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# The scale and scope of locum doctor use in General Practice in England: Analysis of routinely collected workforce data in 2017 - 2020

**Christos Grigoroglou, PhD, Research Fellow in Health Services Research, Manchester Centre for Health Economics, Division of Population Health, Health Services Research and Primary Care, University of Manchester, Manchester, UK**

**Kieran Walshe, PhD, Professor of Health Policy and Management, Alliance Manchester Business School, Institute for Health Policy and Organisation, University of Manchester, Manchester, UK**

**Evangelos Kontopantelis, PhD, Professor of Data Science & Health Services Research, NIHR School for Primary Care Research, Centre for Primary Care, Division of Population Health, Health Services Research and Primary Care, University of Manchester, Manchester, UK & Division of Informatics, Imaging and Data Science, University of Manchester, Manchester, UK**

**Jane Ferguson, PhD, Lecturer in Healthcare Management, Alliance Manchester Business School, Institute for Health Policy and Organisation, University of Manchester, Manchester, UK**

**Gemma Stringer, PhD, Research Associate, Alliance Manchester Business School, Institute for Health Policy and Organisation, University of Manchester, Manchester, UK**

**Darren M Ashcroft, PhD, FRPharmS, NIHR School for Primary Care Research, Centre for Primary Care, Division of Population Health, Health Services Research and Primary Care, University of Manchester, Manchester, UK & NIHR Greater Manchester Patient Safety Translational Research Centre, University of Manchester, Manchester, UK & Centre for Pharmacoepidemiology and Drug Safety, School of Health Sciences, Faculty of Biology, Medicine and Health, University of Manchester, Manchester, UK**

**Thomas Allen, PhD, Research Fellow in Health Economics, Manchester Centre for Health Economics, Division of Population Health, Health Services Research and Primary Care, University of Manchester, Manchester, UK & Danish Centre for Health Economics, University of Southern Denmark, Denmark**

## Abstract

**Background:** Numbers of GP locums in the NHS have grown in recent years, yet evidence on the scale and scope of the locum workforce in general practice is sparse.

**Aim:** To identify characteristics, geographical patterns and drivers of GP locum use.

**Design and setting:** Observational study of routine data from general practices in England.

**Methods:** Descriptive analyses of national GP workforce data between December 2017–September 2020, to determine the volume and geographical distribution of locum use and examine the characteristics of locums compared to other GP types. We modelled locum FTE using negative binomial regressions and estimated Incidence Rate Ratios (IRRs) for the association between the outcome and practice and population characteristics.

**Results:** In December 2019, locums made up 1,217.9 (3.3%) of 33,996.6 total GP FTE which was fewer than other GP types. Median locum age was 42 years (IQR, 36–51), and the majority were UK qualified (660 of 1,034 total locum FTE), were male (642.6 of 1,178.9 locum FTE), and had long-term employment (834.1 of 1,127.9 total locum FTE). Rurality ( $\text{IRR}=1.250$ ; 95%CI 1.095–1.428), inadequate CQC ratings ( $\text{IRR}=2.108$ ; 95%CI 1.370–3.246) and single-handed practice ( $\text{IRR}=4.611$ ; 95%CI 4.101–5.184), were strong predictors of locum use. There was substantial variation in locum use between regions.

**Conclusion:** GP locum use remained stable over time. Compared to other GPs, locums are younger male GPs, a substantial percentage of whom did not qualify in the UK, who serve underperforming practices in rural areas. This is likely to reflect recruitment or high turnover challenges in these practices/areas and can provide a greater understanding of general practice workforce challenges in England.

Word count: 2,901

**How this fits in:** Prior research on the extent of GP locum use in general practice and the composition of the GP locum workforce is sparse, and the availability of new data from general practice allows for a real opportunity to generate new knowledge and to add to the understanding of the current GP workforce composition. Results of the study suggest that GP locum use has remained stable over time and our comparisons of GP locums with other types of GPs show that locums are mostly younger male doctors of whom a large proportion have qualified elsewhere than the UK and who work in underperforming practices. Substantial regional variation in GP locum use across England indicate differences in workforce planning, recruitment and retention. This work provides a useful approach to measure the extent of locum use in primary care and can aid workforce planning by identifying areas of increased recruitment, areas with high GP turnover and also the drivers behind variation in locum use in primary care in England.

## **Introduction**

Access to primary health care services is a core dimension for any high quality health care system (1, 2) and higher availability of primary care services has been associated with lower all-cause mortality, lower hospital admission rates and lower health care costs. (3) However, general practice faces multiple challenges to reduce inequalities in access to services (4, 5) such as insufficient staff and capacity to meet rising patient need and complexity which have a direct impact on quality of patient care and staff experience. (6) A flexible GP workforce can help combat these challenges, but there is little research of the scale and scope of the use of temporary GPs (usually referred to as locums) in the UK.

