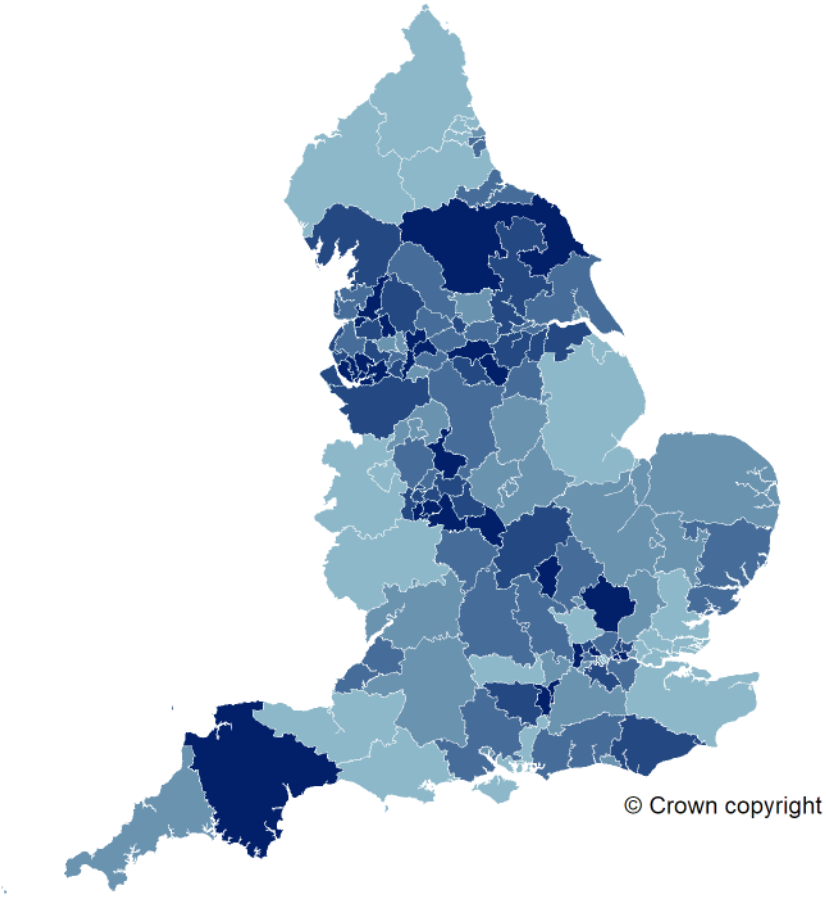
Public Health England

NHS

Atlas of variation in risk factors and healthcare for vision in England

August 2021

Reducing unwarranted variation to improve health outcomes and value



The Atlas of variation in risk factors and healthcare for vision in England has been prepared in partnership with RightCare in conjunction with the following organisations and teams:

Addenbrooke's Hospital

Bedfordshire Hospitals NHS Foundation Trust

Bradford Teaching Hospitals NHS Foundation Trust

Bristol Medical School

British and Eire Association of Vitreoretinal Surgeons

Clinical Council for Eye Health Commissioning

College of Optometrists

Healthcare Public Health, Public Health England

Health Improvement Team, Public Health England

International Centre for Evidence on Disability

Moorfields Eye Hospital NHS Foundation Trust

National Cancer Registration and Analysis Service, Public Health England

NHS Digital

NHS England and NHS Improvement

Office for National Statistics

Royal College of Ophthalmologists

Royal National Institute of Blind People

SeeAbility

Screening Team, Public Health England

University Hospitals of Leicester NHS Trust

Contents

Abbreviations

ADASS	Association of Directors of Adult Social Services
AJCC	American joint committee on cancer
AMD	Age related macular degeneration
anti-VEGF	Anti-vascular endothelial growth factor
ASD	Autism spectrum disorder
BAPM	British Association of Perinatal Medicine
BCVIS	British childhood visual impairment study
BIOS	British and Irish Ophthalmic Society
BMI	Body mass index
CCEHC	Clinical Council for Eye Health Commissioning
CCG	Clinical Commissioning Group
CIPOLD	Confidential Inquiry into premature deaths of people with learning disabilities
CMO	Chief Medical Officer
COPD	Chronic obstructive pulmonary disease
COPS	Central ophthalmic payments system
CVD	Cardiovascular disease
CVI	Certificate of visual impairment
CVS	Child vision screening
DES	Diabetic eye screening
DESP	Diabetic eye screening programme
DMO	Diabetic macular oedema
DNA	Deoxyribonucleic acid
DR	Diabetic retinopathy
EHCP	Education, health and care plan
ePACT	Electronic prescribing analysis and cost tool
ETDRS	Early treatment diabetic retinopathy study
FOI	Freedom of information
GBD	Global burden of disease study
GOS	General ophthalmic services
GIRFT	Getting it right the first time
HES	Hospital episode statistics
ICDO3	International classification of diseases for oncology third edition
ICD10	International statistical classification of diseases and related health problems 10th revision
ICED	International Centre for Evidence on Disability
ICS	Integrated care system
IMD	Index of multiple deprivation
KPI	Key performance indicator
LNU	Local neonatal units
LSHTM	London School of Hygiene & Tropical Medicine

LTLA	Lower-tier local authority
MDT	Multidisciplinary teams
MSK	Musculoskeletal
NCRAS	National Cancer Registration and Analysis Service
NHSE&I	NHS England and NHS Improvement
NICE	National Institute for Health and Care Excellence
NICU	Neonatal intensive care units
OCCCF	Ophthalmic common clinical competency framework
OCT	Optical coherence tomography
ONS	Office for National Statistics
OPCS4	Office of population censuses and surveys classification of surgical operations and procedures (4th revision)
OSSN	Ocular surface squamous neoplasia
PHOF	Public health outcomes framework
PHE	Public Health England
PSR	Primary support reason
QOF	Quality and outcomes framework
RCOphth	Royal College of Ophthalmologists
RCPCH	Royal College of Paediatrics & Child Health
ROP	Retinopathy of prematurity
RNIB	Royal National Institute of Blind People
RRD	Rhegmatogenous retinal detachment
RVO-MO	Retinal vein occlusion - macular oedema
SAFE	System and assurance framework for eye-health
SAS	Staff grades and associate specialists
SCU	Special care unit
STP	Sustainability and transformation partnerships
STPs	Sustainability and transformation plans
SUS+	Secondary uses service
TAT	Test and Training system
TED	Thyroid eye disease
UCL	University College London
UK NSC	National Screening Committee
UTLA	Upper-tier local authority
WHO	World Health Organization

Foreword

This is the first themed Atlas of variation in risk factors and healthcare for vision in England. It presents a range of indicators across eye health and care providing information on service activity and availability that should be meaningful to clinicians, health service managers, commissioners and provider organisations, in England. In doing so the presentation of the indicators go beyond the headline by taking account of the population at risk or in clinical need of an intervention; and cover a range of services from screening to routine and emergency care, and indicators of population eye health.

