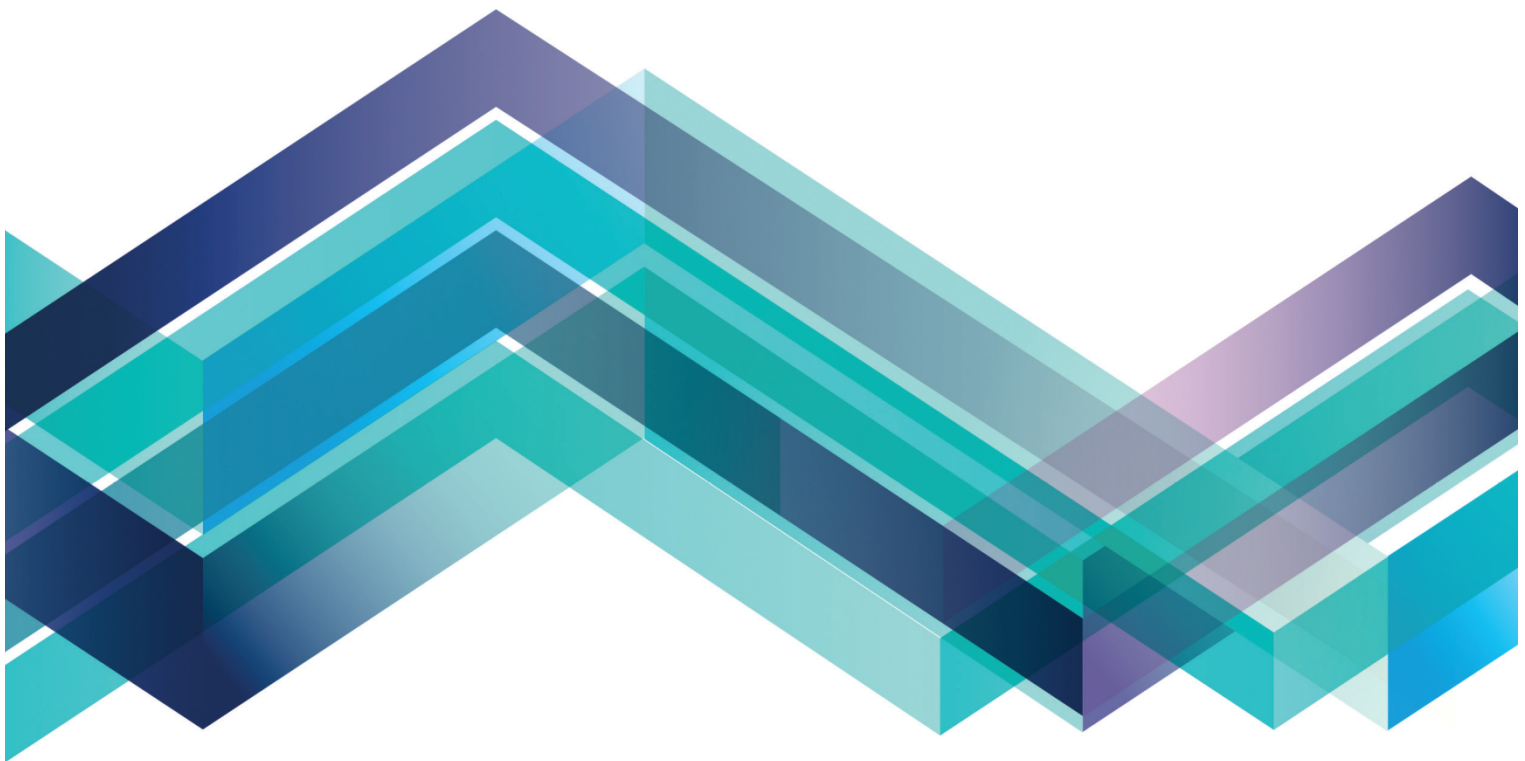


The relationship between primary medical qualification region and nationality at the time of registration

Working paper 2 – March 2017



Contents

Executive summary	3
Introduction	4
Statement of problem	5
PMQ region	5
Nationality group at the time of registration	5
Method	7
Developing an estimation model	7
Information used in the modelling	7
Testing the estimation model	8
Results	9
Counts of doctors	9
Proportions of the workforce	10
Discussion	12
Limitations of the analysis	12
Conclusions	12
Further information	12
Annex A - estimation model design and testing	13
Model design	13
Model testing	21

Executive summary

This working paper reports the results of an analysis of how the regions in which doctors gained their primary medical qualifications (PMQs) relate to their nationalities at the time that they joined the register. By regions, we mean here UK, European Economic Area (EEA), and international medical graduate (IMG).

Of about 232,000 licensed doctors, almost 67,000 doctors who joined the register before 2004 have no nationality information recorded. However, these missing data about nationality at the time of registration may be imputed from other information on the register with a reasonable degree of accuracy.

Having imputed the missing nationality data, the counts of EEA national doctors are compared with those for EEA qualified doctors practising in each country of the UK. The counts of non-EEA national doctors are compared with those for IMGs.

