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Suggested Reference

Broad, J. B., Ashton, T., Lumley, T., Boyd, M., Kerse, N., & Connolly, M. J. (2014). Biases in describing residents in long-term residential aged care. *New Zealand Medical Journal*, 127(1402), 50-61. Retrieved from http://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2014/vol-127-no-1402/6292

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Biases in describing residents in long-term residential aged care

Joanna B Broad, Toni Ashton, Thomas Lumley, Michal Boyd, Ngaire Kerse, Martin J Connolly

Abstract

Aim In New Zealand, no reliable information describes use of long-term residential aged care. Instead, when estimating use, records of government subsidy payments are upscaled to adjust for private payers. This paper assesses consequential bias in reporting use of long-term care and considers the implications.

Methods Data from OPAL, a census-type survey of residents of aged-care facilities in Auckland in 2008, linked to routinely-collected hospitalisation, mortality and subsidy data from national databases. Demographic, functional and service use characteristics of unsubsidised residents were compared to subsidised.

Results Records of 5961 OPAL residents aged 65+ years were matched with subsidy data; 25% were unsubsidised. In low-level care (51% of all), unsubsidised residents had similar care needs to subsidised residents, but were 1.7 years older on average (p<0.001) with shorter length of stay. In high-level care (41% of all), unsubsidised residents had significantly lower care needs on six different measures and were less likely to die during the follow-up period. Upscaling yields undercounts at all care levels.

Conclusions National reports derived from current upscaling methods undercount residents. Stratification by region and age group would improve estimates. Age and care needs are misrepresented. Population policies that depend upon upscaled counts should, where possible, ascertain the biases introduced.

Abbreviations:

CCPS	Client Claims Processing System
DHB	District Health Board
GP	General Practitioner
interRAI LTCF	interRAI Long-Term Care Facilities Assessment System
MoH	Ministry of Health
NHI	National Health Index
NZ	New Zealand
NZACA	New Zealand Aged Care Association
OECD	Organisation for Economic Co-operation and Development
OPAL	Older People's Ability Level survey
RAC	residential aged care
SD	standard deviation
UN	United Nations

Information used to describe use of residential aged care (RAC) in New Zealand (NZ) has been poor, there being no organisation or system that records all residents.[1] As a result, when estimates of demand are required—for improving care quality, workforce or service planning, financial budgeting or investment planning—estimates are based upon the only available data, namely payments for government-subsidised RAC.

Means-tested subsidies are available to NZ residents aged 65 years or over (65+) who are assessed as needing residential care, whether in rest-home care (lower level care), or in higher levels of care (specialised secure dementia care, hospital or psychogeriatrics care).[2] However those not subsidised—believed to be 33% to 38%—are not included.[3]

Upscaling is therefore used in official counts to adjust for private payers. NZ counts supplied for international comparisons, e.g. to the United Nations[4] (not upscaled) and the OECD[5] (upscaled) are also based on subsidy payments records.

Upscaling of data to account for people with absent, incomplete or missing information is a long-established and accepted method of counting whole populations.[6,7]

Unless explicitly manipulated, upscaling inherently assumes that the unknown 'people' are similar in all relevant respects to those for whom information is available. If residents who pay privately or are funded through other sources such as regional schemes for palliative care (and therefore are absent from the government payments systems) are dissimilar to those in the subsidy databases—by gender, age or care needs for example—demand estimates may mislead. In other populations those who pay privately differ from those whose care is subsidised, for example private payers in Korea need lower levels of care,[8] and in the USA are hospitalised less.[9,10]

Whether use of upscaled information from subsidised residents fairly describes total use in NZ is unknown. Assessing the accuracy of information about utilisation and demand is important to address, especially given that in NZ use of RAC in late-life appears higher than other countries.[11]