Variations in healthcare are endemic, and their underlying causes are multifactorial, posing challenges for distinguishing whether they are acceptable (warranted) or not. Eye health is no different. The atlas systematically maps out existing variations in eye health using the selected indicators. The purpose of highlighting these variations is to facilitate local scrutiny and review to inform and support any necessary actions at place and at system level. With competing priorities for healthcare resources, areas for scrutiny and review are proposed as options for action as a starter to understand the causes underlying local and regional service variations and their impact on equity, safety, effectiveness and outcomes of service provision.

Eye health services generate high volume activity across primary and secondary care. In common with the wider NHS they have also been faced with prolonged challenges for service provision from rising demand, capacity pressures (workforce, estate and infrastructure), and in addressing inequalities; all of which are likely to be contributing to the variations reported.

The indicators are drawn from the best available population level data sources that have established resourced processes and infrastructure for data collection, reporting, review and updating. Whilst there are limitations with these sources, they represent the national record. They are currently routinely used as proxies of need for service planning, commissioning and contract agreements. The atlas demonstrates their additional utility to identify and review local and regional variations and the implications of their existence, which would have hitherto remained unrecognised. Improving data quality would make better use of the health information and intelligence that could be potentially generated from these data sources.

How services are commissioned, organised and delivered, and changes in clinical practice and decision making can all contribute to service variations. In the past decade, the introduction of new interventions for previously untreatable chronic conditions has transformed service provision and clinical practice, generating multiple episodes of care. These have all contributed to the rising rates of service activity and their variations for example for outpatient attendances and intravitreal injection procedures.

Also presented in the atlas are broad population based health indicators associated with eye health. In addition to demographic factors, these serve to identify population groups at particular risk to their eye health; inform eye health needs assessments and local eye priorities; and identify opportunities for alignment with broader health priorities, prevention and health improvement interventions.

This atlas is timely. It covers the years immediately prior to the coronavirus (COVID-19) pandemic, providing a baseline and resource for monitoring the impact of the actions taken subsequently for the recovery and transformation of eye health services, their organisation and delivery; and the implementation of integrated care systems and the reconfiguration of the NHS in England.

In identifying, quantifying and reporting existing variations in eye health, this atlas has established the basis for systematically distinguishing and addressing unwarranted variations and trends over time. Should the opportunity arise it is well placed to extend its scope to cover a wider range of eye health and care services.

The Atlas of variation in risk factors and healthcare for vision in England has been eagerly anticipated. It addresses a gap in regular review and reporting of eye health data arising from routine NHS care, and will be a significant tool to monitor population eye health and its contributory factors. Its development is a testament to Public Health England, all its contributors, stakeholders and members of the steering group, and future collaborations for subsequent updates are welcomed.

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Preface

This first Atlas of variation in risk factors and healthcare for vision in England builds on an increasing awareness of the need for good quality data to understand aspects of the need for and provision of eye healthcare.

This is the first health intelligence product produced by Public Health England that looks across the whole vision patient pathway from those populations at risk of poor eye health, screening and healthcare services, and health outcomes. The atlas will contribute to our understanding of how services are being used, and if they are being used equitably.

The Clinical Council for Eye Health Commissioning (CCEHC), an independent advisory body which represents the leading organisations within the eye care sector, has developed the System and Assurance Framework for Eye Health (SAFE).[1] SAFE provides the overarching framework for strategic, population-based planning, commissioning and provision of eye health service systems delivering the whole pathway of care, and operating across service footprints to address health needs. It shows what a good eye health service system should look like and what is expected of it. The atlas has used the SAFE metrics, Portfolio of Indicators for Eye Health and Care[2] as the guide to developing suitable indicators.

The atlas contains 32 indicators, many developed for the atlas as well as indicators already included within products such as the public health outcomes framework (PHOF). The new indicators developed for the atlas mainly cover hospital eye services: outpatient appointments, intravitreal injections, cataract and rhegmatogenous retinal detachment surgery.

The data is presented in a format to show not only a map of geographical variation for each indicator's range of values but also, where appropriate, an accompanying map showing the statistical significance of this variation from the England value. Each indicator is also displayed using a column chart showing the geographical distribution for the most recent period of data and a box and whisker plot showing the degree of geographical variation. In each section the context is described for the indicator(s), options for action and a list of evidence-based resources to aid action. For 26 indicators, it is statistically possible to analyse trend data over time both for the England value and degree of variation.

[1]Clinical Council for Eye Health Commissioning (2018) SAFE: Systems and Assurance Framework for Eye Health [Accessed 24 May 2021]
[2]Clinical Council for Eye Health Commissioning (2018) SAFE: Portfolio of Indicators for Eye Health and Care [Accessed 28 Jul 2021]

Importantly for every indicator there is evidence of variation across England; the rate of all vision outpatient attendances varies 2.5-fold by clinical commissioning group (CCG), the rate of admission to hospital for cataract surgery in people aged 65 years and over varies 2.2-fold and the rate of rhegmatogenous retinal detachment surgery in people aged 18 years and over vary varies 8.9-fold by CCG. Not only do health service indicators vary geographically but so does the prevalence of risk factors for poor vision health and vision outcomes. It is therefore essential that health service providers and commissioners use the data underpinning the presentation in this atlas, the online Interactive Atlas tool available on the RightCare website and other resources referred to within the atlas to understand more about their local picture to determine priorities for action. Following the publication of the atlas, the data will be used to create an online vision health profile. This will enable users to explore the data alongside other datasets included in the PHE public health profiles.

It is important to tackle variation in vision health through better prevention of disease, recognition of those at risk, better diagnosis of those with early eye disease and improved treatment not only to improve outcomes for individual patients but also to ensure optimal allocation and use of staff, capacity and other resources within the health system.

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Introduction

Sight loss is a public health priority

It is estimated that around 2 million people in the UK are living with some form of sight loss, with this expected to rise to 2.7 million by 2030.[1] Maintaining good eye health is central to maintaining good mental, social and physical health. Vision loss is associated with a reduction in overall quality of life, mental health, independence, mobility, educational attainment and employment.[2]

Increasing numbers of people experiencing sight loss are due to an aging population and an increase in the prevalence of conditions associated with poorer eye health such as diabetes and obesity. People from black and minority ethnic communities are at greater risk of some of the leading causes of sight loss.[3,4] Adults with learning disabilities are 10 times more likely to be blind or partially sighted than the general population.[3,5]

Prior to the COVID-19 pandemic the NHS was already experiencing significant pressures and unprecedented levels of demand for elective eye care services.[6] In the financial year beginning 2019 ophthalmology was the single largest specialty for outpatient attendances in England.[7] This atlas shows there were 9 million outpatient attendances in the financial year beginning 2019 for all five vision treatment specialties, 9.4% of all outpatient attendances. Within supplementary figures this atlas presents analysis using provisional datasets for 2020 and 2021 to show the impact of the COVID-19 pandemic on the demand and delivery of services for eye health.