The paper concludes that:

- EEA region PMQ is *not* a reliable indicator for counting doctors who were of EEA nationality at the time of their registration - therefore in considering the workforce implications of Brexit, it will be important to have regard to the fact that EEA region PMQ data under-estimates the number of EEA nationals;
- Counting IMG doctors *may* produce a reasonably accurate surrogate measure for the numbers of doctors who were of non-EEA nationality at the time of their registration.

Introduction

The referendum vote to leave the European Union (EU) has generated interest in the GMC's data about the nationalities of the doctors practising in the UK. This is our second working paper on the topic. The first describes, in detail, the characteristics of doctors who are licensed to practise in the UK and have a primary medical qualification (PMQ) from the European Economic Area (EEA).¹ We refer to these as EEA graduate doctors.

We have produced this second working paper to make our data as useful as possible to those who want to understand more about the composition of the medical workforce. It reports the results of an analysis of how the regions in which doctors gained their PMQs relate to their nationalities at the time that they joined the register.

The relationship between PMQ region - where we have precise information for each and every licensed doctor - and nationality at time of registration - where significant amounts of missing data have to be imputed or estimated - is not a simple one. The estimates in this second working paper are, we believe, robust at a high level of aggregation (by UK country), but are not suitable for more detailed analyses, such as by medical specialty. For these more detailed breakdowns, we refer readers to our first working paper on EEA graduate doctors.

¹ *Our data about doctors with a European primary medical qualification; Working paper 1 - February 2017*, available at www.gmc-uk.org/publications/30409.asp

Statement of problem

On 30 June 2016,² there were 232,192 licensed doctors on the register. For analysis purposes, they may be classified according to either their PMQ region or their nationality group at time of registration.

PMQ region

PMQ countries are, by convention, grouped by the GMC into three regions:

- UK
- EEA
- International medical graduate (IMG).

The number of licensed doctors with a PMQ from each of these regions is shown in Table 1 (below).

Table 1: Licensed doctors on 30 June 2016, by PMQ region

PMQ region	Count	Per cent
UK	155,031	66.8
EEA	21,539	9.3
IMG	55,622	24.0
Total	232,192	

Nationality group at the time of registration

In the same way, nationalities at time of registration may also be grouped into three categories:

- British
- EEA nationality
- Non-EEA nationality.

At the time a doctor applies for registration, up to two nationalities may be recorded.

² The analysis date of 30 June was chosen as the month end closest to the date on which an available data extract used for establishing doctor practice locations was downloaded.

British

This group comprises doctors where at least one of their nationalities is British, or derives from a country that qualifies them for British citizenship. These countries are set out within the www.gov.uk website and include territories such as Gibraltar and Bermuda.

EEA nationality

This group contains doctors who are not British and where at least one of their nationalities is from a country within the EEA. For the purposes of registration, the EEA is the 28 countries of the EU, together with Norway, Switzerland, Iceland and Liechtenstein. In this paper, 'EEA nationality' therefore excludes British doctors and those doctors from outside the EEA with enforceable Community rights.

Non-EEA nationality

Those doctors with all of their nationalities from countries outside the EEA are placed in this group.

Applying this categorisation to the first and second nationalities recorded on the register, the resulting counts of licensed doctors are set out in Table 2 (below).

Table 2: Licensed doctors on 30 June 2016, by recorded nationality group at time of registration

Nationality group recorded	Count	Per cent
British	103,524	44.6
EEA nationality	22,713	9.8
Non-EEA nationality	39,327	16.9
Not recorded	66,628	28.7
Total	232,192	

Note: The vast majority of the doctors with no nationality information recorded joined the register before 2004.

Each of these two sets of categories, PMQ region and nationality group at time of registration, is exhaustive and mutually exclusive - every licensed doctor belongs to one, and only one, category in each set.

The aim of the remainder of the analysis reported here is to allocate the 66,628 doctors in the "Not recorded" nationality group category to one of the three recorded groups, based upon the other information available about them on the register; and then to compare the resulting distribution by estimated nationality at time of registration with the distribution by PMQ region.

Method

Developing an estimation model

A database of licensed doctors was created and split into three parts. The first part contained the 66,628 doctors with no recorded nationality at time of registration. The second part contained a random sample of three-quarters of the doctors with recorded nationality groups, to be used in building an estimation model to explain their nationality groups based on the other information known about them (the "training" data set). The final part contained the remaining quarter of the doctors with recorded nationality groups, to be used in testing the estimation model (the "test" data set).

The technical details of the estimation model design and testing are documented in Annex A. In summary, the following rules were derived to predict nationality group at time of registration based on other registration information.

Information used in the modelling

There is a strong degree of association between the PMQ region of a doctor and their nationality group at time of registration, but this is not determinative. Many doctors move to another country for their medical training. In general, therefore, the model starts by assuming that doctors with an EEA PMQ region were likely to have an EEA nationality, and doctors with an IMG PMQ region were likely to have a non-EEA nationality. It supplements this with further information, as set out under the following three nationality group headings.³

British

If a doctor's ethnicity was British or their qualification was described as "ChB", the doctor was almost certain⁴ to be of British nationality at time of registration.