In recent years, the UK's National Health Service (NHS) has suffered from insufficient long-term workforce planning, prolonged shortfalls in funding, and a high number of doctors leaving the profession early (7) which have contributed to the current workforce crisis. The GP Primary Care workforce has been severely affected by staffing problems, (8) compounded by excessive workload and burnout during the COVID-19 pandemic in 2020. Locum GPs defined as doctors who provide cover for permanent staff including maternity/paternity leave, sick leave, annual leave, suspended doctors or vacancies. Locum GP contracts are arranged at the practice level to tackle short-term staff flexibility and to fill service gaps in remote, small rural areas and in single-handed practices, where locum working may be the only way to obtain cover for sickness or holiday. In the NHS, trends towards non-standard forms of work (9) have led to increases in the numbers of locum GPs, with an increase of 9.7% of GP locum full-time equivalent (FTE) between June 2017 and June 2019 and this figure accounted for 3.8% of total GP FTE in June 2019. (10)

However, NHS organisations need more detailed information to effectively use their workforce. In this study, we quantified general practice GP locum use in England for the period 2017 to 2019 as an aggregate and by Clinical Commissioning Group (CCG) by age group, country of qualification and gender, for the entire GP locum workforce of England and we made comparisons with other types of GPs. We also examined which practice and population characteristics explain variability in locum use at the general practice level for the whole primary care population of England.

## **Methods**

### **Data sources**

We accessed several data sources to extract individual-level information on full-time equivalent (FTE) working hours (1 FTE = 37.5 hours/week), type of GP (i.e. locum GP, GP partner, salaried GP, GP registrar, junior GP and GP retainer), type of locum GP (i.e. long-term

of infrequent locum) and GP characteristics (age, gender, country of qualification). General practice level information, was extracted on population age and gender, quality of care, morbidity burden, patient satisfaction, rurality, deprivation, single-handed practices and healthcare regulators rating for each general practice in England. Definitions and sources for all data are provided in the online supplementary material.

Practitioner level information from NHS Digital was extracted from practices at the last day of each reporting quarter, with 12 quarters available between 31<sup>st</sup> December 2017 to 30<sup>th</sup> September 2020. We restricted the time period window as there were differences in the methodology used by practices to report locum data prior to December 2017. For the period of analysis, some practices did not provide valid or complete records, and this resulted in some data being recorded as missing or estimated. Even though we excluded these records from the analyses, coverage was very high with approximately 95% of all practices providing valid workforce data in December 2019. FTE for locum GPs was derived as an average of the total number of hours worked in each month over the reporting quarter. (11)

From NHS Digital (12) we obtained information on achievement indicators for all long-term conditions in the UK's Quality and Outcomes Framework (QOF) which we used to calculate morbidity burden and performance for each general practice in our dataset. The QOF is a national pay-for-performance scheme in primary care that was introduced in 2004 with the aim to improve quality of care and linked financial awards to performance on achievement indicators. Detailed information on the conditions, their indicators and the methodology used to calculate these measures are provided in the supplementary material. LSOA-level deprivation, as measured by the Index of Multiple Deprivation (IMD) 2019, (13) was available for all Lower-level Super Output Areas (LSOAs) (geographically defined neighbourhoods of 1500 people on average) and we assigned LSOA deprivation scores to practices based on practice's postcode. The IMD is a relative measure of deprivation for all 32,844 LSOAs in England where each LSOA is assigned a score on a continuous scale (i.e. 0 – 100) and a higher score corresponds to greater deprivation. We extracted data on patient satisfaction for all practices from the GP Patient Survey , data on rural/urban classification based on practices' location (14) and practice overall inspection ratings from the Care Quality Commission. Data were publicly available and did not require ethical board review.

## Statistical analysis

We plotted total locum FTE against total FTE for all types of GPs over time for the whole of England. We used violin plots to compare the age and FTE distribution of locums and other GP-types, and by gender. We plotted cumulative FTE by gender and country of qualification for all GP types. We calculated the average rate of general practice locum use in 2019 defined

as total locum FTE as a proportion of the total GP FTE and visualised geographical variation in locum use at the CCG level with the use of spatial maps.

We used mean-dispersion negative binomial models with robust standard errors to model locum FTE, with fixed-effect predictors for region (as categorical, to account for between region variations) and time (as continuous, to account for time trends). We used the natural logarithm of the annual total GP workforce FTE count as offset. We control for several practice characteristics in all models: deprivation, practice CQC ratings, the proportion of practice's female population, the proportion of practice's patients aged over 65, single-handed practices, rurality, QOF performance, QOF morbidity burden, patient satisfaction and practice workload defined as list size over total GP FTE. We used one set of negative binomial regression models to investigate the relationship between locum FTE and practice and population characteristics over time (2018 - 2019) and one set of models to investigate the relationship cross-sectionally (2019).