Sight loss is not an inevitable part of aging, an estimated 50% of sight loss is avoidable.[8] Primary prevention of sight loss is closely linked to maintaining overall good health. Public health prevention programmes to reduce obesity, increase exercise and stop smoking may prevent or delay the onset of eye disease.[9] Secondary prevention is central to maintaining vision or slowing the progression of diseases which can result in

[1] Royal National Institute of Blind People (RNIB) and Specsavers (2017) The State of the Nation Eye Health 2017: A Year in Review [Accessed 06 Jun 2021]
[2] Welp A, Woodbury RB, McCoy MA and others (2016) The impact of vision loss. Making Eye Health a Population Health Imperative: Vision for Tomorrow National Academies Press Washington, DC [Accessed 01 Apr 2021]
[3] Royal National Institute of Blind People (April 2018) Eye health and sight loss stats and facts [Accessed 06 Jun 2021]
[4] Scase MO, Johnson MRD (2005) Visual impairment in ethnic minorities in the UK International Congress Series, 1282:438-442 [Accessed 25 Jun 2021]
[5] Public Health England (2020) Guidance Eye care and people with learning disabilities: making reasonable adjustments [Accessed 25 Jun 2021]
[6] NHS England (16 January 2019) Transforming elective care services: Ophthalmology [Accessed 21 Jan 2021]
[7] NHS Digital (08 October 2020) Hospital Outpatient Activity 2019-20 [Accessed 22 Apr 2021]
[8] London Assembly Health Committee (November 2017) Eye health - preventing sight loss in London [Accessed 01 Apr 2021]
[9] NHS England (2018) Eye Health Needs Assessment Wessex (Dorset, Hampshire and Isle of Wight) [Accessed 06 Jun 2021]

sight loss and is dependent on the organisation and delivery of health services to meet need and demand. Tertiary prevention requires social services and voluntary organisations to support people who are blind or partially sighted to live independently and to adapt to living with their eye condition.

What is variation and why does it matter?

One of the key aims of the atlas of variation series is to highlight geographical variation and to try to differentiate between warranted and unwarranted variation. Warranted variation in health care services may occur because they are appropriately meeting different levels of health care need between areas. These different levels of need may reflect geographical variations in sociodemographic characteristics of the population, such as age, gender, socioeconomic status and ethnicity, risk factors and disease prevalence. These sociodemographic factors may also influence unwarranted variation if they are associated with differing levels of fair access to services. John Wennberg, who founded the pioneering Dartmouth Atlas of Health Care,[10] defined unwarranted variation in healthcare as "variation that cannot be explained on the basis of illness, medical evidence, or patient preference".[11]

Wennberg suggests 3 categories of unwarranted variation:[12]

Effective care:

'…interventions for which the benefits far outweigh the risks; in this case the "right" rate of treatment is 100% of patients defined by evidence-based guidelines to be in need, and unwarranted variation is generally a matter of under-use.' However, it is important to acknowledge patient choice and the right to refuse intervention even where the evidence base for effectiveness is strong and therefore the "right" rate may never be 100%.

Preference-sensitive care:

'…when more than one generally accepted treatment option is available, such as elective surgery; here, the right rate should depend on informed patient choice, but treatment rates can vary extensively due to differences in professional opinion.'

Supply-sensitive care:

'…comprises clinical activities such as doctor visits, diagnostic tests, and hospital admissions, for which the frequency of use relates to the capacity the local healthcare system.' However, as Wennberg notes, higher rates of use of supply-sensitive care do not necessarily correlate with better outcomes.

[10] Wennberg JE, Cooper M and others (1996) The Dartmouth Atlas of Health Care [Accessed 07 Jun 2021]
[11] Wennberg J (2010) Tracking Medicine: A Researcher's Quest to Understand Health Care Oxford University Press [Accessed 07 Jun 2021]
[12] Wennberg J (2011) Time to tackle unwarranted variations in practice BMJ 2011 Mar [Accessed 01 Jun 2021]

This first Atlas of variation in risk factors and healthcare for vision in England presents data on 32 indicators across these areas: population at risk of poor eye health, screening, provision of health services, and eye health outcomes. Importantly, it shows the degree of geographical variation across these areas and their associated indicators, and where possible trend data. Additional data and resources are provided to assist local stakeholders in developing and evaluating their service delivery strategies. An explanation of the data presentation is given in the chapter Introduction to the data and methods.

The burden of eye disease and inequalities

Glaucoma, age related macular degeneration (AMD), cataract, refractive error and diabetic eye disease are the main causes of visual impairment and sight loss/ blindness in the UK.[1,13]

There is no national dataset that provides information on the true prevalence of the main eye conditions, instead estimates are derived from population modelling and information from the Certification of Vision Impairment (CVI) register.[14,15] According to the latest Global Burden of Disease Study (GBD) prevalence estimates for 2019, 2.3 million people in England experience some form of blindness or vision loss.[16] The GBD study estimates that the prevalence in England has risen from 2.1 million people in 2010, an increase of nearly 10%. The study estimates that 80% of this increase has occurred in the population aged 65 years and over.

Table A1: Global Burden of Disease (GBD) prevalence estimates for England, all ages, 2019[16]

	Number	Rate per 100,000 population
Age-related macular degeneration	107,605	190.19
Cataract	483,071	853.82
Glaucoma	67,461	119.24
Near vision loss	438,520	775.07
Other vision loss*	189,004	334.06
Refraction disorders	1,134,120	2,004.53
Total blindness and vision loss	**2,307,776**	**4,078.95**

*Includes diabetic retinopathy

[13] Pezzullo L, Streatfeild J, Simkiss P and others (2018) The economic impact of sight loss and blindness in the UK adult population. BMC Health Serv Res 18, 63 (2018) [Accessed 29 Jun 2021]
[14] Public Health England Public Health Profiles Crown Copyright 2021 [Accessed 04 May 2021]
[15] Deloitte Access Economics (2017) Incidence and risk of sight loss and blindness in the UK Royal National Institute of Blind People [Accessed 30 Apr 2021]
[16] Global Burden of Disease Collaborative Network (2020) Global Burden of Disease Study 2019 (GBD 2019) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME) [Accessed 03 May 2021]

Age and sex

The older you are the greater the risk of sight loss. The RNIB estimates around 79% of people living with sight loss are over the age of 64, with the 'oldest old' at greatest risk – 1 in every 3 people aged 85 and over living with sight loss.[1]

Children at higher risk of vision impairment include those who are very premature and very low birth weight babies, from an ethnic minority group, children from the most economically deprived areas and children with learning difficulties.[17,18]

Incidence estimates suggest women are more likely to experience sight loss or blindness due to both a higher risk and more women in older age groups. The lifetime risk of permanent sight loss or blindness is estimated to be nearly 1 in 5 people. This risk is higher for women, with almost 1 in 4 women at risk of permanent sight loss or blindness compared to 1 in 8 men.[15]

