

Supplementary Information

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Supplementary Box 1: Clinical Practice Research Data Link (CPRD), creation of the migration code list, and data linkage

CPRD is a research service jointly provided by the Medicines and Healthcare Regulatory Agency (MHRA) and the National Institute for Health Research (NIHR).¹ It allows researchers to access routinely collected data from patients registered with GP practices that have agreed to contribute data, unless a patient has specifically opted out of data sharing. CPRD contains two databases, GOLD and Aurum; the former represents patient records from GP practices using Vision[®] general practice patient management software, and the latter from practices using EMIS Web[®] software. Where practices have consented, both CPRD GOLD and Aurum allow for linkage of patient records to other data sources such as hospitalisation, mortality and deprivation data. Monthly builds of the datasets are made available; in this study, we used the January 2021 build of CPRD GOLD.

Primary care staff using the Vision[®] software generally record information in a patient's record in the form of Read v2 codes. Within the CPRD GOLD database there are multiple files: patient, practice, staff, consultation, clinical, additional clinical details, referral, immunisation, test and therapy files. In order to study migrants' primary care outcomes in the UK an international migration code list of Read v2 codes was developed (as described in the Figure).² The CPRD GOLD database was queried to retrieve all instances where a patient's record contained a code from the migration code list, the output of which was a migration events file, with each row indicating one instance of a migration-related code. Consultations (clinical) and ethnicity (non-clinical) events files were also created by querying the CPRD GOLD database for Read codes representing either a consultation or an ethnic group.

The validity of the migration code list was assessed by comparing the completeness and representativeness of the resultant migrant cohort against Office for National Statistics (ONS) country-of-birth data and 2011 Census statistics (Pathak et al., 2021). The cohort and ONS data both had a similar distribution in terms of sex and region of birth. Migration was under-recorded compared to ONS data but improved over time, with better representation for younger migrants.

Linkage of primary care data in CPRD GOLD to Index of Multiple Deprivation (IMD) data (England's official measure of relative deprivation) held by the Office for National Statistics was carried out by NHS Digital, which acts as a Trusted Third Party on behalf of CPRD (CPRD does not hold any personal identifiers).³ The IMD combines 7 domains of deprivation (income, employment, education, health, crime, barriers to housing and services, and the living environment) to create a relative ranking of overall deprivation for each small area in England from the most deprived to the least deprived.⁴ In this analysis, IMD data were provided as quintiles where 1 represents the least deprived quintile and 5 represents the most deprived quintile.³

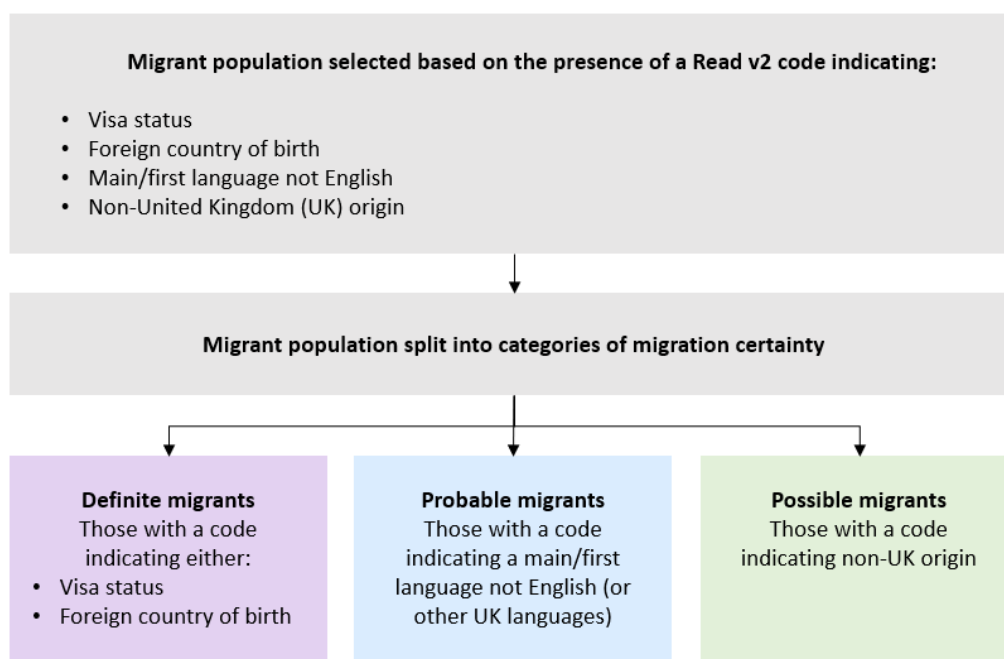


Figure: Migration code list and algorithm based on Read version 2 codes

Supplementary Box 2: Study cohort

The up-to-standard (UTS) date indicates the date at which a practice is deemed to be contributing high quality data that are suitable for research use and is determined by two main factors¹. Firstly, an assessment of the continuity of data recording by examining any meaningful gaps in the data provided by a practice. Secondly, an assurance that patients who have transferred out of the practice or who have died have not been removed from the data; this is assessed by examining gaps in death recording within a practice. The earliest date at which there are no meaningful gaps in the data and in death recording is the practices UTS date.

Patient exclusions were made if a patient's follow-up start date began after their follow-up end date after applying the following exclusions; their certainty of migration using the migration phenotype was 'possible', i.e. determined by an ambiguous non-UK origin code such as "Asian origin", which could refer to ethnicity or country of birth/origin; their age was 100 years and over, as numbers were very small and poorly representative of ONS population estimates². Consultation events were excluded from the count if they were indirect administrative tasks, belonged to patients outside of the final included cohort or were recorded outside of an included patient's follow-up period.

Supplementary Box 3: Interrupted time-series statistical analysis

The interrupted time-series analysis was carried out as reported by Mansfield et al⁵, with some adaptations. A negative binomial model was chosen due to the presence of overdispersion in the consultation count data, with a log offset by weekly total follow-up time for each group (migrants and non-migrants). The model comprised a binary pandemic term to determine the behaviour step-change, a binary migration status term to measure the effect of migration, and an interaction between migration status and the pandemic. This interaction term provides a comparison of the difference in consultation rates between migrants and non-migrants pre-pandemic to the difference in consultation rates between migrants and non-migrants during the pandemic. This is the equivalent of the additional effect of the pandemic on the difference between migrants and non-migrants i.e. the multiplicative effect of migration. Additional terms comprised a linear time variable to account for longer term trends in behaviour and a categorical calendar month variable to capture any seasonal effects. To account for autocorrelation, first-order lagged residuals were included in the model and the Ljung-Box test⁶ was conducted to assess if there was evidence of autocorrelation following their inclusion. In cases where there was still evidence of autocorrelation after the addition of first-order lagged residuals, a partial autocorrelation function plot was inspected, and the appropriate order of lagged residuals were added to the model.

To assess the effect of migration and ethnicity on consultation rates pre- and during the pandemic, the following additional interaction terms were included in the model: (1) an interaction between ethnicity and the pandemic and (2) a three-way interaction between migrant status, ethnicity and the pandemic. Using this model, the effect of being a migrant versus a non-migrant from the same ethnic group on the consultation rate during compared to before the pandemic could be ascertained (represented by combining the migrant status/pandemic interaction term with the three-way migrant status/ethnicity/pandemic interaction term).

Table S1· Categorisation of CPRD consultation types

Direct consultations		Indirect administrative activities
<i>Face-to-face consultation</i>	<i>Phone consultation</i>	
1 Clinic	21 Telephone call to a patient	0 Data Not Entered
2 Night visit, Deputising service	35 Co-op Telephone advice	5 Mail from patient
3 Follow-up/routine visit	55 Telephone Consultation	10 Telephone call from a patient
4 Night visit, Local rota		12 Discharge details
6 Night visit, practice		13 Letter from Outpatients
7 Out of hours, Practice		14 Repeat Issue
8 Out of hours, Non Practice		15 Other
9 Surgery consultation		16 Results recording
11 Acute visit		17 Mail to patient
18 Emergency Consultation		19 Administration
20 Casualty Attendance		22 Third Party Consultation
24 Children's Home Visit		23 Hospital Admission
27 Home Visit		25 Day Case Report
28 Hotel Visit		26 GOS18 Report
30 Nursing Home Visit		29 NHS Direct Report
31 Residential Home Visit		33 Triage
32 Twilight Visit		39 Medicine Management
34 Walk-in Centre		41 Community Nursing Note
36 Co-op Surgery Consultation		42 Community Nursing Report
37 Co-op Home Visit		43 Data Transferred from other system
38 Minor Injury Service		44 Health Authority Entry
40 Community Clinic		45 Health Visitor Note
48 Initial Post Discharge Review		46 Health Visitor Report
50 Night Visit		47 Hospital Inpatient Report
61 Extended Hours		49 Laboratory Request
		51 Radiology Request
		52 Radiology Result
		53 Referral Letter
		54 Social Services Report
		56 Template Entry
		57 GP to GP communication transaction
		58 Non-consultation medication data
		59 Non-consultation data
		60 ePharmacy message

Adapted from https://caliberresearch.org/portal/show/clinical_contact and <https://caliberresearch.org/portal/show/consult>

Table S2· Ethnicity code list

6 level grouping	18 level grouping	Read code	Read term	Medcode
White British	British	9S10·00	White British	12446
White British	British	9S13·00	White Scottish	26467
White British	British	9S14·00	Other white British ethnic group	26310
White British	British	9i00·00	White British – ethnic category 2001 census	98111
White British	British	9i20·00	English – ethnic category 2001 census	12352
White British	British	9i21·00	Scottish – ethnic category 2001 census	12436
White British	British	9i22·00	Welsh – ethnic category 2001 census	12681
White British	British	9i23·00	Cornish – ethnic category 2001 census	28887
White British	British	9t20·00	White: Scottish – Scotland ethnic category 2011 census	110432
White British	British	9t21·00	White: other British – Scotland ethnic category 2011 census	110694
White British	British	9t00·00	White:Eng/Welsh/Scot/NI/Brit – England and Wales 2011 census	110420
White British	British	9i24·00	Northern Irish – ethnic category 2001 census	42294
White British	British	9t10·00	White – Northern Ireland ethnic category 2011 census	112899
White British	British	9i0·00	British or mixed British – ethnic category 2001 census	12351
White Non-British	Irish	9S11·00	White Irish	24837
White Non-British	Irish	9SA9·00	Irish (NMO)	24270
White Non-British	Irish	9i1·00	Irish – ethnic category 2001 census	12532
White Non-British	Irish	9i10·00	White Irish – ethnic category 2001 census	98213
White Non-British	Irish	9t22·00	White: Irish – Scotland ethnic category 2011 census	110687
White Non-British	Irish	9t01·00	White: Irish – England and Wales ethnic category 2011 census	110556
White Non-British	Irish	9i2Q·00	Mixed Irish and other White – ethnic category 2001 census	26391
White Non-British	Gypsy or Irish Traveller	9SI·00	Irish traveller	47601
White Non-British	Gypsy or Irish Traveller	9i2C·00	Irish Traveller – ethnic category 2001 census	55223
White Non-British	Gypsy or Irish Traveller	9i2D·00	Traveller – ethnic category 2001 census	55113
White Non-British	Gypsy or Irish Traveller	9i2E·00	Gypsy/Romany – ethnic category 2001 census	42290
White Non-British	Gypsy or Irish Traveller	9t02·00	White: Gypsy/Irish Traveller – Eng+Wales eth cat 2011 census	111386
White Non-British	Gypsy or Irish Traveller	9t23·00	White: Gypsy/Irish Traveller – Scotland ethnic cat 2011 cens	113253
White Non-British	Gypsy or Irish Traveller	9T2·00	Traveller – gypsy	32781
White Non-British	Other White	9S12·00	Other white ethnic group	12444
White Non-British	Other White	9SAA·00	Greek/Greek Cypriot (NMO)	45947
White Non-British	Other White	9SAA·11	Greek (NMO)	45955
White Non-British	Other White	9SAA·12	Greek Cypriot (NMO)	47949
White Non-British	Other White	9SAB·00	Turkish/Turkish Cypriot (NMO)	32066
White Non-British	Other White	9SAB·11	Turkish (NMO)	32126
White Non-British	Other White	9SAB·12	Turkish Cypriot (NMO)	32069
White Non-British	Other White	9SAC·00	Other European (NMO)	12633
White Non-British	Other White	9i2·00	Other White background – ethnic category 2001 census	12421
White Non-British	Other White	9i26·00	Cypriot (part not stated) – ethnic category 2001 census	32778
White Non-British	Other White	9i27·00	Greek – ethnic category 2001 census	12355
White Non-British	Other White	9i28·00	Greek Cypriot – ethnic category 2001 census	12769
White Non-British	Other White	9i29·00	Turkish – ethnic category 2001 census	12746
White Non-British	Other White	9i2A·00	Turkish Cypriot – ethnic category 2001 census	32413
White Non-British	Other White	9i2B·00	Italian – ethnic category 2001 census	12412
White Non-British	Other White	9i2F·00	Polish – ethnic category 2001 census	12467
White Non-British	Other White	9i2G·00	Baltic Estonian/Latvian/Lithuanian – ethn categ 2001 census	12433
White Non-British	Other White	9i2H·00	Commonwealth (Russian) Indep States – ethn categ 2001 census	28973
White Non-British	Other White	9i2J·00	Kosovan – ethnic category 2001 census	26341
White Non-British	Other White	9i2K·00	Albanian – ethnic category 2001 census	25422
White Non-British	Other White	9i2L·00	Bosnian – ethnic category 2001 census	46956
White Non-British	Other White	9i2M·00	Croatian – ethnic category 2001 census	28866
White Non-British	Other White	9i2N·00	Serbian – ethnic category 2001 census	47074
White Non-British	Other White	9i2P·00	Other republics former Yugoslavia – ethnic categ 2001 census	28936
White Non-British	Other White	9i2T·00	Other White or White unspecified ethnic category 2001 census	12591
White Non-British	Other White	9S1·00	White	22467
White Non-British	Other White	9i25·00	Ulster Scots – ethnic category 2001 census	40102

White Non-British	Other White	9i2R-00	Oth White European/European unsp/Mixed European 2001 census	12402
White Non-British	Other White	9i2S-00	Other mixed White – ethnic category 2001 census	28900
White Non-British	Other White	9t24-00	White: Polish – Scotland ethnic category 2011 census	110465
White Non-British	Other White	9t03-00	White: other White backgrd– Eng+Wales ethnic cat 2011 census	110407
White Non-British	Other White	9t25-00	White: other White ethnic grp– Scotland ethnic cat 2011 cens	110695
White Non-British	Other White	9T11-00	New Zealand European	57286
White Non-British	Other White	9T12-00	Other European in New Zealand	85505
White Non-British	Other White	9T7-00	Slovak	101787
White Non-British	Other White	134B-00	RACE: Caucasian	12191
White Non-British	Other White	134N-00	RACE: White	25550
Mixed/Multiple ethnic group	Mixed White and Black Caribbean	9SB5-00	Black Caribbean and White	32425
Mixed/Multiple ethnic group	Mixed White and Black Caribbean	9i3-00	White and Black Caribbean – ethnic category 2001 census	12742
Mixed/Multiple ethnic group	Mixed White and Black Caribbean	9t12-00	Mixed: White and Black Caribbean – NI ethnic cat 2011 census	110661
Mixed/Multiple ethnic group	Mixed White and Black Caribbean	9t04-00	Mixed: White+Black Caribbean – Eng+Wales eth cat 2011 census	110445
Mixed/Multiple ethnic group	Mixed White and Black African	9SB6-00	Black African and White	32443
Mixed/Multiple ethnic group	Mixed White and Black African	9i4-00	White and Black African – ethnic category 2001 census	12437
Mixed/Multiple ethnic group	Mixed White and Black African	9t13-00	Mixed: White and Black African – NI ethnic cat 2011 census	110651
Mixed/Multiple ethnic group	Mixed White and Black African	9t05-00	Mixed: White+Black African – Eng+Wales eth cat 2011 census	110421
Mixed/Multiple ethnic group	Mixed White and Black African	134L-00	RACE: Afro-caucasian	45167
Mixed/Multiple ethnic group	Mixed White and Asian	9SB2-00	Other ethnic, Asian/White orig	32401
Mixed/Multiple ethnic group	Mixed White and Asian	9i5-00	White and Asian – ethnic category 2001 census	12638
Mixed/Multiple ethnic group	Mixed White and Asian	9i63-00	Chinese and White – ethnic category 2001 census	12706
Mixed/Multiple ethnic group	Mixed White and Asian	9t14-00	Mixed: White and Asian – NI ethnic category 2011 census	110471
Mixed/Multiple ethnic group	Mixed White and Asian	9t06-00	Mixed: White+Asian – Eng+Wales ethnic category 2011 census	110652
Mixed/Multiple ethnic group	Other Mixed	9SB3-00	Other ethnic, mixed white orig	35459
Mixed/Multiple ethnic group	Other Mixed	9i60-00	Black and Asian – ethnic category 2001 census	12795
Mixed/Multiple ethnic group	Other Mixed	9i61-00	Black and Chinese – ethnic category 2001 census	49940
Mixed/Multiple ethnic group	Other Mixed	9SB-00	Other ethnic, mixed origin	12696
Mixed/Multiple ethnic group	Other Mixed	9SB4-00	Other ethnic, other mixed orig	32420
Mixed/Multiple ethnic group	Other Mixed	9i6-00	Other Mixed background – ethnic category 2001 census	12873
Mixed/Multiple ethnic group	Other Mixed	9i64-00	Asian and Chinese – ethnic category 2001 census	47005
Mixed/Multiple ethnic group	Other Mixed	9i65-00	Other Mixed or Mixed unspecified ethnic category 2001 census	32408
Mixed/Multiple ethnic group	Other Mixed	9S51-00	Other Black – Black/White orig	25623
Mixed/Multiple ethnic group	Other Mixed	9SB1-00	Other ethnic, Black/White orig	47401
Mixed/Multiple ethnic group	Other Mixed	9i62-00	Black and White – ethnic category 2001 census	40110
Mixed/Multiple ethnic group	Other Mixed	9iA9-00	Mixed Asian – ethnic category 2001 census	46056
Mixed/Multiple ethnic group	Other Mixed	9iD3-00	Mixed Black – ethnic category 2001 census	40096
Mixed/Multiple ethnic group	Other Mixed	9t15-00	Mixed: other Mixed/multiple ethnic backgrd – NI 2011 census	110536
Mixed/Multiple ethnic group	Other Mixed	9t26-00	Mixed/multiple ethnic grps: any– Scot ethnic cat 2011 census	110696

