Data Insight

Assessing access to primary care in rural and urban Wales

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Introduction

Following a presentation by Professor Ronan Lyons to a stakeholder group of Rural Health Care for Wales (RHCW) in 2023, there was an approach to assist RHCW in their ongoing research into health inequalities across rural areas of Wales, particularly the most sparsely populated Mid Wales region. A collaboration between Administrative Data Research (ADR) Wales researchers at Swansea University and Rural Health Care for Wales (RHCW) was formed to conduct a pilot study on inequalities in rural primary healthcare accessibility.

The research questions related to distances travelled to General Practice (GP) surgeries in rural areas. Specifically, the questions posed were: (1) do individuals use their nearest GP surgeries in rural areas, (2) how far people travel to attend their GP surgeries in rural areas, and (3) how does this compare to distance travelled by patients to their GPs in more urban areas?

Background

Rural Health and Care Wales (RHCW) is a collaboration between the three health boards that cover the most rural parts of Wales – Powys Teaching Health Board, Hywel Dda University Health Board and Betsi Cadwaladr University Health Board. Its prime focus is on undertaking research into any potential health and/or care inequalities that may be faced by people living in rural areas of Wales, whilst also developing and piloting innovative ways of effectively delivering new health and care services in rural areas.

In 2023, RHCW was tasked by its stakeholder group and the Mid Wales Joint Committee for Health to consider the provision of GP surgeries and primary care services across Mid Wales and to develop an action plan that aims to ensure that rural populations receive equitable and sustainable health services. Part of the research work involves consideration of distance travelled and accessibility to GP surgeries for those living in the region, however, other health factors will be required to better understand current patient health issues and on-going support requirements. Further to those from the RHCW team working on this project, additional support is provided through a secondment funded by the Transport and Health Integrated research Network (THINK) at Aberystwyth University. The subsequently agreed additional support from SAIL allows new collaborative work and a new approach to be included in this work.

In addition, to showcase utility and advantages of using the Secure Anonymised Information Linkage (SAIL) Databank hosted at Swansea University to complete such research, health profiles for patients at each practice were compiled, along with a comparison group of urban-based GP surgeries. SAIL is grateful to GPs who provide health data; currently SAIL holds GP data for 84% of the population in Wales and actively works towards recruiting more data.

Aims and objectives

A The research questions were (1) do individuals use their nearest GP surgeries in rural areas, and (2) how far do people travel to GP surgeries in rural areas? Secondary to the research questions, we aimed to provide evidence of the utility of SAIL by creating socio-demographic and clinical patient profiles based on various health metrics for the study group GP surgeries and a comparison group. The comparison group was included for informational purposes, with no direct comparisons due to the descriptive nature of the research.

What we did

This work was carried out in the SAIL Databank, which holds anonymised individual and household-level data at population-scale for Wales (1–4).

Within SAIL all individuals and home addresses are anonymised, with multiple layers of encryption applied before being made available to researchers; these are referred to as anonymised linking fields (ALF) and residential anonymised linking fields (RALF) respectively (5,6). The linking fields are used to link to various other datasets held in SAIL to build more comprehensive datasets to address each research question.

Cohort selection and study groups

We selected individuals and their home address if they were registered to a Wales-based GP on the 31st of June 2021 using the Welsh Demographic Service dataset (WDSD). We allocated individuals to a Mid Wales study group if they were included in an initial selection of GP surgeries provided to SAIL by RHCW.

We selected all individuals registered to GP surgeries located in Wales which were in urban areas according to the ONS urban-rural classification (7); these individuals formed the urban comparator group.

We excluded data for the following reasons: (1) individuals were registered to a GP surgery not providing health data to SAIL; (2) the GP surgery was not a single-site GP surgery i.e. a main-site with at least one branch surgery (discussed below); (3) where distance data could not be linked to a person's home address.

The reason for applying the exclusion related to individuals not registered to a single-site GP was due to how data is recorded within the individual GP patient record which we discovered during this work. In the situation where a patient is registered to a multi-site GP (defined as a GP having more than one location, i.e. a main-site and one or more related branch GP site) it is not possible to understand which of the multiple locations an individual would attend. Despite each GP site having a unique practice-code, only the main site GP code is attached to the individual patient record. Including such records in the study would introduce error with skewed distance data. We completed an initial analysis to quantify this scenario using Geographic Information System (GIS) techniques to calculate road distances between main-site and branch GP practice data (8). This included 309 locations classed as multi-site GPs, consisting of 137 main-site GPs and 172 associated branch GPs (multi-site GP surgeries have one or more branch sites). The mean distance between a main-site GP and the associated branch GP was 5.8 km, with a standard deviation of 3.6 km. This information helped inform the decision to exclude individuals registered to a multi-site GP to avoid introducing this error into the main analyses.

Geographical distance data

To understand potential distances travelled to GP surgery sites, a database was created using Geographical Information System (GIS) techniques, mapping road network distances from each residential address in Wales to each GP surgery in Wales and imported into the SAIL Databank.

The locations and corresponding geographical latitude and longitude coordinates of all GP surgery locations was extracted from Data Map Wales on 26th July 2024 to create a geospatial dataset of each GP surgery location in Wales (8). This dataset was used in conjunction with data for all residential dwelling locations in

Wales identified using a Unique Property Reference Number (UPRN) (https://www.ordnancesurvey.co.uk/products/os-open-uprn). Using road network data provided by OpenStreetMap an origin-destination matrix was calculated measuring road network distances between every GP surgery and all residential addresses in Wales (9). This dataset was encrypted and ingested into SAIL, with the UPRN being replaced with a RALF. Subsequently the data was joined to the WDS records using the RALF and encrypted GP surgery identifier to join individual's place of residence to their registered GP surgery and derive the road network distance between them. The distances calculated are based on road network configuration captured in OpenStreetMap at the time of data extraction (May 2024) and shortest route calculations and road restrictions in place along the road network at this time. Distances based measurements were created for individuals: distance to an individual's registered GP; distance to an individual's nearest GP surgery; and a binary indicator to capture whether individuals were registered to their nearest or a more distant GP surgery (set to 1 for nearest).

Demographic and health data measurements

We linked study individuals to the WDSD to obtain individual level factors including age, sex, and RALF. We also used the WDS to calculate the number of individuals registered to each RALF on the census date and determine whether an individual was living alone or not. We subsequently used the RALF to obtain the 2011 Lower layer super output area (LSOA) associated with the property to assign area-level factors: deprivation (overall measure from WIMD 2019, using quintiles, where 1 represents the most deprived) (10), and rurality (ONS Rurality measure for individuals depending on home location, classed as living in rural town, rural village, or urban city and town).

Defining health indicators

We used existing methods to calculate health outcomes and measures of wellbeing to be used as indicators of the health and wellbeing of the study groups.

Using the electronic Frailty Index (eFI) we classified individuals as fit, mild, moderate or severe based on GP records with a maximum look back period of 10 years prior to the census date (11,12).

To understand levels of illness between study groups we assigned individuals as being multimorbid if they had two or more specific health conditions using a modified multimorbidity algorithm based on primary and secondary care records over a maximum 10 years prior to census date (13).