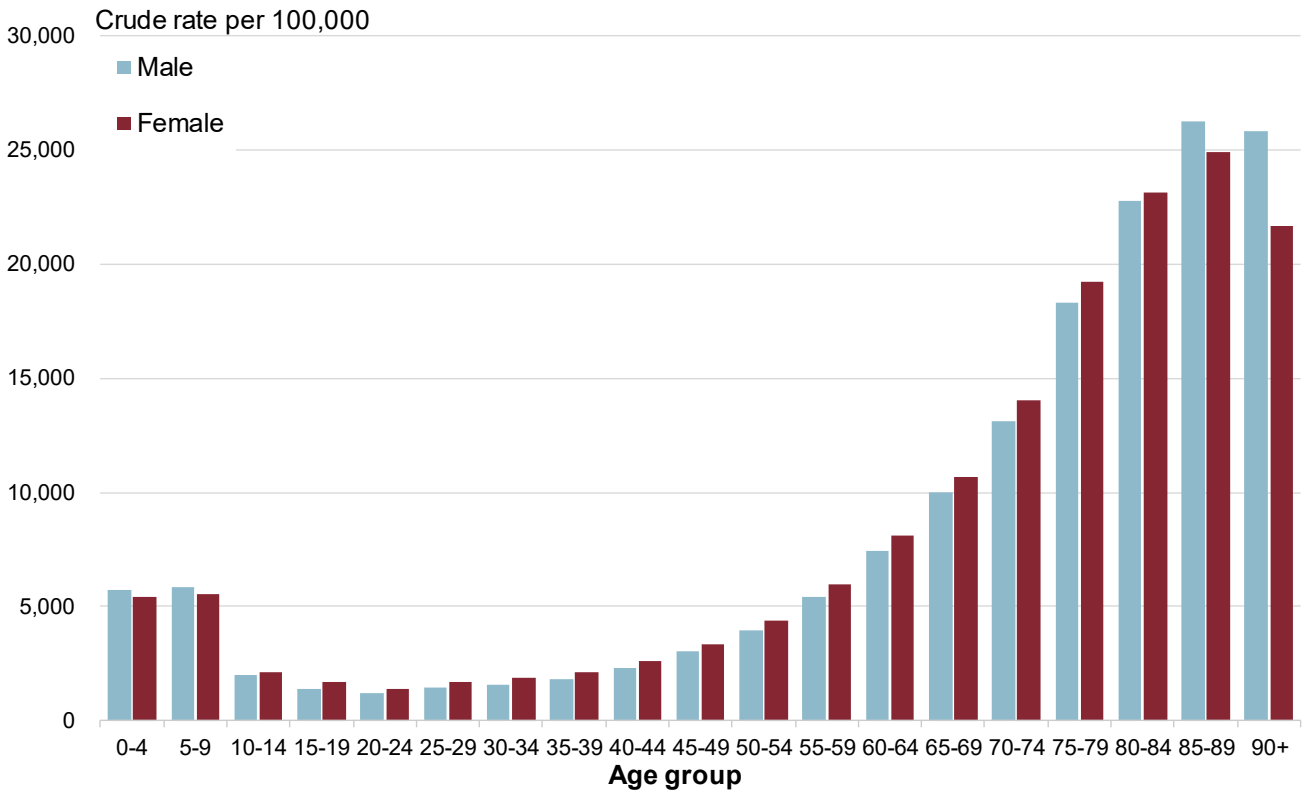
Analysis for this atlas shows that in the financial year beginning 2019 there were 9 million all vision outpatient attendances in England. 56% were for people aged 65 years and older.[6] Many people will be required to attend outpatients multiple times throughout the year. Analysis for individuals shows that 3.4 million people attended outpatient appointments in the financial year beginning 2019, with nearly 1.8 million women and 1.6 million men attending outpatients. Figure A1 shows that women have higher age-specific rates than men in all age groups from age 10 years to 84 years.

Men and women in the 85 to 89 year old age group have the highest age-specific population rates for outpatient attendances. In the financial year beginning 2019 men aged 85 to 89 years had an attendance rate of 26,233 per 100,000 population and women 24,885 per 100,000 (see Figure A1). Overall, nearly 1 in 4 individuals in the 85 to 89 year age group had an outpatient appointment for their eye health.

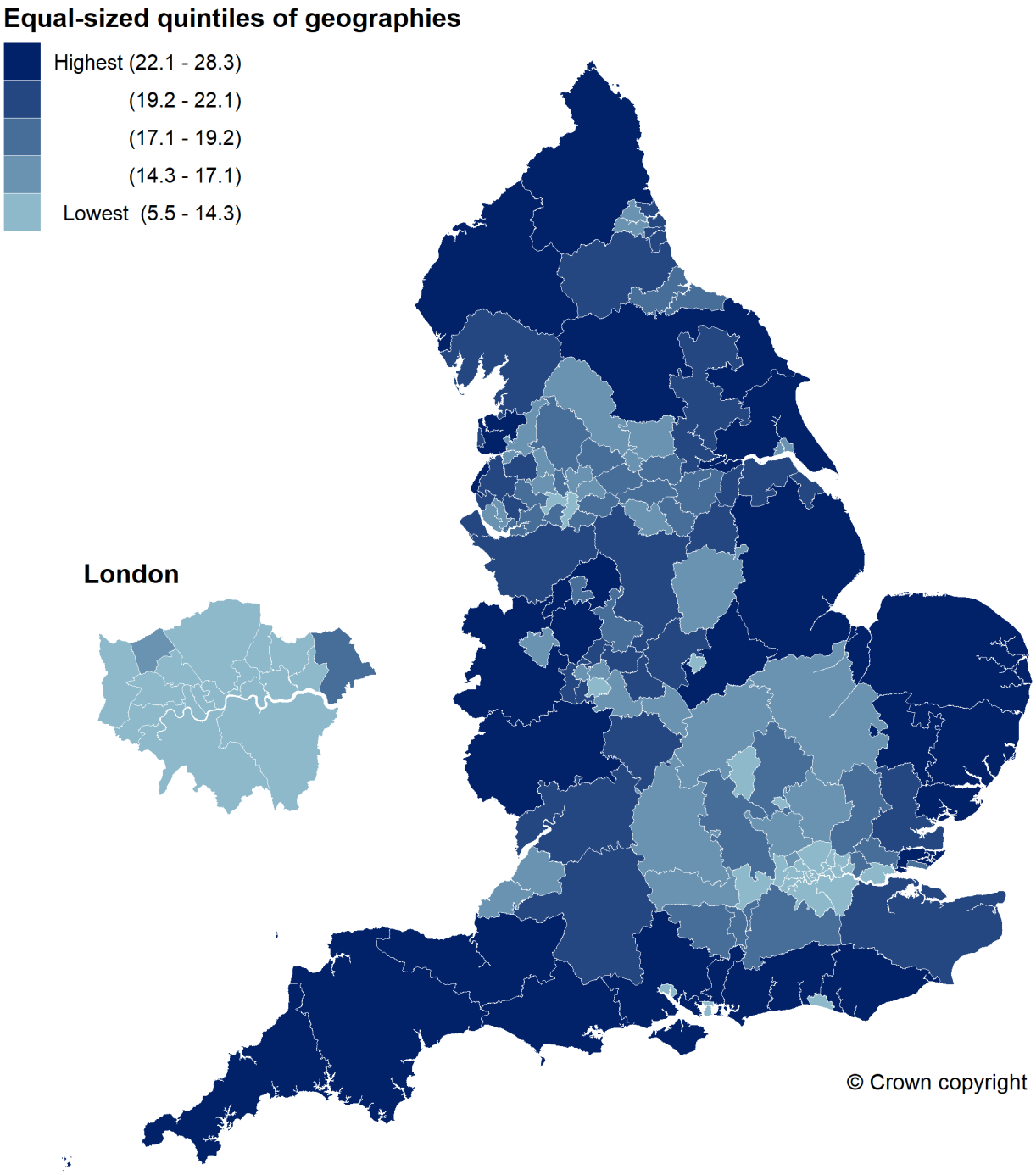
[17] Teoh LJ, Solebo AL, Rahi JS and others (2021) Visual impairment, severe visual impairment, and blindness in children in Britain (BCVIS2): a national observational study Lancet Child Adolesc Health 2021 Mar;5(3):190-200 [Accessed 23 Apr 2021]

