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Area-level and individual-socioeconomic variation in use of GP and specialist services. A multilevel analysis using linked data

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Abstract

Background

Timely access to primary healthcare and supporting specialist care relative to need is essential for health equity. However, use of services can vary according to an individuals' socioeconomic circumstances or where they live. This study aimed to quantify individual socioeconomic variation in GP and specialist use in New South Wales (NSW), accounting for area-level variation in use.

Methods

Baseline data (2006–2009) from the 45 and Up Study, involving 267,112 adults in NSW, Australia, were linked to Medicare Benefits Schedule (MBS) and death data (to December 2012). Multilevel logistic regression was used to estimate median odds ratios (MORs) to quantify small-area variation in need-adjusted GP use and quality-of-care and specialist use, and odds ratios (ORs) to quantify associations with individual socioeconomic position (SEP), separately by remoteness.

Results

GP (MOR=1.32-1.35) and specialist use (1.16-1.18) varied between areas, accounting for individual characteristics. For a given level of need and accounting for area-variation, low-SEP individuals were more likely to be frequent users of GP services (no school certificate vs university, OR=1.63-1.91, depending on remoteness category) and have continuity of care (OR=1.14-1.24), but were less likely to see a specialist (OR=0.85-0.95).

Conclusion

GP and specialist use varied across small-areas in NSW, independent of individual characteristics. Specialist but not GP care was inequitable. Failure to address inequitable specialist use may undermine equity gains within the PHC system. Policies should also focus on local variation.

Introduction

Adequate and timely access to primary healthcare relative to need is a specified goal of high performing health systems [1–3]. This is integral to improving average levels of population health, as well as health equity [4]. Further, an effective primary healthcare system requires ready access to supporting specialist care. Yet often individuals' socioeconomic circumstances or where they live, as much as their need for care, determine their use of services [5–9]; that is, access to care is inequitable. Examining and quantifying these differing sources of variation in care is essential for directing policy responses for achieving an equitable healthcare system.

There is evidence internationally [10–12], and to a lesser extent within Australia [7–9], of socioeconomic variation in use of GP and specialist services. Across most jurisdictions, people who are of low socioeconomic position (SEP) use equal or more GP services for a given level of need relative to their high-SEP counterparts [7–9, 12]. On the other hand, individuals of high-SEP are more likely to see a specialist than those of low-SEP [9, 10, 12]. Use of primary healthcare and specialist services also varies geographically. Studies in Australia using aggregated area-level data consistently find increased use of GP and specialist services in major cities compared with more remote areas [5, 8, 13]. To date, no Australian studies have examined individual socioeconomic variation in use of primary and specialist services while accounting for area-variation in use of services, or quantified the extent of variation at the area-level, beyond that explained by the characteristics of individuals living in those areas.

The aim of this study was to use large-scale linked data and multi-level analysis [14, 15] to examine the extent to which GP and specialist service use varied at the area-level, having accounted for the characteristics of people who lived in those areas. Further, we quantified variation in use of services according to individual SEP, having accounted for variation in use across areas. In this way, sources of variation in use of GP and specialist services are clarified and indicate directions for reducing unwarranted variation in care.

Methods

Study population and setting

The Sax Institute's 45 and Up Study is a large prospective cohort study involving 267,153 people aged 45 years and older residing in New South Wales, the most populous state in Australia [16]. Participants were randomly sampled from the Services Australia (formerly the Australian Government Department of Human Services) Medicare enrolment database, with over-sampling by a factor of two of individuals aged 80 years and over and people resident in rural areas. Participants enrolled in the study by completing a baseline questionnaire, distributed between 2006 and 2009, and providing consent for 5-yearly questionnaires and linkage to routinely collected health data. Approximately 11% of the total NSW population aged 45 years and older was included in the study, with a response rate of around 18% [17]. The study design and details of the questionnaire are reported elsewhere [17].