We used a newly developed method aimed at capturing likely wellbeing of a population using six factors of health and healthcare utilisation, known as the Desirable Health Indicator (DHI) (Doel et al., 2025 under review). Health and administrative data was analysed for a one-year period centred around the census date and including the following factors: primary care medications for (1) mental health, (2) infections, and (3) pain relief; secondary care factors: (4) hospital admissions, (5) emergency department attendance, and (6) death. We created a summary measure, assigning individuals as having 'desirable' health (absence of any of the six factors), or 'non-desirable' based on the presence of at least one of the non-desirable events.

Statistical analysis

Demographic, health, and distance-based data were linked, analysed, and summarised to create profiles for both study groups and for each of the study group GPs. We created descriptive summary statistics and data visualisations and performed t-tests to examine differences in mean travel distances between groups.

Results

The final Mid Wales study group consisted of 15 GP surgeries with 86,996 registered individuals, and 136 GP surgeries with 979,652 registered individuals in the urban comparator group (Figure 1). The consort diagram below describes the study selection process starting from the full population of Wales on June 30th, 2021.

Figure 1 – Description of study selection process

Stage and description	Measurement level	Study Group		Comparison Group	
		Total n	Total n dropped per stage	Total n	Total n dropped per stage
Stage 1: Registered to a GP, and Welsh address registration June 2021	GPs	21		246	
	Individuals (ALF)	144,770		2,108,349	
	Properties (RALF)	61,207		852,532	
Stage 2: Exclude GP's not providing health data to SAIL	GPs	18	-3	210	-36
	Individuals	118,051	-26,719	1,824,257	-284,092
	Properties	51,361	-9,846	759,090	-93,442
Stage 3: Exclude multi-site GP's	GPs	15	-3	136	-74
	Individuals	93,225	-24,826	1,012,665	-811,592
	Properties	41,045	-10,316	441,416	-317,674
Stage 4: Final study numbers Exclude if missing GIS data or not linkable to property	GPs	15	-	136	-
	Individuals	86,996	-6,229	979,652	-33,013
	Properties	38,743	-2,302	429,449	-11,967

We report results by study group, by rurality classification of location of GP surgeries and by individual GP surgery. Study GP surgeries are represented with an anonymous indicator (letters A to O), with 'Z' being allocated to the comparator group.

Rurality classification of GP surgeries within Mid Wales study group

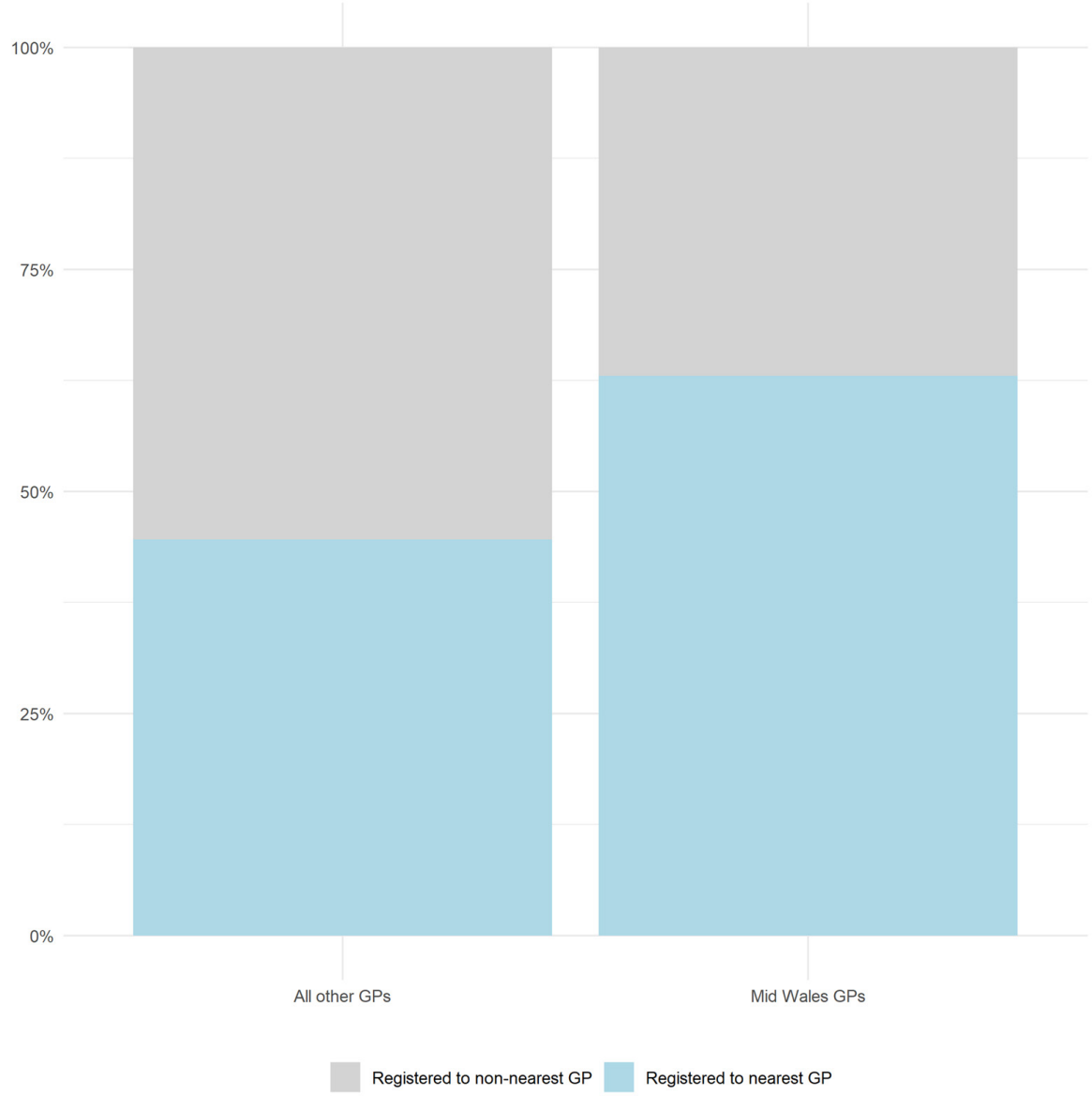
Study group GP surgeries were primarily rural based, although variation is noted in terms of the ONS Rural-Urban classification, with classification of 27% 'urban city and town in a sparse setting', 40% 'rural town and fringe in a sparse setting' and 33% 'rural village and dispersed in a sparse setting'. It is noteworthy that all were classed as being in sparsely populated settings, as ONS includes this sub classification as population sparsity, which is noted as a problem for delivery of services in rural areas, indicating areas with especially low household density. By design, 99% of comparator GP surgeries were 'urban city and town', with only 1% classed as 'urban city and town in a sparse setting'.

Primary outcomes

Are individuals registered to their nearest or a more distant GP surgery?

Within the study group, 63% of individuals were registered to their nearest GP practice, with the remaining 37% being registered to a more distant GP practice (Figure 2). This compares to 45% registered to the nearest GP in the comparison group.

Figure 2 - Percentage of individuals registered to nearest or more distant GP surgeries for study and comparator groups.



Differences in distance to the nearest GP surgery were observed when study GP surgeries were grouped by rurality classifications, with 38.0%, 70.7% and 80.7% of individuals registered to their nearest GP in urban, village and town classifications respectively (Table 1). Within the study group GP surgeries, the proportion of patients registered to their nearest GP surgery ranged from 24.2% to 95.4% (Appendix 3).