[18] Woodhouse JM, Davies N, McAvinchey A and Ryan B (2014) Ocular and visual status among children in special schools in Wales: the burden of unrecognised visual impairment Archives of Diseases in Childhood 99:500-504. (cited by RNIB 2016 state of the nation) [Accessed 23 Apr 2021]

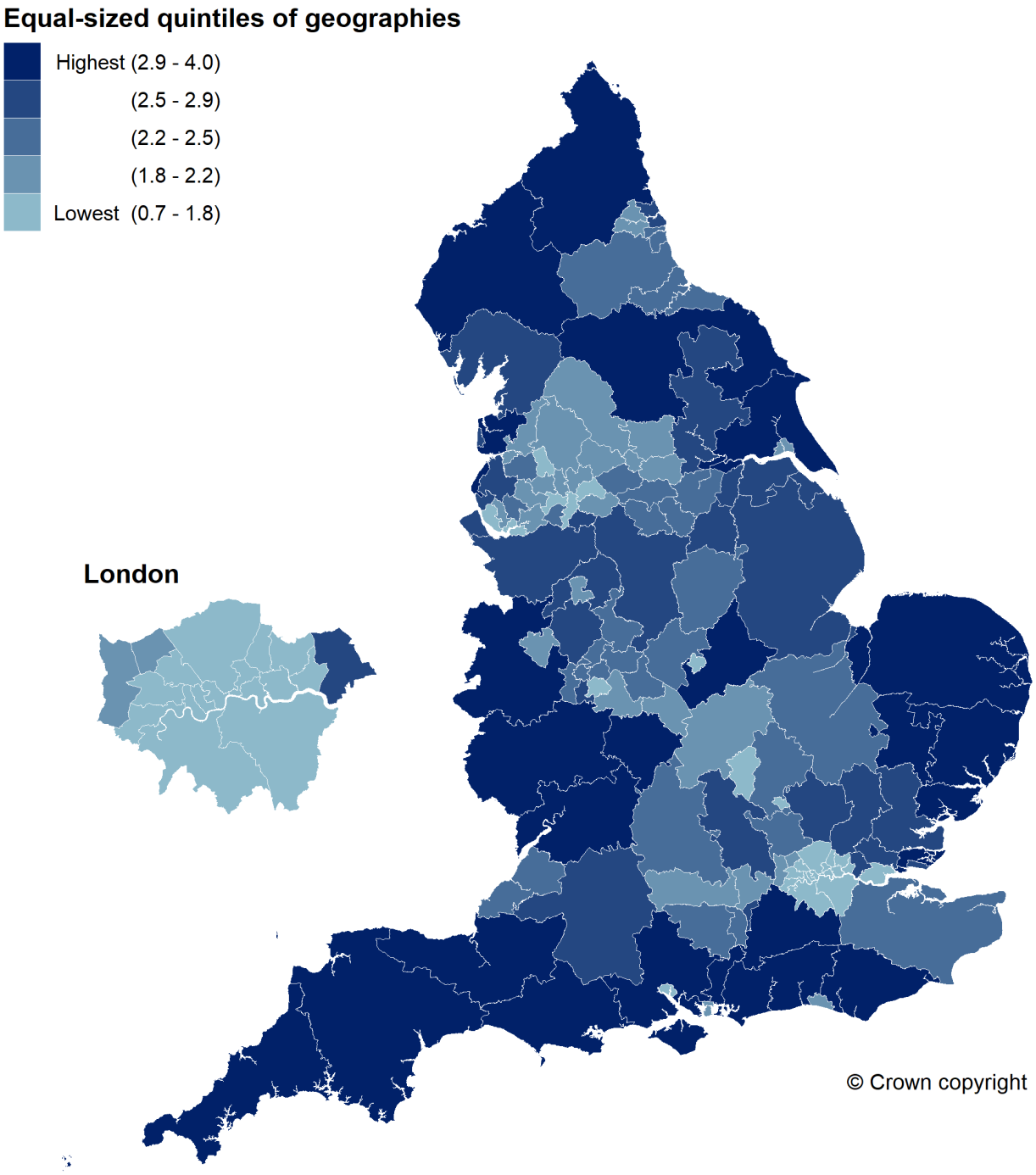
Figure A1: All vision outpatient attendances (persons based) by age and sex, for England (2019/20)



Map A1: Percentage of the GP registered population aged 65 years and over by clinical commissioning group (2020)



Map A2: Percentage of the GP registered population aged 85 years and over by clinical commissioning group (2020)



Ethnic minorities

People from certain ethnic minority groups are at greater risk of some of the most common causes of sight loss in the UK.

People of Black African and Caribbean ethnicity are at a 4 to 8 times greater risk of developing open angle glaucoma, the most common form of glaucoma in the UK compared with the general British population.[19,20] There is also an increased risk of angle closure glaucoma in people from East Asian communities.

People of South Asian and Black ethnicity are at a significantly higher risk of diabetic eye disease.[21,22] People of South Asian and Black African and Caribbean ethnicity have double the prevalence of clinically significant macular oedema and sight threatening diabetic retinopathy compared to the white population with type 2 diabetes.[22]

People of Asian ethnicity have a greater risk of developing age-related cataracts with some evidence of an earlier onset of the disease.[23,24]

Black and minority ethnic people with sight loss may also require higher support needs due to language barriers or social isolation.[25]

Public Health England is currently improving the methodology for assigning ethnicity codes for analysis. Future updates to the hospital episode statistics indicators included within this atlas are planned to include analysis by ethnicity.