Stata v16.1 was used for the principal data cleaning, management and analyses. For the two primary sets of analyses, we used the *nbreg* command with the *exposure* option and the *IRR* specification. Practices with <1,000 patients were omitted from the regression analyses because these practices are opening, closing or serving specific populations.

## Results

Over time, reported mean locum use in England varied from 3.15% (1045.8 FTE) in December 2017 to 3.31% (1157 FTE) of total GP FTE in September 2020 (Figure 1 - top). The proportion of practices that reported at least some locum use varied from 37.4% and 40.8% in 2018 and 2019, respectively. Most locums (74%) worked in long-term positions compared with infrequent locums (26%) (Figure 1 - bottom). Long-term locum use remained stable over the study period, though there was a substantial 47% reduction in infrequent locum use between the first and the second quarter of 2020 indicating the impact of the COVID-19 pandemic.

Violin plots depicting the FTE distribution of locums and other types of GPs are presented in Figure 2 (top). Median locum FTE in December 2019 was 0.09 FTE (0.7 sessions in a practice where 1FTE = 8 sessions) and we observed a similar distribution in FTE for both male and female locums in contrast to other GP types (e.g. GP partners/salaried GPs) where we observed large variation in the distribution of FTE between genders.

Locum workforce characteristics in terms of age are presented in figure 2 (bottom) and in terms of gender and country of qualification are presented in figure 3. In December 2019, the age distribution of locums shared similar characteristics with the age distribution of both male and female salaried GPs and with the age distribution of female GP retainers. Median age of

female locums was 41 years (IQR 35 to 48) and median age of male locums was 44 years (IQR 37 to 55) (Figure 4). The median age for GP partners, junior doctors, GP retainers and salaried GPs was 49, 31, 42, and 39 years respectively. Male locums accounted for 54.5% of total locum FTE. This was similar to GP partners who were mostly males (60%) but in contrast to registrars/junior doctors (40.6%), GP retainers (18.5%) and salaried GPs (30.5%) who were mostly females (Figure 3 - top). In terms of country of qualification, most locums obtained their degree in the UK (63.8%) although this proportion was smaller compared to other types of GPs (82% for salaried GPs and 76% for partner GPs) (Figure 3 - bottom).

We present variability in mean locum use at the CCG level across regions in 2019 in figure 4 with dark-shaded areas indicating higher locum use and light-shaded areas indicating lower locum use. Locum use varied substantially between regions (from 0.4% to 13.7%) with locum use accounting for 2.5% of total GP FTE in the North East and 7.4% in London. Descriptive statistics on locum FTE, population size estimates, number of practices, census information, deprivation and QOF population achievement for all English regions in 2019/2020 are reported in table 1. In the supplementary material we provide a table with 10 CCGs with the highest use of locums and 10 CCGs with the lowest use of locums in 2019 (eTable 1).

## Results from regression analyses

After adjusting for practice and population characteristics, large variability in locum FTE between regions persisted (Table 2). Using Midlands as the reference category, practices in London had the highest locum FTE (IRR=1.369, 95%CI 1.180-1.588), and practices in the North East and Yorkshire had the lowest locum FTE (IRR=0.711, 95%CI 0.626-0.843).

CQC ratings appeared to be a strong predictor of locum FTE, where practices rated as having inadequate (IRR=2.108, 95%CI 1.370- 3.246) and good services (IRR=1.343, 95%CI 1.103-1.637) had higher locum FTE than practices that were rated as having outstanding services. Single-handed practices had substantially higher locum FTE (IRR=4.611; 95%CI 4.101- 5.184) compared to group practices. For practices in rural locations locum FTE was 25% higher than for practices located in urban areas (IRR=1.250; 95%CI 1.095-1.428). Practices with a higher proportion of female population had 3.3% lower locum FTE (IRR=0.967; 95%CI 0.959-0.981) than practices that had a higher proportion of male population. A larger patient population in the over 65 age group was associated with 3% lower locum FTE (IRR=0.970, 95%CI 0.950-0.984). Finally, patient satisfaction was very weakly associated with locum FTE while deprivation, QOF quality of care, QOF morbidity burden and practice workload did not appear to have any discerning effect on practice locum FTE. Partial results from the over-time and cross-section regression models are reported in table 2 and the full results are reported in eTable3 in the supplement.

## **Discussion**

### **Summary of findings**

This work describes a methodological approach to capture and monitor the scale and scope of the GP locum workforce in the English Primary Care. Our findings suggest that between December 2017 and September 2020 the proportion of GP locum work in the NHS has remained stable, despite widespread perceptions that the number of locum GPs has risen. (15) Regarding regional variation and the characteristics of locums, we describe the intensity of locum use in general practice and how this varies across regions, as well as important information about the composition of the GP locum workforce. We identified substantial geographical variation in locum use between and within regions suggesting differences in the distribution of locums in England. Our comparisons of locums with other GP types, showed that locums were more mobile, younger males of whom most had qualified in the UK although a large percentage had qualified elsewhere. Most locums were employed in long-term positions and on average they did very few sessions. Our regression analyses showed that practice characteristics such as rurality, CQC ratings and whether the practice was single-handed were stronger predictors of higher locum FTE than population characteristics.