Table 1 – Percentage of individuals registered to nearest or more distant GP surgery

Analysis level	Description	Not registered to nearest GP	Registered to nearest GP
Study Group	Comparator Urban based GP surgeries	55.4% (543045)	44.6% (436607)
	Mid Wales GP surgeries	37.0% (32163)	63.0% (54833)
GP Location	Rural village and dispersed in a sparse setting	29.3% (6041)	70.7% (14579)
	Rural town and fringe in a sparse setting	19.3% (6809)	80.7% (28409)
	Urban city and town in a sparse setting	62.0% (19313)	38.0% (11845)

How far do people travel to GP surgeries in rural areas?

There was wide variation across study GP surgeries, with a minimum mean distance of 3.1 km and maximum of 9.9 km (Appendix 4). Table 2 shows the mean distances (and standard deviation) and median distances travelled to registered GP surgeries for each study group, and for each rurality classification sub-division of the study group. The mean distance individuals travel to primary care GP surgeries across the entire study group was 6.3 km, compared with 2.3 km in the comparator group, a statistically significant difference of 4.1 km (p-value <0.05, confidence intervals 4.06-4.14 km). Median distances were shorter, with travel distances of 5.4 km and 1.8 km in the study and comparator groups respectively, a difference between groups of 2.6 km.

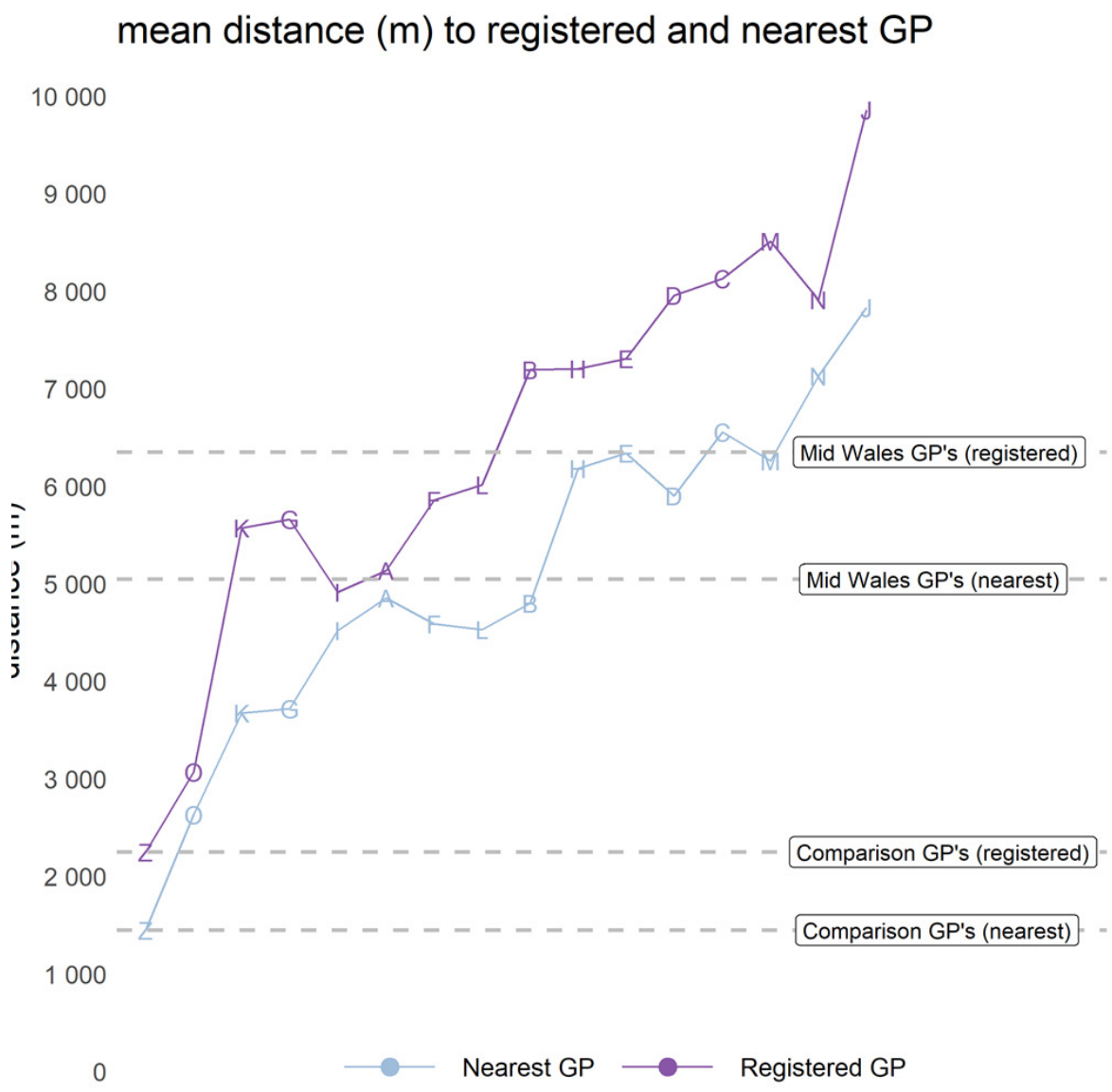
For each of the additional rurality classification levels, all three comparisons (urban, town, village) were statistically significant, with distance differences of 2.5 km (p-value <0.05, CI 2.44-2.56 km), 4.5 km (p-value <0.05, CI 4.48-4.60 km) and 5.8 km (p-value <0.05, CI 5.69-2.84 km) respectively, compared to the overall comparator group (Table 2).

Table 2 – Distance metrics to registered GP surgeries

Analysis level	Description	Total individuals	Mean distance	Standard deviation	Median distance
Study Group	Comparison GP surgeries	979,652	2.3	2.0	1.8
	Study GP surgeries	86,996	6.3	5.7	5.4
GP surgery location	Rural village and dispersed in a sparse setting	20,620	8.0	5.4	7.8
	Rural town and fringe in a sparse setting	35,218	6.8	5.7	6.4
	Urban city and town in a sparse setting	31,158	4.8	5.4	2.2

Figure 2 visualises the differences in distances between the registered or nearest GP surgery for each GP surgery in the study group and the comparator.

Figure 2 - Chart showing mean distance to nearest, and mean distance to registered GP for each individual study group GP and comparator GP.



Secondary outcomes

Demographics

Table 2 shows key demographic factors for the study and comparison groups. Generally, the study group was older, with over a third of individuals aged 60 or greater, compared to around a quarter of the comparisons. The study group lived in less deprived areas, with 5.8% living in areas classed as the most deprived in Wales compared to 26.3% for those in the comparison group. Individuals in the study group were predominantly rural based, 62.6% with home addresses classed as rural village, 14.6% classed as rural town, with the remaining 22.7% living in areas classed as urban, compared to 93.7% urban, 3.7% rural village, and 2.6% classed as rural town in the comparator group. The number of individuals living alone in the study group was higher than comparisons (13.9% vs 11.5%). Further information on group socio-demographics are visualised in Appendix 7.