Mixed/Multiple ethnic group	Other Mixed	9t07-00	Mixed: other Mixed/multiple backgrd – Eng+Wales 2011 census	110654
Mixed/Multiple ethnic group	Other Mixed	9S52-00	Other Black – Black/Asian orig	32165
Mixed/Multiple ethnic group	Other Mixed	9S5-00	Black – other, mixed	25676
Mixed/Multiple ethnic group	Other Mixed	134J-00	RACE: Mixed	30408
Asian/Asian British	Indian	9S6-00	Indian	12482
Asian/Asian British	Indian	9SA7-00	Indian sub-continent (NMO)	39696
Asian/Asian British	Indian	9i7-00	Indian or British Indian – ethnic category 2001 census	12414
Asian/Asian British	Indian	9t16-00	Asian or Asian British: Indian – NI ethnic cat 2011 census	110422
Asian/Asian British	Indian	9t28-00	Asian: Indian, Indian Scot/Indian Brit– Scotland 2011 census	111368
Asian/Asian British	Indian	9t08-00	Asian/Asian Brit: Indian – Eng+Wales ethnic cat 2011 census	110477
Asian/Asian British	Indian	9T1D-00	Indian	25920
Asian/Asian British	Pakistani	9S7-00	Pakistani	24690
Asian/Asian British	Pakistani	9i8-00	Pakistani or British Pakistani – ethnic category 2001 census	12460
Asian/Asian British	Pakistani	9t09-00	Asian/Asian British:Pakistani– Eng+Wales eth cat 2011 census	110464
Asian/Asian British	Pakistani	9t17-00	Asian/Asian British: Pakistani – NI ethnic cat 2011 census	110538
Asian/Asian British	Pakistani	9t27-00	Asian: Pakistani/Pakistani Scot/Pakistani Brit– Scot 2011	110460
Asian/Asian British	Pakistani	134M-00	RACE: Pakistani	26062
Asian/Asian British	Bangladeshi	9S8-00	Bangladeshi	24740
Asian/Asian British	Bangladeshi	9i9-00	Bangladeshi or British Bangladeshi – ethn categ 2001 census	28888
Asian/Asian British	Bangladeshi	9t18-00	Asian/Asian British: Bangladeshi – NI ethnic cat 2011 census	110720
Asian/Asian British	Bangladeshi	9t0A-00	Asian/Asian Brit: Bangladeshi– Eng+Wales eth cat 2011 census	110590
Asian/Asian British	Bangladeshi	9t29-00	Bangladeshi, Bangladeshi Scot or Bangladeshi Brit– Scot 2011	112225
Asian/Asian British	Bangladeshi	134I-00	RACE: Bangladeshi	26348
Asian/Asian British	Chinese	9S9-00	Chinese	24272
Asian/Asian British	Chinese	9iE-00	Chinese – ethnic category 2001 census	12468
Asian/Asian British	Chinese	9t2A-00	Asian: Chinese – Scotland ethnic category 2011 census	111064
Asian/Asian British	Chinese	9t19-00	Asian/Asian British: Chinese – NI ethnic cat 2011 census	112363
Asian/Asian British	Chinese	9t0B-00	Asian/Asian Brit: Chinese – Eng+Wales ethnic cat 2011 census	110922
Asian/Asian British	Chinese	9T1C-00	Chinese	12718
Asian/Asian British	Chinese	134D-00	RACE: Chinese	32224
Asian/Asian British	Other Asian	9iA7-00	Caribbean Asian – ethnic category 2001 census	32399
Asian/Asian British	Other Asian	9iA1-00	Punjabi – ethnic category 2001 census	26392
Asian/Asian British	Other Asian	9SA6-00	E Afric Asian/Indo-Carib (NMO)	38097
Asian/Asian British	Other Asian	9iA2-00	Kashmiri – ethnic category 2001 census	64133
Asian/Asian British	Other Asian	9SA6-11	East African Asian (NMO)	46818
Asian/Asian British	Other Asian	9SA8-00	Other Asian (NMO)	26379
Asian/Asian British	Other Asian	9SH-00	Other Asian ethnic group	12668
Asian/Asian British	Other Asian	9iA-00	Other Asian background – ethnic category 2001 census	12513
Asian/Asian British	Other Asian	9iA3-00	East African Asian – ethnic category 2001 census	47077
Asian/Asian British	Other Asian	9iA8-00	British Asian – ethnic category 2001 census	12653
Asian/Asian British	Other Asian	9iAA-00	Other Asian or Asian unspecified ethnic category 2001 census	28935
Asian/Asian British	Other Asian	9SA6-12	Indo-Caribbean (NMO)	99316
Asian/Asian British	Other Asian	9t2B-00	Asian: other Asian group – Scotland ethnic cat 2011 census	110855
Asian/Asian British	Other Asian	9t0C-00	Asian/Asian Brit: other Asian– Eng+Wales eth cat 2011 census	111743
Asian/Asian British	Other Asian	9t1A-00	Asian/Asian British: other Asian – NI ethnic cat 2011 census	110425
Asian/Asian British	Other Asian	9T1E-00	Other Asian	32396
Asian/Asian British	Other Asian	9iA4-00	Sri Lankan – ethnic category 2001 census	12608
Asian/Asian British	Other Asian	9iA5-00	Tamil – ethnic category 2001 census	12760
Asian/Asian British	Other Asian	9iA6-00	Sinhalese – ethnic category 2001 census	12887

Asian/Asian British	Other Asian	9iF0-00	Vietnamese – ethnic category 2001 census	12719
Asian/Asian British	Other Asian	9iF1-00	Japanese – ethnic category 2001 census	12473
Asian/Asian British	Other Asian	9iF2-00	Filipino – ethnic category 2001 census	12420
Asian/Asian British	Other Asian	9iF3-00	Malaysian – ethnic category 2001 census	12730
Asian/Asian British	Other Asian	9TiB-00	South East Asian	46649
Asian/Asian British	Other Asian	9SC-00	Vietnamese	25411
Asian/Asian British	Other Asian	9T9-00	Nepali	101162
Asian/Asian British	Other Asian	134E-00	RACE: Japanese	45163
Asian/Asian British	Other Asian	134G-00	RACE: Oriental	41200
Asian/Asian British	Other Asian	134F-00	RACE: Korean	41394
Black/African/Caribbean/ Black British	African	9S3-00	Black African	12778
Black/African/Caribbean/ Black British	African	9S44-00	Black – other African country	35412
Black/African/Caribbean/ Black British	African	9SA5-00	Other African countries (NMO)	47969
Black/African/Caribbean/ Black British	African	9iC-00	African – ethnic category 2001 census	12350
Black/African/Caribbean/ Black British	African	9iD1-00	Nigerian – ethnic category 2001 census	32886
Black/African/Caribbean/ Black British	African	9S43-11	Black North African	46812
Black/African/Caribbean/ Black British	African	9t2D-00	African: any other African – Scotland ethnic cat 2011 census	110655
Black/African/Caribbean/ Black British	African	9t1B-00	Black/Afri/Carib/Black Brit: African– NI eth cat 2011 census	110630
Black/African/Caribbean/ Black British	African	9t2C-00	African: African/African Scot/African Brit – Scotland 2011	111059
Black/African/Caribbean/ Black British	African	9t0D-00	Black/African/Carib/Black Brit: African– Eng+Wales 2011 cens	110437
Black/African/Caribbean/ Black British	African	9iFA-00	North African – ethnic category 2001 census	47028
Black/African/Caribbean/ Black British	Caribbean	9S2-00	Black Caribbean	12632
Black/African/Caribbean/ Black British	Caribbean	9S42-00	Black Caribbean/W-I/Guyana	57435
Black/African/Caribbean/ Black British	Caribbean	9S42-11	Black Caribbean	47950
Black/African/Caribbean/ Black British	Caribbean	9S42-12	Black West Indian	47997
Black/African/Caribbean/ Black British	Caribbean	9S42-13	Black Guyana	32100
Black/African/Caribbean/ Black British	Caribbean	9SA3-00	Caribbean I-/W-I/Guyana (NMO)	54593
Black/African/Caribbean/ Black British	Caribbean	9SA3-11	Caribbean Island (NMO)	57094
Black/African/Caribbean/ Black British	Caribbean	9SA3-12	West Indian (NMO)	57075
Black/African/Caribbean/ Black British	Caribbean	9SA3-13	Guyana (NMO)	93144
Black/African/Caribbean/ Black British	Caribbean	9iB-00	Caribbean – ethnic category 2001 census	12432
Black/African/Caribbean/ Black British	Caribbean	9t0E-00	Black/African/Caribbn/Black Brit: Caribbean – Eng+Wales 2011	110436
Black/African/Caribbean/ Black British	Caribbean	9t1C-00	Black/Afri/Carib/Black Brit: Caribbean– NI eth cat 2011 cens	110779
Black/African/Caribbean/ Black British	Caribbean	9t2E-00	Carib/Black: Caribbean/Carib Scot/Carib Brit– Scotland 2011	113671
Black/African/Caribbean/ Black British	Caribbean	134K-00	RACE: West indian	32095
Black/African/Caribbean/ Black British	Caribbean	134H-00	RACE: Afro-caribbean	25894
Black/African/Caribbean/ Black British	Other Black	9S41-00	Black British	12452
Black/African/Caribbean/ Black British	Other Black	9iD2-00	Black British – ethnic category 2001 census	40097
Black/African/Caribbean/ Black British	Other Black	9S45-00	Black E Afric Asia/Indo–Caribb	47965
Black/African/Caribbean/ Black British	Other Black	9S45-11	Black East African Asian	57753

Black/African/Caribbean/ Black British	Other Black	9S45·12	Black Indo–Caribbean	57763
Black/African/Caribbean/ Black British	Other Black	9S46·00	Black Indian sub–continent	48005
Black/African/Caribbean/ Black British	Other Black	9S47·00	Black – other Asian	35350
Black/African/Caribbean/ Black British	Other Black	9iD0·00	Somali – ethnic category 2001 census	12443
Black/African/Caribbean/ Black British	Other Black	9S4·00	Black, other, non–mixed origin	24339
Black/African/Caribbean/ Black British	Other Black	9S43·13	Black Iranian	50286
Black/African/Caribbean/ Black British	Other Black	9S48·00	Black – other	26312
Black/African/Caribbean/ Black British	Other Black	9SG·00	Other black ethnic group	32136
Black/African/Caribbean/ Black British	Other Black	9iD·00	Other Black background – ethnic category 2001 census	32389
Black/African/Caribbean/ Black British	Other Black	9iD4·00	Other Black or Black unspecified ethnic category 2001 census	46047
Black/African/Caribbean/ Black British	Other Black	9t1D·00	Black/Afri/Carib/Black Brit: other – NI eth cat 2011 census	111880
Black/African/Caribbean/ Black British	Other Black	9t0F·00	Black/Afr/Carib/Black Brit: other Black– Eng+Wales 2011 cens	110540
Black/African/Caribbean/ Black British	Other Black	9t2G·00	Carib/Black: any other Black/Caribbean grp – Scotland 2011	112216
Black/African/Caribbean/ Black British	Other Black	9t2F·00	Carib/Black: Black/Black Scot/Black Brit– Scotland 2011 cens	112649
Other ethnic group	Arab	9S43·00	Black N African/Arab/Iranian	41329
Other ethnic group	Arab	9S43·12	Black Arab	57752
Other ethnic group	Arab	9SA4·00	N African Arab/Iranian (NMO)	24962
Other ethnic group	Arab	9SA4·11	North African Arab (NMO)	47285
Other ethnic group	Arab	9SA4·12	Iranian (NMO)	25082
Other ethnic group	Arab	9iF9·00	Arab – ethnic category 2001 census	46059
Other ethnic group	Arab	9t1E·00	Other ethnic group: Arab – NI ethnic category 2011 census	110780
Other ethnic group	Arab	9t0G·00	Other ethnic group: Arab – Eng+Wales ethnic cat 2011 census	110555
Other ethnic group	Arab	9t2H·00	Other ethnic grp: Arab/Arab Scot/Arab British– Scotland 2011	112245
Other ethnic group	Arab	134C·00	RACE: Arab	12875
Other ethnic group	Any other ethnic group	9T1·00	New Zealand ethnic groups	45008
Other ethnic group	Any other ethnic group	9T1Y·00	Other New Zealand ethnic group	96789
Other ethnic group	Any other ethnic group	9T1Z·00	New Zealand ethnic group NOS	71425
Other ethnic group	Any other ethnic group	9SA·00	Other ethnic non–mixed (NMO)	30280
Other ethnic group	Any other ethnic group	9SA1·00	Brit· ethnic minor· spec·(NMO)	32110
Other ethnic group	Any other ethnic group	9SA2·00	Brit· ethnic minor· unsp·(NMO)	57764
Other ethnic group	Any other ethnic group	9SAD·00	Other ethnic NEC (NMO)	41214
Other ethnic group	Any other ethnic group	9SJ·00	Other ethnic group	12757
Other ethnic group	Any other ethnic group	9T1A·00	Other Pacific ethnic group	46752
Other ethnic group	Any other ethnic group	9iF·00	Other – ethnic category 2001 census	12434
Other ethnic group	Any other ethnic group	9iF4·00	Buddhist – ethnic category 2001 census	63872
Other ethnic group	Any other ethnic group	9iF5·00	Hindu – ethnic category 2001 census	56127
Other ethnic group	Any other ethnic group	9iF6·00	Jewish – ethnic category 2001 census	46063
Other ethnic group	Any other ethnic group	9iF7·00	Muslim – ethnic category 2001 census	47091
Other ethnic group	Any other ethnic group	9iF8·00	Sikh – ethnic category 2001 census	49658
Other ethnic group	Any other ethnic group	9iFB·00	Mid East (excl Israeli, Iranian & Arab) – eth cat 2001 cens	28909
Other ethnic group	Any other ethnic group	9iFC·00	Israeli – ethnic category 2001 census	46964
Other ethnic group	Any other ethnic group	9iFD·00	Iranian – ethnic category 2001 census	25937
Other ethnic group	Any other ethnic group	9iFE·00	Kurdish – ethnic category 2001 census	45964
Other ethnic group	Any other ethnic group	9iFF·00	Moroccan – ethnic category 2001 census	25451
Other ethnic group	Any other ethnic group	9iFG·00	Latin American – ethnic category 2001 census	26246
Other ethnic group	Any other ethnic group	9iFH·00	South and Central American – ethnic category 2001 census	12756
Other ethnic group	Any other ethnic group	9iFJ·00	Mauritian/Seychellois/Maldivian/St Helena eth cat 2001census	32382
Other ethnic group	Any other ethnic group	9iFK·00	Any other group – ethnic category 2001 census	26455
Other ethnic group	Any other ethnic group	9t0H·00	Other ethnic: any other grp – Eng+Wales eth cat 2011 census	110742