Subsidy systems in New Zealand

Means-tested RAC subsidies for those aged 65+ years cover the full costs of care where assets are below a defined threshold.[12] Additionally, those in high-level care and who would otherwise pay privately (because their assets are higher than the threshold) are entitled to receive a "top-up" subsidy for costs that exceed an amount known as the "maximum contribution". This maximum contribution is central to upscaling. The level is set at the most recently agreed contract price in each local authority area for 24-hour rest-home care. It is the same for all residents regardless of the level of care they receive.[13]

The proportion of residents receiving a government subsidy varies by place and over time, partly through normal fluctuations and partly because, after 2006, the asset threshold increased by $10,000 annually (until 2012, after which the annual increase is set by the Consumer Price Index).[2 14] In July 2013 the asset threshold was $215,132. Subsidy recipients retain a small personal allowance, but otherwise their superannuation or other pension or main benefit contributes directly to the costs of care.[2]

Upscaling to count RAC use

Because the cost of high-level care is always greater than the maximum contribution, all those in high-level care are assumed to receive a subsidy. Counts of the number of residents in this level of care are therefore not upscaled. But for counting those in rest-home care, counts of the "known", i.e. those receiving a subsidy, are upscaled. The extent of upscaling, the "upscaling factor", is determined by the proportion of all in continuing high-level care (continuing hospital care, specialist dementia care or psychogeriatrics care) who pay the maximum contribution privately and receive a "top-up" payment [MoH personal communication, April 2013].

The expressed assumption is that the proportion subsidised is the same across all levels of care.

Ministry of Health (MoH) estimates that in 2008 32% of residents in high-level care received a "top-up" subsidy[15] and would not have been subsidised if in lower-level care. The upscaling factor applied to counts of residents known to be in rest-home care was therefore:

$$1/(\text{proportion on higher-level care subsidy})$$
$$=1/(1-0.32)$$
$$=1/0.68$$
$$=1.47$$

The impact of upscaling is therefore substantial, for it implies an increase of 47% over the residents known to receive subsidy payments. Based on that, for 2008, MoH official estimates were that 5.2% of the population aged 65+ years were in RAC at any one time, 15.4% of those aged 85 years or over.[3]

This paper examines whether unsubsidised residents differ systematically from private payers in demographic or functional characteristics, considers whether current upscaling methods lead to bias, and makes suggestions to improve national RAC estimates.

Methods

In 2008, we conducted OPAL, a census-type survey of RAC facilities in the Auckland region.[16 17] Pre-coded forms were delivered to all certified facilities, with facility staff completing one form for each resident on the survey night (10 September 2008). Questions covered 36 demographic, functional and care items.

Residents were classified by bed type—predominantly rest-home care, dementia care, continuing hospital care or psychogeriatrics care. In all, 154 (89%) of all 172 eligible facilities participated. Of these, 149 also provided separate, numbered lists of National Health Index (NHI) numbers, the unique personal health identifiers enabling linkage to national service use datasets. Validity of NHI numbers was checked using a check-digit calculator and corrections made where possible. Survey methods are described in detail elsewhere.[16,17]

OPAL residents (n=6816) were categorised into one of three distinct care groups: rest-home (including short-stay such as respite care but excluding dementia care), dementia care, and hospital care (including psychogeriatrics care). We dropped people with no suitable matching NHI (n=525), those aged under 65 years (n=341) because subsidy criteria differ for younger residents, and those in other care groups (n=92). Some were dropped for more than one reason. Thus we retained for these analyses only those 5961 residents who were matched (by NHI, gender and age).

Subsidy data for residents were sourced from transactions data from the MoH Client Claims Processing System (CCPS). Each resident was classified as in receipt of a rest-home care subsidy, a dementia care

subsidy, a hospital care subsidy, or as having no record of a subsidy in the two-week subsidy payment period around the survey.

In the few instances where a resident received two or more subsidies, such as during a period of change, the higher-level subsidy was used. Electronic records of public hospitalisations, emergency department presentations and deaths during the 22-months following the survey were obtained from routinely collected MoH data.