Table 2 – Demographic factors for the study and comparison group

	Study group N	Study group %	Comparison group N	Comparison group %
Total	86,996	100.0	979,652	100.0
Sex				
Male	43,325	49.8	486,827	49.7
Female	43,671	50.2	492,825	50.3
Age group				
0-19	16,396	18.8	215,908	22.0
20-39	18,135	20.8	247,325	25.2
40-59	22,612	26.0	261,661	26.7
60-79	23,983	27.6	206,575	21.0
80+	5,870	6.7	48,573	5.0
Deprivation				
1. Most deprived	5,072	5.8	257,848	26.3
2	15,986	18.4	209,841	21.4
3	32,668	37.6	158,221	16.2
4	26,452	30.4	153,601	15.6
5. Least deprived	6,818	7.8	191,060	19.5
Rurality				
Rural village	54,474	62.6	35,723	3.7
Rural town	12,738	14.6	25,608	2.6
Urban city and town	19,784	22.7	918,321	93.7
Living alone				
No	74,861	86.1	866,680	88.5
Yes	12,135	13.9	112,972	11.5

Health indicators and profiles

Table 3 compares the health indicators for the study and comparator group. The frailty index approach shows a smaller proportion of the study group were classed as fit (82.5% vs 85.1%), with small increased proportions for those classed as being mild, moderate, or severely frail compared with urban comparisons.

The study group had more individuals with the multi-morbid indicator (at least two conditions) with 29.3% compared to 28% in the comparison group.

For the DHI, a higher proportion of the study group had none of the six adverse health events recorded, with 48.8% classed as no adverse health events, compared with 44.4% of the comparator group. The hospital

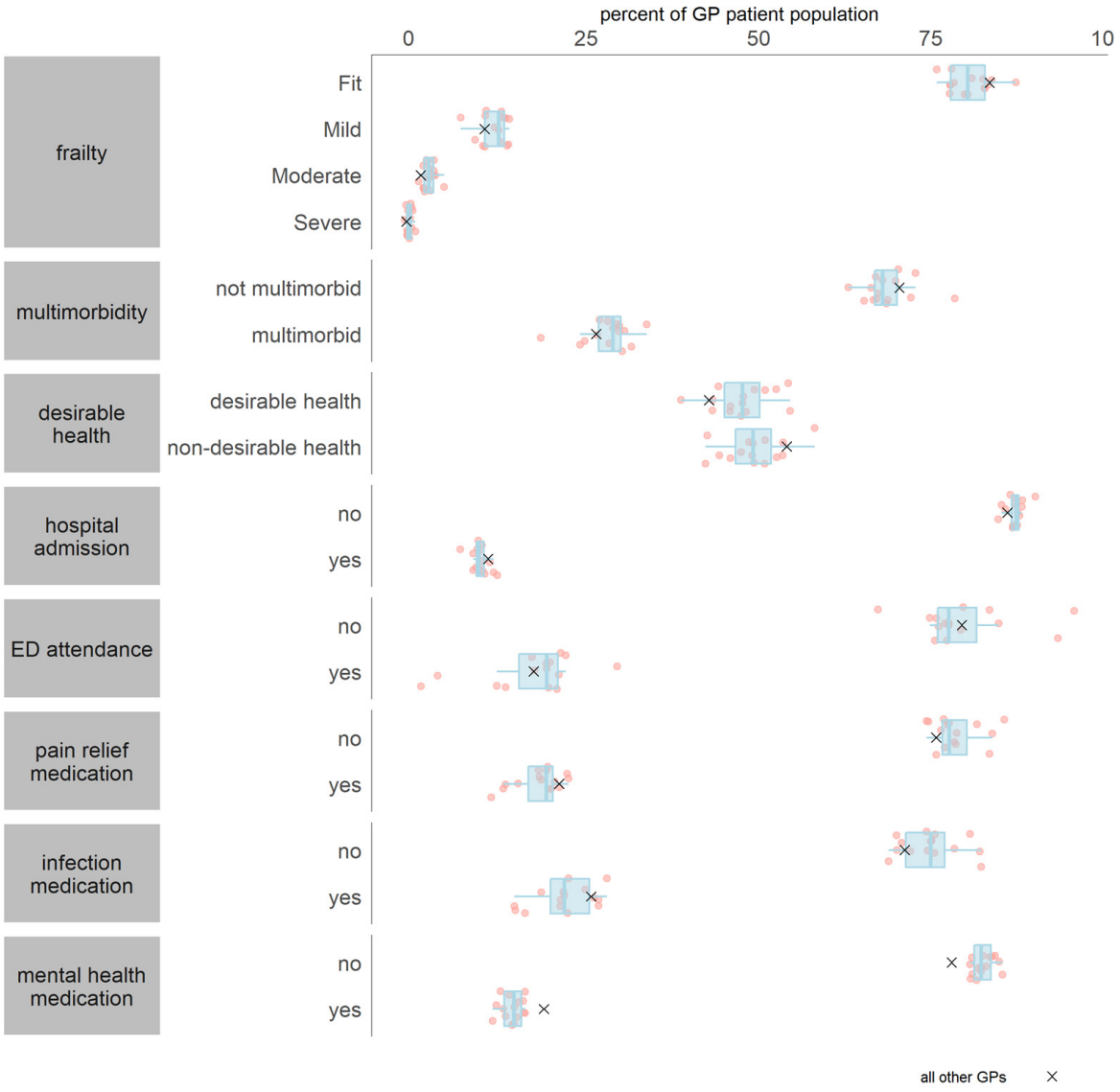
related indicators were very similar across groups with less than 1% differences for hospital admissions and ED attendances. Larger differences between the groups were evident for GP-recorded event types, with smaller percentages of individuals in the study group having medications related to pain relief, infections, and mental health, with differences of 2.6%, 3.4%, and 4.3% respectively. Further information on health profiles are visualised in Appendix 8.

Table 3 - Health factors for the study and comparison group

Factor	Description	Study Group n (%)	Comparisons n (%)
Frailty	Fit	71,809 (83%)	833,498 (85%)
	Mild	11,275 (13%)	116,088 (12%)
	Moderate	3,171 (4%)	25,414 (3%)
	Severe	741 (1%)	4,652 (1%)
Multi-morbidity	At least 2 conditions	25,509 (29%)	274,358 (28%)
Desirable health	No adverse health events	42,493 (49%)	434,644 (44%)
	No emergency hospital admissions	77,136 (89%)	858,863 (88%)
	No ED attendance	71,087 (82%)	794,004 (81%)
	No pain relief GP medications	69,638 (80%)	757,731 (77%)
	No infection GP medications	66,316 (76%)	712,716 (73%)
	No mental health GP medications	72,988 (84%)	779,528 (80%)

Figure 3 visualises health factors and provides further granularity into the health factors, showing the variation across the individuals within their respective GP surgeries. For each health factor, the study group is represented by a box plot to describe the distribution; the box represents the middle 50% of the data, with a vertical line indicating the median value; the points/circles represent the specific values for each study GP surgery. The ‘x’ represents the corresponding percentage for all other patients in the rest of Wales comparator group.

Figure 3 - Visualisation of health factors.



Discussion and why it matters

Previous anecdotal evidence suggested that people do not necessarily register with their nearest GP, and that those in rural areas need to travel further to receive care. Previous methods to quantify these factors predominantly rely upon open-source data, often at area-level and are therefore limited in scope and accuracy. Further, previous methods without access to individual level data, such as that held in SAIL, can be limited to the assumption that individuals travel to their nearest GP surgery. Using the SAIL Databank and combining existing individual and household level data with specific road network distance data, we can overcome these challenges and provide new evidence. Such new evidence is important when taken in the context of the Welsh Government policy of moving care back to the community, with potential wider implications for those who live in more rural areas with further distances to travel to attend and receive care.