Other ethnic group	Any other ethnic group	9t2J-00	Other ethnic grp: any other ethnic grp– Scotland 2011 census	111806
Other ethnic group	Any other ethnic group	9t1F-00	Other ethnic group: any other grp– NI ethnic cat 2011 census	110646
Other ethnic group	Any other ethnic group	9T11-11	Pakeha	85509
Other ethnic group	Any other ethnic group	9T13-00	New Zealand Maori	32479
Other ethnic group	Any other ethnic group	9T14-00	Samoan	64610
Other ethnic group	Any other ethnic group	9T15-00	Cook Island Maori	89910
Other ethnic group	Any other ethnic group	9T16-00	Tongan	60837
Other ethnic group	Any other ethnic group	9T17-00	Niuean	55584
Other ethnic group	Any other ethnic group	9T18-00	Tokelauan	25434
Other ethnic group	Any other ethnic group	9T19-00	Fijian	64609
Other ethnic group	Any other ethnic group	9T3-00	Yemeni	94487
Other ethnic group	Any other ethnic group	134P-11	RACE: Other	32391
N/A	Ethnic group not specified	916E-00	Patient ethnicity unknown	93749
N/A	Ethnic group not specified	9S-00	Ethnic groups (1991 census)	10196
N/A	Ethnic group not specified	9SD-00	Ethnic group not given – patient refused	12429
N/A	Ethnic group not specified	9SE-00	Ethnic group not recorded	24340
N/A	Ethnic group not specified	9SZ-00	Ethnic groups (census) NOS	45199
N/A	Ethnic group not specified	9T-00	Ethnicity and other related nationality data	23955
N/A	Ethnic group not specified	9i-00	Ethnic category – 2001 census	12435
N/A	Ethnic group not specified	9iG-00	Ethnic category not stated – 2001 census	12459
N/A	Ethnic group not specified	9t1-00	Ethnic category – 2011 census Northern Ireland	112302
N/A	Ethnic group not specified	9t0-00	Ethnic category – 2011 census England and Wales	110417
N/A	Ethnic group not specified	9t-00	Ethnic category – 2011 census	110472
N/A	Ethnic group not specified	9t2-00	Ethnic category – 2011 census Scotland	110962
N/A	Ethnic group not specified	134O-00	RACE: Unknown	22953
N/A	Ethnic group not specified	134P-00	RACE: Not stated	46137

Where a patient had multiple or conflicting ethnicity codes, their most recently recorded ethnicity was used.
Where the date of ethnicity recording was unknown, the most frequently recorded ethnicity was used.

Table S3: Demographic characteristics of the annual cohort

Characteristic	Overall N = 601,033	Non-migrant n = 455,800 (75.8%)	Migrant n = 145,233 (24.2%)	Definite n = 53,729 (37.0%)	Probable n=91,504 (63.0%)
<i>Follow up, person-years</i>					
Total	1,353,914	1,054,984	298,930	103,743	195,188
Mean (SD)	2.25 (1.91)	2.31 (1.93)	2.06 (1.84)	1.93 (1.82)	2.13 (1.84)
Median (IQR)	1.59 (2.98)	1.61 (3.10)	1.55 (2.73)	1.44 (2.71)	1.64 (2.75)
<i>Sex, n (%)</i>					
Male	294,377 (49.0%)	225,228 (49.4%)	69,149 (47.6%)	25,881 (48.2%)	43,268 (47.3%)
Female	306,656 (51.0%)	230,572 (50.6%)	76,084 (52.4%)	27,848 (51.8%)	48,236 (52.7%)
<i>Year of cohort entry, n (%)</i>					
2015	488,966 (81.4%)	389,449 (85.4%)	99,517 (68.5%)	42,228 (78.6%)	57,289 (62.6%)
2016	31,809 (5.3%)	19,832 (4.4%)	11,977 (8.2%)	3,870 (7.2%)	8,107 (8.9%)
2017	27,971 (4.7%)	18,005 (4.0%)	9,966 (6.9%)	2,637 (4.9%)	7,329 (8.0%)
2018	23,249 (3.9%)	12,971 (2.8%)	10,278 (7.1%)	2,353 (4.4%)	7,925 (8.7%)
2019	25,380 (4.2%)	12,478 (2.7%)	12,902 (8.9%)	2,519 (4.7%)	10,383 (11.3%)
2020	3,658 (0.6%)	3,065 (0.7%)	593 (0.4%)	122 (0.2%)	471 (0.5%)
<i>Age at cohort entry, years</i>					
Mean (SD)	38 (23)	40 (24)	33 (17)	35 (16)	32 (18)
Median (IQR)	36 (33)	39 (38)	33 (19)	33 (18)	32 (21)
<i>Age at cohort exit, years</i>					
Mean (SD)	40 (23)	41 (24)	35 (17)	36 (16)	34 (18)
Median (IQR)	38 (34)	41 (38)	34 (20)	35 (19)	34 (21)
<i>Time from database entry to cohort entry, years</i>					
Mean (SD)	7 (7)	8 (7)	2 (4)	2.5 (3.7)	2.3 (3.7)
Median (IQR)	4 (13)	7 (14)	0 (3)	0.5 (3.6)	0.3 (3.4)
<i>Ethnicity, n (%)</i>					
White British	217,139 (36.1%)	212,643 (46.7%)	4,496 (3.1%)	2,083 (3.9%)	2,413 (2.6%)
White non-British	89,122 (14.8%)	33,343 (7.3%)	55,779 (38.4%)	15,299 (28.5%)	40,480 (44.2%)
Mixed/Multiple ethnic groups	9,345 (1.6%)	5,117 (1.1%)	4,228 (2.9%)	1,736 (3.2%)	2,492 (2.7%)
Asian/Asian British	55,265 (9.2%)	15,414 (3.4%)	39,851 (27.4%)	11,412 (21.2%)	28,439 (31.1%)
Black/African/Caribbean/Black British	25,084 (4.2%)	11,529 (2.5%)	13,555 (9.3%)	7,230 (13.5%)	6,325 (6.9%)
Other ethnic group	12,842 (2.1%)	3,028 (0.7%)	9,814 (6.8%)	2,962 (5.5%)	6,852 (7.5%)
Unknown	192,236 (32.0%)	174,726 (38.3%)	17,510 (12.1%)	13,007 (24.2%)	4,503 (4.9%)
<i>Practice region, n (%)</i>					
London	136,726 (22.7%)	74,966 (16.4%)	61,760 (42.5%)	28,369 (52.8%)	33,391 (36.5%)

North East	6,869 (1.1%)	6,373 (1.4%)	496 (0.3%)	77 (0.1%)	419 (0.5%)
North West	80,019 (13.3%)	65,528 (14.4%)	14,491 (10.0%)	4,769 (8.9%)	9,722 (10.6%)
Yorkshire & The Humber	8,519 (1.4%)	8,207 (1.8%)	312 (0.2%)	74 (0.1%)	238 (0.3%)
East Midlands	674 (0.1%)	628 (0.1%)	46 (0.0%)	14 (0.0%)	32 (0.0%)
West Midlands	61,639 (10.3%)	51,596 (11.3%)	10,043 (6.9%)	1,333 (2.5%)	8,710 (9.5%)
East of England	45,622 (7.6%)	37,426 (8.2%)	8,196 (5.6%)	998 (1.9%)	7,198 (7.9%)
South West	56,161 (9.3%)	47,956 (10.5%)	8,205 (5.6%)	3,727 (6.9%)	4,478 (4.9%)
South Central	93,368 (15.5%)	72,188 (15.8%)	21,180 (14.6%)	10,889 (20.3%)	10,291 (11.2%)
South East Coast	111,436 (18.5%)	90,932 (19.9%)	20,504 (14.1%)	3,479 (6.5%)	17,025 (18.6%)
<i>IMD, n (%)</i>					
IMD 1	132,635 (22.1%)	114,157 (25.0%)	18,478 (12.7%)	7,768 (14.5%)	10,710 (11.7%)
IMD 2	115,950 (19.3%)	96,212 (21.1%)	19,738 (13.6%)	6,206 (11.6%)	13,532 (14.8%)
IMD 3	117,655 (19.6%)	91,493 (20.1%)	26,162 (18.0%)	8,561 (15.9%)	17,601 (19.2%)
IMD 4	122,409 (20.4%)	82,710 (18.1%)	39,699 (27.3%)	14,835 (27.6%)	24,864 (27.2%)
IMD 5	112,384 (18.7%)	71,228 (15.6%)	41,156 (28.3%)	16,359 (30.4%)	24,797 (27.1%)
<i>Patients in each study year, n (%)</i>					
2015	488,966 (29.2%)	389,449 (30.2%)	99,517 (25.8%)	42,228 (31.5%)	57,289 (22.7%)
2016	350,071 (20.9%)	277,077 (21.5%)	72,994 (18.9%)	28,538 (21.3%)	44,456 (17.6%)
2017	271,309 (16.2%)	210,582 (16.3%)	60,727 (15.7%)	19,255 (14.4%)	41,472 (16.5%)
2018	226,471 (13.5%)	167,070 (13.0%)	59,401 (15.4%)	18,604 (13.9%)	40,797 (16.2%)
2019	200,161 (12.0%)	144,785 (11.2%)	55,376 (14.3%)	14,857 (11.1%)	40,519 (16.1%)
2020	137,410 (8.2%)	99,248 (7.7%)	38,162 (9.9%)	10,658 (7.9%)	27,504 (10.9%)

Table S4: Demographic characteristics of the annual cohort matched on age at and year of contributing up-to-standard data to the CPRD GOLD database and practice region

Characteristic	Overall N = 244,266	Non-migrant n = 122,133 (50.0%)	Migrant n = 122,133 (50.0%)	Definite n = 41,593 (34.1%)	Probable n = 80,540 (65.9%)
<i>Follow up, person-years</i>					
Total	524,732	259,103	265,630	88,042	177,588
Mean (SD)	2.15 (1.87)	2.12 (1.89)	2.17 (1.86)	2.12 (1.86)	2.20 (1.85)
Median (IQR)	1.59 (2.86)	1.52 (2.91)	1.71 (2.82)	1.62 (2.87)	1.75 (2.81)
<i>Sex, n (%)</i>					
Male	118,204 (48.4%)	60,037 (49.2%)	58,167 (47.6%)	20,143 (48.4%)	38,024 (47.2%)
Female	126,062 (51.6%)	62,096 (50.8%)	63,966 (52.4%)	21,450 (51.6%)	42,516 (52.8%)
<i>Year of cohort entry, n (%)</i>					
2015	169,746 (69.5%)	84,873 (69.5%)	84,873 (69.5%)	32,199 (77.4%)	52,674 (65.4%)
2016	21,132 (8.7%)	10,566 (8.7%)	10,566 (8.7%)	3,333 (8.0%)	7,233 (9.0%)
2017	18,064 (7.4%)	9,032 (7.4%)	9,032 (7.4%)	2,417 (5.8%)	6,615 (8.2%)
2018	16,208 (6.6%)	8,104 (6.6%)	8,104 (6.6%)	1,799 (4.3%)	6,305 (7.8%)
2019	18,048 (7.4%)	9,024 (7.4%)	9,024 (7.4%)	1,739 (4.2%)	7,285 (9.0%)
2020	1,068 (0.4%)	534 (0.4%)	534 (0.4%)	106 (0.3%)	428 (0.5%)
<i>Age at cohort entry, years</i>					
Mean (SD)	33 (18)	33 (18)	33 (18)	35 (17)	32 (19)
Median (IQR)	33 (22)	33 (22)	33 (22)	34 (21)	32 (24)
<i>Age at cohort exit, years</i>					
Mean (SD)	35 (18)	35 (18)	35 (18)	37 (17)	34 (19)
Median (IQR)	34 (23)	34 (23)	35 (23)	36 (21)	34 (24)
<i>Time between CPRD GOLD entry to study entry, years</i>					
Mean (SD)	2.6 (3.9)	2.6 (3.9)	2.6 (3.9)	2.9 (3.9)	2.5 (3.9)
Median (IQR)	0.8 (4.0)	0.8 (4.0)	0.8 (4.0)	0.9 (4.6)	0.7 (3.7)
<i>Ethnicity, n (%)</i>					
White British	64,027 (26.2%)	60,193 (49.3%)	3,834 (3.1%)	1,660 (4.0%)	2,174 (2.7%)
White non-British	59,889 (24.5%)	12,490 (10.2%)	47,399 (38.8%)	11,785 (28.3%)	35,614 (44.2%)
Mixed/Multiple ethnic groups	6,026 (2.5%)	2,440 (2.0%)	3,586 (2.9%)	1,359 (3.3%)	2,227 (2.8%)
Asian/Asian British	41,445 (17.0%)	7,701 (6.3%)	33,744 (27.6%)	8,807 (21.2%)	24,937 (31.0%)
Black/African/Caribbean/Black British	18,414 (7.5%)	6,863 (5.6%)	11,551 (9.5%)	5,938 (14.3%)	5,613 (7.0%)
Other ethnic group	10,215 (4.2%)	1,641 (1.3%)	8,574 (7.0%)	2,504 (6.0%)	6,070 (7.5%)
Unknown	44,250 (18.1%)	30,805 (25.2%)	13,445 (11.0%)	9,540 (22.9%)	3,905 (4.8%)
<i>Practice region, n (%)</i>					
London	95,674 (39.2%)	47,837 (39.2%)	47,837 (39.2%)	21,772 (52.3%)	26,065 (32.4%)
North East	846 (0.3%)	423 (0.3%)	423 (0.3%)	65 (0.2%)	358 (0.4%)
North West	27,356 (11.2%)	13,678 (11.2%)	13,678 (11.2%)	4,546 (10.9%)	9,132 (11.3%)
Yorkshire & The Humber	558 (0.2%)	279 (0.2%)	279 (0.2%)	58 (0.1%)	221 (0.3%)
East Midlands	62 (0.0%)	31 (0.0%)	31 (0.0%)	8 (0.0%)	23 (0.0%)
West Midlands	19,460 (8.0%)	9,730 (8.0%)	9,730 (8.0%)	1,275 (3.1%)	8,455 (10.5%)
East of England	13,534 (5.5%)	6,767 (5.5%)	6,767 (5.5%)	908 (2.2%)	5,859 (7.3%)
South West	15,572 (6.4%)	7,786 (6.4%)	7,786 (6.4%)	3,555 (8.5%)	4,231 (5.3%)
South Central	30,656 (12.6%)	15,328 (12.6%)	15,328 (12.6%)	5,969 (14.4%)	9,359 (11.6%)
South East Coast	40,548 (16.6%)	20,274 (16.6%)	20,274 (16.6%)	3,437 (8.3%)	16,837 (20.9%)
<i>IMD, n (%)</i>					

IMD 1	43,400 (17·8%)	28,537 (23·4%)	14,863 (12·2%)	5,297 (12·7%)	9,566 (11·9%)
IMD 2	41,592 (17·0%)	24,748 (20·3%)	16,844 (13·8%)	4,896 (11·8%)	11,948 (14·8%)
IMD 3	44,623 (18·3%)	23,280 (19·1%)	21,343 (17·5%)	6,112 (14·7%)	15,231 (18·9%)
IMD 4	57,071 (23·4%)	24,046 (19·7%)	33,025 (27·0%)	11,483 (27·6%)	21,542 (26·7%)
IMD 5	57,580 (23·6%)	21,522 (17·6%)	36,058 (29·5%)	13,805 (33·2%)	22,253 (27·6%)
<i>Patients in each study year, n (%)</i>					
2015	169,746 (25·3%)	84,873 (25·5%)	84,873 (25·2%)	32,199 (29·0%)	52,674 (23·3%)
2016	127,934 (19·1%)	62,780 (18·8%)	65,154 (19·3%)	24,158 (21·8%)	40,996 (18·1%)
2017	110,600 (16·5%)	55,760 (16·7%)	54,840 (16·3%)	16,841 (15·2%)	37,999 (16·8%)
2018	102,080 (15·2%)	49,771 (14·9%)	52,309 (15·5%)	15,958 (14·4%)	36,351 (16·1%)
2019	95,147 (14·2%)	48,327 (14·5%)	46,820 (13·9%)	12,539 (11·3%)	34,281 (15·1%)
2020	64,960 (9·7%)	31,643 (9·5%)	33,317 (9·9%)	9,246 (8·3%)	24,071 (10·6%)

Table S5: Demographic characteristics of the annual cohort matched on follow-up time (person-years) and practice region