EEA nationality

If a doctor's PMQ region was "EEA - Southern" or their qualification was described as any of "Artsexamen", "LMS", "Ptychio Iatrikes", "State Exam" or "State Exam Med", the doctor was almost certain to be of EEA nationality at time of registration.

³ The factors set out here are *not* necessarily the strongest indicators of the nationality group of a doctor; they are the strongest indicators that allow non-trivial numbers of doctors with no recorded nationality group to be assigned to a group.

⁴ "Almost certain" here implies that more than 90 per cent of the doctors in the training and test data sets conform to the pattern described.

If a doctor's route to registration was "EEA" or their ethnicity was Irish, the doctor was likely⁵ to be of EEA nationality. The older they were at the time of their first registration, the more likely they were to be of EEA nationality.

Non-EEA nationality

If a doctor's PMQ country was Myanmar, the doctor was almost certain to be of non-EEA nationality at time of registration.

If a doctor's route to registration was "IMG" or their registration type was "Full in Approved Practice Settings", the doctor was likely to be of non-EEA nationality.

Testing the estimation model

Having built the model using the records in the training data set, its performance was assessed by using it to explain the nationality groups at time of registration of the doctors in the test data set. The estimation model was then used as the basis for assigning doctors with no recorded nationality to their most likely nationality group at time of registration, and counts based on this assignment were regarded as our "best estimates".

⁵ "Likely" is used to describe factors that have an statistically significant and material effect on improving the quality of the estimation model.

Results

Counts of doctors

The best estimates described above are first presented for doctors licensed to practise in the UK, and then for those currently practising in each of England, Scotland, Wales and Northern Ireland, in Table 3 (below). For comparison, the number of licensed doctors with an EEA PMQ is shown below each EEA nationality estimate, and the number with an IMG PMQ is shown below each Non-EEA nationality estimate.

Table 3: Licensed doctors, on 30 June 2016, by nationality group / PMQ region, by UK country

Estimate	EEA national / EEA	Non-EEA national / IMG
UK - Best estimate	24,546	51,774
UK - By PMQ	21,539	55,622
England - Best estimate	17,083	44,779
England - By PMQ	15,859	47,968
Scotland - Best estimate	1,478	2,444
Scotland - By PMQ	1,155	2,295
Wales - Best estimate	694	2,406
Wales - By PMQ	629	2,586
Northern Ireland - Best estimate	n/a	337
Northern Ireland - By PMQ	549	363

Note: The UK figures include all doctors licensed to practise in the UK; the country-level figures include those licensed doctors currently in those countries; figures for doctors currently outside the UK are not presented, so the England, Scotland, Wales and Northern Ireland counts do not total to those for the UK.

For example, at UK level, whereas there are 21,539 licensed doctors holding a EEA PMQ, our best estimate of the number of EEA nationals licensed to practise in the UK is higher – 24,546.

No reliable best estimate for Northern Ireland is available from the modelling. The recorded registration data implying EEA nationality for doctors practising there may be unreliable, because under the Belfast Agreement people born in Northern Ireland can choose to be British citizens, Irish citizens or both. They may choose to identify themselves at registration as either having been born in part of the UK or being Irish, for a variety of personal reasons.

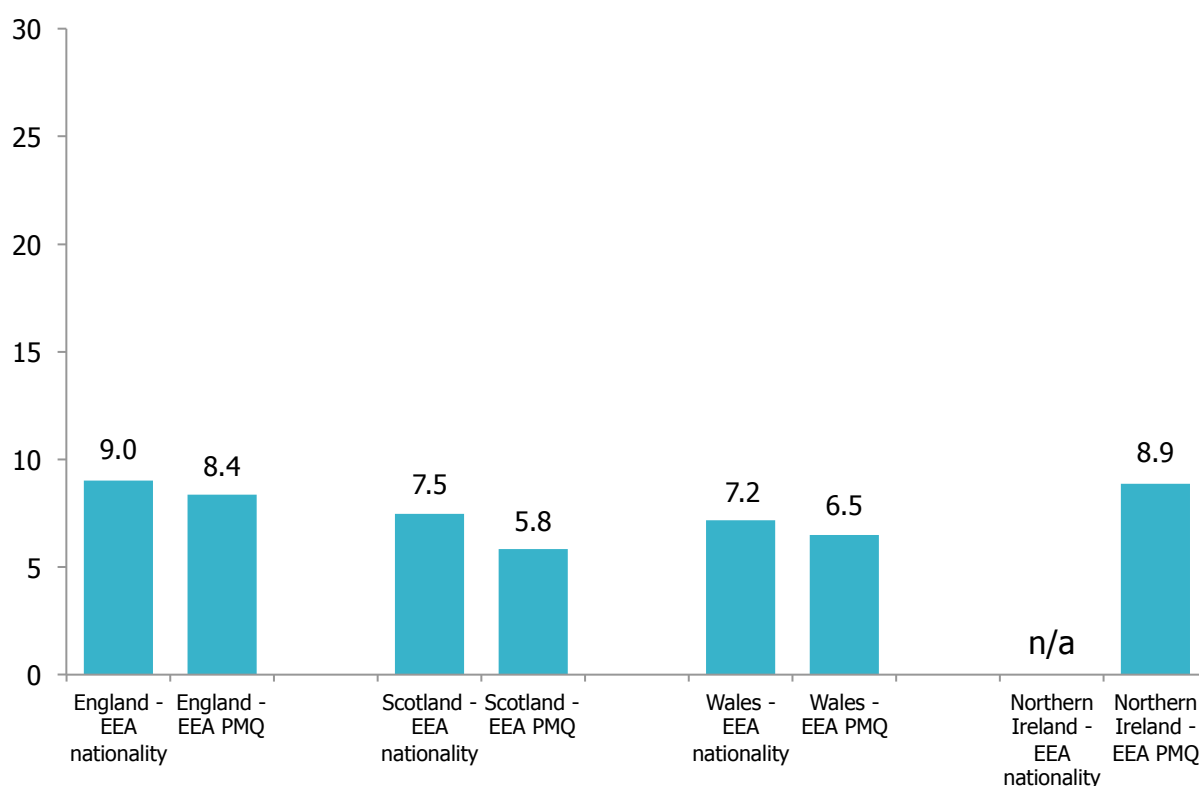
Of the 549 doctors with an EEA region PMQ practising in Northern Ireland, 398 doctors obtained their qualification in the Republic of Ireland.