Demographic, selected functional characteristics and service use (retrospectively and prospectively) of subsidised and non-subsidised residents were compared. Absolute differences with 95% confidence intervals were tabulated and tested using chi-square and t-tests. Upscaling factors for each of three age-groups in rest-home care were recalculated based on OPAL data using the formula shown above. Ethics approvals were obtained for the survey (NTX/08/49/EXP) and for matching to health and subsidy data (NTX/10/EXP/087).

Results

Receipt of subsidy—Of the 5961 residents, about half (3059, 51%) were classified by the facility staff as in rest-home care, 445 (8%) were in specialised dementia care, and 2457 (41%) in hospital-level care (Figure 1). Linkage with subsidy payments data revealed that 30% received a rest-home subsidy, 6% a dementia care subsidy and 39% a hospital subsidy (Table 1).

Figure 1. Comparison of Auckland OPAL counts with MoH upscaled counts
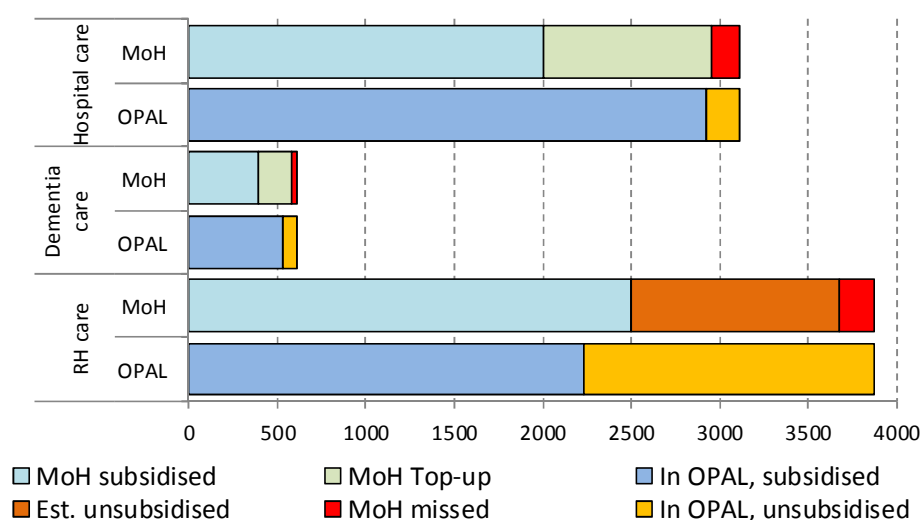
Overall, no subsidy was paid for 25%: 43% of those in rest-home care, 13% in dementia care and 6% in hospital-level care. Of those in rest-home care, 55% received a rest-home subsidy and 2% a higher level subsidy. Of those in hospital-level care, 92% received a hospital-level care subsidy and 2% a lower level subsidy (Table 1).

Upscaling factors—To estimate the total number of rest-home residents (unsubsidised and subsidised) from subsidy records, the upscaling factor would be:

Number in rest-home care in OPAL/Number on rest-home subsidy(s)
=3059/(0.296*5961)
=3059/1764
=1.7345

Effectively, each 100 residents on a rest-home care subsidy in Auckland represented 173 residents. Use of a scaling factor of 1.47 would "miss" 466 Auckland residents (Figure 1).

The unsubsidised proportion rose with age group, so improved age-specific upscaling factors for rest-home care increased from 1.31 in those aged 65–74 years, to 1.69 in those aged 75-84 years and 1.84 in those aged 85+ years.

Unsubsidised residents were identified in higher care levels as well as rest-home level care. Upscaling factors specific to care level would be: 1.24 (=445/(0.06*5961)) for dementia care and 1.05 (=2457/(0.391*5961)) for high-level care.