Characteristic	Overall N = 233,894	Non-migrant n = 116,947 (50.0%)	Migrant n = 116,947 (50.0%)	Definite n = 37,620 (32.2%)	Probable n = 79,327 (67.8%)
<i>Follow up, person-years</i>					
Total	487,038	243,519	243,519	77,605	165,914
Mean (SD)	2.08 (1.85)	2.08 (1.85)	2.08 (1.85)	2.06 (1.89)	2.09 (1.84)
Median (IQR)	1.51 (2.84)	1.51 (2.84)	1.51 (2.84)	1.46 (2.88)	1.53 (2.71)
<i>Sex, n (%)</i>					
Male	113,058 (48.3%)	57,910 (49.5%)	55,148 (47.2%)	17,854 (47.5%)	37,294 (47.0%)
Female	120,836 (51.7%)	59,037 (50.5%)	61,799 (52.8%)	19,766 (52.5%)	42,033 (53.0%)
<i>Year of cohort entry, n (%)</i>					
2015	162,087 (69.3%)	84,388 (72.2%)	77,699 (66.4%)	27,815 (73.9%)	49,884 (62.9%)
2016	18,084 (7.7%)	8,038 (6.9%)	10,046 (8.6%)	3,168 (8.4%)	6,878 (8.7%)
2017	16,499 (7.1%)	7,909 (6.8%)	8,590 (7.3%)	2,187 (5.8%)	6,403 (8.1%)
2018	15,631 (6.7%)	6,888 (5.9%)	8,743 (7.5%)	1,974 (5.2%)	6,769 (8.5%)
2019	19,388 (8.3%)	8,088 (6.9%)	11,300 (9.7%)	2,359 (6.3%)	8,941 (11.3%)
2020	2,205 (0.9%)	1,636 (1.4%)	569 (0.5%)	117 (0.3%)	452 (0.6%)
<i>Age at cohort entry, years</i>					
Mean (SD)	35 (21)	37 (24)	33 (17)	35 (16)	32 (18)
Median (IQR)	33 (27)	34 (36)	33 (20)	34 (18)	32 (21)
<i>Age at cohort exit, years</i>					
Mean (SD)	37 (21)	38 (24)	35 (17)	37 (16)	34 (18)
Median (IQR)	35 (27)	36 (37)	35 (20)	36 (19)	34 (21)
<i>Time from CPRD GOLD entry to study entry, years</i>					
Mean (SD)	3.9 (5.7)	5.5 (6.8)	2.4 (3.7)	2.6 (3.8)	2.3 (3.7)
Median (IQR)	1.1 (5.7)	2.2 (10.4)	0.5 (3.6)	0.6 (4.0)	0.4 (3.4)
<i>Ethnicity, n (%)</i>					
White British	58,593 (25.1%)	54,866 (46.9%)	3,727 (3.2%)	1,580 (4.2%)	2,147 (2.7%)
White non-British	56,962 (24.4%)	10,291 (8.8%)	46,671 (39.9%)	11,051 (29.4%)	35,620 (44.9%)
Mixed/Multiple ethnic groups	5,736 (2.5%)	2,294 (2.0%)	3,442 (2.9%)	1,232 (3.3%)	2,210 (2.8%)
Asian/Asian British	39,546 (16.9%)	7,385 (6.3%)	32,161 (27.5%)	7,824 (20.8%)	24,337 (30.7%)
Black/African/Caribbean/Black British	16,333 (7.0%)	5,832 (5.0%)	10,501 (9.0%)	5,116 (13.6%)	5,385 (6.8%)
Other ethnic group	9,452 (4.0%)	1,405 (1.2%)	8,047 (6.9%)	2,298 (6.1%)	5,749 (7.2%)
Unknown	47,272 (20.2%)	34,874 (29.8%)	12,398 (10.6%)	8,519 (22.6%)	3,879 (4.9%)
<i>Practice region, n (%)</i>					
London	89,240 (38.2%)	44,620 (38.2%)	44,620 (38.2%)	18,753 (49.8%)	25,867 (32.6%)
North East	692 (0.3%)	346 (0.3%)	346 (0.3%)	62 (0.2%)	284 (0.4%)
North West	26,982 (11.5%)	13,491 (11.5%)	13,491 (11.5%)	4,428 (11.8%)	9,063 (11.4%)
Yorkshire & The Humber	528 (0.2%)	264 (0.2%)	264 (0.2%)	65 (0.2%)	199 (0.3%)
East Midlands	88 (0.0%)	44 (0.0%)	44 (0.0%)	14 (0.0%)	30 (0.0%)
West Midlands	18,724 (8.0%)	9,362 (8.0%)	9,362 (8.0%)	1,195 (3.2%)	8,167 (10.3%)
East of England	14,614 (6.2%)	7,307 (6.2%)	7,307 (6.2%)	936 (2.5%)	6,371 (8.0%)
South West	14,612 (6.2%)	7,306 (6.2%)	7,306 (6.2%)	3,152 (8.4%)	4,154 (5.2%)
South Central	30,080 (12.9%)	15,040 (12.9%)	15,040 (12.9%)	5,604 (14.9%)	9,436 (11.9%)
South East Coast	38,334 (16.4%)	19,167 (16.4%)	19,167 (16.4%)	3,411 (9.1%)	15,756 (19.9%)
<i>IMD, n (%)</i>					
IMD 1	41,061 (17.6%)	25,888 (22.1%)	15,173 (13.0%)	5,433 (14.4%)	9,740 (12.3%)

IMD 2	40,249 (17.2%)	23,499 (20.1%)	16,750 (14.3%)	4,706 (12.5%)	12,044 (15.2%)
IMD 3	43,172 (18.5%)	22,418 (19.2%)	20,754 (17.7%)	5,633 (15.0%)	15,121 (19.1%)
IMD 4	53,261 (22.8%)	22,815 (19.5%)	30,446 (26.0%)	9,745 (25.9%)	20,701 (26.1%)
IMD 5	56,151 (24.0%)	22,327 (19.1%)	33,824 (28.9%)	12,103 (32.2%)	21,721 (27.4%)
<i>Patients in each study year, n (%)</i>					
2015	162,087 (25.8%)	84,388 (27.0%)	77,699 (24.7%)	27,815 (27.9%)	49,884 (23.2%)
2016	119,649 (19.1%)	61,142 (19.5%)	58,507 (18.6%)	20,402 (20.5%)	38,105 (17.7%)
2017	103,246 (16.4%)	51,827 (16.6%)	51,419 (16.3%)	15,509 (15.6%)	35,910 (16.7%)
2018	95,521 (15.2%)	45,902 (14.7%)	49,619 (15.7%)	14,871 (14.9%)	34,748 (16.1%)
2019	88,530 (14.1%)	41,504 (13.3%)	47,026 (14.9%)	12,535 (12.6%)	34,491 (16.0%)
2020	58,924 (9.4%)	28,111 (9.0%)	30,813 (9.8%)	8,554 (8.6%)	22,259 (10.3%)

Table S6: Demographic characteristics of the interrupted time series cohort matched on age and year of joining the CPRD GOLD database, sex, practice region and IMD

Characteristic	Overall N = 192,336	Non-migrant n = 96,168 (50.0%)	Migrant n = 96,168 (50.0%)	Definite n = 32,531 (33.8%)	Probable n = 63,637 (66.2%)
<i>Follow up, person-years</i>					
Total	413,441	201,533	211,908	68,392	143,515
Mean (SD)	2.15 (1.88)	2.10 (1.88)	2.20 (1.87)	2.10 (1.87)	2.26 (1.87)
Median (IQR)	1.59 (2.86)	1.49 (2.87)	1.72 (2.85)	1.59 (2.87)	1.78 (2.86)
<i>Sex, n (%)</i>					
Male	91,588 (47.6%)	45,794 (47.6%)	45,794 (47.6%)	15,802 (48.6%)	29,992 (47.1%)
Female	100,748 (52.4%)	50,374 (52.4%)	50,374 (52.4%)	16,729 (51.4%)	33,645 (52.9%)
<i>Year of cohort entry, n (%)</i>					
2015	137,640 (71.6%)	68,820 (71.6%)	68,820 (71.6%)	26,124 (80.3%)	42,696 (67.1%)
2016	15,252 (7.9%)	7,626 (7.9%)	7,626 (7.9%)	2,237 (6.9%)	5,389 (8.5%)
2017	13,582 (7.1%)	6,791 (7.1%)	6,791 (7.1%)	1,682 (5.2%)	5,109 (8.0%)
2018	12,408 (6.5%)	6,204 (6.5%)	6,204 (6.5%)	1,344 (4.1%)	4,860 (7.6%)
2019	12,630 (6.6%)	6,315 (6.6%)	6,315 (6.6%)	1,073 (3.3%)	5,242 (8.2%)
2020	824 (0.4%)	412 (0.4%)	412 (0.4%)	71 (0.2%)	341 (0.5%)
<i>Age at cohort entry, years</i>					
Mean (SD)	32 (18)	32 (18)	32 (18)	35 (16)	31 (18)
Median (IQR)	32 (22)	32 (22)	32 (22)	34 (20)	31 (24)
<i>Age at cohort exit, years</i>					
Mean (SD)	34 (18)	34 (18)	34 (18)	36 (16)	33 (18)
Median (IQR)	34 (22)	34 (23)	34 (22)	35 (21)	33 (24)
<i>Time from CPRD GOLD entry to study entry, years</i>					
Mean (SD)	2.6 (3.9)	2.6 (3.9)	2.6 (3.9)	2.8 (3.9)	2.5 (3.9)
Median (IQR)	0.8 (4.0)	0.8 (4.0)	0.8 (4.0)	0.9 (4.5)	0.8 (3.8)
<i>Ethnicity, n (%)</i>					
White British	48,696 (25.3%)	45,418 (47.2%)	3,278 (3.4%)	1,439 (4.4%)	1,839 (2.9%)
White non-British	48,225 (25.1%)	10,055 (10.5%)	38,170 (39.7%)	9,195 (28.3%)	28,975 (45.5%)
Mixed/Multiple ethnic groups	4,979 (2.6%)	2,128 (2.2%)	2,851 (3.0%)	1,067 (3.3%)	1,784 (2.8%)
Asian/Asian British	32,308 (16.8%)	6,567 (6.8%)	25,741 (26.8%)	6,811 (20.9%)	18,930 (29.7%)
Black/African/Caribbean/Black British	14,768 (7.7%)	6,245 (6.5%)	8,523 (8.9%)	4,289 (13.2%)	4,234 (6.7%)
Other ethnic group	8,157 (4.2%)	1,431 (1.5%)	6,726 (7.0%)	1,895 (5.8%)	4,831 (7.6%)
Unknown	35,203 (18.3%)	24,324 (25.3%)	10,879 (11.3%)	7,835 (24.1%)	3,044 (4.8%)
<i>Practice region, n (%)</i>					
London	75,916 (39.5%)	37,958 (39.5%)	37,958 (39.5%)	16,683 (51.3%)	21,275 (33.4%)
North East	510 (0.3%)	255 (0.3%)	255 (0.3%)	36 (0.1%)	219 (0.3%)
North West	21,268 (11.1%)	10,634 (11.1%)	10,634 (11.1%)	3,449 (10.6%)	7,185 (11.3%)
Yorkshire & The Humber	248 (0.1%)	124 (0.1%)	124 (0.1%)	16 (0.0%)	108 (0.2%)
East Midlands	42 (0.0%)	21 (0.0%)	21 (0.0%)	4 (0.0%)	17 (0.0%)
West Midlands	14,250 (7.4%)	7,125 (7.4%)	7,125 (7.4%)	889 (2.7%)	6,236 (9.8%)
East of England	8,544 (4.4%)	4,272 (4.4%)	4,272 (4.4%)	723 (2.2%)	3,549 (5.6%)
South West	11,858 (6.2%)	5,929 (6.2%)	5,929 (6.2%)	2,532 (7.8%)	3,397 (5.3%)
South Central	26,860 (14.0%)	13,430 (14.0%)	13,430 (14.0%)	5,394 (16.6%)	8,036 (12.6%)
South East Coast	32,840 (17.1%)	16,420 (17.1%)	16,420 (17.1%)	2,805 (8.6%)	13,615 (21.4%)

<i>IMD, n (%)</i>					
IMD 1	28,916 (15.0%)	14,458 (15.0%)	14,458 (15.0%)	5,073 (15.6%)	9,385 (14.7%)
IMD 2	31,276 (16.3%)	15,638 (16.3%)	15,638 (16.3%)	4,588 (14.1%)	11,050 (17.4%)
IMD 3	36,022 (18.7%)	18,011 (18.7%)	18,011 (18.7%)	5,211 (16.0%)	12,800 (20.1%)
IMD 4	47,740 (24.8%)	23,870 (24.8%)	23,870 (24.8%)	8,172 (25.1%)	15,698 (24.7%)
IMD 5	48,382 (25.2%)	24,191 (25.2%)	24,191 (25.2%)	9,487 (29.2%)	14,704 (23.1%)
<i>Patients in each study year, n (%)</i>					
2015	137,640 (26.1%)	68,820 (26.5%)	68,820 (25.7%)	26,124 (30.3%)	42,696 (23.5%)
2016	101,227 (19.2%)	49,673 (19.1%)	51,554 (19.3%)	18,611 (21.6%)	32,943 (18.2%)
2017	86,200 (16.4%)	43,151 (16.6%)	43,049 (16.1%)	12,723 (14.8%)	30,326 (16.7%)
2018	78,646 (14.9%)	37,831 (14.6%)	40,815 (15.3%)	12,085 (14.0%)	28,730 (15.8%)
2019	73,112 (13.9%)	36,361 (14.0%)	36,751 (13.7%)	9,442 (11.0%)	27,309 (15.0%)
2020	50,295 (9.5%)	23,672 (9.1%)	26,623 (9.9%)	7,135 (8.3%)	19,488 (10.7%)

Table S7: Demographic characteristics of the interrupted time series cohort matched on age at study start, sex, and practice region

Characteristic	Overall N = 274,348	Non-migrant n = 137,174 (50.0%)	Migrant n = 137,174 (50.0%)	Definite n = 49,662 (36.2%)	Probable n = 87,512 (63.8%)
<i>Follow up, person-years</i>					
Total	592,823.21	309,031.05	283,792.16	96,137.80	187,654.36
Mean (SD)	2.16 (1.90)	2.25 (1.94)	2.07 (1.85)	1.94 (1.84)	2.14 (1.85)
Median (IQR)	1.57 (2.93)	1.59 (3.04)	1.55 (2.77)	1.40 (2.75)	1.65 (2.78)
<i>Sex, n (%)</i>					
Male	132,246 (48.2%)	66,123 (48.2%)	66,123 (48.2%)	24,353 (49.0%)	41,770 (47.7%)
Female	142,102 (51.8%)	71,051 (51.8%)	71,051 (51.8%)	25,309 (51.0%)	45,742 (52.3%)
<i>Year of cohort entry, n (%)</i>					
2015	203,905 (74.3%)	109,682 (80.0%)	94,223 (68.7%)	39,092 (78.7%)	55,131 (63.0%)
2016	18,756 (6.8%)	7,415 (5.4%)	11,341 (8.3%)	3,545 (7.1%)	7,796 (8.9%)
2017	16,789 (6.1%)	7,307 (5.3%)	9,482 (6.9%)	2,460 (5.0%)	7,022 (8.0%)
2018	15,179 (5.5%)	5,663 (4.1%)	9,516 (6.9%)	2,171 (4.4%)	7,345 (8.4%)
2019	17,558 (6.4%)	5,492 (4.0%)	12,066 (8.8%)	2,281 (4.6%)	9,785 (11.2%)
2020	2,161 (0.8%)	1,615 (1.2%)	546 (0.4%)	113 (0.2%)	433 (0.5%)
<i>Age at cohort entry, years</i>					
Mean (SD)	33 (18)	33 (18)	33 (18)	35 (16)	32 (18)
Median (IQR)	32 (21)	32 (21)	32 (21)	33 (20)	32 (23)
<i>Age at cohort exit, years</i>					
Mean (SD)	35 (18)	35 (18)	35 (18)	36 (17)	34 (18)
Median (IQR)	34 (22)	34 (22)	34 (21)	35 (21)	34 (23)
<i>Time from CPRD GOLD entry to study entry, years</i>					
Mean (SD)	4.3 (5.8)	6.2 (6.7)	2.4 (3.8)	2.5 (3.7)	2.3 (3.8)
Median (IQR)	1.7 (6.4)	3.7 (11.3)	0.4 (3.5)	0.4 (3.7)	0.4 (3.4)
<i>Ethnicity, n (%)</i>					
White British	67,454 (24.6%)	63,167 (46.0%)	4,287 (3.1%)	1,937 (3.9%)	2,350 (2.7%)
White non-British	64,705 (23.6%)	12,207 (8.9%)	52,498 (38.3%)	13,960 (28.1%)	38,538 (44.0%)
Mixed/Multiple ethnic groups	6,320 (2.3%)	2,307 (1.7%)	4,013 (2.9%)	1,620 (3.3%)	2,393 (2.7%)
Asian/Asian British	44,837 (16.3%)	7,130 (5.2%)	37,707 (27.5%)	10,463 (21.1%)	27,244 (31.1%)
Black/African/Caribbean/Black British	19,240 (7.0%)	6,523 (4.8%)	12,717 (9.3%)	6,645 (13.4%)	6,072 (6.9%)
Other ethnic group	10,906 (4.0%)	1,564 (1.1%)	9,342 (6.8%)	2,774 (5.6%)	6,568 (7.5%)
Unknown	60,886 (22.2%)	44,276 (32.3%)	16,610 (12.1%)	12,263 (24.7%)	4,347 (5.0%)
<i>Practice region, n (%)</i>					
London	107,932 (39.3%)	53,966 (39.3%)	53,966 (39.3%)	24,502 (49.3%)	29,464 (33.7%)
North East	990 (0.4%)	495 (0.4%)	495 (0.4%)	77 (0.2%)	418 (0.5%)
North West	28,982 (10.6%)	14,491 (10.6%)	14,491 (10.6%)	4,769 (9.6%)	9,722 (11.1%)
Yorkshire & The Humber	622 (0.2%)	311 (0.2%)	311 (0.2%)	74 (0.1%)	237 (0.3%)
East Midlands	88 (0.0%)	44 (0.0%)	44 (0.0%)	14 (0.0%)	30 (0.0%)
West Midlands	20,086 (7.3%)	10,043 (7.3%)	10,043 (7.3%)	1,333 (2.7%)	8,710 (10.0%)
East of England	16,390 (6.0%)	8,195 (6.0%)	8,195 (6.0%)	998 (2.0%)	7,197 (8.2%)
South West	16,410 (6.0%)	8,205 (6.0%)	8,205 (6.0%)	3,727 (7.5%)	4,478 (5.1%)
South Central	41,840 (15.3%)	20,920 (15.3%)	20,920 (15.3%)	10,689 (21.5%)	10,231 (11.7%)
South East Coast	41,008 (14.9%)	20,504 (14.9%)	20,504 (14.9%)	3,479 (7.0%)	17,025 (19.5%)
<i>IMD, n (%)</i>					
IMD 1	51,191 (18.7%)	33,643 (24.5%)	17,548 (12.8%)	7,312 (14.7%)	10,236 (11.7%)