### **Strengths and limitations**

This analysis was conducted at the population level and allowed us to quantify and examine the scale and characteristics of the GP locum workforce compared to other types of GPs for the first time across general practices in England. We explored whether variation in practice and population characteristics explain variability in locum FTE to account for different health needs across different practice populations. The study has national scope and comprehensive coverage of the primary care population (95% of all general practices).

We used publicly available routinely collected data from NHS Digital. However, other databases on workforce report different estimates on the number of locum GPs. The General Medical Council (GMC) register and the National Association of Sessional GPs, estimate approximately 17,000 - 18,000 GPs with a locum license in England in 2017 (15, 16) while the NHS Digital data report only 5,040 employed locum GPs in December 2017. There may be several reasons why these differences exist, one being that the NHS Digital data show a picture of the actual GP workforce at each time point rather than the prospective workforce that other databases report. Locum headcounts may over-estimate locum use as some locum GPs may also be simultaneously permanently employed.

Second, the GP workforce data collected by NHS Digital have been subjected to changes in data sources and methodology over the years and also include estimates for practices where data is incomplete or has not been submitted. We restricted our time period to exclude data

prior December 2017 when the infrequent locum category was first reported in the collection and excluded estimates for those practices that did not submit valid data. Third, the locum data are believed to be under-reported when compared to other types of GPs, mainly due to the infrequent locum category for which reporting may be lower than long-term locum data. In September 2020, NHS Digital switched from quarterly to monthly data collections of the GP workforce data, however, the transition to monthly collection led to a decrease in the number of FTE for infrequent locums. For this reason, the data collections were reverted back to quarterly to allow practice managers to report infrequent locum data in time. (14)

## **Comparisons with existing literature**

Previous international evidence shows that the numbers of locums continue to rise (9, 15, 17) but our findings suggest that this may not be the case for GPs in England. Previous reports from the GMC and the National Association of Sessional GPs showed that the proportion of GPs with a locum GP contract had increased from 30% to 39% of all licensed GPs from 2013 to 2016 and was equivalent to approximately 18,000 GPs in 2018. (15)

One recent study examined the geographical variation in the distribution of the GP workforce, including GP locums, across the 13 Health Education England (HEE) regions using data from NHS Digital but did not make specific comparisons between locums and other types of GPs.(18) Our comparisons can provide a review of the locum workforce at a more granular level which is also particularly relevant to NHS organisations (e.g. CCGs). To our knowledge, no other studies to date have examined contextual factors and their association with locum use in general practices.

## **Implications for research and practice**

The accurate monitoring of the GP workforce may help policy-makers and commissioners to understand current challenges in primary care, including capacity and composition of the GP workforce and inform workforce planning. This can be particularly useful to meet local health care needs with sufficient resources for training and deployment of GPs which will help ensure that the targets set out in the NHS long-term plan are met. (19) For example, this research highlights elevated locum GP employment in practices in rural areas and those with inadequate CQC inspection ratings. These types of practices may face substantial challenges in recruiting and retaining permanent GPs and we could hypothesise that relatively high and sustained levels of locum use may be an indicator of wider problems which are affecting recruitment and retention..

Furthermore, this work lays the foundation for future analysis of other existing routine primary care datasets that contain information on service utilisation and patient outcomes.

Additional work is needed to identify whether there exist differences in the clinical practice and performance between locum doctors and permanent doctors and also what consequences these may have for patient safety and quality of care. Future work should also aim to identify career intentions of locum GPs and what factors influence the choice to work as a locum. Furthermore, it will be important to understand what implications these career intentions and the observed locum workforce characteristics have on future workforce planning. As more data become available, the impact of COVID 19 on the use of the GP locum workforce should be examined.

## **Conclusion**

Locum GPs have an important role in the delivery of primary care services, particularly in the delivery of out-of-hours care and in helping to address short-term workforce shortages. Despite expectations that locum GP numbers are rising we found that locum use in primary care has remained stable over time though the use of locums seems to vary substantially across different practice types and areas of the country.

## **Funding**

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## **Ethical approval**

No ethical approval was required as the data are freely available.

## **Provenance**

Freely submitted; externally peer reviewed.

## **Competing interests**

The authors have declared no competing interests.

**Table 1:** Descriptive statistics in 2019, by region

\*Locum use is defined as mean locum FTE as a proportion (%) of total GP FTE

†IMD measures the deprivation of the area in which a practice is located. A higher value indicates greater deprivation. The IMD values are on a scale of 0 to 100.