Table 1. Receipt of subsidies among residents aged 65 years and over

| | Care type in OPAL: | | | |
	Rest-home n=3059 51.3%	Dementia n=445 7.5%	Hospital n=2457 41.2%	All n=5961 100%
	%	%	%	%
Subsidy type:				
Rest-home subsidy	**55.3**	6.3	1.9	29.6
Dementia care subsidy	0.2	**77.1**	0.3	6.0
Hospital subsidy	2.0	3.8	**91.7**	39.1
No subsidy, private paying	42.5	12.8	6.1	25.3

Resident characteristics—On average, unsubsidised *rest-home* residents were 1.7 years older than subsidised residents at the time of survey (p<0.001), 3.1 years older when first admitted to the facility (p<0.001) and their stay-to-date in the facility 1.4 years shorter (p<0.001) (Table 2).

In most functional and care needs unsubsidised and subsidised residents were similar. However, the unsubsidised appear to be less bed- or chair-bound (2% vs. 4%, p=0.05), need less help to eat (2% vs. 4%, p=0.04), and more often visited an emergency department during the following 22 months (50% vs. 43%, p<0.001).

In *hospital-level care,* in many respects the unsubsidised and subsidised were similar (Table 3). However they were significantly more likely to be men, were as likely to be married or partnered, and were less dependent—in needing help to walk, being chair or bed-bound, needing attention at night, orientation to time and/or place, and urinary incontinence. More were seen urgently in the 2-weeks prior to OPAL (11.3% vs. 3.8% respectively, p<0.001) however fewer died within the 22-month follow-up period (39.3% vs. 54.5%, p=0.003).

Comparisons for those in *dementia care* showed the 13% unsubsidised were similar except they were less likely to require attention at night (63.2% vs. 78.9, p=0.009) and less often seen by a GP in the 2-weeks prior to OPAL (3.5% vs. 15.5%, p=0.015) (results not shown).

Table 2. Characteristics of rest-home residents aged 65 years and over

	Unsubsidised n=1299	Subsidised n=1760	Difference (95%CIs)	p-value
Men (%)	26.3	27.6	-1.36 (-4.54, 1.81)	0.40
Married or partnered (%)	14.6	16.0	-1.42 (-3.99, 1.15)	0.28
Age group at survey (%):				
65-74 years	6.3	12.8		
75-84 years	28.5	30.7		
85+ years	65.2	56.5		<0.001
Age at survey, years (mean, SD)	86.4 (6.9)	84.7 (7.9)	1.7 (0.1, 2.2)	<0.001
Age at admission, years (mean, SD)	84.5 (7.0)	81.4 (8.5)	3.1 (2.6, 3.7)	<0.001
Length of stay, years (mean, SD)	1.8 (2.1)	3.3 (3.6)	-1.4 (-1.6, -1.2)	<0.001
Admitted from acute hospital (%)	31.4	30.9	0.56 (-2.76, 3.88)	0.74
Needs help to walk (%)	4.8	4.7	0.11 (-1.41, 1.63)	0.88
Chair or bed-bound (%)	2.4	3.6	-1.25 (-2.46, -0.04)	0.049
Needs help to eat (%)	2.2	3.5	-1.29 (-2.47, -0.11)	0.038
Needs help to use toilet (%)	20.3	19.1	1.23 (-1.62, 4.09)	0.40
Needs attention at night (%)	36.6	36.1	0.43 (-3.02, 3.88)	0.81
Lost orientation to time (%)	29.3	26.3	3.02 (-0.20, 6.24)	0.064
Lost orientation to place (%)	12.0	11.3	0.70 (-1.60, 3.01)	0.55
Incontinent of urine (%)	26.1	27.7	-1.57 (-4.75, 1.60)	0.33
Persistently wanders (%)	3.7	3.9	-0.23 (-1.59, 1.14)	0.75
Behaviour disturbs (%)	13.1	14.6	-1.46 (-3.92, 1.01)	0.25
In two weeks prior to OPAL survey:				
Seen acutely by GP (%)	12.4	10.9	1.54 (-0.77, 3.85)	0.19
Seen urgently in hospital (%)	3.8	3.4	0.36 (-0.98, 1.70)	0.59
In 22-months after OPAL survey:				
Emergency department visit (%)	50.4	42.6	7.73 (4.16, 11.30)	<0.001
Any hospital stay (%)	56.3	55.3	0.99 (-2.57, 4.55)	0.78
Death (%)	32.3	33.1	-0.74 (4.10, 2.63)	0.67