[19] Wormald R, Basauri E, Wright L and others (1994) The African Caribbean eye survey: Risk factors for glaucoma in a sample of African Caribbean people living in London Eye 8, 3150–320 (cited by RNIB 2018 stats & facts) [Accessed 23 Apr 2021]

[20] Cross V, Shah P, Bativala R and Spurgeon P (2007) ReGAE 2: glaucoma awareness and the primary eye-care service: some perceptions among African Caribbeans in Birmingham UK Eye 21, 912-920 (cited by RNIB 2018 stats & facts) [Accessed 23 Apr 2021]

[21] Pardhan S, Gilchrist J and Mahomed I (2004) Impact of age and duration on sight–threatening retinopathy in South Asians and Caucasians attending a diabetic clinic. *Eye* 18, 233–240 2004 (cited by RNIB 2018 stats & facts) [Accessed 23 Apr 2021]

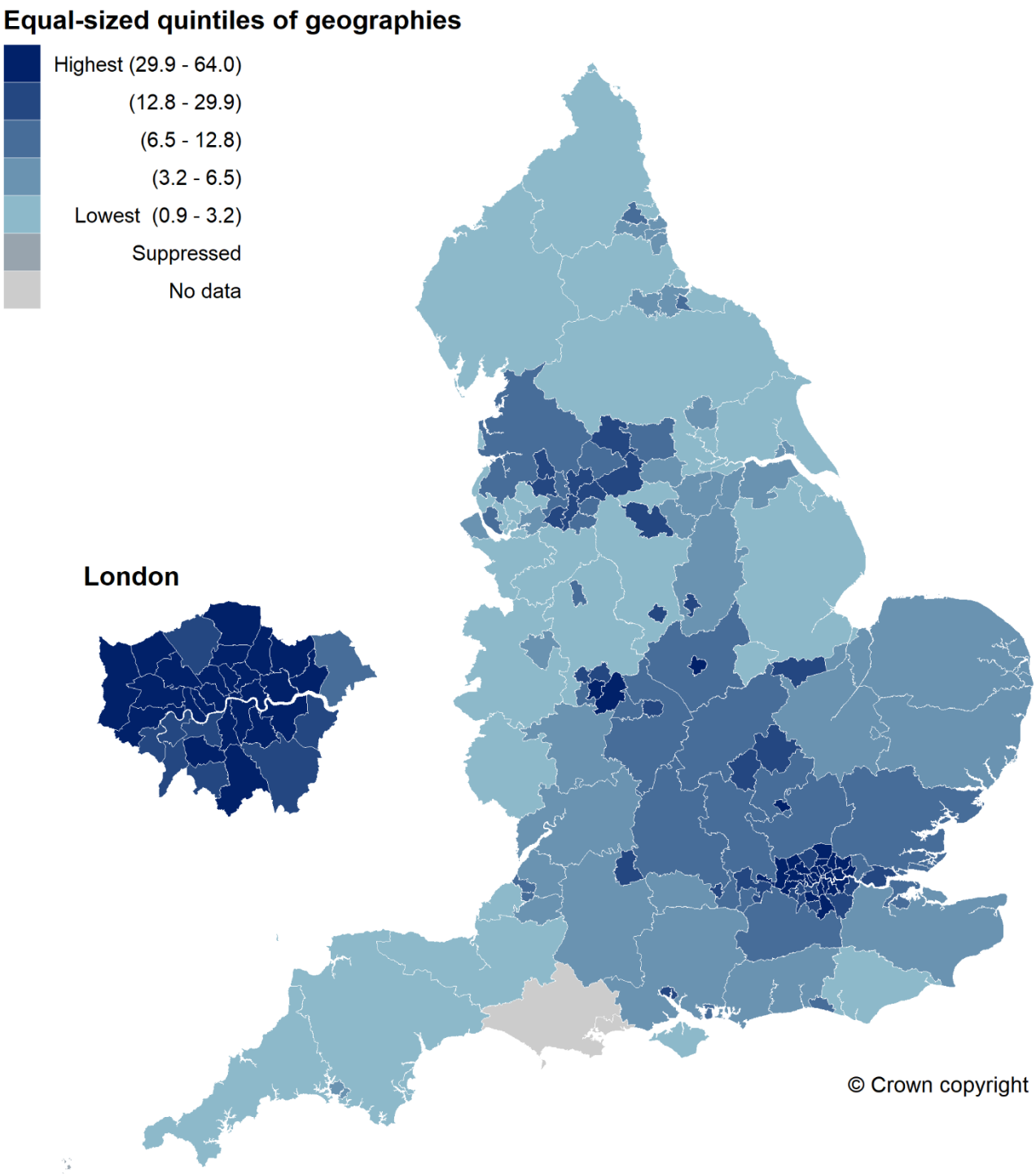
[22] Sivaprasad S, Gupta B, Gulliford MC and others (2012) Ethnic Variations in the Prevalence of Diabetic Retinopathy in People with Diabetes Attending Screening in the United Kingdom (DRIVE UK) PLoS One 2012;7:e32182 [Accessed 24 May 2021] (cited by RNIB 2018 stats & facts)

[23] Das BN, Thompson JR, Patel R, and Rosenthal AR (1993) The prevalence of eye disease in Leicester: a comparison of adults of Asian and European descent J R Soc Med. 1994;87(4):219-222 [Accessed 17 Jun 2021]

[24] Rauf A, Malik R, Bunce C and Wormald R. (2013) The British Asian community eye study: outline of results on the prevalence of eye disease in British Asians with origins from the Indian subcontinent Indian J Ophthalmol. 2013;61(2):53-58 [Accessed 17 Jun 2021]

[25] Johnson MD and Morjaria-Keval A (2007) Ethnicity, sight loss and invisibility The British Journal of Visual Impairment 25 (1) pp 21-31 2007, (cited by Peace S, Katz J, Holland C and Jones R. Oct 2016) [Accessed 06 May 2021]

Map A3: Percentage of population from ethnic minorities aged 16 years and over by upper tier local authority (2016)



Learning disabilities

People with learning disabilities experience high levels of sight problems at all ages. Adults with learning disabilities are ten times more likely to experience sight loss than the general population.[26] Children with a learning disability are 28 times more likely to have a serious sight problem.[27] Many of the risk factors, such as smoking, diet, physical activity, hypertension and obesity associated with eye conditions such as glaucoma and diabetic eye disease are more likely to be present for people with learning disabilities than the general population.[28,29]

Recent studies suggest half of adults with learning disabilities have not had a sight test in the recommended period and 4 in 10 children in special schools have never had a sight test.[30]

Further information can be found in the Learning disabilities section which includes actions that can be taken to improve the sight of people with learning disabilities.