Data

Sociodemographic and health variables were derived from the self-reported baseline questionnaire. Data from the questionnaire were linked to Medicare Benefits Schedule (MBS) claims data (1 January 2003–14 December 2012) provided by Services Australia, and data from the NSW Registry of Births, Deaths and Marriages (RBDM) and the National Death Index (NDI). The MBS claims database includes all claims for subsidised medical and diagnostic services provided by registered medical and other practitioners through the MBS. For each claim for service processed, the MBS data include a range of information, including the date of the service and the item number for the service. Linkage of baseline data from 45 and Up Study participants to MBS data was performed at the Sax Institute through deterministic linkage, using an encrypted version of the Medicare number provided directly by Services Australia.

Probabilistic linkage to NSW RBDM was performed by the Centre for Health Record Linkage (CHeReL) data. Quality assurance data on the CHeReL data linkage show false positive and negative rates of $< 0.5\%$ and $< 0.1\%$, respectively [18].

Variables

For use of GP services, the main outcome was above-average GP use (no/yes) as a measure of frequent use, defined as eight or more services in the year following completion of the baseline survey, which is broadly consistent with definitions reported in the literature [9, 19]. We also examined secondary outcomes relating to types and qualities of GP services that indicate high-quality primary care [1–3], and that the general population would be eligible to receive. This included: i) any MBS service for a long or prolonged consultation (no/yes) in the follow up period (known to be associated with more problems managed and better outcomes, [20, 21]); ii) continuity of GP care measured by the usual provider continuity index (UPI) [22], calculated as the proportion of GP MBS services with the most frequent provider of total GP MBS services and defined as a UPI of 70% or more. As per standard definitions, the UPI was calculated over a 2-year period and calculated only for those participants who used at least four services in that time; and iii) care planning (no/yes) defined as at least one MBS service for a chronic disease and complex care planning item (including a GP management plan, team care arrangement or review item) in the follow - up period. These items relate to specific MBS funded services that can be claimed for care planning relating to chronic and complex care needs and to enable multidisciplinary coordination of care.

Specialist use was defined as any out-of-hospital MBS specialist service in the follow up period (no/yes). See additional file 1 for full list of MBS items codes included in the outcome measures.

Individual-level characteristics were derived from the 45 and Up baseline questionnaire. Our main exposure variable, SEP, was measured as the highest educational level attained (no school certificate, school certificate, apprenticeship or diploma, and university degree).

To determine need-adjusted use, healthcare need [9, 23] variables included were: self-reported health (excellent, very good, good, fair and poor); physical functioning (no limitation, minor limitation, moderate limitation, severe limitation and a missing category); and number of chronic conditions for the following self-reported conditions – cancer, asthma, hayfever, heart disease, heart attack, angina, stroke, diabetes, hypertension, hypercholesterolaemia, arthritis, osteoporosis, anxiety, depression and Parkinson’s disease (none, 1–2 chronic conditions, 3 or more chronic conditions).

To account for confounders in the relationship between SEP or healthcare need and use of health services we also included: age (10 age categories from 45 years through to 85 years and over), sex (male/female); country of birth (Australia/NZ, Europe/Nth America, Asia, Africa/Mid East, and other); and marital status (married/defacto or not married/not defacto).

Using Australian Bureau of Statistics (ABS) concordance files, each participant was assigned to a Statistical Area Level 3 (SA3) geography. These areas have populations of between 30,000 and 130,000 persons and are considered representative of communities sharing similar characteristics in terms of services available (additional file 1).

Analysis

Participants were followed for one year after study entry (most had completed entry by 2008) and were included if they had a least one Medicare record, were alive at the end of the follow up period and had a geographical identifier coded to NSW.

Frequencies and proportions were calculated for the sample according to participant characteristics, for the total sample, by education and by outcomes. A series of two-level random intercept multilevel logistic regression models (participants nested within SA3 of residence) were fitted for each outcome. Two model specifications were used: i) random intercept with no explanatory variables to determine if outcomes varied at the area-level; and ii) adjusted for individual education, healthcare need and confounders to determine need-adjusted individual-level socioeconomic variation in outcomes (having accounted for area-level variation).

