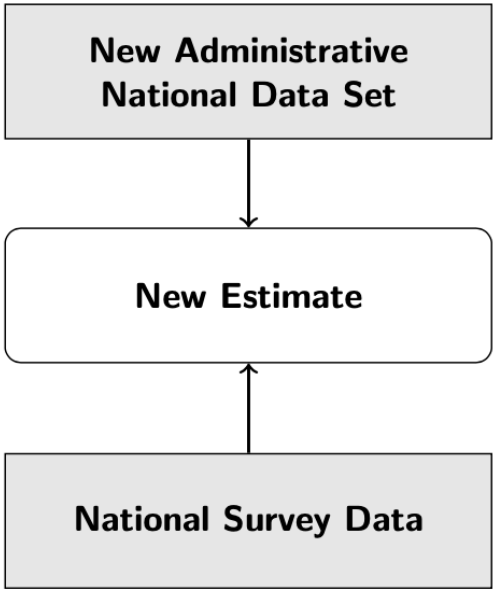
TABLE 3 LoCS staff survey participants' characteristics at T1 (2010–2011) and T2 (2012–2013)

Participants' characteristics	T1	T2	Total
Mean age	44.04	46.23	44.75
SD	11.27	9.38	10.74
% Female	81.6%	80.6%	81.3%
% BME	20.7%	16.2%	19.2%
% With any disability	4.0%	8.5%	5.6%
% Born outside the UK	17.8%	13.9%	16.5%
Marital status[a]			
Single	16.7%	13.0%	15.5%
Married/partnership	51.3%	53.6%	52.1%
Separated/divorce/widowed	11.8%	13.3%	12.3%
Prefer not to say	3.1%	2.4%	2.8%
% Suffer from any long-term illness/ health condition[b]	65.8%	72.6%	69.3%
% Judge their health to be poor or very poor during previous 12 months to the survey	7.6%	10.1%	8.5%
% Provide unpaid care to a family member	17.4%	27.2%	20.7%
% Finding finance quite or very difficult to manage at the time of the survey among			
Frontline workers	28.1%	29.4%	28.5%
Professional	15.0%	15.0%	15.0%
Managers/supervisors	17.4%	16.0%	17.0%
% Currently receiving any benefits[c]	57.4%	58.7%	59.4%
Mean overall life satisfaction[d]	6.98	7.05	7.01
SD	1.9	1.63	1.81
Total number of valid cases	847	445	1342

How to make use of all information available

- Pros:
  - A formal approach for including prior knowledge in the analysis
  - Flexibility in constructing an appropriate model for the data
  - Transparent, all modelling decisions are clear
  - Full distributions instead of point estimates- CI have a more intuitive meaning
- Cons:
  - Tailored estimations could be challenging
  - Computationally intensive
  - Requires defence of decisions