Socioeconomic deprivation

Socioeconomic deprivation is both a cause and an outcome of sight loss, at both an individual and an area level. However, it is recognised that a stronger evidence base is needed to develop universal solutions.[31]

Studies show that there is a link between low income and sight loss; 48% of people with sight loss say that they live in a household with a total income of less than £300 a week, compared to 19% of people with no sight loss.[32] People with low vision are more likely to live in more deprived areas.[33] There is also a protective effect on AMD for people living in less deprived areas.[34]

Area deprivation is associated with late presentation of glaucoma, which will result in increased risk of blindness from glaucoma.[35] People living in more deprived areas are

[26] Emerson E and Robertson J (2011) The Estimated Prevalence of Visual Impairment among People with Learning Disabilities in the UK. Royal National Institute of Blind People and SeeAbility 35 (2011) [Accessed 23 Apr 2021]
[27] SeeAbility (2019) Children in Focus 2019 – A Change in Sight [Accessed 23 Apr 2021]
[28] Royal National Institute of Blind People (2014) Sight loss: a public health priority [Accessed 15 Jun 2021]
[29] Rickard W and Donkin A (2018) A fair, supportive society: summary report. London: Institute of Health Equity [Accessed 15 Jun 2021]
[30] SeeAbility (2016) Delivering an equal right to sight [Accessed 23 Apr 2021]
[31] College of Optometrists (May 2016) See The Gap A policy report on UK eye health inequalities [Accessed 18 Jan 2021]
[32] Saunders A (2014) The link between sight loss and income Royal National Institute of Blind People [Accessed 06 May 2021]
[33] Yip JLY, Luben R, Hayat S and others (2014) Area deprivation, individual socioeconomic status and low vision in the EPIC-Norfolk Eye Study J Epidemiol Community Health 2014;68:204–210 [Accessed 13 Jun 2021]
[34] Yip JYL, Khawaja AP, Chan MPY and others (2015) Area deprivation and age related macular degeneration in the EPIC-Norfolk Eye Study Public Health Volume 129, Issue 2, 2015, 103-109 [Accessed 13 Jun 2021]
[35] Fraser S, Bunce C, Wormald R and Brunner E (2001) Deprivation and late presentation of glaucoma: case-control study. BMJ 322, 639–643 2001 [Accessed 19 Mar 2021]

more likely to develop diabetes and diabetic retinopathy[36] and are also less likely to attend retinal screening, all of which will increase risk of sigh loss from diabetic retinopathy.[37]

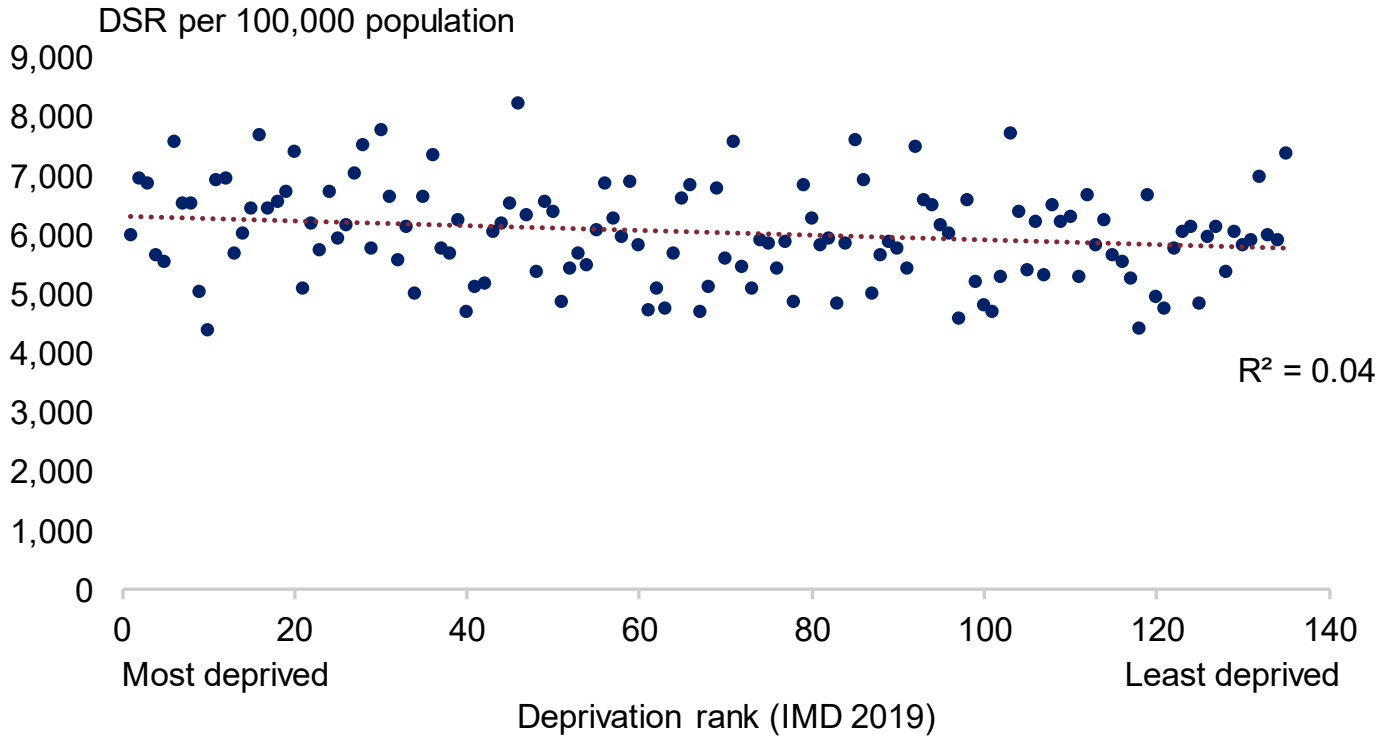
Within more deprived areas there is a lack of public awareness of the health benefits of eye examinations combined with negative perceptions of optometry around the sale of spectacles, both of which affect people accessing services.[38,39] There is also evidence of scarcity of optometry practices within areas of deprivation. Reasons for disparities in location and uptake are uncertain, the College of optometrists have suggested this could be linked to the optometry funding structures.[31]

The lack of good quality data for primary care eye services makes evidence of links between access to eye services and deprivation difficult to analyse. The General Ophthalmic Services (GOS) Activity Statistics publication does not include any breakdowns by eligibility reason or geography due to accuracy issues.[40] From 2020 a new provider is capturing the GOS data submitted for inputting to the Central Ophthalmic Payments System (COPS). NHS Digital have yet to announce what changes this may make to the published statistics.[41]