We were approached to support an ongoing RHCW research project by providing additional evidence to understand distances travelled to GP surgeries in rural areas in mid Wales. Specifically, the questions posed were: (1) do individuals use their nearest GP surgeries in rural areas, and (2) how far people travel to attend their GP surgeries in rural areas and (3) how does this compare to more urban areas? Additionally, health and demographic profiles were included to showcase the utility and advantages of using the SAIL Databank to complete such research.

Our primary outcome findings add new empirical evidence to the previously unquantified theory that individuals do not necessarily register with their nearest GP surgery. Results show that overall, 63% of individuals within the study group register with their nearest GP surgery, compared to 45% in the urban comparator group. Furthermore, the level depends upon the rurality of the GP surgery location; around 81% of those in village areas and 71% of those in town areas register with their nearest GP surgery, whereas only 38% of those living in more urban areas register to the nearest GP surgery.

The findings also quantify differences in distances people need to travel to GP surgeries depending on where they live. We report the greater distances required to attend GP surgeries in Mid Wales compared to urban based comparator GP surgeries, with an overall difference of 4.1 km. We also provide further detail, showing generally the more rural, or more sparsely populated an area, the further the distance to travel, for example, those in areas classed as rural villages travel nearly 6km further than those individuals in the urban comparison group.

The combined factors of whether individuals register to their nearest GP surgery and the distance travelled act in combination and could suggest that people living in more rural areas have less choice over which GP surgery to attend. Understanding the reasons why people may choose not to register with the nearest GP are important to understand in a rural context where distances travelled are greater, for example the average distance to a GP surgery in rural village in a sparse setting is 8.0 km. Reasons that influence such choice are likely wide ranging and include reasons which include convenience of location (distance to home or place of work), historical relationships (potentially long-standing family doctor), health factors and the ability to secure appointments (15).

Health indicators were included in this study as a secondary aim to show the research potential of using SAIL to understand various health and social aspects of individuals throughout Wales. The research provides sufficient detail to provide descriptive statistics relating to the health and demographic differences between groups. However, it should be noted that, to understand how distances may be associated with health outcomes, further work would be required to adjust for the various factors such as demographic and socio-economic circumstances.

Strengths

Completing this work using anonymised data within the SAIL Databank has permitted linking of individual, household, GP surgery locations and road network distance data on a large scale to provide information on access to health services in rural areas. This method has provided new evidence and avoids limitations common to other methods which include uncertainty due to reliance on area level data estimates and a lack of access to individual level data linked to households and GP surgery data.

Previous studies tend to rely upon distances measured to the nearest GP. By using the novel aspect of the SAIL Databank we were able to link individuals to their actual and nearest GP and compare results.

The ability to work with large and sophisticated GIS data for this project added to the novelty and accuracy of this work; such methods could be expanded to incorporate a wider selection of services and locations in future work.

The work has benefited from SAIL having around 84% coverage of GP data across Wales. The use of validated existing algorithms for health outcomes allowed a relatively straightforward method of describing health characteristics across the study populations and sub-groups.

The uncovering of the technical issue relating to how GP data is collected and provided to SAIL, where data is allocated to the main-site GP and not to each branch, will play an important part of ensuring any similar research understands this limitation and potentially allows for future work to address and correct the issue.

The work has fostered a new relationship between RHCW and researchers at SAIL which may lead to future research applications and creation of new evidence for rural healthcare.

Limitations

Not all GP surgeries were included in the analysis due to various reasons (as noted in the methods), and therefore there may be an element selection bias. The issue detailed in the report discusses the decision to exclude all GP surgeries that are part of multi-sites to avoid providing incorrect distance measures.

Recommendations

For any future work to overcome the multi-site GP surgery limitation, technical investigations and solutions would be required to potentially overcome this issue; this may allow future research to include a wider sample of GP surgeries and those individuals registered to provide more generalisable results. Investment in GP data would benefit the wider research community, and in turn, the wider health service. Future work could aim to capture the notion of health in the community-based setting in line with Welsh Government policy. Understanding the complex situations and capturing aspects in data would be a challenge, but it would also enable policy evaluation and understanding of how such policies impact the services, the healthcare staff, and the health and wellbeing of patients.

What next

Initial results contained in this report were presented at the Rural Health and Care Wales annual conference (https://ruralhealthandcare.wales/conference-2024/), and separately to the RHCW stakeholder group. RHCW are working towards delivering a report into the provision of GP and Primary Care services across rural Mid Wales, which will include reference to this work.

The research team are collaborating with RHCW to develop a future grant application to investigate implications and impacts of increased distances to primary care services, along with the Welsh Government strategic direction outlined in A Healthier Wales (2018, updated 2024) that is encouraging a move from hospital-based secondary care to community-based care at home(16).

If our recommendations relating to GP surgery data can be resolved, this would form the basis of potential important future research across Wales, especially related to the Welsh Government strategy of moving towards community-based care. Having better and more granular data on service delivery and interventions would improve the potential ability to understand the impacts of using similar data linkage or other research techniques and provide important evidence. The proposal is for a longitudinal study that would capture changes over a 5-year period – sufficient to witness the impact of a change of focus from secondary care to community-based provision.

The research team at Swansea University and specifically members of the Environment and Health (ENVHE) Research Centre https://popdatasci.swan.ac.uk/centres-of-excellence/envhe/ continue to develop methods using Geographical Information Systems (GIS) to support research into various areas such as climate change-based research.