Bayes' Theorem

$$P(A \mid B) = \frac{P(B \mid A)\,P(A)}{P(B)}$$

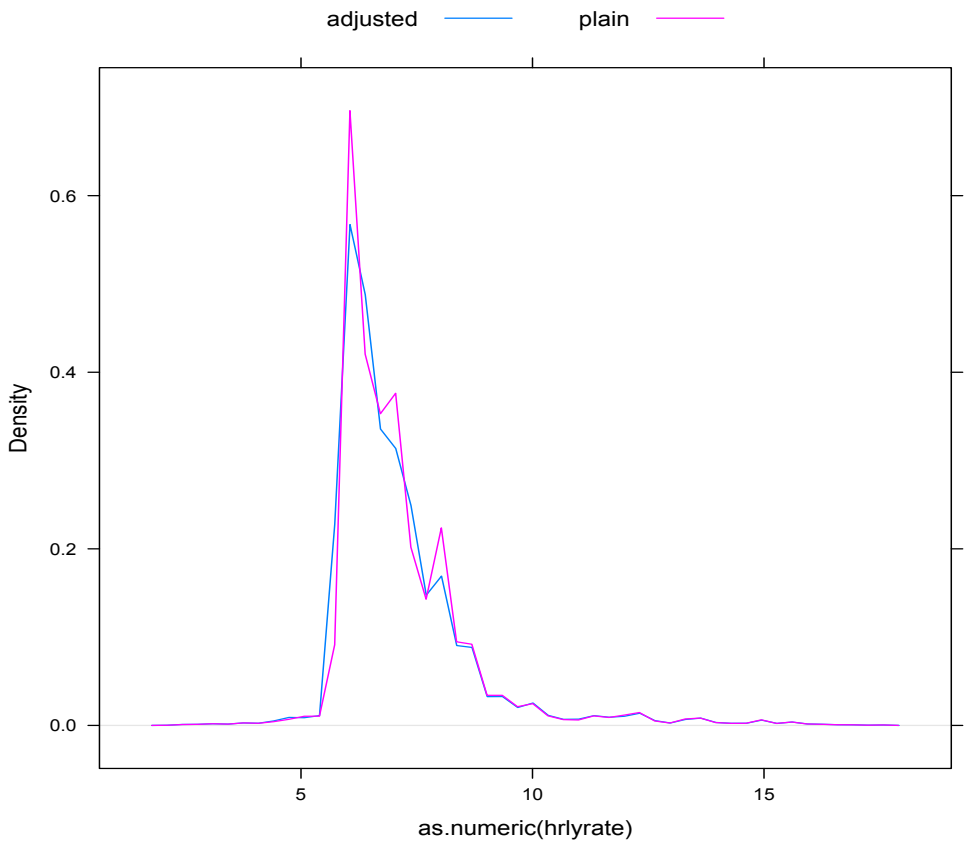
$$P(Parameter|Data) \propto P(Parameter) \times P(Data|Parameter)$$

Adjusting care workers' hourly pay

To counter the effect of unreported work and travel time, we use NMDS-SC data in conjunction with information from LoCS survey with frontline LTC workers to obtain an adjusted hourly pay rate (small proportion)

Accounting for one fifth of the reported unpaid additional work and travel time

Adjusted hourly pay rate
$\psi_n=\psi/(1+(\Delta t/t))$



Estimating the prevalence of underpayment of NMW

A hierarchical Bayesian approach

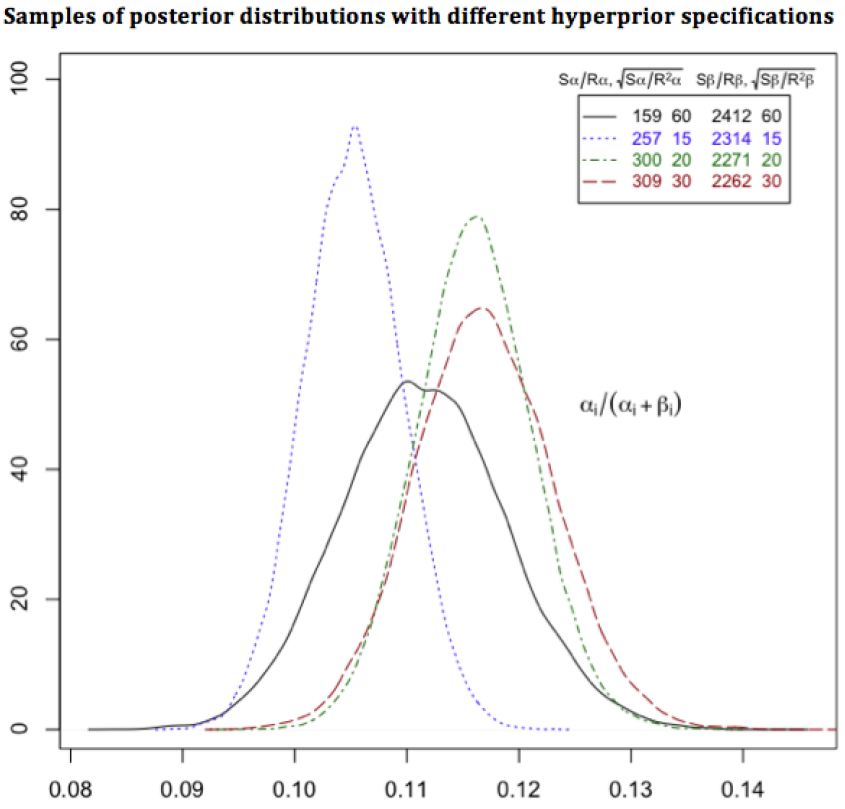
An iterative process of the hyper Metropolis-Hastings/Gibbs sampling algorithm.