IMD 2	46,809 (17.1%)	28,202 (20.6%)	18,607 (13.6%)	5,780 (11.6%)	12,827 (14.7%)
IMD 3	50,567 (18.4%)	25,811 (18.8%)	24,756 (18.0%)	8,086 (16.3%)	16,670 (19.0%)
IMD 4	63,623 (23.2%)	26,623 (19.4%)	37,000 (27.0%)	13,346 (26.9%)	23,654 (27.0%)
IMD 5	62,158 (22.7%)	22,895 (16.7%)	39,263 (28.6%)	15,138 (30.5%)	24,125 (27.6%)
<i>Patients in each study year, n (%)</i>					
2015	203,905 (27.2%)	109,682 (28.5%)	94,223 (25.7%)	39,092 (31.5%)	55,131 (22.8%)
2016	145,697 (19.4%)	76,514 (19.9%)	69,183 (18.9%)	26,120 (21.0%)	43,063 (17.8%)
2017	121,271 (16.2%)	63,291 (16.5%)	57,980 (15.8%)	17,906 (14.4%)	40,074 (16.6%)
2018	109,757 (14.6%)	53,488 (13.9%)	56,269 (15.4%)	17,252 (13.9%)	39,017 (16.1%)
2019	100,020 (13.3%)	47,626 (12.4%)	52,394 (14.3%)	13,909 (11.2%)	38,485 (15.9%)
2020	69,644 (9.3%)	33,575 (8.7%)	36,069 (9.9%)	10,009 (8.1%)	26,060 (10.8%)

Table S8: Demographic characteristics of the interrupted time series cohort matched on age at study start and sex

Characteristic	Overall N = 290,466	Non-migrant n = 145,233 (50.0%)	Migrant n = 145,233 (50.0%)	Definite n = 53,729 (37.0%)	Probable n = 91,504 (63.0%)
<i>Follow up, person-years</i>					
Total	631,202.23	332,271.95	298,930.29	103,742.77	195,187.52
Mean (SD)	2.17 (1.88)	2.29 (1.92)	2.06 (1.84)	1.93 (1.82)	2.13 (1.84)
Median (IQR)	1.57 (2.87)	1.59 (3.06)	1.55 (2.73)	1.44 (2.71)	1.64 (2.75)
<i>Sex, n (%)</i>					
Male	138,298 (47.6%)	69,149 (47.6%)	69,149 (47.6%)	25,881 (48.2%)	43,268 (47.3%)
Female	152,168 (52.4%)	76,084 (52.4%)	76,084 (52.4%)	27,848 (51.8%)	48,236 (52.7%)
<i>Year of cohort entry, n (%)</i>					
2015	221,790 (76.4%)	122,273 (84.2%)	99,517 (68.5%)	42,228 (78.6%)	57,289 (62.6%)
2016	19,063 (6.6%)	7,086 (4.9%)	11,977 (8.2%)	3,870 (7.2%)	8,107 (8.9%)
2017	16,198 (5.6%)	6,232 (4.3%)	9,966 (6.9%)	2,637 (4.9%)	7,329 (8.0%)
2018	14,938 (5.1%)	4,660 (3.2%)	10,278 (7.1%)	2,353 (4.4%)	7,925 (8.7%)
2019	16,986 (5.8%)	4,084 (2.8%)	12,902 (8.9%)	2,519 (4.7%)	10,383 (11.3%)
2020	1,491 (0.5%)	898 (0.6%)	593 (0.4%)	122 (0.2%)	471 (0.5%)
<i>Age at cohort entry, years</i>					
Mean (SD)	33 (17)	33 (17)	33 (17)	35 (16)	32 (18)
Median (IQR)	32 (19)	32 (19)	33 (19)	33 (18)	32 (21)
<i>Age at cohort exit, years</i>					
Mean (SD)	35 (17)	35 (17)	35 (17)	36 (16)	34 (18)
Median (IQR)	34 (20)	34 (20)	34 (20)	35 (19)	34 (21)
<i>Time from CPRD GOLD entry to study entry, years</i>					
Mean (SD)	4.7 (6.0)	6.9 (7.0)	2.4 (3.7)	2.5 (3.7)	2.3 (3.7)
Median (IQR)	2.1 (7.3)	4.6 (12.6)	0.4 (3.5)	0.5 (3.6)	0.3 (3.4)
<i>Ethnicity, n (%)</i>					
White British	71,281 (24.5%)	66,785 (46.0%)	4,496 (3.1%)	2,083 (3.9%)	2,413 (2.6%)
White non-British	67,705 (23.3%)	11,926 (8.2%)	55,779 (38.4%)	15,299 (28.5%)	40,480 (44.2%)
Mixed/Multiple ethnic groups	6,100 (2.1%)	1,872 (1.3%)	4,228 (2.9%)	1,736 (3.2%)	2,492 (2.7%)
Asian/Asian British	46,091 (15.9%)	6,240 (4.3%)	39,851 (27.4%)	11,412 (21.2%)	28,439 (31.1%)
Black/African/Caribbean/Black British	17,668 (6.1%)	4,113 (2.8%)	13,555 (9.3%)	7,230 (13.5%)	6,325 (6.9%)
Other ethnic group	10,939 (3.8%)	1,125 (0.8%)	9,814 (6.8%)	2,962 (5.5%)	6,852 (7.5%)
Unknown	70,682 (24.3%)	53,172 (36.6%)	17,510 (12.1%)	13,007 (24.2%)	4,503 (4.9%)
<i>Practice region, n (%)</i>					
London	87,698 (30.2%)	25,938 (17.9%)	61,760 (42.5%)	28,369 (52.8%)	33,391 (36.5%)
North East	2,537 (0.9%)	2,041 (1.4%)	496 (0.3%)	77 (0.1%)	419 (0.5%)
North West	35,158 (12.1%)	20,667 (14.2%)	14,491 (10.0%)	4,769 (8.9%)	9,722 (10.6%)
Yorkshire & The Humber	2,852 (1.0%)	2,540 (1.7%)	312 (0.2%)	74 (0.1%)	238 (0.3%)
East Midlands	258 (0.1%)	212 (0.1%)	46 (0.0%)	14 (0.0%)	32 (0.0%)
West Midlands	26,288 (9.1%)	16,245 (11.2%)	10,043 (6.9%)	1,333 (2.5%)	8,710 (9.5%)
East of England	20,027 (6.9%)	11,831 (8.1%)	8,196 (5.6%)	998 (1.9%)	7,198 (7.9%)
South West	22,819 (7.9%)	14,614 (10.1%)	8,205 (5.6%)	3,727 (6.9%)	4,478 (4.9%)
South Central	43,908 (15.1%)	22,728 (15.6%)	21,180 (14.6%)	10,889 (20.3%)	10,291 (11.2%)
South East Coast	48,921 (16.8%)	28,417 (19.6%)	20,504 (14.1%)	3,479 (6.5%)	17,025 (18.6%)
<i>IMD, n (%)</i>					
IMD 1	53,801 (18.5%)	35,323 (24.3%)	18,478 (12.7%)	7,768 (14.5%)	10,710 (11.7%)

IMD 2	49,628 (17.1%)	29,890 (20.6%)	19,738 (13.6%)	6,206 (11.6%)	13,532 (14.8%)
IMD 3	55,027 (18.9%)	28,865 (19.9%)	26,162 (18.0%)	8,561 (15.9%)	17,601 (19.2%)
IMD 4	66,630 (22.9%)	26,931 (18.5%)	39,699 (27.3%)	14,835 (27.6%)	24,864 (27.2%)
IMD 5	65,380 (22.5%)	24,224 (16.7%)	41,156 (28.3%)	16,359 (30.4%)	24,797 (27.1%)
<i>Patients in each study year, n (%)</i>					
2015	221,790 (27.9%)	122,273 (30.0%)	99,517 (25.8%)	42,228 (31.5%)	57,289 (22.7%)
2016	159,691 (20.1%)	86,697 (21.2%)	72,994 (18.9%)	28,538 (21.3%)	44,456 (17.6%)
2017	127,857 (16.1%)	67,130 (16.5%)	60,727 (15.7%)	19,255 (14.4%)	41,472 (16.5%)
2018	113,093 (14.2%)	53,692 (13.2%)	59,401 (15.4%)	18,604 (13.9%)	40,797 (16.2%)
2019	101,810 (12.8%)	46,434 (11.4%)	55,376 (14.3%)	14,857 (11.1%)	40,519 (16.1%)
2020	69,943 (8.8%)	31,781 (7.8%)	38,162 (9.9%)	10,658 (7.9%)	27,504 (10.9%)

Table S9: Crude consultations rates 2015–2020 by migration status and migration certainty in England

Year	Crude consultation rate per person–year (95%CI)			
	Non-migrant	Migrant	Definite	Probable
2015–2019	5.62 (5.62–5.62)	4.31 (4.31–4.32)	4.62 (4.61–4.64)	4.14 (4.13–4.15)
2015	5.66 (5.65–5.67)	4.29 (4.28–4.31)	4.06 (4.04–4.09)	4.45 (4.43–4.47)
2016	5.71 (5.7–5.72)	4.41 (4.39–4.42)	4.54 (4.51–4.57)	4.33 (4.3–4.35)
2017	5.59 (5.58–5.6)	4.46 (4.45–4.48)	5.14 (5.11–5.18)	4.13 (4.11–4.15)
2018	5.53 (5.51–5.54)	4.19 (4.17–4.21)	5.01 (4.98–5.05)	3.8 (3.78–3.83)
2019	5.5 (5.48–5.51)	4.17 (4.15–4.19)	5 (4.96–5.05)	3.84 (3.82–3.86)
2020	4.95 (4.94–4.97)	3.99 (3.97–4.01)	4.84 (4.79–4.88)	3.65 (3.63–3.68)

Table S10: Crude consultations rates before and during the pandemic by migration status and migration certainty in England

Crude consultation rate per person-year (95%CI)					
Consultation type	Pandemic	Non-migrant	Migrant	Definite	Probable
All	Before	4.6 (4.59–4.6)	4.35 (4.34–4.36)	4.73 (4.71–4.74)	4.16 (4.15–4.17)
	During	4.2 (4.17–4.23)	3.54 (3.52–3.57)	4.33 (4.27–4.38)	3.24 (3.21–3.27)
Face-to-face	Before	4.35 (4.34–4.36)	4.12 (4.11–4.13)	4.48 (4.47–4.5)	3.94 (3.93–3.95)
	During	3.52 (3.49–3.55)	3.02 (3–3.05)	3.77 (3.72–3.82)	2.73 (2.7–2.76)
Telephone	Before	0.25 (0.25–0.25)	0.23 (0.23–0.23)	0.24 (0.24–0.25)	0.22 (0.22–0.22)
	During	0.68 (0.67–0.69)	0.52 (0.51–0.53)	0.56 (0.54–0.58)	0.51 (0.5–0.52)

Table S11: Consultation rate ratios before the pandemic (2015–2019) derived from a negative binomial model adjusting for time-varying age, sex, study year, practice region and IMD quintile.

Characteristic	Rate ratio (95% CI)
Migrant status	
Non-migrant	–
Migrant	0.94 (0.93–0.94)
Study year	
2015	–
2016	1.01 (1.01–1.02)
2017	1.02 (1.01–1.02)
2018	0.99 (0.98–0.99)
2019	0.96 (0.96–0.97)
Sex	
Male	–
Female	1.49 (1.49–1.5)
Age group	
0–5 years	–
6–10 years	0.37 (0.37–0.38)
11–15 years	0.37 (0.37–0.38)
16–19 years	0.51 (0.5–0.52)
20–24 years	0.57 (0.56–0.58)
25–29 years	0.63 (0.62–0.64)
30–34 years	0.66 (0.65–0.66)
35–39 years	0.68 (0.67–0.69)
40–44 years	0.74 (0.73–0.75)
45–49 years	0.82 (0.81–0.82)
50–54 years	0.91 (0.9–0.92)
55–59 years	1.03 (1.01–1.04)
60–64 years	1.21 (1.2–1.23)
65–69 years	1.42 (1.41–1.44)
70–74 years	1.7 (1.68–1.72)
75–79 years	2.05 (2.03–2.08)
80–84 years	2.37 (2.33–2.41)

85–89 years	2.66 (2.61–2.71)
90–94 years	2.88 (2.81–2.95)
95–99 years	2.87 (2.75–3)

IMD quintile

IMD 1 (most deprived)	–
IMD 2	0.99 (0.98–1)
IMD 3	1.04 (1.03–1.05)
IMD 4	1.09 (1.09–1.1)
IMD 5 (least deprived)	1.03 (1.03–1.04)

Practice region

London	–
North East	0.93 (0.91–0.95)
North West	1.11 (1.1–1.12)
Yorkshire & The Humber	0.93 (0.92–0.95)
East Midlands	1.07 (0.97–1.18)
West Midlands	1.21 (1.2–1.22)
East of England	0.95 (0.94–0.96)
South West	1.09 (1.08–1.1)
South Central	1.13 (1.12–1.14)
South East Coast	0.98 (0.98–0.99)

Rate ratios were derived by exponentiating the β regression coefficients.