Other

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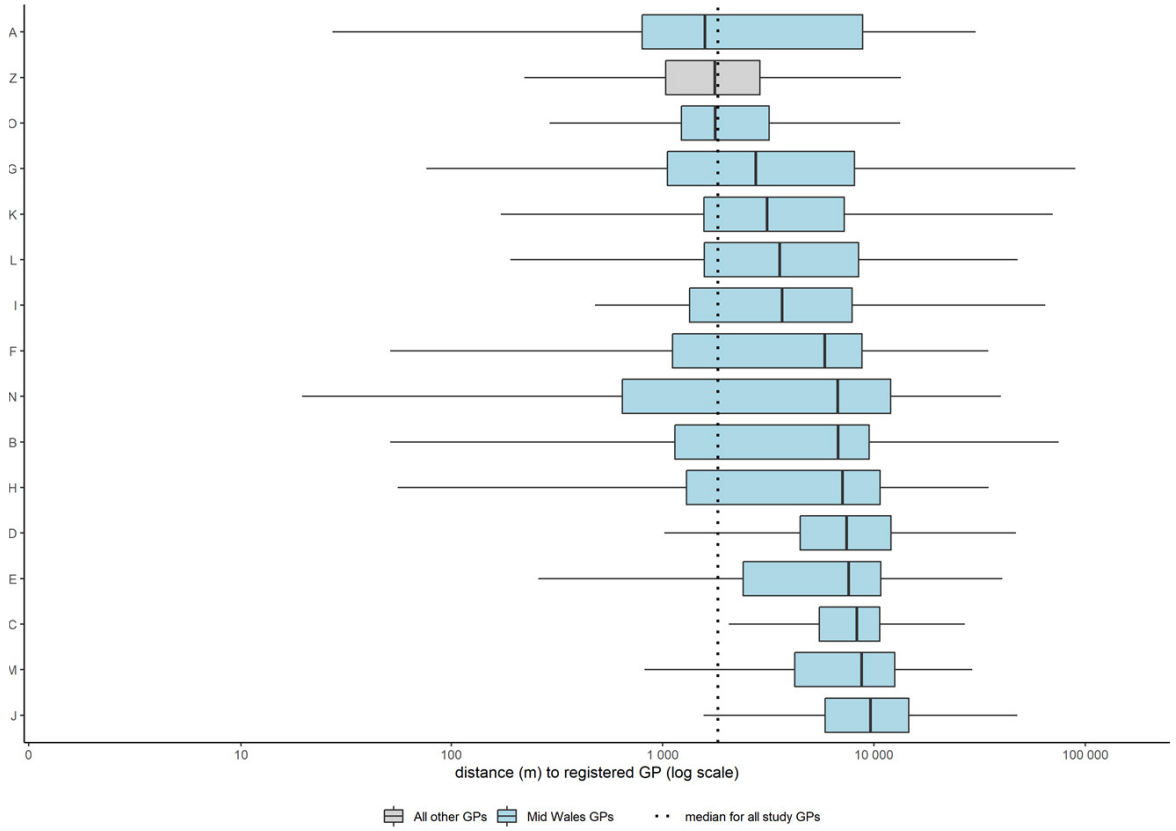
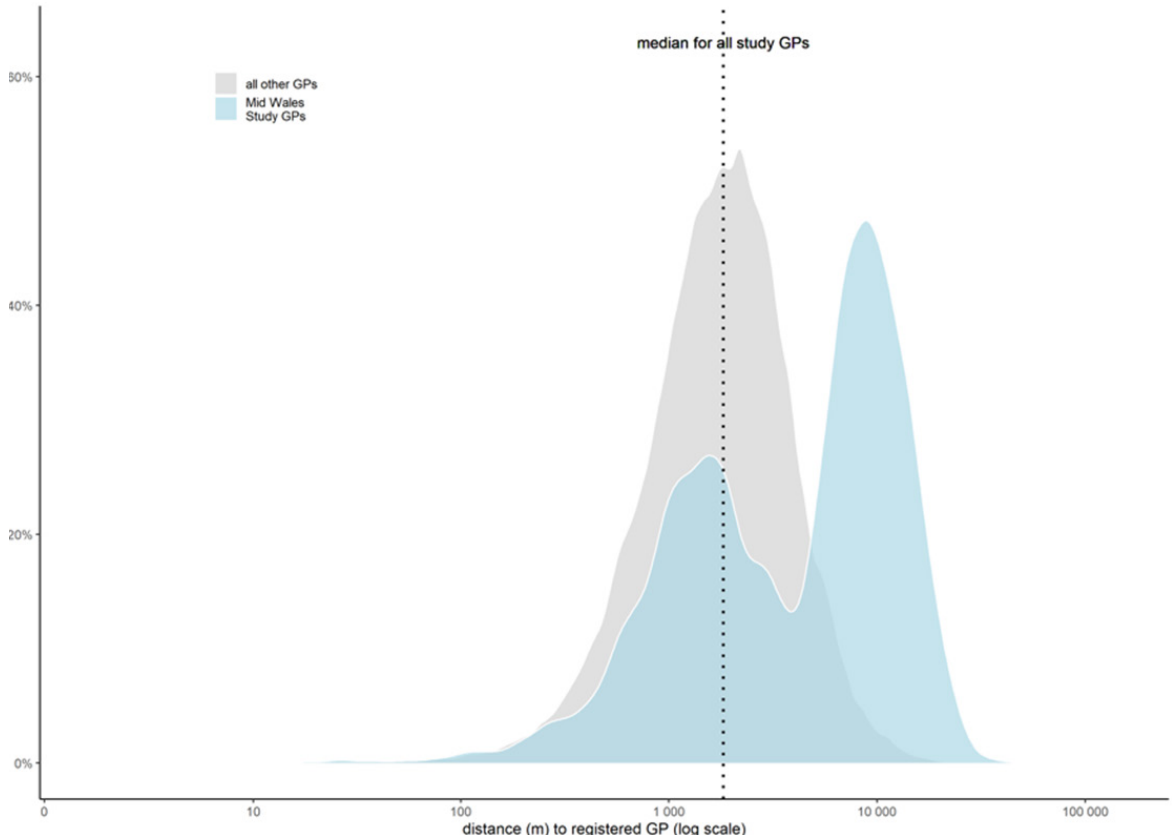
Appendices

Appendix 1: Boxplot of distances from home address to registered GP for each practice and comparator group (labelled Z)



Appendix 2: Density plot showing distances from home address to registered GP for combined study group and comparator group (log-scale)



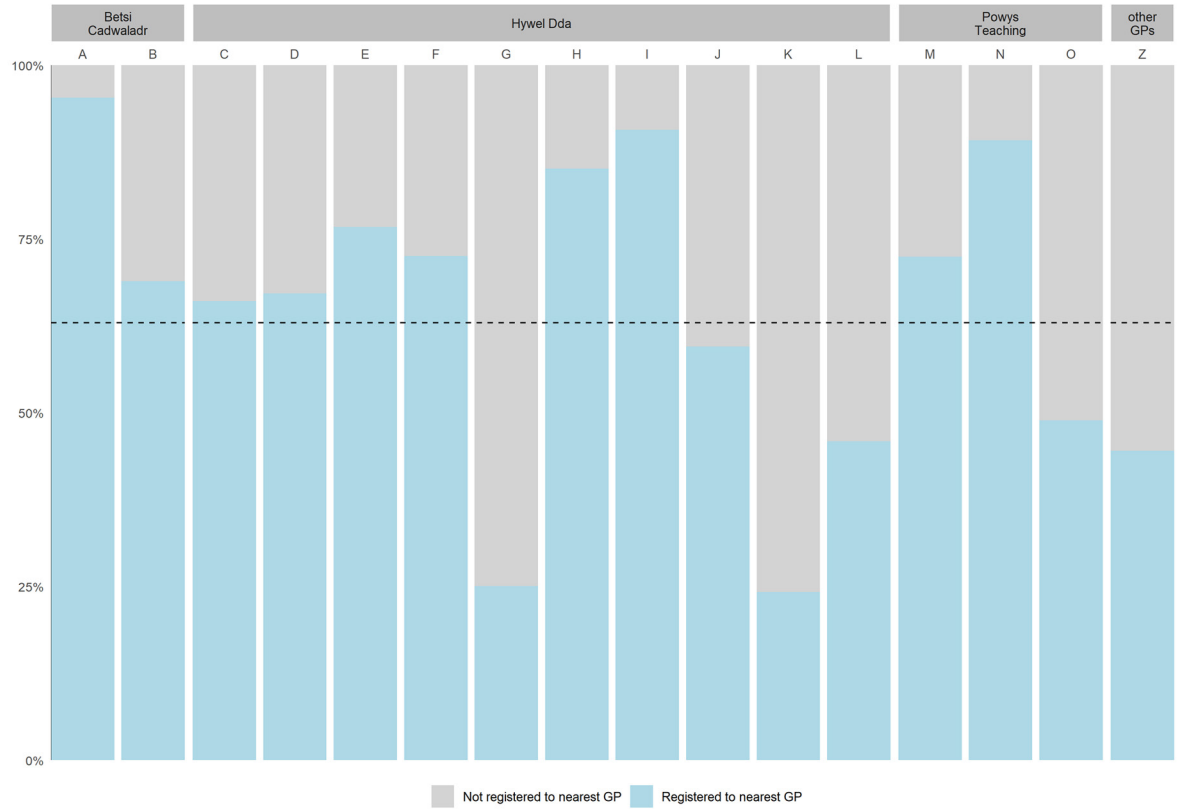
Appendix 3: Number and percentage of individuals registered to nearest or non-nearest GP surgeries