Area-level variation in each outcome was estimated from the variance term (V_A) by calculating the ICC by the linear threshold model method (ICC = $V_A/(V_A+3.29)$ and the median odds ratio (MOR=$\exp(0.954\sqrt{V_A})$ [14]. The proportional change in variance (PCV=(V_A $-V_B/V_A$) x 100) [14] was used to estimate the proportion of overall variation in outcome explained by addition of explanatory variables to the model. Second-order penalised quasi-likelihood (PQL) estimation was used as per Rasbash and colleagues [15]. Monte Carlo Markov Chain (MCMC) estimation was used to assess model fit statistics and residuals plotted to test model assumptions held.

As health service use in Australia varies according to remoteness, analyses were stratified by categories of remoteness (major cities, inner regional, outer regional/remote) based on the 2006 Access and Remoteness Index of Australia (+) [24] and according to the Australian Statistical Geography Standard Classification of remoteness (ASGC-RA).

Analyses were undertaken using Stata (College Station, Texas, StataCorp; Version 14.1) in the Secure Unified Research Environment, a secure remote-access computer facility for analysis of linked data. Multilevel analysis were performed using the runmlwin add-on [25], using Stata's post estimation procedures.

Sensitivity analyses were also repeated using alternative measures of frequency of GP use (low versus medium and medium versus high) and including those who died in the follow up period.

Ethics approval

for this project was obtained from the NSW Population and Health Services Research Ethics Committee (HREC/13/CIPHS/8), the University of Western Sydney Ethics Committee (H9835) and the Australian National University Human Research Ethics Committee (2011/703). Ethics approval for the 45 and Up Study was granted by the University of New South Wales Human Research Ethics Committee. The 45 and Up Study participants consented to data linkage at baseline. Linkage of the MBS data is performed under approvals from the ethics committees of Services Australia and the Australian Government Department of Health.

Results

Sample Characteristics

After excluding those who had an invalid death date or died in the follow up period (n = 320), did not have an MBS service (n = 1583), or were unable to be assigned to an SA3 (n = 151) the final sample for inclusion was 263,083. Of these, 11.7% had no school certificate, 31.8% completed a school certificate, 31.8% had completed an apprenticeship or diploma and 23% had completed a tertiary level qualification. The mean age of the population was 62.7 years (SD 11.2), 46% were male, over 80% rated their health as good, very good or excellent and 73% had at least one chronic condition (Table 1).

Table 1
Sample characteristics: individual-level variables by educational attainment (%) and for total sample

Variable	***Educational attainment***					
	No school certificate	**School certificate**	**Apprentice/ diploma**	**University**	**Missing**	**Row category total %(n)**
Education						
Total %(n)	11.7(31,126)	31.8(84,302)	31.8(84,294)	23(60,933)	1.7(4,428)	100(265,083)
Sex						
Male	42.1	36.1	55.2	50.0	48.6	46(122,893)
Female	57.3	63.9	44.8	50.0	51.5	53.6(142,190)
Age						
45–54	16.5	24.4	31.6	40.1	14.4	29.2(77,397)
55–64	27.4	32.9	31.9	34.8	22.6	32.2(85,342)
65–74	28.9	23.7	21.5	15.7	25.4	21.8(57,734)
75–84	21.8	15.3	12.7	8.0	28.8	13.8(36,516)
85 plus	5.4	3.8	2.3	1.5	8.8	3.1(8,082)
Country of birth						
Australia/NZ	75.9	80.8	76.9	72.5	64.8	76.8(203,629)
Europe/ N. America	18.6	13.4	17.7	16.8	20.9	16.3(43,154)
Asia	2.3	2.6	2.3	6.5	4.0	3.4(9,031)
Africa/Mid. East	1.1	1.5	1.3	2.7	1.7	1.7(4,397)
Other	0.5	0.8	0.9	0.8	0.9	0.08(2,145)
Marital status						
Not married/ not de facto	32.6	26.2	22.3	21.0	33.5	24.7(65,288)
Married/de facto	66.8	73.3	77.1	78.5	64.3	74.7(198,185)