The posterior density of α, β could be written as follows:

$$P(\theta_i, \phi|y_i) \propto P(y_i|\theta_i, \phi) \times P(\theta_i, \phi)$$

$$\underbrace{P(\theta, \alpha, \beta|y)}_{\text{Posterior}} \propto \underbrace{P(y|\theta)}_{\text{Likelihood}} \times \underbrace{P(\theta|\alpha, \beta)}_{\text{Prior}} \times \underbrace{P(\alpha, \beta)}_{\text{hyperprior}}$$

$$\mathcal{P}(\alpha, \beta|y) \propto \mathcal{P}(\alpha, \beta) \prod_{i=1}^{I} \frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} \prod_{i=1}^{I} \frac{\Gamma(\alpha+y_i)\Gamma(\beta+n_i-y_i)}{\Gamma(\alpha+\beta+n_i)}$$



The scale of underpayment of NMW in SC

Taking all prior knowledge together, it is with 95% credibility that the prevalence of underpayment of NMW among frontline care workers is between 10-13%; higher than other previous estimates.

Indicating between **95,760** and **197,600** frontline workers to be paid under the NMW.

TABLE 4 Results of hierarchical Bayesian models estimating the distribution of under payments of the NMW in the LTC sector including four prior estimates for six different model specifications

Models with various specifications	Prior estimate 1 Mean SD (95% CI)	Prior estimate 2 Mean SD (95% CI)	Prior estimate 3 Mean SD (95% CI)	Prior estimate 4 Mean SD (95% CI)	Posterior distribution Mean SD (95% CI)
Model 1	0.1141 0.0047 (0.105, 0.124)	0.1077 0.0066 (0.095, 0.121)	0.1099 0.0066 (0.097, 0.123)	0.1168 0.0071 (0.103, 0.131)	0.1115 0.0032 (0.105, 0.118)
Model 2	0.1163 0.0052 (0.106, 0.127)	0.1118 0.0077 (0.097, 0.127)	0.1140 0.0077 (0.099, 0.129)	0.1213 0.0082 (0.106, 0.138)	0.1160 0.0052 (0.106, 0.126)
Model 3	0.1095 0.0051 (0.099, 0.119)	0.0993 0.0074 (0.085, 0.114)	0.1014 0.0075 (0.087, 0.116)	0.1077 0.0080 (0.092, 0.124)	0.1023 0.0921 (0.092, 0.113)
Model 4	0.1109 0.0049 (0.101, 0.121)	0.1019 0.0070 (0.089, 0.116)	0.1041 0.0070 (0.091, 0.118)	0.1106 0.0075 (0.096, 0.126)	0.1052 0.0044 (0.097, 0.114)
Model 5	0.1168 0.0055 (0.106, 0.127)	0.1127 0.0083 (0.097, 0.129)	0.1148 0.0083 (0.099, 0.132)	0.1222 0.0089 (0.105, 0.140)	0.1169 0.0062 (0.105, 0.129)
Model 6	0.1141 0.0058 (0.103, 0.126)	0.1079 0.0089 (0.091, 0.126)	0.1099 0.0089 (0.093, 0.128)	0.1166 0.0095 (0.098, 0.136)	0.1115 0.0074 (0.097, 0.126)

Understanding the determinants of poverty- pay in the social care sector

- Thematic analysis of around 300 interviews (124 CW; 116 Managers; 60 SU/carers)
- Data were coded previously with different nods and sub-nodes in Nvivo
  - Through a process of familiarisation, themes' identification and coding then refining
- Focusing on issues related to pay and wages
- Data thematically analysed
- Four themes emerged (1 confirmatory & 3 inter-linked explanatory themes)

Theme 1: confirming the widespread of underpayment

Interviews with employers confirms the practice of non-payment of travel time

INT: They [LTC frontline workers] see several clients during a day?
RES: Yes.
INT: Do they get paid for the time between seeing clients?
RES: No.
INT: Their travel between clients, do they get paid for that?
RES: They are paid for the time they see the client. They get to the client's place. Between their travel no, they don't get paid for that. *(Registered Manager 1001010, T2)*