Analysis level	Group description	Total n	Not registered to nearest GP % (n)	Registered to nearest GP % (n)
Study Groups	Urban comparator GP surgeries	979,652	55.4% (543045)	44.6% (436607)
	Mid Wales GP surgeries	86,996	37.0% (32163)	63.0% (54833)
Mid Wales GPs: urban-rural classification	Rural town and fringe in a sparse setting	35,218	19.3% (6809)	80.7% (28409)
	Rural village and dispersed in a sparse setting	20,620	29.3% (6041)	70.7% (14579)
	Urban city and town in a sparse setting	31,158	62.0% (19313)	38.0% (11845)
Mid Wales GPs: GP Practice	A	3,829	4.6% (178)	95.4% (3651)
	B	3,232	31.0% (1003)	69.0% (2229)
	C	8,444	33.9% (2864)	66.1% (5580)
	D	7,624	32.7% (2496)	67.3% (5128)
	E	6,102	23.3% (1419)	76.7% (4683)
	F	2,192	27.4% (601)	72.6% (1591)
	G	7,129	74.9% (5343)	25.1% (1786)
	H	3,153	14.8% (468)	85.2% (2685)
	I	8,259	9.3% (769)	90.7% (7490)
	J	2,885	40.4% (1166)	59.6% (1719)
	K	6,086	75.8% (4611)	24.2% (1475)
	L	6,366	54.1% (3445)	45.9% (2921)
	M	4,766	27.5% (1310)	72.5% (3456)
	N	5,352	10.8% (576)	89.2% (4776)
	O	11,577	51.1% (5914)	48.9% (5663)

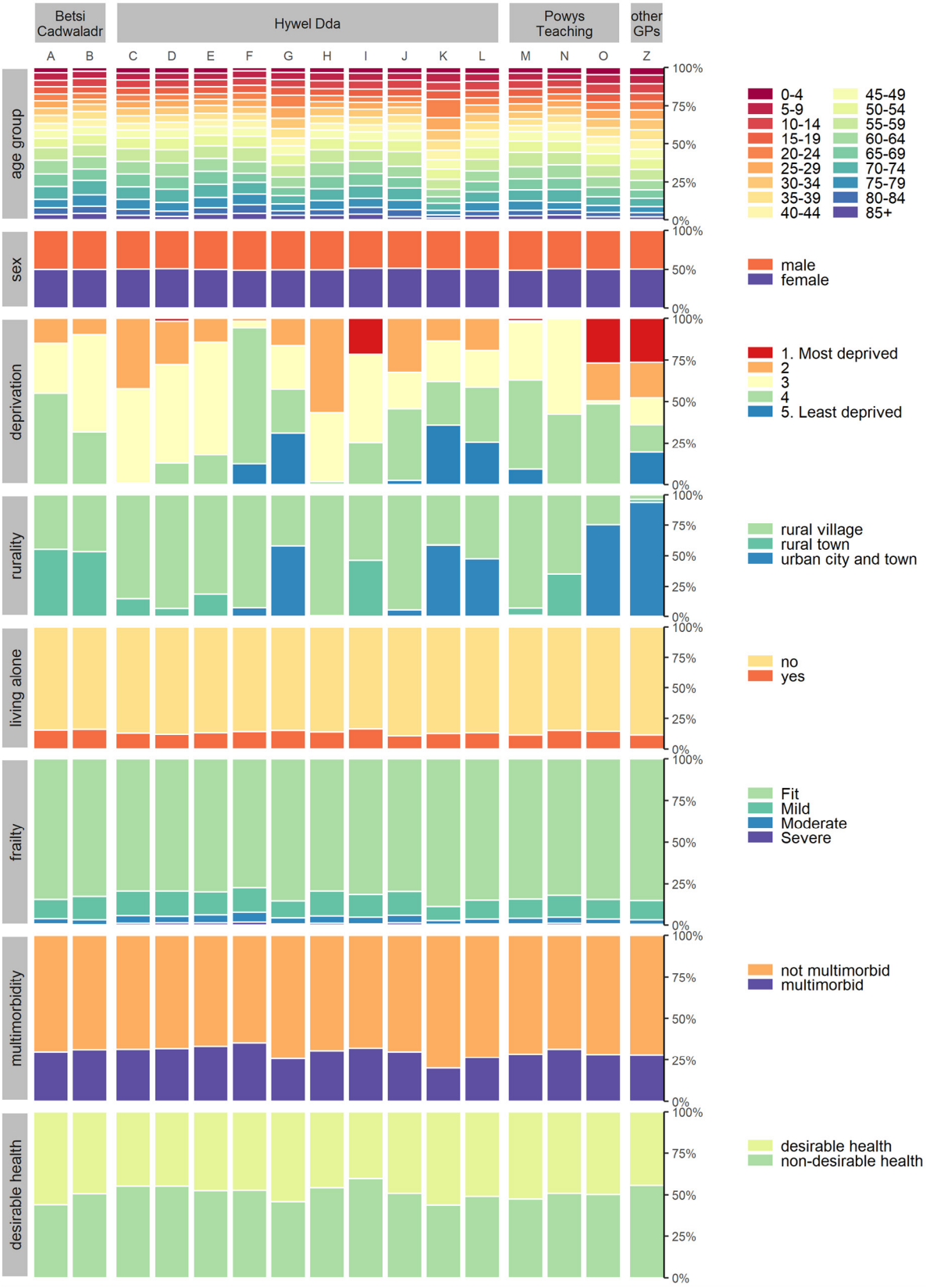
Appendix 4: Distance metrics (Km) to registered GP

Analysis level	Description	Mean distance	Standard deviation	Median distance	25th percentile	75th percentile	Interquartile range
Study Groups	Comparison GP surgeries	2.3	2.0	1.8	1.0	2.9	1.9
	Study GP surgeries	6.3	5.7	5.4	1.5	9.7	8.2
Mid Wales GPs: urban-rural classification	Rural town and fringe in a sparse setting	6.8	5.7	6.4	1.4	10.3	8.9
	Rural village and dispersed in a sparse setting	8.0	5.4	7.8	3.7	11.9	8.2
	Urban city and town in a sparse setting	4.8	5.4	2.2	1.4	7.0	5.6
Mid Wales GPs: GP Practice	A	5.1	5.7	1.6	0.8	8.9	8.1
	B	7.2	7.4	6.8	1.1	9.5	8.3
	C	8.1	4.3	8.3	5.5	10.7	5.1
	D	8.0	5.1	7.4	4.5	12.1	7.6
	E	7.3	5.2	7.6	2.4	10.8	8.4
	F	5.9	4.6	5.9	1.1	8.8	7.7
	G	5.7	6.2	2.8	1.1	8.1	7.0
	H	7.2	5.6	7.1	1.3	10.7	9.4
	I	4.9	4.1	3.7	1.3	7.9	6.5
	J	9.9	6.1	9.6	5.9	14.6	8.7
	K	5.6	6.6	3.1	1.6	7.2	5.7
	L	6.0	5.5	3.6	1.6	8.5	6.9
	M	8.5	5.4	8.8	4.2	12.6	8.4
	N	7.9	7.6	6.7	0.6	12.0	11.4
	O	3.1	3.3	1.8	1.2	3.2	2.0