Proportions of the workforce

EEA nationality

In order to allow the counts reported in Table 3 to be compared, they are presented as percentages of the workforce in Chart 1 (below).

Chart 1: Proportions of licensed doctors who were EEA nationals at time of registration / have an EEA PMQ, 30 June 2016, by UK country



Note: This is based on 189,519 doctors in England, 19,803 in Scotland, 9,695 in Wales and 6,197 in Northern Ireland. Figures for doctors currently practising outside the UK are not shown.

When comparing best estimates, the proportion of the workforce that was of EEA nationality at time of registration decreases on moving from England (9.0 per cent), to Scotland (7.5 per cent), to Wales (7.2 per cent).

It is notable that, in every country where an estimate is available, the best estimate of the proportion of doctors of EEA nationality at time of registration is *higher* than the proportion with an EEA PMQ.

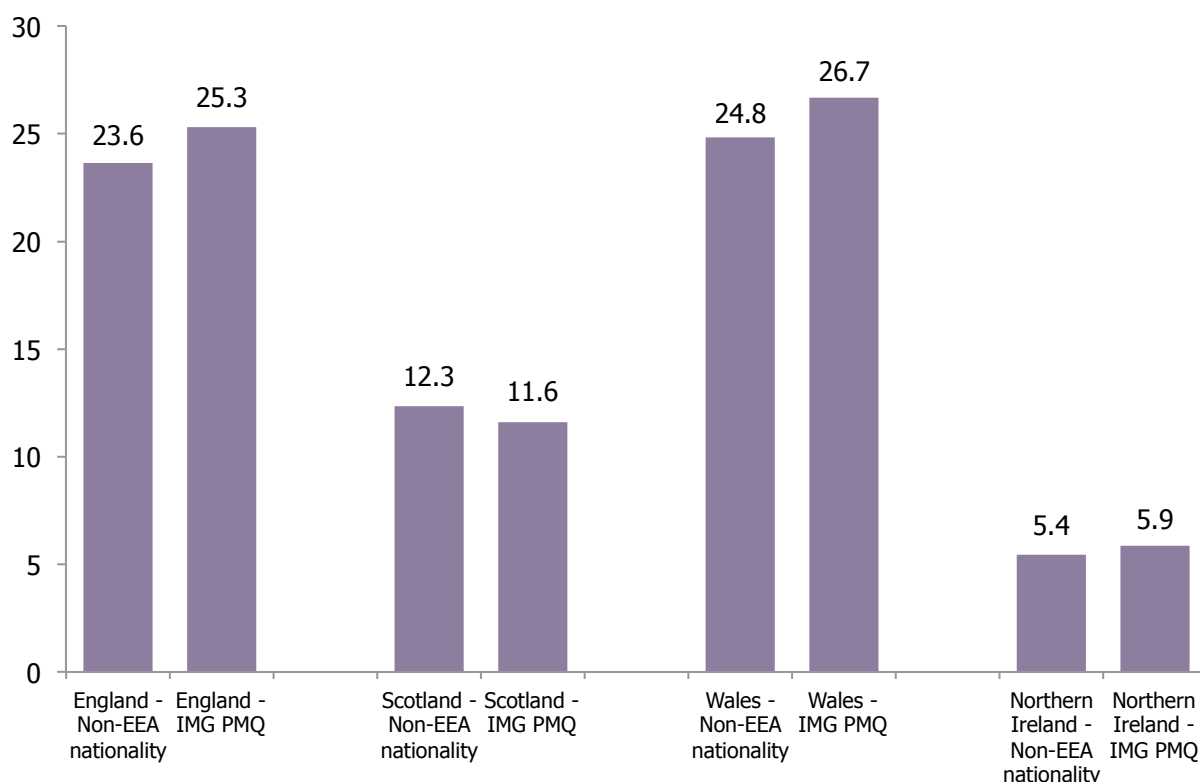
A more detailed comparison of the accuracy of the estimation method against simply using PMQ region as a surrogate for nationality group is documented in Annex A. It confirms that EEA region PMQ is not a reliable surrogate for counting doctors who were of EEA

nationality at time of registration. In particular, see Table A4 for a cross tabulation of PMQ region against estimated nationality and Table A11 for the results of the comparison.