Table S12: Consultation rate ratios from interrupted time-series analysis (5 January 2015 to 26 December 2020) in England by age group

Variable	RR (95%CI)					
	0–15 years	16–24 years	25–34 years	35–49 years	50–64 years	65 and over
Pandemic	0.84 (0.79–0.89)	0.92 (0.87–0.97)	0.99 (0.94–1.04)	0.99 (0.95–1.04)	0.95 (0.9–1)	0.91 (0.86–0.96)
Migration status	1.05 (1.02–1.07)	0.69 (0.68–0.71)	0.74 (0.72–0.75)	0.9 (0.88–0.92)	1.13 (1.11–1.16)	1.21 (1.18–1.23)
Migration status + interaction term (between migrant status and pandemic)	0.76 (0.71–0.82)	0.59 (0.55–0.64)	0.58 (0.55–0.62)	0.74 (0.7–0.78)	1.08 (1.02–1.15)	1.28 (1.2–1.36)
Interaction term (between migrant status and pandemic)	0.73 (0.68–0.79)	0.86 (0.8–0.92)	0.79 (0.74–0.84)	0.82 (0.77–0.87)	0.96 (0.9–1.02)	1.06 (0.99–1.13)

Figure S1: Weekly consultation rates by migration status in London: predicted rates from interrupted time-series analysis (solid line) and actual observed rates (dashed line), truncated view July 2019 – November 2020

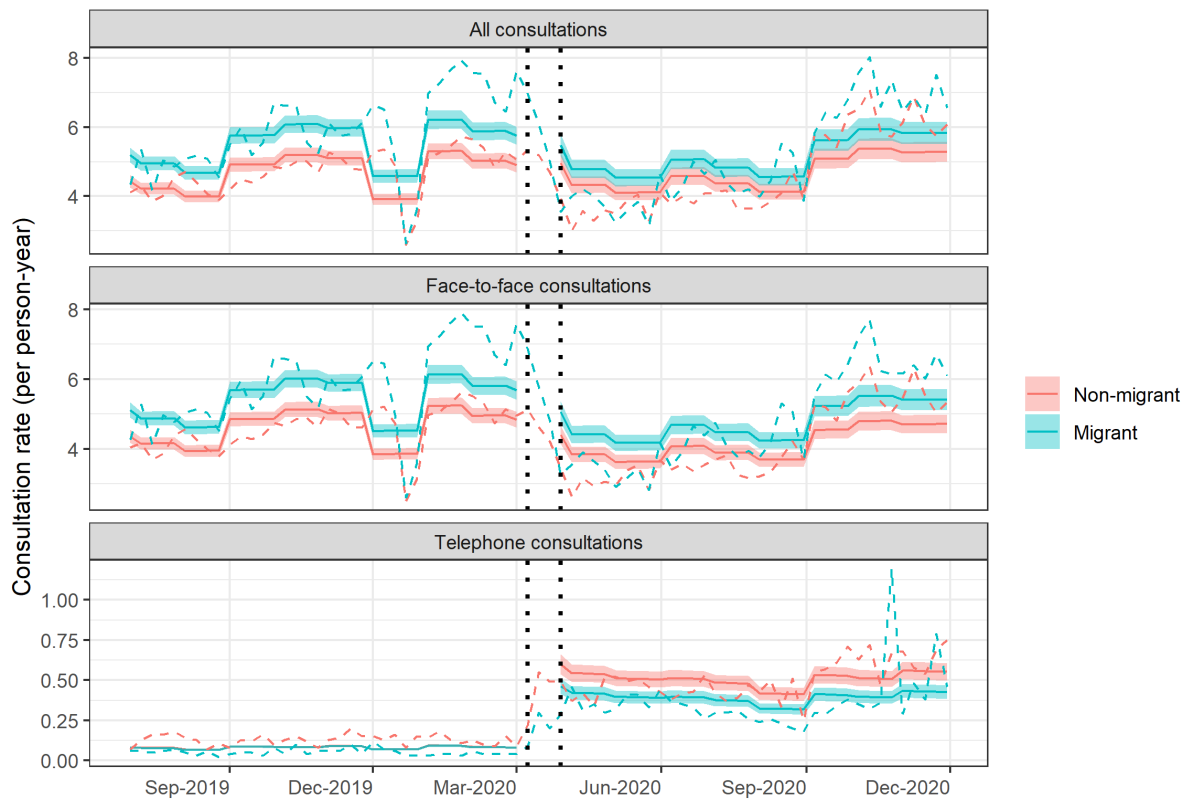


Table S13: Consultation rate ratios from interrupted time series analysis (5 January 2015 to 26 December 2020) for London

Variable	Interpretation	All	Face-to-face	Telephone
Pandemic	Comparing non-migrants' consultation rates during the pandemic to non-migrants' consultation rates pre-pandemic	1.01 (0.96-1.06)	0.91 (0.86-0.96)	7.6 (6.92-8.34)
Migration status	Comparing migrants' consultation rates pre-pandemic to non-migrants consultations pre-pandemic	1.17 (1.15-1.2)	1.17 (1.15-1.2)	0.99 (0.95-1.03)
Migration status + interaction term (between migrant status and pandemic)	Comparing migrants' consultation rates during the pandemic to non-migrants' consultation rates during the pandemic	1.1 (1.04-1.17)	1.15 (1.08-1.22)	0.77 (0.7-0.86)
Interaction term (between migrant status and pandemic)	Comparing the ratio of consultation rates between migrants and non-migrants pre-pandemic to the ratio of consultation rates between migrants and non-migrants during the pandemic (the additional effect of the pandemic on the ratio between migrants and non-migrants i.e. the multiplicative effect)	0.94 (0.88-1.01)	0.98 (0.92-1.05)	0.78 (0.7-0.88)

Table S14: Effect modification by ethnicity for the effect of migration on pre-pandemic consultation rates

Ethnicity	RR (95% CI) comparing each group to White British non-migrants		RR (95% CI) comparing migrants to non-migrants of each ethnicity	Multiplicative effect (95%CI)	RERI, additive effect (95%CI)
	Non-migrants	Migrants			
White British	1.0	0.95 (0.92–0.97)	0.95 (0.92–0.97)	–	–
White non-British	0.92 (0.91–0.92)	0.69 (0.68–0.69)	0.75 (0.74–0.76)	0.79 (0.77–0.82)	–0.17 (–0.2–0.15)
Mixed/Multiple ethnic groups	0.96 (0.94–0.98)	0.86 (0.84–0.88)	0.9 (0.87–0.93)	0.95 (0.91–0.99)	–0.05 (–0.08–0.01)
Asian/Asian British	0.99 (0.97–1)	1.17 (1.16–1.18)	1.19 (1.17–1.21)	1.26 (1.22–1.29)	0.24 (0.21–0.27)
Black/African/Caribbean/Black British	0.88 (0.87–0.9)	0.99 (0.98–1.01)	1.13 (1.1–1.15)	1.19 (1.15–1.23)	0.17 (0.14–0.2)
Other ethnic group	0.89 (0.87–0.92)	0.91 (0.89–0.92)	1.02 (0.98–1.05)	1.07 (1.03–1.12)	0.07 (0.03–0.11)
Unknown	0.85 (0.85–0.86)	0.73 (0.72–0.74)	0.86 (0.84–0.87)	0.91 (0.88–0.93)	–0.07 (–0.09–0.04)
All ethnic groups	–	0.6 (0.53–0.69)	–	–	–

Table S15: Effect modification by ethnicity for the effect of migration on pre-pandemic consultation rates (18-category ethnic groups)

Ethnicity	RR (95% CI) comparing each group to White British non-migrants		RR (95% CI) comparing migrants to non-migrants of each ethnicity	Multiplicative effect (95%CI)	RERI, additive effect (95%CI)
	Non-migrants	Migrants			
British	1.0	0.95 (0.92–0.97)	0.95 (0.92–0.97)	–	–
Irish	0.96 (0.93–0.99)	0.76 (0.71–0.81)	0.79 (0.74–0.85)	0.84 (0.77–0.91)	–0.15 (–0.21–0.08)
Gypsy or Irish Traveller	1.22 (1.03–1.45)	1.13 (0.97–1.31)	0.92 (0.74–1.16)	0.98 (0.78–1.23)	–0.04 (–0.31–0.23)
Other White	0.91 (0.9–0.92)	0.69 (0.68–0.69)	0.75 (0.74–0.76)	0.8 (0.77–0.82)	–0.17 (–0.2–0.15)
Mixed White and Black Caribbean	1.09 (1.04–1.14)	0.73 (0.66–0.82)	0.68 (0.6–0.76)	0.72 (0.63–0.81)	–0.3 (–0.39–0.2)
Mixed White and Black African	0.99 (0.93–1.04)	0.84 (0.8–0.88)	0.85 (0.79–0.92)	0.9 (0.83–0.98)	–0.09 (–0.16–0.02)
Mixed White and Asian	0.9 (0.86–0.95)	0.89 (0.84–0.93)	0.99 (0.92–1.06)	1.04 (0.97–1.12)	0.04 (–0.03–0.11)
Other Mixed	0.92 (0.88–0.95)	0.88 (0.84–0.92)	0.96 (0.91–1.01)	1.01 (0.96–1.08)	0.02 (–0.04–0.07)
Indian	1.02 (0.99–1.04)	1.14 (1.12–1.16)	1.12 (1.1–1.15)	1.19 (1.15–1.23)	0.18 (0.14–0.22)
Pakistani	1.15 (1.12–1.19)	1.28 (1.25–1.3)	1.11 (1.07–1.15)	1.17 (1.12–1.22)	0.18 (0.13–0.23)
Bangladeshi	1.27 (1.21–1.33)	1.29 (1.26–1.33)	1.02 (0.97–1.08)	1.08 (1.02–1.14)	0.08 (0.01–0.15)
Chinese	0.64 (0.61–0.67)	0.7 (0.68–0.73)	1.1 (1.04–1.16)	1.16 (1.1–1.23)	0.12 (0.08–0.16)
Other Asian	0.88 (0.86–0.91)	1.21 (1.19–1.23)	1.37 (1.33–1.41)	1.45 (1.39–1.51)	0.38 (0.34–0.42)
African	0.86 (0.84–0.87)	1.02 (1–1.04)	1.19 (1.16–1.22)	1.26 (1.21–1.31)	0.22 (0.18–0.25)
Caribbean	0.92 (0.89–0.95)	0.97 (0.93–1.01)	1.05 (1–1.11)	1.11 (1.05–1.18)	0.1 (0.05–0.16)
Other Black	0.91 (0.88–0.93)	0.92 (0.89–0.95)	1.01 (0.97–1.06)	1.07 (1.02–1.13)	0.07 (0.02–0.11)
Arab	0.99 (0.86–1.14)	0.97 (0.91–1.03)	0.98 (0.84–1.14)	1.04 (0.89–1.21)	0.04 (–0.12–0.19)
Any other ethnic group	0.89 (0.86–0.92)	0.9 (0.89–0.92)	1.02 (0.98–1.05)	1.07 (1.03–1.12)	0.07 (0.03–0.11)
Unknown	0.85 (0.85–0.86)	0.73 (0.72–0.74)	0.86 (0.84–0.87)	0.91 (0.88–0.93)	–0.07 (–0.09–0.04)

Table S16: Effect modification by ethnicity for the effect of migration on consultation rates pre vs during the pandemic

Ethnicity	Variable	Interpretation	RR (95%CI)
White British (ethnicity reference group)	2-way interaction (between migration status and pandemic)		0.69 (0.64–0.73)
White non-British	2-way interaction (between migration status and pandemic)	Effect of being a migrant of X ethnicity vs non-migrant of the same ethnicity on consultation rate during the pandemic restrictions compared to before the pandemic (i.e. the additional effect that the pandemic had on the difference in consultation rates between migrants and non-migrants of the same ethnicity before the pandemic)	0.72 (0.68–0.77)
Mixed/Multiple ethnic groups	+		1.04 (0.95–1.14)
Asian/Asian British	3-way interaction (between migration status, ethnicity and pandemic)		1.11 (1.04–1.18)
Black/African/Caribbean/Black British			0.68 (0.64–0.73)
Other ethnic group			0.83 (0.75–0.91)
Unknown			0.8 (0.75–0.86)

Figure S2: Weekly consultation rates by migration status and ethnicity (18 categories) in England: predicted rates from interrupted time-series analysis (solid line) and actual observed rates (dashed line), truncated view July 2019–November 2020

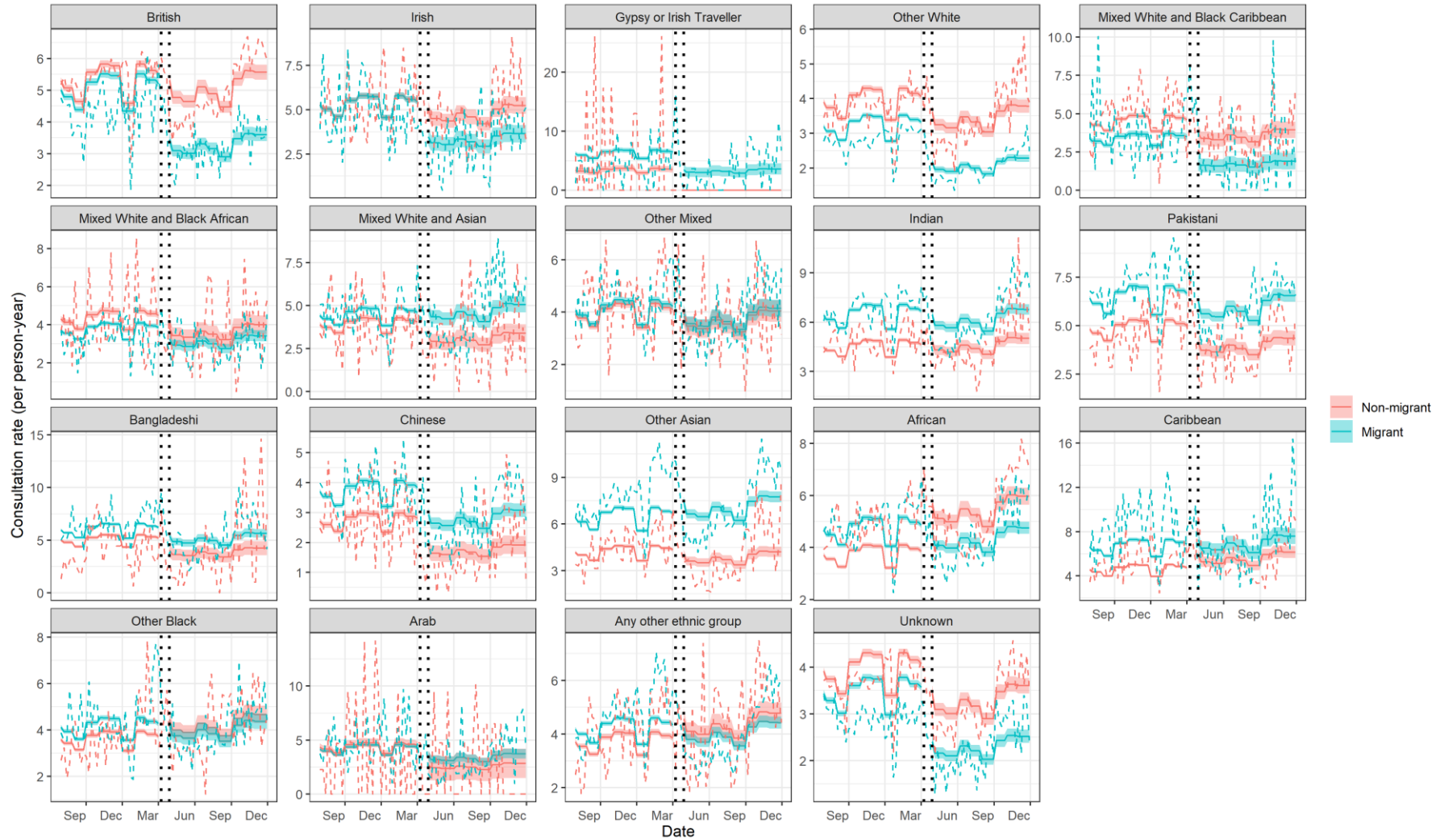


Table S17: Effect modification by ethnicity (18 categories) for the effect of migration on consultation rates pre vs during the pandemic

Ethnicity	Variable	Interpretation	RR (95%CI)
British (ethnicity reference group)	2-way interaction (between migration status and pandemic)		0.69 (0.64-0.74)
Irish			0.7 (0.59-0.83)
Gypsy or Irish Traveller			—*
Other White			0.74 (0.69-0.79)
Mixed White and Black Caribbean			0.63 (0.46-0.87)
Mixed White and Black African			0.99 (0.85-1.16)
Mixed White and Asian	2-way interaction (between migration status and pandemic)	Effect of being a migrant of X ethnicity vs non-migrant of the same ethnicity on consultation rate during the pandemic restrictions compared to before the pandemic (i.e. the additional effect that the pandemic had on the difference in consultation rates between migrants and non-migrants of the same ethnicity before the pandemic)	1.31 (1.1-1.57)
Other Mixed			0.99 (0.87-1.13)
Indian	+		0.94 (0.86-1.02)
Pakistani	3-way interaction (between migration status, ethnicity and pandemic)		1.13 (1.02-1.25)
Bangladeshi			1.12 (0.94-1.33)
Chinese			1.18 (0.99-1.41)
Other Asian			1.2 (1.09-1.32)
African			0.63 (0.59-0.68)
Caribbean			0.85 (0.75-0.97)
Other Black			0.82 (0.73-0.92)
Arab			1.37 (0.83-2.27)
Any other ethnic group			0.82 (0.74-0.91)
Unknown			0.8 (0.74-0.86)

*RR not available due to small numbers in the group

Figure S3: Forest plot of pre-pandemic sensitivity analyses in England: consultation rate ratios comparing migrants and non-migrants matched by (1) age and year of joining the CPRD GOLD database and practice region and (2) by follow-up time in person-years and practice region