Notes: N, number; %, percentage; Columns for each variable category for each educational attainment categories sum to 100%. Values in last column gives break down by category for each individual variables for the total sample, not stratified by educational attainment. For each variable, total (n) sums to 265,083 and percent sums to 100% including missings;Chi-squared test for trend with education $p < .001$ all variables. Missing: age < 1%, country of birth 1%, marital status 0.6%, self-rated health 3.5%, physical functioning 13.3%, continuity of care 0.1%, care planning 30.6%. 3. Missing for care planning includes those excluded as ineligible (i.e. do not have a chronic disease or long-term condition).

Variable	*Educational attainment*					
	No school certificate	**School certificate**	**Apprentice/ diploma**	**University**	**Missing**	**Row category total %(n)**
Self-rated health						
Excellent	7.4	12.2	14.1	22.4	10.1	14.6(38,575)
Very good	25.6	35.0	36.8	40.8	24.6	35.6(94,481)
Good	36.3	34.5	33.8	26.5	32.1	32.6(86,451)
Fair	20.5	12.3	10.7	6.9	17.5	11.6(30,644)
Poor	4.8	2.2	1.8	1.0	4.0	2.1(5,575)
Chronic conditions						
none	20.7	25.4	27.3	31.2	25.2	26.8(70,991)
1–2	49.9	52.0	52.6	53.0	50.1	52.1(198,116)
3 or more	29.4	22.6	20.2	15.8	24.7	21.1(55,976)
Physical functioning						
No limitation	18.9	26.5	30.0	39.4	19.2	29.5(78,323)
Minor limitation	15.4	23.2	26.9	30.2	14.5	24.9(66,072)
Moderate limitation	21.4	22.5	21.6	17.3	16.7	20.8(55,097)
Severe limitation	21.8	12.9	10.3	5.5	16.5	11.5(30,367)
GP use						
Below average (%)	46.5	59.0	64.4	74.3	47.8	62.6(165,803)
Above average (%)	53.6	41.1	35.6	25.7	52.2	37.5(99,280)
Continuity of care						

Notes: N, number; %, percentage; Columns for each variable category for each educational attainment categories sum to 100%. Values in last column gives break down by category for each individual variables for the total sample, not stratified by educational attainment. For each variable, total (n) sums to 265,083 and percent sums to 100% including missings;Chi-squared test for trend with education $p < .001$ all variables. Missing: age < 1%, country of birth 1%, marital status 0.6%, self-rated health 3.5%, physical functioning 13.3%, continuity of care 0.1%, care planning 30.6%. 3. Missing for care planning includes those excluded as ineligible (i.e. do not have a chronic disease or long-term condition).

Variable	*Educational attainment*					
	No school certificate	School certificate	Apprentice/ diploma	University	Missing	Row category total %(n)
< 70%	41.1	44.8	46.5	50.4	41.6	46.1(105,433)
≥ 70%	58.7	55.0	53.4	49.6	58.1	53.7(128,055)
Care planning						
No	53.5	54.8	55.3	56.3	51.6	55.1(146,046)
Yes	22.4	15.9	13.5	8.5	20.1	14.3(37,815)
Long consult						
No	56.5	58.7	60.1	59.8	56.2	59.1(156,652)
Yes	43.5	41.3	39.9	40.2	43.8	40.9(108,428)
Any specialist use						
No (%)	40.5	44.3	46.5	47.9	40.5	45.3(120,063)
Yes (%)	59.5	55.7	53.6	52.1	59.5	54.7(145,019)

Notes: N, number; %, percentage; Columns for each variable category for each educational attainment categories sum to 100%. Values in last column gives break down by category for each individual variables for the total sample, not stratified by educational attainment. For each variable, total (n) sums to 265,083 and percent sums to 100% including missings;Chi-squared test for trend with education $p < .001$ all variables. Missing: age < 1%, country of birth 1%, marital status 0.6%, self-rated health 3.5%, physical functioning 13.3%, continuity of care 0.1%, care planning 30.6%. 3. Missing for care planning includes those excluded as ineligible (i.e. do not have a chronic disease or long-term condition).