	England	North East & Yorkshire	South West	East of England	North West	South East	Midlands	London
<b>Locum GP FTE, Yearly Mean (95% CI)</b>	<b>192.1 (125 to 259.2)</b>	<b>136.9 (118.9 to 154.8)</b>	<b>137.8 (130.2 to 145.3)</b>	<b>155.1 (147.1 to 163.2)</b>	<b>165.1 (159.6 to 170.7)</b>	<b>165.6 (152.5 to 178.6)</b>	<b>254.8 (234.3 to 275.4)</b>	<b>329.5 (323.5 to 335.5)</b>
<b>Total GP FTE, Yearly Mean (95% CI)</b>	<b>4,564.1 (1,967.4 to 6,639.6)</b>	<b>5,457.9 (2,754.6 to 8,154.1)</b>	<b>3,628 (1,849.7 to 5,396.3)</b>	<b>3,718.0 (1,911.5 to 5,497.5)</b>	<b>4,408 (1,805.9 to 6,983)</b>	<b>4,869 (2,238.4 to 7,471.5)</b>	<b>6,317.2 (2,937.3 to 9,699.3)</b>	<b>4,471.7 (1,696.9 to 7,254.1)</b>
<b>Locum use (%)*</b>	<b>4.2%</b>	<b>2.5%</b>	<b>3.8%</b>	<b>4.2%</b>	<b>3.7%</b>	<b>3.4%</b>	<b>4%</b>	<b>7.4%</b>
<b>General practice population</b>	57,653,853	8,788,992	5,477,907	6,692,664	7,057,650	9,178,676	10,780,976	9,676,986
<b>Practices, n</b>	6,422	991	539	655	951	856	1,268	1,162
<b>Single-handed practices, n</b>	693	73	5	59	119	52	120	107
<b>Practice list size, Median (IQR)</b>	7,522 (4,692 to 11,124)	7,708.8 (4,913.3 to 10,884.5)	8,760.8 (5,996.8 to 12,481.5)	8,997 (6,065 to 12,868.5)	6,410.3 (4,212.3 to 9,315.8)	9,845.3 (6,367.4 to 13,180)	7,333.5 (4,591.8 to 10,829.6)	7,311.5 (4,858 to 10,554)
<b>IMD 2019†, Median (IQR)</b>	21.9 (12.5 to 35.5)	29.3 (15.7 to 46.8)	18.2 (11.4 to 26)	16.6 (9.2 to 24.5)	32.5 (17.3 to 52.8)	14.2 (7.6 to 22.5)	25 (14.3 to 39.8)	22.1 (13.6 to 30.7)
Practice Female population, Median (IQR) (%)	3,778 (2,315 to 5,611) (50%)	3,851 (2,428.5 to 5,437.8) (50%)	4,392.5 (3,035.8 to 6,365.5) (50.1%)	4,529 (3,018.3 to 6,510.8) (50.3%)	3,165.8 (2,088 to 4,686) (49.4%)	4,956.4 (3,228.6 to 6,670.6) (50.3%)	3,639.3 (2,250.3 to 5,441.9) (49.6%)	3,617.3 (2,380.3 to 5,248.5) (49.5%)
<b>QOF data</b>								
<b>Population achievement, % Median (IQR)</b>	82.2 (79.7 to 84.4)	83.1 (80.8 to 85)	82.6 (80.1 to 84.3)	82.5 (80.1 to 84.6)	82.6 (80.2 to 84.7)	81.8 (79.4 to 83.9)	82.5 (79.8 to 84.6)	80.6 (78 to 83.2)
<b>Morbidity burden, % Median (IQR)</b>	67 (55 to 77.3)	75.7 (67.1 to 83.2)	73.2 (64.9 to 80.4)	64.8 (56.3 to 73)	74.2 (65.5 to 82.2)	64.2 (56.5 to 73.5)	71 (62.4 to 79.4)	50.6 (43.2 to 57.2)
<b>Rural, %</b>	15.4	17.2	32.5	27.1	5.3	21.4	18	0.1

**Table 2:** Regression analyses results from negative binomial regression for locum use at the general practice level, over time (2018 – 2019), cross-sectionally (2019)

Coefficients are reported as Incidence Rate Ratios (IRRs) with 95% confidence intervals in brackets; results are followed by P-values and standard errors in parentheses.