Non-EEA nationality

Similar percentages for doctors in the non-EEA nationality group at time of registration are presented in Chart 2 (below).

Chart 2: Proportions of licensed doctors who were non-EEA nationals at time of registration / have an IMG PMQ, 30 June 2016, by country



Note: This is based on 189,519 doctors in England, 19,803 in Scotland, 9,695 in Wales and 6,197 in Northern Ireland. Figures for doctors currently practising outside the UK are not shown.

When comparing best estimates, the proportion of the workforce that was of non-EEA nationality at time of registration decreases on moving from Wales (24.8 per cent), to England (23.6 per cent), to Scotland (12.3 per cent), to Northern Ireland (5.4 per cent).

The best estimates of the proportions of doctors of non-EEA nationality at time of registration are generally somewhat *lower* than the proportions with an IMG PMQ, except in Scotland where it is somewhat *higher*. The differences are, however, relatively small.

See Annex A for a detailed comparison of the two different measures, which suggests that IMG may be a reasonable surrogate for counting doctors with a non-EEA nationality group at time of registration.

Discussion

Limitations of the analysis

It must be kept in mind that the nationality information recorded by the GMC is mainly⁶ that *at the time of registration* and, for some doctors, this may have changed since. The analysis therefore has little to say about the relationship between PMQ region and *current* nationality.

The modelling approach assumes that the underlying relationships between registration information and nationality at time of registration operate consistently over time, and this is un-tested. Furthermore, the two stage approach identifies about 900 doctors with no nationality recorded as likely to be in the non-EEA group in the first stage, then as likely to be in the EEA group in the second stage. The final estimates of numbers thus depend somewhat on the ordering of the stages in the analysis.

The estimation methods used here are not reliable for use in the particular circumstances of Northern Ireland. To investigate nationality in Northern Ireland further, it is likely that primary research (that is, contacting doctors for further information) would be needed.

Conclusions

The analysis described in this paper suggests that, in each of England, Scotland, Wales and Northern Ireland:

- EEA region PMQ is *not* a reliable indicator for counting doctors who were of EEA nationality at the time of their registration - therefore in considering the workforce implications of Brexit, it will be important to have regard to the fact that EEA region PMQ data under-estimates the number of EEA nationals
- Counting IMG doctors may produce a reasonable accurate surrogate measure for the numbers of doctors who were of non-EEA nationality at the time of their registration.

Further information

Further detail about this project is available from Tom Franklin at tom.franklin@gmc-uk.org.

⁶ "Mainly", because the GMC has from time to time undertaken projects to update the information held about doctors' nationality on the register.

Annex A - Estimation model design and testing

Model design

The work to derive a best estimate nationality group for each of the 66,628 licensed doctors with no recorded nationality proceeded in three stages:

- First, imputations of a British, EEA or non-EEA nationality group were made, based on register variables that have a very strong (90 per cent or more) association with one group;
- Then, a first logistic regression model was developed to identify those of the remaining doctors who were more likely to be non-EEA nationals than not;
- Finally, a second logistic regression model was developed to identify those of the last remaining doctors who were more likely to be EEA nationals than not.

Source data

The following four sources of data were used for the analysis.

Table A1: Data sources

File	Source	Cases	Variables
Licensed_PMQ-EEA.csv	Downloaded from the GMC management information systems as at 30 June 2016	232,192 licensed doctors	GMC Reference Number; Date of Birth; Gender; Nationality; Second Nationality; Country (Contact); First Registration Year; PMQ Qualification; PMQ Country; Ethnic Origin - Level 1; Ethnic Origin - Level 2.
Registration_PMQ-EEA.csv	Downloaded from the GMC management information systems as at 30 June 2016	604,842 doctors who have ever been registered	GMC Reference Number; Route (First Granted Application); Type (First Granted Application).
06_Prioritised_postcodes.csv	Taken from the <i>State of Medical Education and Practice 2016</i>	245,803 registered doctors with a postcode	GMC Reference Number; Postcode; Region.
EthnicityWithNTS.xlsx	Extracted from NTS, HESA, GAMSAT & UKCAT data files	34,536 UIDs with no ethnicity data on the register	GMC Reference Number; FinalEthnicity.

The first data file, Licensed_PMQ-EEA.csv, was the master list of licensed doctors as at 30 June 2016 for the analysis. The data in the other three files was added to it, to supplement the registration data contained. Specifically, Registration_PMQ-EEA.csv added information about the route to register and type of registration; 06_Prioritised_postcodes.csv added information about the UK country in which each doctor was practising in June 2016; and ' EthnicityWithNTS.xlsx ' supplemented missing ethnicity data from various education datasets.