[Table 1 here]

Area-level variation

Use of GP services varied according to where a person resided–for all regions–having accounted for the characteristics of individuals living in those areas (Fig. 1, MOR major cities 1.34, inner regional 1.32, outer regional/remote 1.35). This means that an individual who lived in area with a higher rate of above-average GP use had a (median) 32–34% greater probability of having above-average GP use than an individual with identical characteristics who lived in an area with a lower rate of above-average GP use. Area-level variation in specialist use across all regions was also evident after accounting for the characteristics of individuals (MOR 1.16–1.17; additional file 1).

[Figure 1 here]

Individual level socioeconomic variation

For a given level of need, people of low education used more GP services on average compared to those with higher levels of education, having accounted for area variation in use (no school certificate vs university educated; major cities OR 1.91, 95%CI [1.81, 2.03], inner regional 1.63 [1.54, 1.73], outer regional remote 1.72 [1.60, 1.84], Fig. 2). For secondary outcomes examining quality of GP care, people of low education were also more likely to have care planning (e.g. no school certificate vs university educated in major cities 1.53[1.42, 1.14]) and continuity of care (e.g. in major cities 1.14[1.07, 1.20]) compared to their high education counterparts, but less likely to have a long consultation (e.g. inner regional 0.90[0.87, 0.95]), accounting for area-variation in these outcomes (additional file 1). Patterns of association were found whether in major cities or more remote locations.

[Figure 2 here]

On the other hand, people of low education (for a given level of need) were less likely have a specialist service compared to their higher-education counterparts, accounting for area-variation (no school certificate vs university educated; major cities 0.86 [0.81, 0.90], inner regional 0.85 [0.81, 0.90], Fig. 2).

Discussion

This study has shown, that where people live (at the local area-level) matters for the GP and specialist services they receive, independent of their personal characteristics. This was the case across all remoteness categories - major cities, regional and more remote areas - in New South Wales. Further, having accounted for where people live, use of GP services and quality of care was equitable, in that disadvantaged people were more likely to use more services on average, and to have continuity of care and care planning. However, the finding that advantaged people were more likely to see a specialist or have a long consultation suggests a potential source of inequity.

This is the first study in Australia and one of few internationally to quantify area-level variation in GP and specialist use, independent of the characteristics of people who lived in these areas. The amount of variation between areas quantified in this study is comparable to that previously reported when examining other healthcare outcomes in Australia (e.g. hospitalisations [26]), and internationally [10]. More use of GP services and care planning and greater continuity of care among people of lower SEP has been previously shown [7–9, 27] and this study confirms that this holds having accounted for where people live. People of lower SEP are more likely to have multiple and complex health and psychosocial care needs [28] than their advantaged counterparts; continuity and care planning are essential for enabling these needs to be met. International data from countries without gate-keeping mechanisms in place have found inequity of specialist use [10], independent of where people live. Our study demonstrates this was also found within a setting with gate-keeping policies in place.

We found that individual use of GP and specialist services varied across small-areas, for all remoteness categories, beyond what could be explained by the characteristics of people living in those areas. This suggests that there are aspects within peoples' local context that systematically shape the care of all who live in that area. The specific reasons are unknown but may relate to how services are organised and delivered (including availability of providers) within an area or structural policies determining the geographical distribution of services and providers. International multilevel studies in countries with [29] and without [10] a gate-keeping mechanism have shown that availability of GPs and specialists within an area was associated with specialist use. This has not been investigated for GP service use or quality of care. Importantly, how services are organised can be changed (through policy and practice) and doing so may contribute to reducing the unwarranted variation across areas.