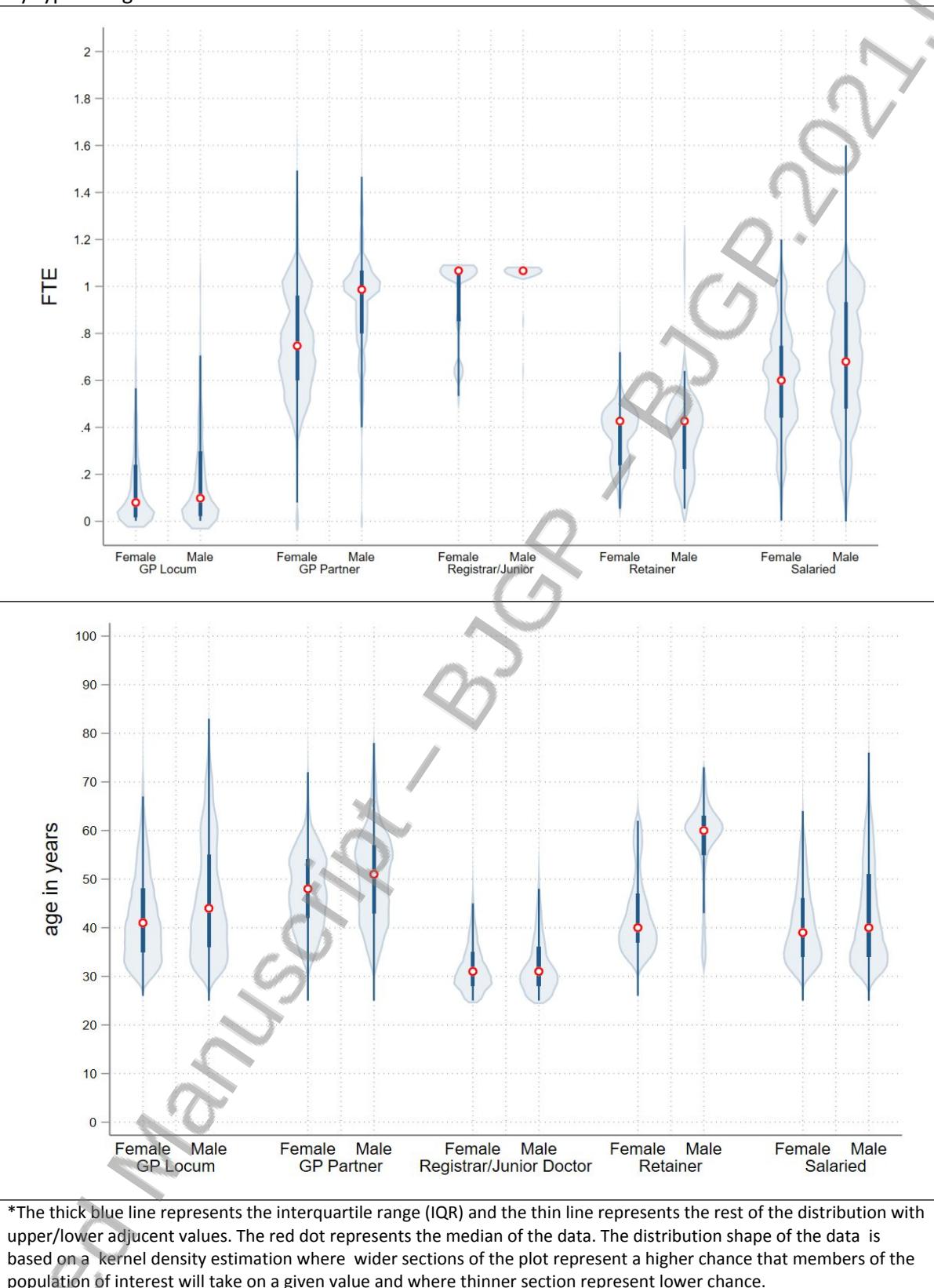
	<b>Model A</b> <b>Analyses over time</b>	<b>Model B</b> <b>Cross-section Analyses</b>
Rurality (0=urban, 1=rural)	1.250 (1.095 to 1.428), <0.001 (0.085)	1.300 (1.085 to 1.559), <0.004 (0.120)
Index of multiple deprivation (IMD) 2019	1.002 (0.999 to 1.006), <0.096 (0.002)	1.005 (1.000 to 1.009), <0.046 (0.002)
Quality and Outcomes Framework (QOF) practice performance	1.005 (0.991 to 1.017), <0.479 (0.007)	1.009 (0.991 to 1.026), <0.298 (0.009)
Single-handed practice	4.611 (4.101 to 5.184), <0.001 (0.276)	4.618 (3.928 to 5.428), <0.001 (0.381)
Quality and Outcomes Framework (QOF) morbidity burden	1.384 (0.963 to 1.991), <0.079 (0.257)	1.255 (0.801 to 1.996), <0.320 (0.287)
Percentage of female population	0.967 (0.959 to 0.981), <0.001 (0.006)	0.970 (0.946 to 0.994), <0.015 (0.012)
Proportion of practice population aged >= 65	0.970 (0.950 to 0.984), <0.001 (0.009)	0.971 (0.958 to 0.988), <0.001 (0.007)
Practice workload (Total GP FTE/list size)	1.001 (1.001 to 1.002), <0.001 (0.001)	1.001 (1.001 to 1.002), <0.003 (0.001)
CQC ratings (reference group is outstanding services)	<b>Reference group</b>	<b>Reference group</b>
Inadequate	2.108 (1.370 to 3.246), <0.001 (0.464)	2.687 (1.451 to 4.974), <0.001 (0.844)
Requires improvement	1.229 (0.949 to 1.592), <0.118 (0.163)	1.198 (0.822 to 1.744), <0.346 (0.229)
Good	1.343 (1.103 to 1.637), <0.003 (0.136)	1.267 (0.947 to 1.696), <0.111 (0.188)
Year (reference year is 2018)	Reference year	-
2019	1.055 (0.970 to 1.148), <0.210 (0.045)	-
constant	0.041 (0.011 to 0.142), <0.001 (0.026)	0.020 (0.004 to 0.111), <0.001 (0.018)