Table 3. Characteristics of hospital residents aged 65 years and over

	Unsubsidised n=150	Subsidised n=2307	Difference (95% CIs)	p-value
Men (%)	38.0	30.4	7.61 (-0.38, 15.61)	0.050
Married or partnered (%)	26.7	26.9	-0.21 (-7.51, 7.10)	0.96
Age group at survey (%):				
65-74 years	16.0	11.6		
75-84 years	28.0	33.4		
85+ years	56.0	55.0		0.17
Age at survey, years (mean, SD)	84.1 (8.8)	84.7 (7.7)	-0.6 (-2.0, 0.9)	0.42
Age at admission, years (mean, SD)	81.7 (9.8)	82.3 (8.0)	-0.5 (-1.8, 0.8)	0.51
Length of stay, years (mean, SD)	2.3 (3.7)	2.4 (2.6)	-0.1 (-0.5, 0.4)	0.75
Admitted from acute hospital (%)	56.7	55.6	1.10 (-7.09, 9.28)	0.79
Needs help to walk (%)	9.3	17.6	-8.31 (-13.22, -3.40)	0.009
Chair or bed-bound (%)	36.7	46.3	-9.58 (-17.56, -1.61)	0.022
Needs help to eat (%)	28.0	35.0	-7.02 (-14.47, 0.42)	0.080
Needs help to use toilet (%)	54.7	58.3	-3.59 (-11.82, 4.63)	0.39
Needs attention at night (%)	80.7	88.3	-7.63 (-14.08, -1.18)	0.006
Lost orientation to time (%)	42.7	58.3	-15.68 (-23.84, -7.51)	0.002
Lost orientation to place (%)	34.7	46.7	-12.06 (-19.94, -4.18)	0.004
Incontinent of urine (%)	46.0	60.6	-14.55 (-22.78, -6.33)	0.004
Persistently wanders (%)	6.7	5.9	0.77 (-3.33, 4.88)	0.70
Behaviour disturbs (%)	19.3	22.0	-2.69 (-9.33, 3.86)	0.44
In two weeks prior to OPAL survey:				
Seen acutely by GP (%)	20.9	16.6	-4.11 (-2.55, 10.76)	0.19
Seen urgently in hospital (%)	11.3	3.8	7.52 (2.39, 12.65)	<0.001
In 22-months after OPAL survey:				
Emergency department visit (%)	55.3	49.8	5.57 (-2.64, 13.79)	0.19
Any hospital stay (%)	56.7	50.8	5.91 (-2.28, 14.10)	0.16
Death (%)	39.3	54.5	-15.15 (-23.23, -7.08)	<0.001

Discussion

Resident characteristics—Of all residents matched, 25% were unsubsidised: 43% in rest-home care, 6% in hospital-level care and 13% in dementia care. Differences between unsubsidised residents and others were observed in demographic and functional characteristics, and in service use.

In *rest-home* care, the 43% that were unsubsidised appear to be similarly dependent as those subsidised, although older and having shorter lengths of stay. Mortality of the two groups was also similar. Small differences between unsubsidised and subsidised residents in being bed- or chair-bound and in needing help to eat are not compelling given the number of statistical tests.

It is curious that the higher rate of urgent hospital presentation post-survey was not observed in the 2-weeks prior to the survey as reported by facility staff nor in actual admissions post-survey. For this care level, the current upscaling method does not bias estimates with respect to care needed, but bias does arise in terms of resident age (undercounting the very old) and length of stay (overstating duration of stay). Overall counts are marked underestimates.