There are likely multiple reasons why socioeconomically disadvantaged people use less specialist services for a given level of need. Unlike GP care, in Australia there are no bulk-billing incentives for specialists. Out-of-pocket costs for specialist services doubled in the decade prior to the study period [30] and have continued to rise since. Further, private health insurance has been shown to contribute to pro-high income use of specialist services [9]; yet government funded rebates for private health insurance have remained in place. Other possible reasons include: differences in propensity to seek care due to differences in health literacy, attitudes and beliefs; or, due to negatively biased behaviours from providers, disadvantaged people are less likely to seek specialist care [31]. However, if this was the case a similar finding would be expected with use of GP services. Further, studies examining propensity to seek care [32] or rates of completion of specialist referrals[33] have not found differences between socioeconomic groups.

Alternatively, these differences may be due to provider preferences and bias. International evidence also suggests providers offer fewer services to those of low SEP [31] and are more likely to refer higher SEP individuals to a specialist [34]. Irrespective of the reasons, differences in use does not reflect need for care and hence is inequitable and unjust.

The reason why people of high education were more likely to have a long consultation is unknown. Possibly, low educated people are more likely to be bulk-billed, and given current financing arrangements in Australia, the benefit per minute falls with longer consultations. These findings may also reflect differences in health literacy. More highly educated people may be more likely to anticipate and expect a range a health issues to be addressed in a single episode and request a consultation length to that effect, or actively seek out practitioners with characteristics associated with longer consultations[35].

A strength of our study is the multilevel analytical design, which allowed modelling of nested levels of data and quantification of area- and individual-level variation. Further, the large sample linked to MBS service use, allowed quantification of observed use (rather than self-report) after accounting for a range of factors. While MBS data will capture nearly all GP services, there are some settings where services provided do not attract an MBS claim. For example, publicly funded community health centres and some GP services provided in emergency departments in rural and remote areas. In addition, a substantial proportion of specialist services in Australia are provided in publicly funded hospital-based outpatient clinics, which generally do not attract an MBS rebate. Low-SEP people are more likely to use these community and hospital-based services [9] and exclusion of these services may bias estimates for SEP gradients to be pro-high SEP. However, previous studies found this did not alter estimates of socioeconomic variation in GP and ambulatory specialist care[9].

Implications for policy/public health.

An effective PHC system requires ready and reliable access to secondary level care. This has not been equitably achieved in Australia–despite the presence of universal health insurance–undermining the equity that exists in the PHC system. National structural policies, such as minimising out-of-pocket costs for example through bulk-billing incentives, would go some way to redressing inequitable use of specialist services. Given that private health insurance contributes to pro-high SEP use of specialist services, offsetting government rebates in favour of lower income or disadvantaged individuals could also contribute to reducing this inequity. It could be argued that the inequity in community-based specialist services is balanced by a pro-low SEP preference for specialist outpatient services through the public hospital sector. However, waiting times for less urgent and more discretionary health needs (and in some instances for more urgent health needs) in the public sector are understood to exceed that in the private sector [36], although actual wait times are not published. This increases the impact of illness on recovery and quality of life, affecting those who are disadvantaged to a greater extent. As such, addressing inequalities in access to specialist care is even more pressing.

The unwarranted variation in both GP and specialist use suggests that additional policy approaches are needed that are directed to local contexts, rather than at individuals. For example, it may be that availability of providers (both GPs and specialists) may need to be addressed, as international studies have shown this explains some of the area-level variation in care. Similarly, there may be other aspects of how services are organised and delivered at the local area-level that may determine their use of services. The specific drivers and hence policy solutions to addressing the unwarranted area-level variation requires further exploration.

Conclusion

It is reassuring that, for a given level of need, GP service use and important aspects of quality of care (such as care planning, continuity of care) favours those who are disadvantaged; further, this is the case regardless of where people live. However, the ongoing pro-high SEP use of specialist service threatens to undermine this and requires urgent attention. Equity measures to improve affordability are an important avenue to address this. However, both GP and specialist care varies not only between major cities and more remote locations, but also within at the small area-level. This is unwarranted and highlights an important opportunity to improve equity in the Australian healthcare system.