- a. Locum use is defined as practice aggregate FTE of locum doctors
- b. QOF performance is measured as % achievement of the population across all QOF indicators
- c. Coefficients can be interpreted as percentage change, for example, adjusted locum use in London was 0.45% lower than the East of England (model A).

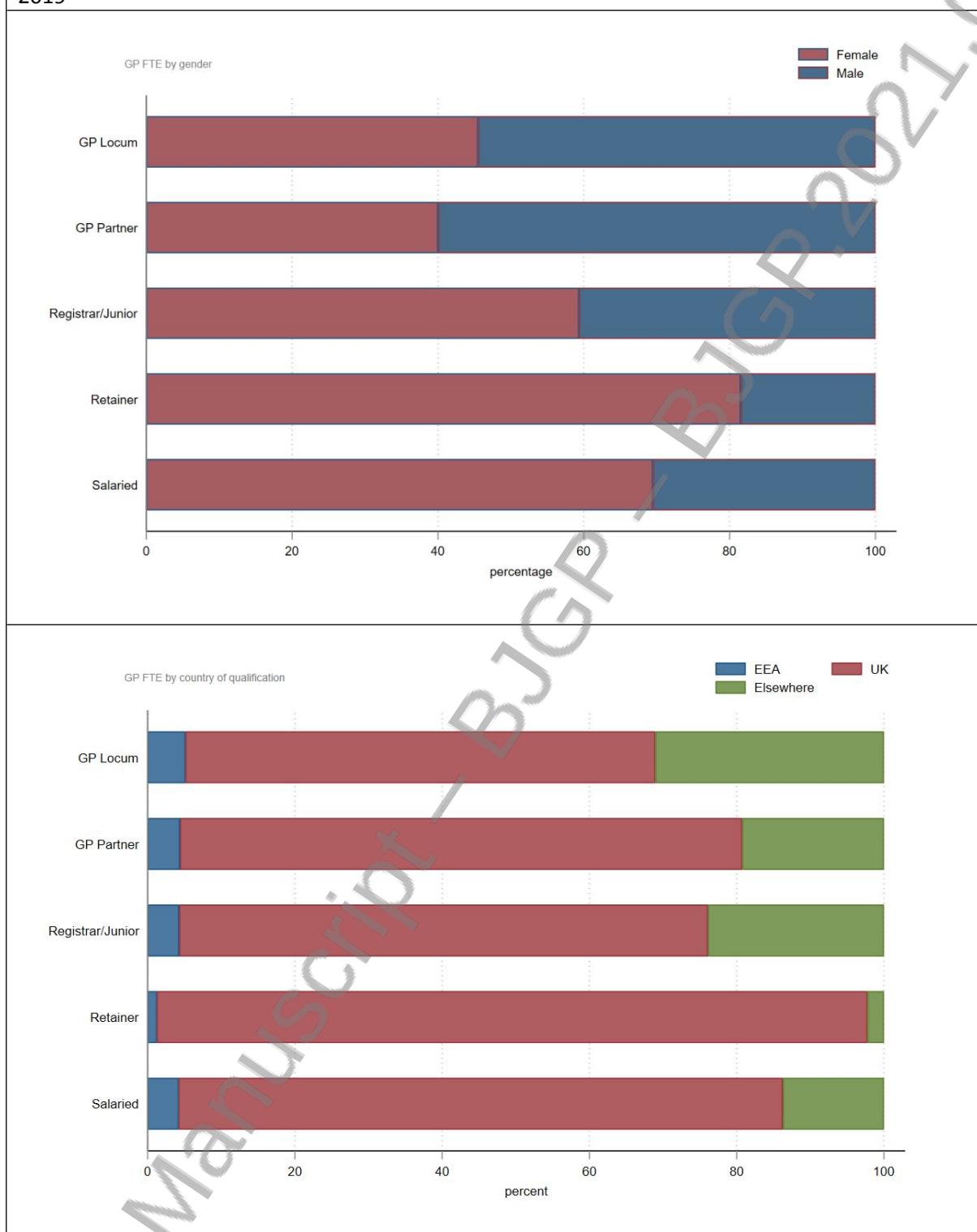
**Figure 1:** Variation in FTE by GP (top) and locum (bottom) type over time, December 2017 to September 2020