A dissimilar pattern was seen in the 6% who were unsubsidised in *hospital-level care*; they had better function and longer survival than the subsidised. The reasons are unclear: they or their families may be more able to access services, facilities could accept their entry in part as a less resource-intensive income stream, or subsidised residents could enter later in their disability process than others. A longitudinal population-based study would describe care pathways and address these questions.

Geographic variability—With 43% of OPAL rest-home residents being unsubsidised, an upscaling factor for Auckland would be 1.73, rather than the 1.47 MoH uses for NZ overall. When the MoH national upscaling factor was used, 466 Auckland residents were missed (Figure 1). To cross-check these results, the CCPS data were checked for Auckland; 40% of residents in high-level care received top-up payments,[15] giving an upscaling factor of 1.67 for rest-home counts, very similar to OPAL's 1.73. Arguably upscaling factors should be region-specific, so higher in Auckland and correspondingly smaller in other regions, according to the CCPS proportions.

That a higher proportion of Auckland residents are assessed as eligible for care yet do not receive a subsidy indicates they are assessed as having greater financial assets than their counterparts elsewhere.

The average value of a home is higher in large urban regions including Auckland, where even a small flat or apartment would have a government valuation over the asset threshold of $215,132. For those where the family home is not exempt from consideration, it is likely the single most valuable asset when assessing subsidy eligibility. The proportion who need care but who are deemed ineligible for a subsidy will thus be influenced by regional differences in housing values.

Such geographic variations, together with variations in bed availability, the proportion ineligible (such as those without NZ citizenship or residency), dependency, and health service utilisation will differentially impact subsidy uptake even among those having equal incomes. In an apparent anomaly, weekly subsidy rates are permitted to differ

by region while asset thresholds are the same throughout the country. Review of the assets and income tests is suggested in order to avoid geographic inequities.

Unsubsidised residents in high-level care—The finding that use of subsidy data under-reports high-level care is a concern. It has been[16] and currently (MoH, personal communication) constitutes the area of fastest growth in the RAC sector.

Those in dementia or high-level care are not upscaled in national demand estimates as it is assumed that all receive top-up payments and therefore will appear in the payments systems. Contrary to expectations, in Auckland, 6% of people in hospital-level care and 13% in dementia care were unsubsidised. Even if in other regions this percentage is lower, national undercounting is likely.

The policy is that all new or intending residents are formally needs assessed, even if intending to pay privately. Otherwise, should private funds be exhausted the resident could require a government subsidy even if the care assessment did not justify RAC care.[18] Different reasons may explain non-receipt of subsidy in hospital-level care.

Official NZ citizenship or residency is a pre-requisite for subsidy receipt, and Auckland likely has disproportionately more people without citizenship or residency visas than elsewhere.[19] But in all regions, delays in assessment or in completing the application for subsidy may mean some period is not covered because of mandated time limits.

Various regional schemes exist that fund RAC care for palliative care, short-term rehabilitative or convalescent care, or long-term mental health care, rendering a subsidy application unnecessary. For all these reasons, the assumption that all in higher-level care will appear in the CCPS is invalid, will vary geographically and will lead to undercounts.

National reporting—Unless specifically addressed, upscaling to account for people with absent (or incomplete) information inevitably assumes that the unknown 'people' are similar to those for whom information is available.

The proportion that was unsubsidised in Auckland, even in MoH data, differed markedly from national figures, indicating that more accurate national estimates would likely be achieved if stratified by region. Further, in OPAL the proportion paying privately increased with age. Estimation stratified by age group would avoid undercounting at higher ages and over-counting at lower ages. This is important because the older age groups are growing the fastest.