Declarations

Ethics approval and consent to participate

Ethics approval for this project was obtained from the NSW Population and Health Services Research Ethics Committee (HREC/13/CIPHS/8), the University of Western Sydney Ethics Committee (H9835) and the Australian National University Human Research Ethics Committee (2011/703). Ethics approval for the 45 and Up Study was granted by the University of New South Wales Human Research Ethics Committee. The 45 and Up Study participants consented to data linkage at baseline. Linkage of the MBS data is performed under approvals from the ethics committees of Services Australia and the Australian Government Department of Health.

Consent for publication

Not applicable

Availability of data and materials

The data that support the findings of this study are available from the Sax Institute, NSW but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data part of the Sax Institute's 45 and Up Study are available for approved projects to approved researchers (www.saxinstitute.org.au).

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

DB, LJ, SL, RK conceived and designed the analysis. DB completed data analysis and drafted the manuscript. All authors revised the work for intellectual content and approved the final version of the manuscript.

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Figures

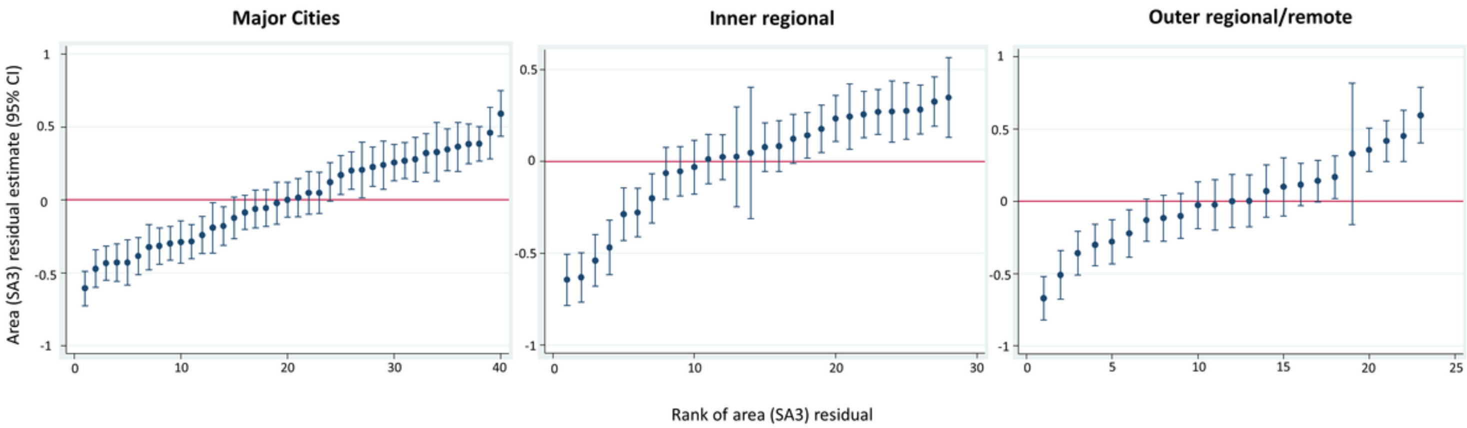

Figure 1

Difference between mean for each area (SA3) and the mean across all areas in log odds of above-average use (95% CI) for each area, by remoteness

Notes: Adjusted for education, age, sex, country of birth, marital status, self-rated health, chronic disease and physical functional limitation; Mean log odds of above-average use across areas for that remoteness category set 0 and given by the horizontal red line; Each dot represents the mean for each SA3 of the difference in log odds of above-average use for each person in that SA3 from the mean log odds of above-average use for all areas (i.e. the mean of the residuals by SA3). Bars are the 95% confidence intervals around the mean for each SA3. SA3 values that lie above and below the red with CIs that do not cross the red line, are significantly different from the mean log odds of above-average use for all SA3s in that remoteness category. A person living in an area above the line has a higher probability of above-average GP use than the overall sample mean, irrespective of their individual characteristics; CI, confidence interval; SA3, statistical area 3.