Distributions of variables used

The distributions of the variables used (during any of the three stages) in the analysis are summarised below.

Table A2: Licensed doctors with a PMQ country of Myanmar, by recorded nationality group

PMQ country		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
Myanmar	Count	32	0	404	168	604
	Per cent	7.3	0.0	92.7	-	

Table A3: Licensed doctors with a PMQ region (twelve areas) of EEA - Southern Europe, by recorded nationality group

PMQ region (12)		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
EEA - S. Europe	Count	236	6,767	190	395	7,588
	Per cent	3.3	94.1	2.6	-	

Table A4: Licensed doctors, by PMQ region (three areas), by recorded nationality group

PMQ region (3)		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
UK	Count	95,153	3,384	5,184	51,310	155,031
	Per cent	91.7	3.3	5.0	-	
EEA	Count	1,541	16,996	766	2,236	21,539
	Per cent	8.0	88.1	4.0	-	
IMG	Count	6,830	2,333	33,377	13,082	55,622
	Per cent	16.1	5.5	78.5	-	
Total	Count	103,524	22,713	39,327	66,628	232,192

Table A5: Licensed doctors with selected PMQ qualifications, by recorded nationality group

PMQ Qualification		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
ChB	Count	36	0	0	19	55
	Per cent	100.0	0.0	0.0	-	
Artsexamen	Count	19	536	0	146	701
	Per cent	3.4	96.6	0.0	-	
LMS	Count	23	1,061	3	170	1,257
	Per cent	2.1	97.6	0.3	-	
Ptychio Iatrikes	Count	46	2,260	108	65	2,479
	Per cent	1.9	93.6	4.5	-	
State Exam	Count	29	506	2	78	615
	Per cent	5.4	94.2	0.4	-	
State Exam Med	Count	85	1,900	39	258	2,282
	Per cent	4.2	93.9	1.9	-	

Table A6: Licensed doctors with a recorded route to registration, by route, by recorded nationality group

Route to registration		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
UK	Count	66,875	3,712	10,281	3,886	84,754
	Per cent	82.7	4.6	12.7	-	
EEA	Count	899	11,909	467	1	13,276
	Per cent	6.8	89.7	3.5	-	
IMG	Count	2,070	157	13,911	39	16,177
	Per cent	12.8	1.0	86.2	-	
Licence	Count	1,315	296	255	712	2,578
	Per cent	70.5	15.9	13.7	-	
Restoration	Count	497	584	230	3	1,314
	Per cent	37.9	44.6	17.5	-	
Other route	Count	1,529	486	633	708	3,356
	Per cent	57.7	18.4	23.9	-	
Total	Count	73,185	17,144	25,777	5,349	121,455

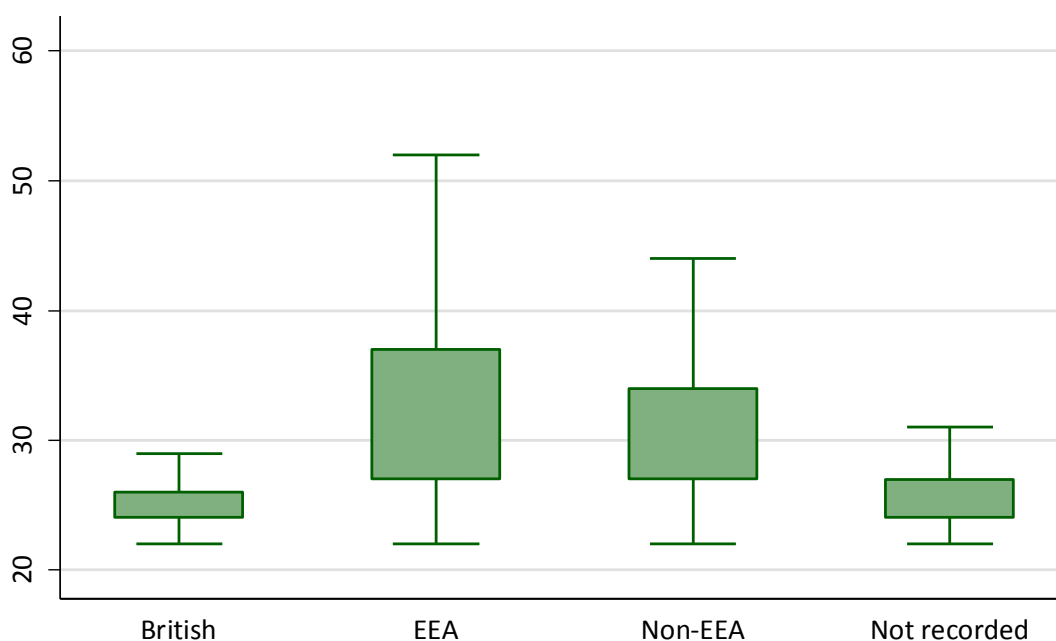
Table A7: Licensed doctors with a specified registration type, by type, by recorded nationality group