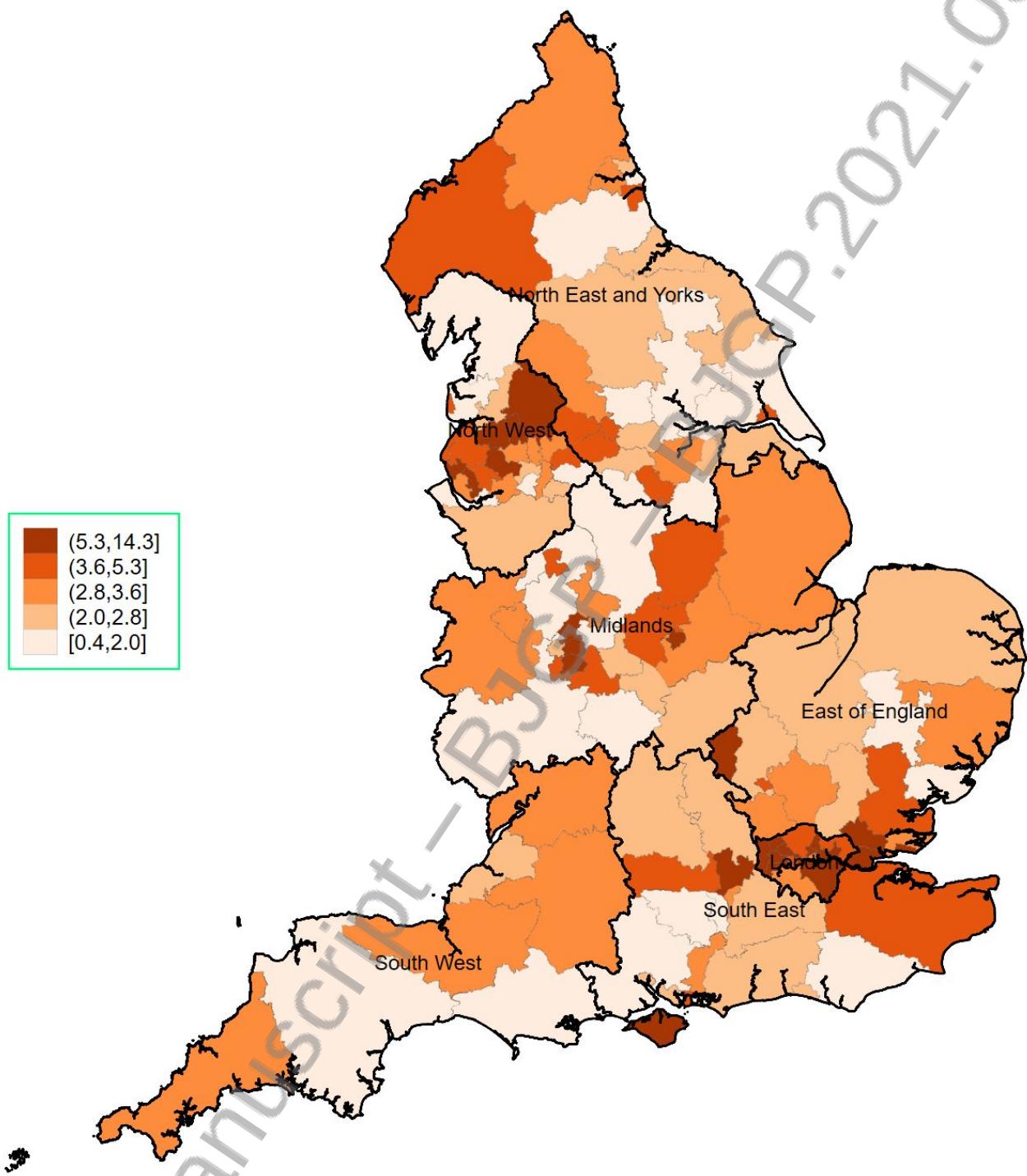
**Figure 2:** Full-time equivalent (FTE) (top) and age (bottom) distribution of GPs in December 2019, by type and gender



**Figure 3:** Gender (top) and country of qualification (bottom) breakdown by GP type, December 2019



**Figure 4:** Geographical distribution of Locum use in 2019\*†



\*Locum use is defined as mean locum FTE as a proportion (%) of total GP FTE

†Population is divided into quintiles depending on levels of locum use. A higher level of the measure in the key represents higher locum use in the locality.

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