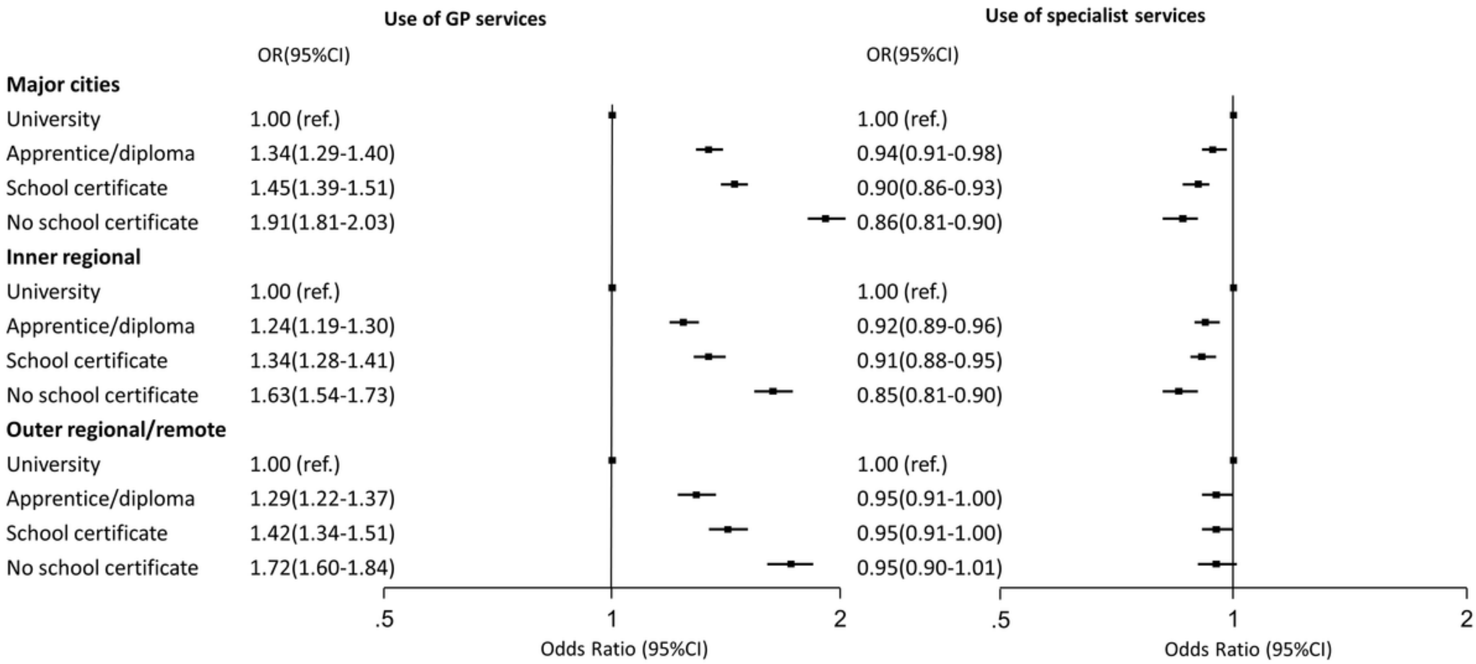

Figure 2

Odds ratios and 95% confidence intervals for education with above-average use of GP services and any use of specialist services, by remoteness.

Notes: GP, general practitioner; OR, odds ratio; CI, confidence interval; %, percentage; ref., reference. Model fitted with a random intercept (area-level) adjusted for sociodemographic (education, age, sex, country of birth, marital status) and need (self-rated health status, number of chronic disease, physical functioning) variables. GP use, Wald joint test of significance for education p<.001 for all remoteness categories. Any specialist use Wald joint test of significance for education cities and inner regional <.001, outer regional not significant.

Supplementary Files

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