Type of registration		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
Provisional	Count	48,047	2,936	4,009	233	55,225
	Per cent	87.4	5.3	7.3	-	
Full	Count	938	6,688	844	8	8,478
	Per cent	11.1	79.0	10.0	-	
Full in APS	Count	6,776	615	12,805	13	20,209
	Per cent	33.6	3.1	63.4	-	
Full with Specialist	Count	333	3,296	596	123	4,348
	Per cent	7.9	78.0	14.1	-	
GP	Count	4,250	317	1,786	403	6,756
	Per cent	66.9	5.0	28.1	-	
Specialist	Count	10,081	1,486	4,922	3,242	19,731
	Per cent	61.1	9.0	29.9	-	
Other type	Count	2,760	1,806	815	1,327	6,708
	Per cent	51.3	33.6	15.2	-	
Total	Count	73,185	17,144	25,777	5,349	121,455

Table A8: Licensed doctors with a recorded ethnicity, by ethnicity, by recorded nationality group

Ethnicity		Recorded nationality group				Total
		British	EEA	Non-EEA	Not recorded	
Indian	Count	10,217	289	13,333	7,500	31,339
	Per cent	42.9	1.2	55.9	-	
Pakistani	Count	4,662	393	5,278	1,589	11,922
	Per cent	45.1	3.8	51.1	-	
Bangladeshi	Count	990	13	484	243	1,730
	Per cent	66.6	0.9	32.6	-	
Chinese	Count	1,822	62	1,952	891	4,727
	Per cent	47.5	1.6	50.9	-	
Other Asian background	Count	3,455	294	3,573	1,702	9,024
	Per cent	47.2	4.0	48.8	-	
African	Count	2,215	385	3,542	1,174	7,316
	Per cent	36.1	6.3	57.7	-	
Caribbean	Count	273	9	179	156	617
	Per cent	59.2	2.0	38.8	-	
Other Black background	Count	234	32	113	148	527
	Per cent	61.7	8.4	29.8	-	
British	Count	64,491	448	468	35,230	100,637
	Per cent	98.6	0.7	0.7	-	
Irish	Count	953	2,803	16	1,492	5,264
	Per cent	25.3	74.3	0.4	-	
Other White background	Count	2,955	14,213	2,704	3,199	23,071
	Per cent	14.9	71.5	13.6	-	
Mixed White / Asian	Count	1,356	132	119	250	1,857
	Per cent	84.4	8.2	7.4	-	
Mixed White / Black African	Count	308	101	242	176	827
	Per cent	47.3	15.5	37.2	-	
Mixed White / Black Caribbean	Count	190	36	30	53	309
	Per cent	74.2	14.1	11.7	-	
Other Mixed background	Count	1,241	209	367	288	2,105
	Per cent	68.3	11.5	20.2	-	
Arab	Count	586	128	1 027	171	1,912
	Per cent	33.7	7.4	59.0	-	
Other ethnic group	Count	1,746	340	2,112	843	5,041
	Per cent	41.6	8.1	50.3	-	
Total	Count	97,694	19,887	35,539	55,105	208,225

Figure A1: Box plots for ages at first registration for licensed doctors, by recorded nationality group



The shaded area of each box extends from the lower quartile of the ages for that nationality group to the upper quartile. No outlying or extreme values are shown.

The box plots in Figure A1 (above) suggest that doctors from EEA countries tend to register first at a somewhat older age than those from non-EEA countries, and at a much older age than British doctors.

- **Stage 1: Imputing missing nationality groups**

The missing nationality groups were imputed using five rules, applied in priority order:

- If PMQ country is Myanmar, doctor is non-EEA nationality;
- If PMQ region is EEA - Southern, doctor is EEA nationality;
- If Level 1 ethnicity is British, doctor is British nationality;
- If qualification is ChB, doctor is British nationality;
- If qualification is any of Artsexamen, LMS, Ptychio Iatrikes, State Exam or State Exam Med, doctor is EEA nationality.

These imputations reduced the number of doctors with an unknown nationality group from 66,628 to 30,524.

- **Stage 2: Estimating missing non-EEA nationality groups**

Table A9: Logistic regression results, non-EEA nationality onto five selected doctor characteristics

Number of observations = 151,250

Likelihood ratio $\chi^2(5) = 78,466$

χ^2 significance = 0.0000

Pseudo $R^2 = 0.52$

Non-EEA nationality	Odds ratio	Standard Error	Z-score	Z-score significance	Odds ratio 95% confidence interval	
UK PMQ	0.0151	0.0003	-184.6	0.000	0.0144	0.0157
EEA PMQ	0.0159	0.0007	-91.6	0.000	0.0145	0.0173
Irish ethnicity	0.0504	0.0152	-9.9	0.000	0.0280	0.0909
IMG route	1.5541	0.0736	9.3	0.000	1.4163	1.7053
Full in APS registration	1.9596	0.0872	15.1	0.000	1.7960	2.1381
Constant	2.5389	0.0393	60.2	0.000	2.4630	2.6172

The model was estimated using all of the 151,250 licensed doctor records in the training data set.

The probability that each doctor with no recorded nationality was of non-EEA nationality was predicted, and those of them with a predicted probability of more than 0.5 were added to the estimated non-EEA nationality group.