Yes. Carers [LTC workers], sadly, on minimum wage. Senior carers are on a little bit higher. Pay wise, it's not very good.
(Registered Manager 2115, T1)

I am actually going to become a bike mechanic, a bicycle mechanic, yes. I know there is no future in this job [care work], unfortunately, well from where we see it. It's just been privatised and the private companies pay £6.50, £7.50 an hour maximum, you just can't afford to live on that. You get paid more at [fast food chain].
(Frontline staff 1100001, T2)

Explanations 1: The intrinsic nature of the job

Care workers participating in the interviews repeatedly discussed the pay level as an unimportant element in their decision to work in care.

Confirmed by employers/managers

It [the pay] is so much less than what I used to earn. However, obviously anyone would want more. But the hours of work fit very well for me. And erm, the interaction that I get actually that means that I, one always wants more, but at the same time I enjoy what I am doing. It's okay.

(Frontline staff 1099003, T2)

We reward them in different ways [not increasing wages]. I pay for all their uniforms. They don't pay for anything like that at all. At the moment, in practice we can't get carers [care workers]. I don't know whether it's the pay. I don't know why or whether people just don't want to do that sort of job. I don't know.

(Employer 2049, T1)

Explanation 2: Society and the value of care work

- The acceptable norms of society regarding the value placed on care work.
- the majority of the wider society does not regard supporting the old, disabled and the weak as a "career".
- Reflecting an 'ageist' society
  - *It is difficult to attract people to work in social care. Massively difficult, caring for someone should be one of the most highly paid things, completely. But, it's not respected at all, and it's incredibly important. (User/carer 110003, T2)*

I haven't come across anywhere that pays a carer what they should be paid. I still don't feel it's ever really been recognised as a career. We pay minimum wage to people but not with much progress.

(Registered Manager in a care village 2184, T2)

Excuse me. I think there is ageism. I think there is under funding. It is real … Your biggest cost is staff, so you've got to cut the staffing cost.

(Frontline manager 2099, T1)

Explanation 3: Funding, outsourcing and marketisation of care

Employers/manager discussed the impact of funding, marginal pay increases associated with senior job roles and the 'inability' of the private sector to pay 'decent' wages:

- *I mean to hear our finance department and our line managers above us talk. They say it's all due to the recession. I think that is just a cop out. If they can afford to buy up new homes and open up new homes then surely they can afford, rather than open up the homes, employ, pay a different wage. (Frontline Manager 1063001, T2)*

The business is getting more and more stringent for less and less money. At some point, it's all going to blow up, because there is a limit to what actually can be provided for the money they are paying.

(General Manager of a nursing home 1021001, T1)

I haven't got much to do with that [increasing wages]. I can juggle 5p, 10p here and there.

(Registered Manager in a care home 1038001, T1)

Concluding Remarks

- Huge value in combining existing statistics and new quantitative measures
- Employing an innovative quantitative methodology (a Bayesian approach) allows us to consider all prior information as well as new data
    - Increases confidence in the findings
- In this scenario, the quantitative analysis allowed us to establish a valid estimate with high credibility of the scale of poverty pay.
- The qualitative data confirmed the general perception of underpayment in the sector.
- More importantly, to further our understanding of the perceived reasons for the widespread poor pay in a more nuanced way.
- Mixed methods allow us to 'balance' the limitations in each method; providing strong evidence

IMPACT

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Ensuring employers comply with National Minimum Wage regulations

Report by the Comptroller and Auditor General

ordered by the House of Commons
printed on 9 May 2016

HM Revenue & Customs

**National Minimum Wage compliance in the so
sector**

n evaluation of National Minimum Wage enforceme
al care sector over the period 1st April 2011 to 3

theguardian

Search

Minimum wage is least care workers deserve

If we really care about elderly people, the practice of paying care workers less than minimum wage must be stamped out

Gavin Kelly
The Guardian, Wednesday 18 April 2012 21.30 BST

[redacted]

How can we promote the use of mixed-methods at the Centre for Care?

Open Discussion

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