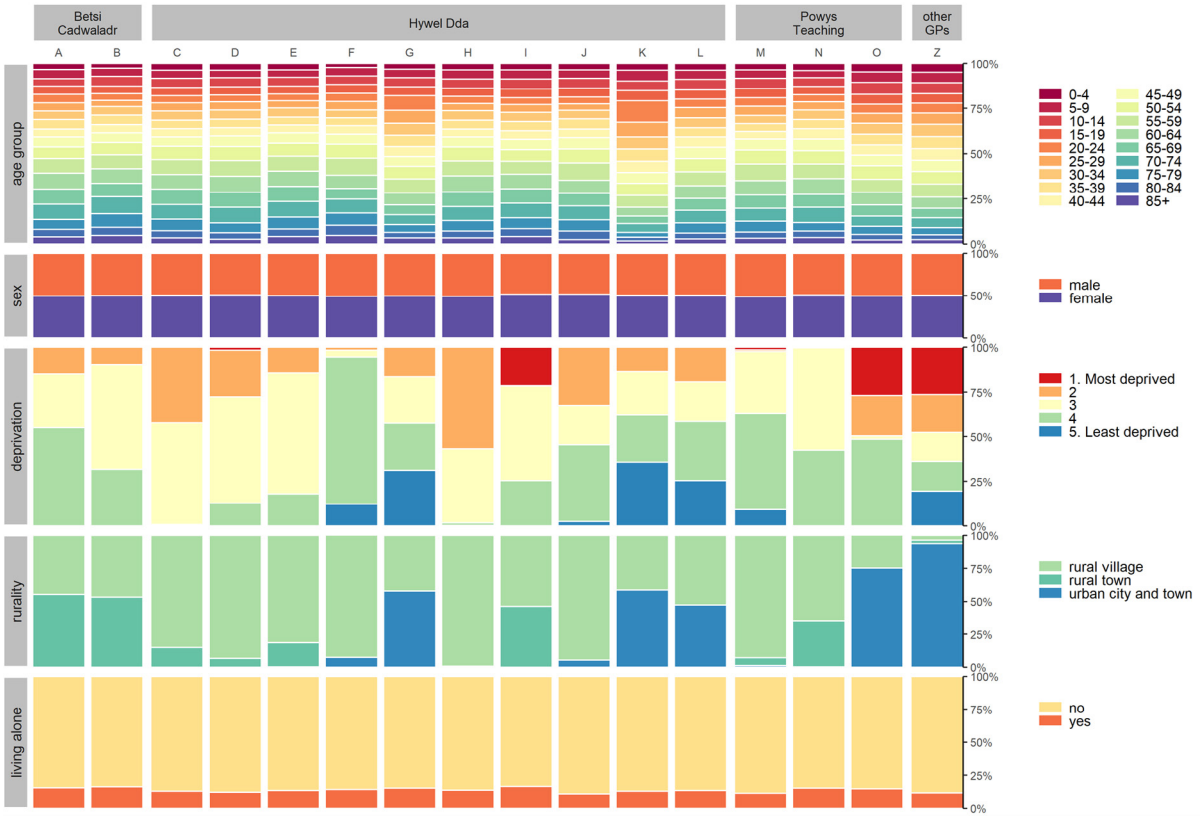
Appendix 5: Bar chart showing percentage of individuals for each practice and comparator group (Z) registered to their nearest or other (non-nearest) GP



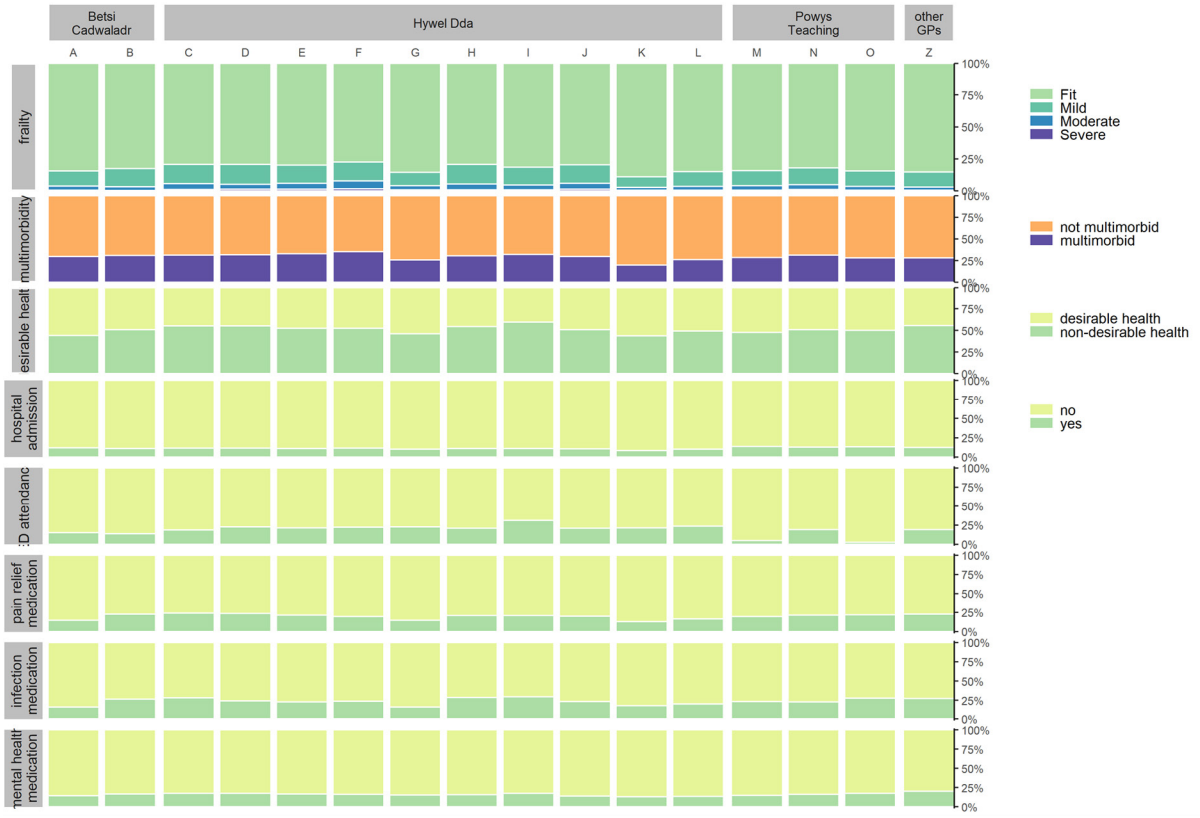
Appendix 6: Combined socio-demographic and clinical patient profiles by General Practice



Appendix 7: Socio-demographic patient profiles by General Practice



Appendix 8: Health patient profiles by General Practice



Glossary

PALF: anonymised linking field

RALF: residential anonymised linking field

WDS(D): Welsh Demographic Service (Dataset)

Produced by ADR Wales

Website: ADRUK.org
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ADR Wales unites specialists from Swansea University Medical School and the Wales Institute of Social and Economic Research and Data (WISERD) at Cardiff University with statisticians, data scientists and social researchers from the Welsh Government. The cutting-edge data analysis techniques and research excellence developed, along with the world-renowned SAIL Databank – which is an accredited processor under the 2017 Digital Economy Act (DEA) – allow the delivery of robust, secure and informative research that can inform future policy decisions in Wales. The ADR Wales programme of work is aligned to the priority themes as identified in the Welsh Government's Programme for Government.
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