- **Stage 3: Estimating missing EEA nationality groups**

Table A10: Logistic regression results, EEA nationality onto selected doctor characteristics

Number of observations = 120,675

Likelihood ratio $\chi^2(5) = 74,375$

χ^2 significance = 0.0000

Pseudo $R^2 = 0.74$

EEA nationality	Odds ratio	Standard Error	Z-score	Z-score significance	Odds ratio 95% confidence interval	
EEA route	4.6692	0.2743	26.2	0.000	4.1615	5.2390
IMG PMQ	5.0630	0.2998	27.4	0.000	4.5083	5.6860
Age at first registration	1.1030	0.0036	29.6	0.000	1.0959	1.1102
EEA PMQ	68.5816	3.4856	83.2	0.000	62.0791	75.7652
Irish ethnicity	61.4632	2.5224	100.4	0.000	56.7131	66.6113
Constant	0.0008	0.0001	-77.1	0.000	0.0007	0.0009

The model was estimated using the 120,675 licensed doctor records in the training data set that had an imputed nationality group of British or EEA and data present for their age at first registration. 954 doctors were excluded from the model building because they had no age at first registration recorded.

The probability that each doctor with no recorded nationality was of EEA nationality was predicted⁷, and those of them with a predicted probability of more than 0.5 were added to the estimated EEA nationality group. The remaining doctors with no recorded nationality were estimated to be British.

Model testing

Using the test data set, the results of applying the estimations described above were assessed, by testing them against the imputed nationality groups - that is, the groups for those doctors that had been either recorded on the register or imputed in Stage 1. The results of this testing are tabulated in the columns headed "Estimated nationality" in Table A11 (below). For comparison, the results of simply using the PMQ region to estimate nationality group are shown alongside, in the columns headed "PMQ".

The analysis has been repeated for the UK and each of the four UK countries.

⁷ For those doctors with no age at first registration recorded, the sample mean value of 27 years was used to support a probability prediction.

Table A11: Percentages of doctors in test data set correctly or incorrectly assigned to their imputed nationality groups by PMQ and by the estimation process, by practice country

<i>Row per cent</i>		<i>UK / British</i>		<i>EEA</i>		<i>IMG / Non-EEA</i>	
Practice region	Imputed nationality group	PMQ	Estimated nationality	PMQ	Estimated nationality	PMQ	Estimated nationality
UK	British	93.4	93.5	1.3	1.4	5.4	5.0
	EEA	14.4	16.1	75.6	78.7	9.9	5.3
	Non-EEA	13.1	13.5	1.9	7.0	84.9	79.5
England	British	92.9	93.1	1.4	1.5	5.8	5.4
	EEA	12.2	13.5	78.7	81.3	9.1	5.2
	Non-EEA	12.7	13.0	1.9	7.1	85.4	79.9
Scotland	British	97.4	97.2	0.4	0.7	2.2	2.1
	EEA	27.1	29.8	66.7	67.8	6.2	2.4
	Non-EEA	26.9	27.5	1.4	6.6	71.7	65.9
Wales	British	94.6	94.8	0.9	0.9	4.5	4.2
	EEA	11.0	15.3	77.9	79.1	11.0	5.5
	Non-EEA	7.6	8.1	1.4	4.0	91.0	87.9
Northern Ireland	British	96.8	n/a	2.0	n/a	1.2	n/a
	EEA	74.6	n/a	20.7	n/a	4.6	n/a
	Non-EEA	17.6	n/a	0.0	n/a	82.4	n/a

Note: The UK percentages are based on 50,418 licensed doctors in the test data set. The bases for the four UK countries were: England 41,103, Scotland 4,382, Wales 1,981 and Northern Ireland 1,263.

Looking at the first row of Table A11 (above) for example, of those doctors in the test data set with a recorded or imputed nationality group of British, 93.4 per cent of them were correctly estimated by looking at PMQ and 93.5 per cent by the estimation model.

Inspection of the results in Table A11 suggests that both methods are very accurate in identifying British doctors (better than 90 per cent success in every UK country), but less accurate in identifying EEA and non-EEA nationality group doctors. The estimation model consistently out-performs using PMQ for EEA nationals, but the reverse is true for non-EEA nationals.

Both methods are at their least accurate in Scotland.

Email: gmc@gmc-uk.org
Website: www.gmc-uk.org
Telephone: **0161 923 6602**

General Medical Council, 3 Hardman Street, Manchester M3 3AW

Textphone: **please dial the prefix 18001** then
0161 923 6602 to use the Text Relay service

Join the conversation

 [@gmcuk](https://twitter.com/gmcuk)  facebook.com/gmcuk
 linkd.in/gmcuk  youtube.com/gmcuktv

This information can be made available in alternative formats or languages. To request an alternative format, please call us on **0161 923 6602** or email us at publications@gmc-uk.org.

Published March 2017

© 2017 General Medical Council

The text of this document may be reproduced free of charge in any format or medium providing it is reproduced accurately and not in a misleading context. The material must be acknowledged as GMC copyright and the document title specified.

The GMC is a charity registered in England and Wales (1089278) and Scotland (SC037750)

Code: GMC/PMQ&N/0317

General
Medical
Council