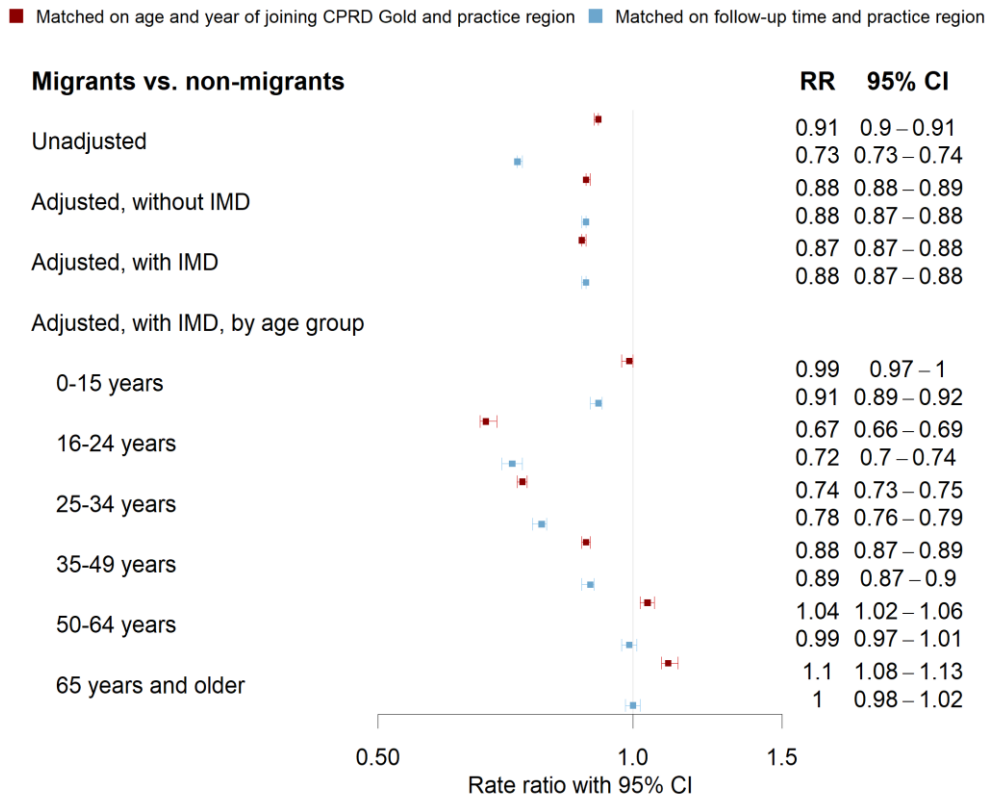


Figure S4: Forest plot of pre-pandemic sensitivity analyses in England: consultation rate ratios by migration certainty

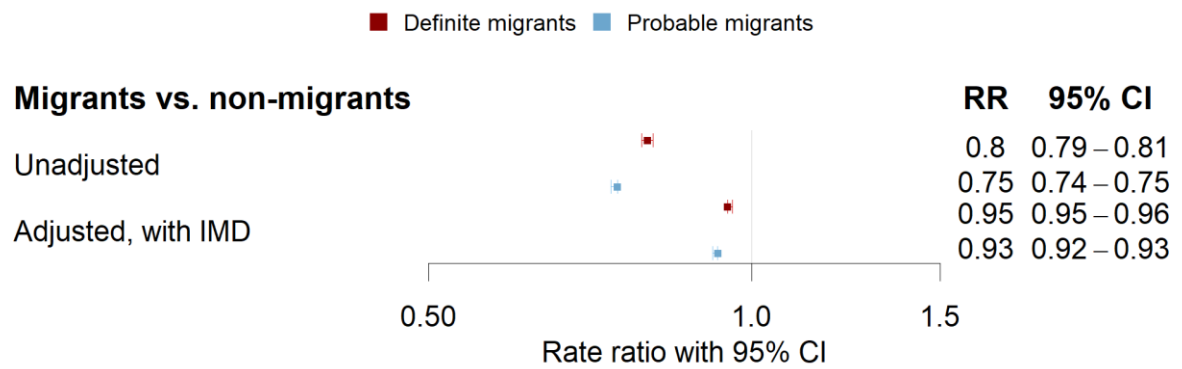


Figure S5: Weekly consultation rates by migration certainty in England: predicted rates from interrupted time-series analysis (solid line) and actual observed rates (dashed line), truncated view July 2019 – November 2020

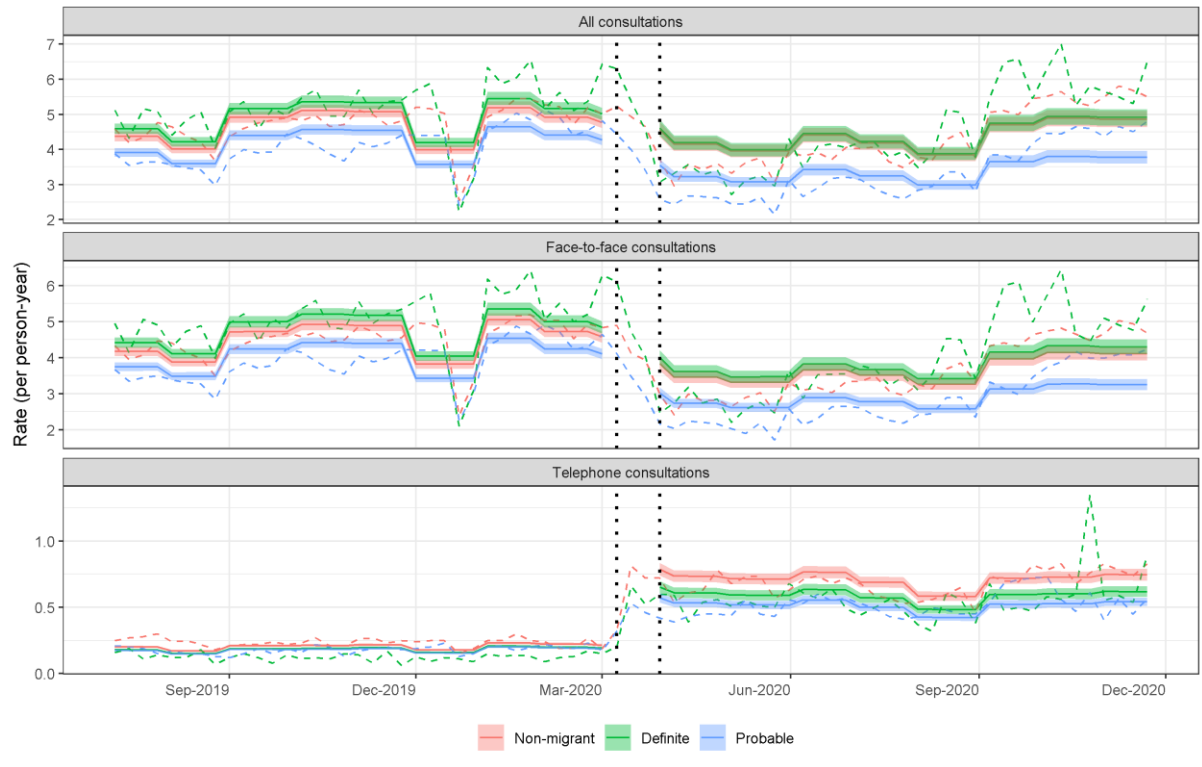


Table S18: Consultation rate ratios from interrupted time series sensitivity analysis for England by migration certainty (5 January 2015 to 26 December 2020)

Variable	Interpretation	All	Face-to-face	Telephone
Pandemic	Comparing non-migrants' consultation rates during the pandemic to non-migrants' consultation rates pre-pandemic	0.96 (0.91–1)	0.84 (0.8–0.87)	3.7 (3.5–3.92)
'Definite' migrant	Comparing 'definite' migrants' consultation rates pre-pandemic to non-migrants consultations pre-pandemic	1.05 (1.03–1.07)	1.06 (1.04–1.08)	0.89 (0.87–0.92)
'Probable' migrant	Comparing 'probable' migrants' consultation rates pre-pandemic to non-migrants consultations pre-pandemic	0.9 (0.88–0.91)	0.9 (0.88–0.92)	0.87 (0.85–0.89)
'Definite' migrant + 'Definite' migrant interaction	Comparing 'definite' migrants' consultation rates during the pandemic to non-migrants' consultation rates during the pandemic	1.01 (0.95–1.07)	1.05 (0.99–1.11)	0.83 (0.77–0.89)
'Probable' migrant + 'Probable' migrant interaction	Comparing 'probable' migrants' consultation rates during the pandemic to non-migrants' consultation rates during the pandemic	0.78 (0.73–0.82)	0.79 (0.75–0.83)	0.73 (0.68–0.78)
'Definite' migrant interaction (between migration certainty and pandemic)	Comparing the ratio of consultation rates between 'definite' migrants and non-migrants pre-pandemic to the ratio of consultation rates between 'definite' migrants and non-migrants during the pandemic (the additional effect of the pandemic on the ratio between 'definite' migrants and non-migrants i.e. the multiplicative effect)	0.96 (0.91–1.02)	0.99 (0.93–1.05)	0.93 (0.86–1.01)
'Probable' migrant interaction (between migration certainty and pandemic)	Comparing the ratio of consultation rates between 'probable' migrants and non-migrants pre-pandemic to the ratio of consultation rates between 'probable' migrants and non-migrants during the pandemic (the additional effect of the pandemic on the ratio between 'probable' migrants and non-migrants i.e. the multiplicative effect)	0.87 (0.82–0.92)	0.88 (0.83–0.93)	0.83 (0.77–0.9)

Figure S6: Weekly consultation rates by migration status in England: predicted rates (solid line) from interrupted time series sensitivity analysis (matched on age and year of joining the CPRD GOLD database, sex, practice region and IMD) and observed rates (dashed line), truncated view July 2019 – November 2020

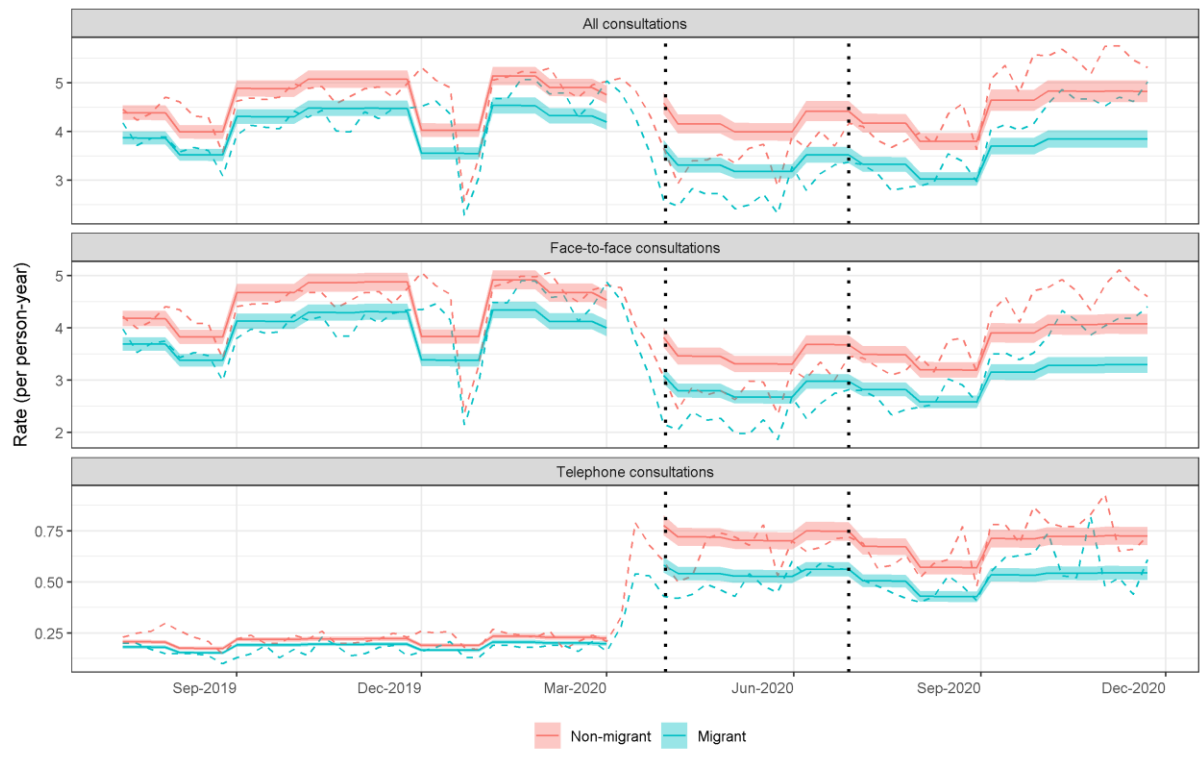


Table S19: Consultation rate ratios from interrupted time series analysis (5 January 2015 to 26 December 2020) for England in cohort matched on age and year of joining the CPRD GOLD database, sex, practice region and IMD

Variable	Interpretation	All	Face-to-face	Telephone
Pandemic	Comparing non-migrants' consultation rates during the pandemic to non-migrants' consultation rates pre-pandemic	0.96 (0.92-1.01)	0.84 (0.81-0.88)	3.46 (3.27-3.67)
Migration status	Comparing migrants' consultation rates pre-pandemic to non-migrants consultations pre-pandemic	0.88 (0.87-0.9)	0.88 (0.87-0.9)	0.88 (0.86-0.9)
Migration status + interaction term (between migrant status and pandemic)	Comparing migrants' consultation rates during the pandemic to non-migrants' consultation rates during the pandemic	0.8 (0.76-0.84)	0.81 (0.77-0.85)	0.75 (0.7-0.8)
Interaction term (between migrant status and pandemic)	Comparing the ratio of consultation rates between migrants and non-migrants pre-pandemic to the ratio of consultation rates between migrants and non-migrants during the pandemic (the additional effect of the pandemic on the ratio between migrants and non-migrants i.e. the multiplicative effect)	0.9 (0.86-0.95)	0.92 (0.87-0.97)	0.85 (0.8-0.92)

Figure S7: Weekly consultation rates by migration status in England: predicted rates (solid line) from interrupted time series sensitivity analysis (matched on age at study start, sex, and practice region) and observed rates (dashed line), truncated view July 2019 – November 2020

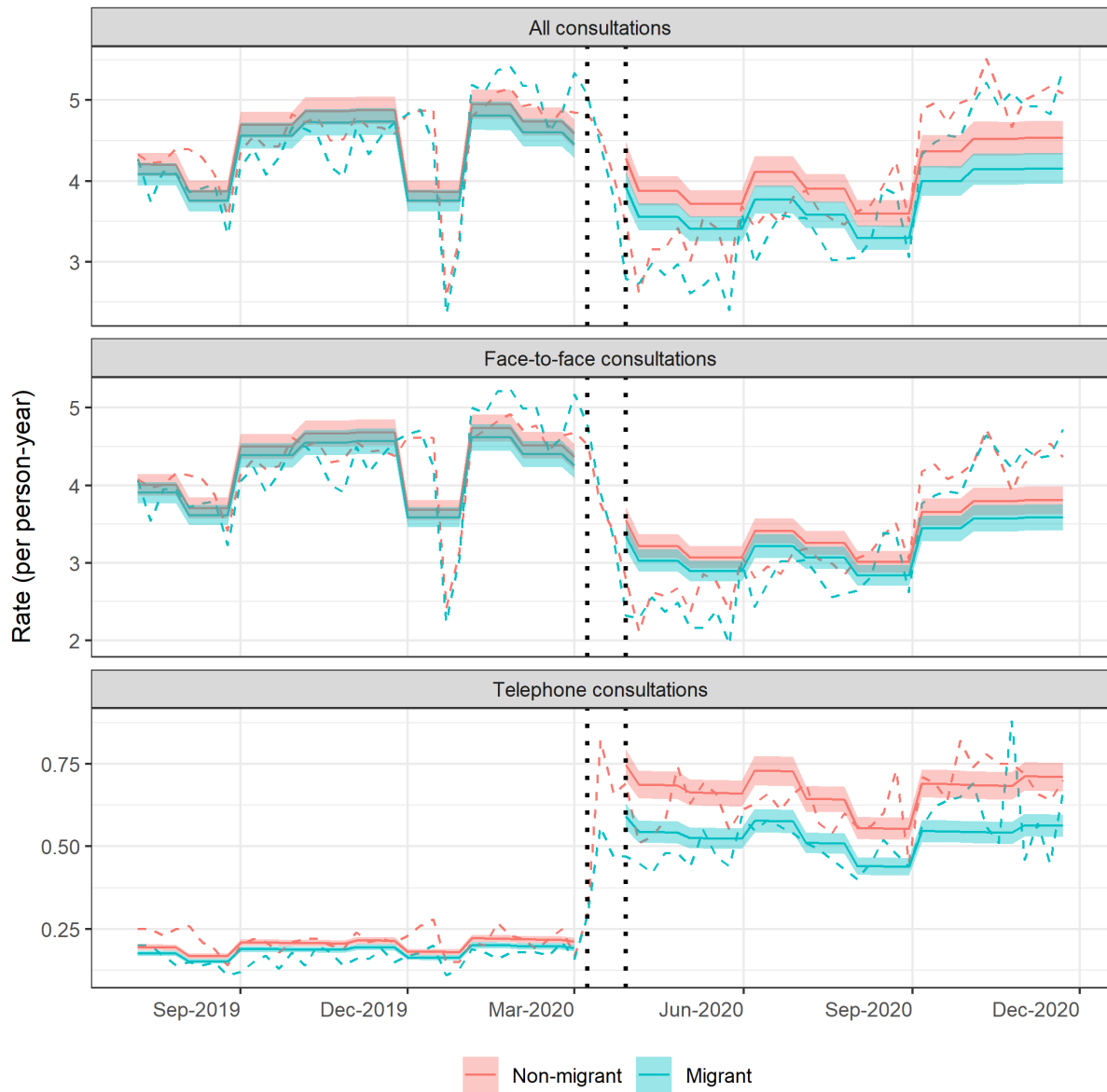


Table S20: Consultation rate ratios from interrupted time series analysis (5 January 2015 to 26 December 2020) for England in cohort matched on matched on age at study start, sex, and practice region