In recent years MoH has vastly improved and standardised its methods of measuring present and future use of RAC.[1] In their reports provided to and published by the OECD for the financial years 2006/07 to 2011/12, the proportion of long-term care residents nationally who paid the whole cost of care themselves reportedly rose from 33% to 38%.[3] Those estimates use a new database that facilitates ongoing reporting, providing recent counts and projections by age group, by region, and for the nation.[15] However neither MoH nor OPAL data can be used to estimate residents missing from high-level care. Though it seems reasonable to use an upscaling factor derived from incomplete high-level care data to low-level counts, the method is not validated. A more accurate method of measurement is needed.

Accurate tracking of residents from RAC entry until discharge is currently possible only for those who are subsidised, and only from the date first subsidised. By 1 July 2015, all facilities will use the suite of health and support needs assessment tools known as interRAI, in particular, the interRAI LTCF (Long-Term Care Facilities Assessment System).[20-22]

Extensive international testing of these instruments has demonstrated success in reporting needs for care provision, funding and quality improvement.[23] It is hoped that roll-out of interRAI will enable prospective tracking of all people receiving long-term RAC, including hospital-level care, from prior to admission through to discharge from the facility.

Strengths and limitations of this study—The OPAL survey was population-based with very high participation. Assessments of dependency, function and care needs were recorded by the usual nurses and/or caregivers within facilities based on the bed-type currently occupied. It covered three large district health boards that together provide healthcare services to 26% of the older population in NZ.[24]

The study is limited in that it describes the situation five years ago, in a region that has long been regarded as over-endowed with RAC beds.[25 26] Nevertheless, the 25% who were un-subsidised in OPAL is considerably lower than the 37% and 42% in prior Auckland RAC surveys in 1988 and 1993.[27 28]

Although the response rate of 89% of certified facilities was high, it is possible that the survey does not represent all in RAC at the survey date. When analyses were weighted to adjust for non-response, to test the impact of non-participation, percentages changed only at the 2nd decimal place. In the interests of simplicity these were not reported.

For 525 (under 8%) of residents surveyed, data matching was not possible because no NHI was provided or because important identifiers (age, gender, location) in the MoH record were very different from the OPAL record. There is therefore a risk that matching led to bias. However, the unmatched proportion was small and care levels and other characteristics of those dropped correspond well those with linkage data – for example, 52% (vs. 51% with linkage data) were in rest-home care, 7% (vs. 8%) in dementia care and 41% (vs. 41%) in hospital-level care.

In comparison, in an industry survey of all NZ facilities, 57% were in rest-home care, 8% in dementia care and 33% in hospital care, but survey participation was much lower, at 43%, and may itself be biased.[29]

Conclusions—Policy and service provision should be informed by the knowledge that unsubsidised residents differ in demographic characteristics from subsidised residents in low-level care, by age and probably by region. Use of InterRAI may eventually render redundant the current method of estimation. Until then, in deriving NZ estimates of RAC demand, upscaling should take age and region into account to provide for regional variability and to reduce inaccuracies in international comparisons. Research is needed to describe care pathways near the end of life and to understand how those in hospital-level care are not receiving financial assistance for their care.

Author information: Joanna B Broad, Senior Research Fellow, Freemasons' Department of Geriatric Medicine, University of Auckland; Toni Ashton, Professor, Health Systems, School of Population Health, University of Auckland; Thomas Lumley, Professor, Department of Statistics, University of Auckland; Michal Boyd, Senior Lecturer, School of Nursing, University of Auckland & Older Adults and Home Health, Waitemata District Health Board, Auckland; Ngaire Kerse, Professor, School of Population Health, University of Auckland; Martin J Connolly, Professor, Freemasons' Department of Geriatric Medicine, University of Auckland & Older Adults and Home Health, Waitemata District Health Board, Auckland

Correspondence: Joanna B Broad, Freemasons' Department of Geriatric Medicine, University of Auckland, C/- WDHB, Box 93503, Takapuna, Auckland 0740, New Zealand. j.broad@auckland.ac.nz

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