Variable	Interpretation	All	Face-to-face	Telephone
Pandemic	Comparing non-migrants' consultation rates during the pandemic to non-migrants' consultation rates pre-pandemic	0.93 (0.89-0.97)	0.81 (0.78-0.85)	3.53 (3.33-3.74)
Migration status	Comparing migrants' consultation rates pre-pandemic to non-migrants consultations pre-pandemic	0.97 (0.95-0.99)	0.97 (0.96-0.99)	0.91 (0.88-0.93)
Migration status + interaction term (between migrant status and pandemic)	Comparing migrants' consultation rates during the pandemic to non-migrants' consultation rates during the pandemic	0.92 (0.87-0.96)	0.94 (0.89-0.99)	0.79 (0.74-0.85)
Interaction term (between migrant status and pandemic)	Comparing the ratio of consultation rates between migrants and non-migrants pre-pandemic to the ratio of consultation rates between migrants and non-migrants during the pandemic (the additional effect of the pandemic on the ratio between migrants and non-migrants i.e. the multiplicative effect)	0.94 (0.89-1)	0.97 (0.91-1.02)	0.87 (0.81-0.94)

Figure S8: Weekly consultation rates by migration status in England: predicted rates (solid line) from interrupted time series sensitivity analysis (matched on age at study start and sex) and observed rates (dashed line), truncated view July 2019 – November 2020

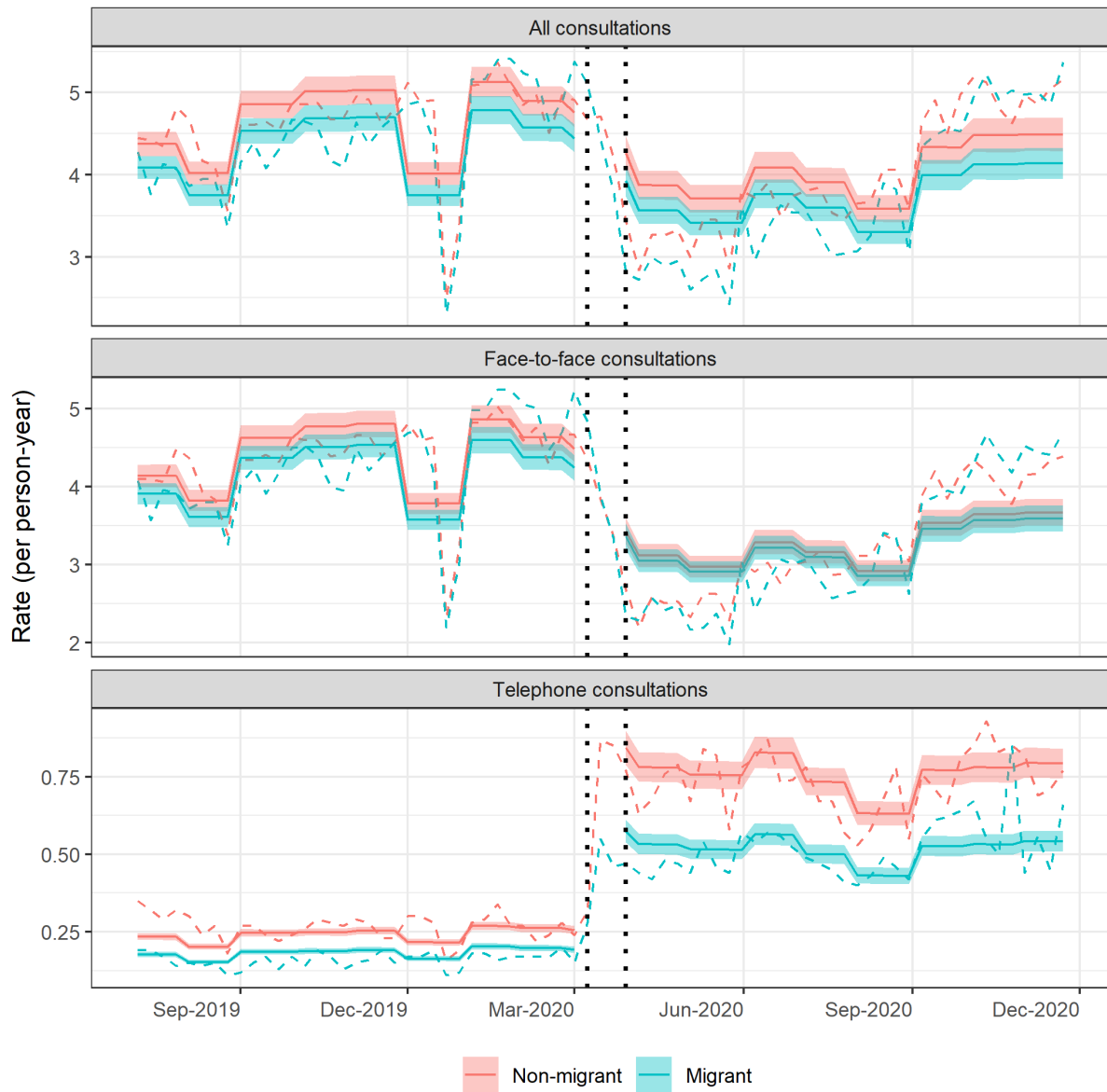
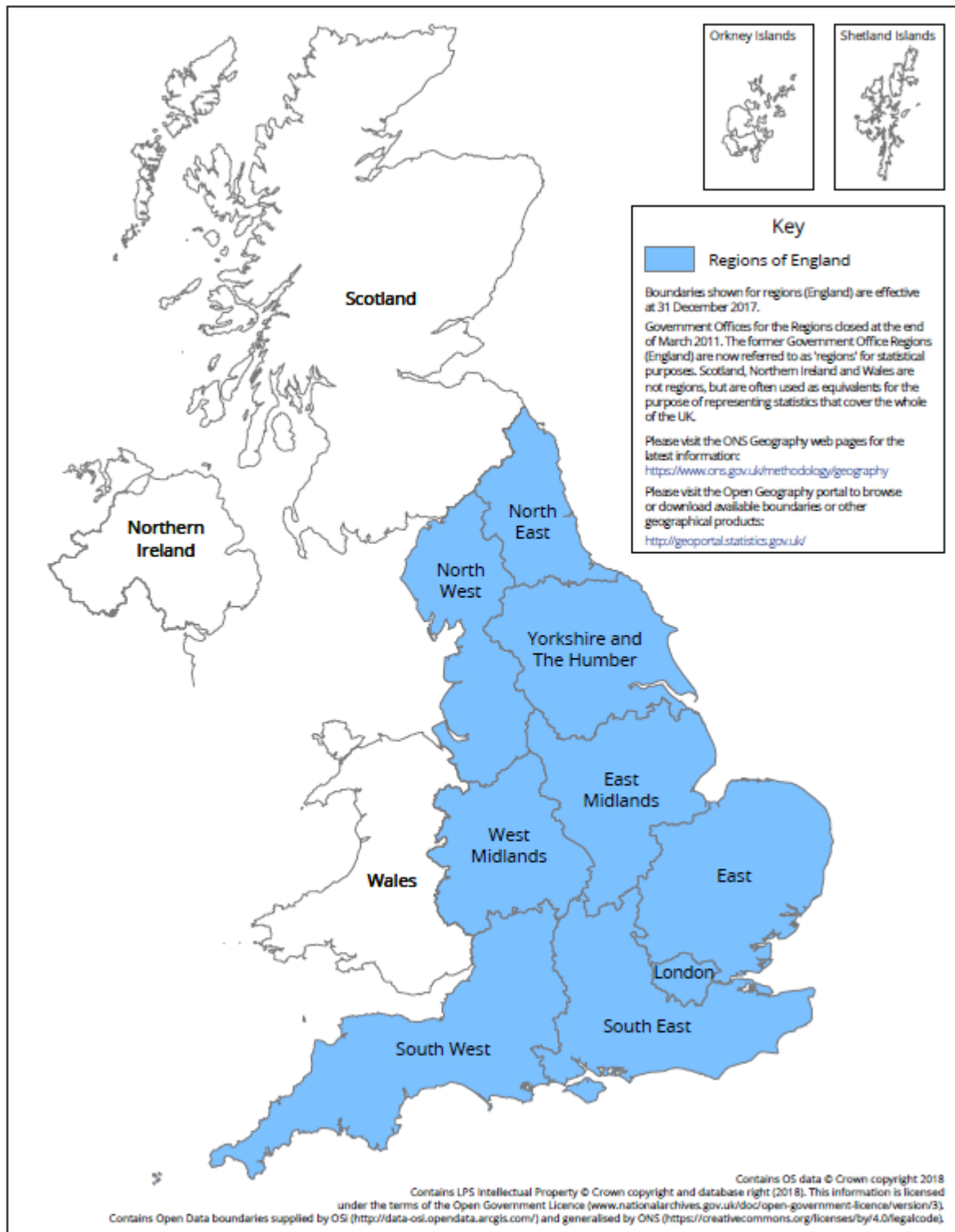


Table S21: Consultation rate ratios from interrupted time series analysis (5 January 2015 to 26 December 2020) for England in cohort matched on matched on age at study start and sex

Variable	Interpretation	All	Face-to-face	Telephone
Pandemic	Comparing non-migrants' consultation rates during the pandemic to non-migrants' consultation rates pre-pandemic	0.9 (0.86-0.94)	0.77 (0.73-0.8)	3.31 (3.13-3.51)
Migration status	Comparing migrants' consultation rates pre-pandemic to non-migrants consultations pre-pandemic	0.93 (0.92-0.95)	0.94 (0.93-0.96)	0.75 (0.74-0.77)
Migration status + interaction term (between migrant status and pandemic)	Comparing migrants' consultation rates during the pandemic to non-migrants' consultation rates during the pandemic	0.92 (0.88-0.97)	0.98 (0.93-1.03)	0.68 (0.64-0.73)
Interaction term (between migrant status and pandemic)	Comparing the ratio of consultation rates between migrants and non-migrants pre-pandemic to the ratio of consultation rates between migrants and non-migrants during the pandemic (the additional effect of the pandemic on the ratio between migrants and non-migrants i.e. the multiplicative effect)	0.99 (0.94-1.04)	1.04 (0.98-1.1)	0.9 (0.84-0.97)

Supplementary Box 4: Regions of England⁷

UK: Regions of England, 2017



STROBE checklist

	Item No.	Recommendation	Page No.
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	Title – p1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Abstract – p2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Background – p4
Objectives	3	State specific objectives, including any prespecified hypotheses	Background – p4
Methods			
Study design	4	Present key elements of study design early in the paper	Title – p1 Abstract – p2 Methods/Study overview and data management – p4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods/Study overview and data management – p4 Methods/Study cohort – p5
Participants	6	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	Methods/Study overview and data management – p4 Methods/Study cohort – p5
		<i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	Supplementary Information/Supplementary Box 2 – p5
		(b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case	Supplementary Information/Supplementary Box 3: Interrupted time-series statistical analysis – p6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Methods/Exposure and outcomes – p4 Methods/Statistical analysis: Before the pandemic – p7 Methods: Statistical analysis: Effect modification by ethnicity – p7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Methods/Study overview and data management – p4 Methods/Exposure and outcomes – p4 Methods/Figure 1 – p6
Bias	9	Describe any efforts to address potential sources of bias	Methods/Bias – p7
Study size	10	Explain how the study size was arrived at	Methods/Study cohort – p5 Methods/Figure 1 – p6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Methods/Exposure and outcomes – p4 Methods/Study cohort – p4/5 Information/Supplementary Box 2 – p5
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	Methods/Statistical analysis: Before the pandemic – p7 Methods/Statistical analysis: Before versus during the pandemic – p7 Methods: Statistical analysis: Effect modification by ethnicity – p7

			Supplementary Box 3: Interrupted time-series statistical analysis – p6
		(b) Describe any methods used to examine subgroups and interactions	Methods: Statistical analysis: Effect modification by ethnicity – p7 Supplementary Information/Supplementary Box 3: Interrupted time-series statistical analysis – p6
		(c) Explain how missing data were addressed	N/A for main migration exposure Methods: Statistical analysis: Effect modification by ethnicity – p7 (for missing ethnicity data)
		(d) Cohort study—If applicable, explain how loss to follow-up was addressed Case-control study—If applicable, explain how matching of cases and controls was addressed Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	Methods/Bias – p7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—e.g. numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	Methods/Figure 1 – p6
Descriptive data	14*	(a) Give characteristics of study participants (e.g. demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (e.g., average and total amount)	Results/Table 1 – p9–10 Supplementary Information/Tables S3–S8 – p14–25 Missing ethnicity data: Results/Table 1 – p9 Supplementary Information/Tables S3–S8 – p14–25 Results/Table 1 – p9 Supplementary Information/ Tables S3–S8 – p14–25
Outcome data	15*	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	Supplementary Information/Table S9 – p26 Supplementary Information/Table S10 – p27 N/A N/A
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Results/Before the pandemic – p11 Results/Figure 2 – p12 Results/Before versus during the pandemic – p12/13 Results/Figure 3 – p13 Results/Table 2 – p13/14 N/A N/A
Other analyses	17	Report other analyses done—e.g. analyses of subgroups and interactions, and sensitivity analyses	Results/Figure 2B – p12 Results/Figure 4 – p14 Results/Figure 5 – p15 Supplementary Information/Tables S9 – S21 – p26–30, p32–35, p37, p41, p43, p45, p47 Supplementary Information/Figures S1–S8 – p31, p36, p38–40, p42, p44, p46

Discussion			
Key results	18	Summarise key results with reference to study objectives	Discussion – p17
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion – p17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion – p17/18
Generalisability	21	Discuss the generalisability (external validity) of the study results	Discussion – p18
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Methods/Role of the funding source – p7 Acknowledgements – p19

References for supplementary information

- 1 Herrett E, Gallagher AM, Bhaskaran K, Forbes H, Mathur R, van Staa T, et al. Data Resource Profile: Clinical Practice Research Datalink (CPRD). *Int J Epidemiol*. 2015;**44**(3):827-36.
- 2 Pathak N, Zhang CX, Boukari Y, Burns R, Mathur R, Gonzalez-Izquierdo A, et al. Development and Validation of a Primary Care Electronic Health Record Phenotype to Study Migration and Health in the UK. *Int J Environ Res Public Health*. 2021;**18**(24).
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- 4 UK Government. English indices of deprivation 2019 2019 [Available from: <https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019> [cited 5 May].
- 5 Mansfield KE, Mathur R, Tazare J, Henderson AD, Mulick AR, Carreira H, et al. Indirect acute effects of the COVID-19 pandemic on physical and mental health in the UK: a population-based study. *Lancet Digit Health*. 2021;**3**(4):e217-e30.
- 6 Ljung GM, Box GEP. On a measure of lack of fit in time series models. *Biometrika*. 1978;**65**(2):297–303.
- 7 Office for National Statistics. Regions of England 2017 [Available from: <https://geoportal.statistics.gov.uk/documents/regions-december-2017-map-in-united-kingdom/explore> [cited 13 May].