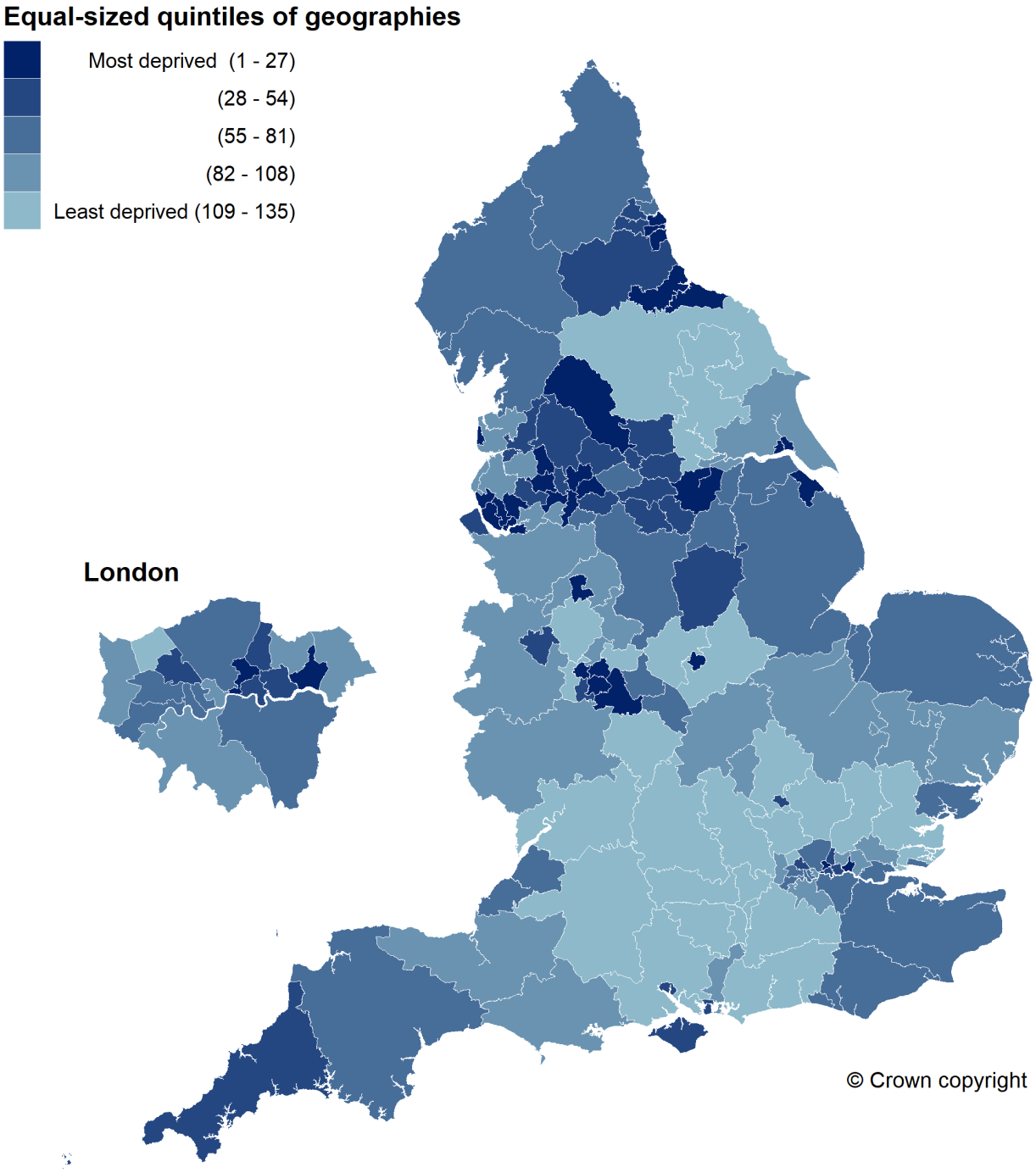
Area deprivation analysis of the hospital data for this atlas does not suggest a strong relationship with deprivation at a clinical commissioning group (CCG) level (see Figure A2) though the relationship is likely confounded by access. However, this needs to be combined with analysis of improved primary care data and at a lower geographical level to fully explore links with deprivation.

[36] Kilner M, Fell G, Gibbons C and others (2012) Inequalities in eye health and healthcare requires cross-organisational collaboration. Eye 26, 671–677 [Accessed 30 Apr 2021]
[37] Moreton RBR, Stratton IM, Chave S and others (2017) Factors determining uptake of diabetic retinopathy screening in Oxfordshire, Diabetic Medicine 43 [Accessed 05 May 2021]
[38] Shickle D, Farragher TM, Davey CJ and others (2018) Geographical inequalities in uptake of NHS funded eye examinations: Poisson modelling of small-area data for Essex, UK J Public Health (Oxf). 2018;40(2):e171-e179 [Accessed 13 Jun 2021]
[39] Shickle D, Farragher TM (2015) Geographical inequalities in uptake of NHS funded eye examinations: small area analysis of Leeds, UK J Public Health (Oxf) 2015;37(2):337–45 [Accessed 19 Mar 2021]
[40] NHS Digital (25 June 2020) General Ophthalmic Services Activity Statistics England, year ending 31 March 2020 [Accessed 24 May 2021]
[41] NHS Digital (20 Dec 2019) Consultation on plans to cease NHS Digital General Ophthalmic Services Workforce and Activity publications [Accessed 20 Jun 2021]

Figure A2: Scatterplot of all vision outpatient attendances (persons based) by index of multiple deprivation by clinical commissioning group (2019/20)



Map A4: Variation in deprivation rank (index of multiple deprivation 2019) by clinical commissioning group



The economic burden of sight loss to the NHS and wider society

A study by Deloitte highlighted that the financial burden of eye health is significant for the NHS, and to wider society.[42] In 2013, they estimated the total economic cost of sight loss to be £23.6 billion per year in England. This comprised £21.1 billion indirect costs associated with loss of productivity and reduced health and wellbeing.

The direct costs of eye health (health and social care services) in England were estimated by Deloitte to be in the region of £2.47 billion in 2013. About 50% of these costs are estimated to come from hospital inpatient, day case and outpatient expenditure, 13% for prescribing and 20% for the GOS.[42]

As the population ages and the number of people requiring treatment for eye conditions continues to increase, the direct health service costs are projected to continue to grow. The Deloitte research projected that AMD would increase its share of sight loss and blindness prevalence from 23.2% in 2013 to 29.6% in 2050 in England, reflecting a more than doubling in the number of people affected.[42] Across the UK AMD was estimated to account for 34% of total health system costs in 2013.[13] This represents the rapid growth in costs associated with the anti-vascular endothelial growth factor (VEGF) therapies used within intravitreal injection procedures to treat AMD. The analysis for this atlas shows that from the financial years beginning 2013 to 2019 there was a statistically significant rise in intravitreal injection procedures. In the financial year beginning 2013, 67,000 people received therapy, by the financial year beginning 2019 this had more than doubled to 143,000 people. NICE reports that in the financial year beginning 2015 two of the medicines for the treatment of late AMD were second and fourth in the list of medicines with positive NICE technology appraisals on which the NHS spent most money.[43]

Healthcare variation

Healthcare variation may be due to differences in preventative (for example, immunisation), primary, community, secondary and tertiary services and how they are commissioned. Maxwell's dimensions of health care quality provide a framework for measuring healthcare quality that incorporates both population level and individual patient care.[44] When the 6 dimensions are not met patient outcomes can suffer as a result.

[42] Deloitte Access Economics (2014) The economic impact of sight loss and blindness in the UK adult population, 2013 Royal National Institute of Blind People [Accessed 30 Apr 2021]
[43] National Institute for Health and Care Excellence (2018) Age-related macular degeneration (NICE Guideline [NG82]) [Accessed 20 Jun 2021]
[44] Maxwell R (1984) Quality assessment in health BMJ 288;1470-2 [Accessed 01 Jun 2021]

Maxwell's dimensions of health care quality[44]

- access to services
- relevance to need (for the whole community)
- effectiveness (for individual patients)
- equity (fairness)
- social acceptability
- efficiency and economy

It is appropriate that eye health service provision and spend varies across the country and within communities, as the total burden of eye disease varies widely (equity in access). However, all patients, regardless of where they live, should receive eye health care of equal quality. Access to services and their importance to need is particularly relevant in relation to geographical variation. However, even where services exist, the extent to which best practice is implemented in different settings can vary widely (effectiveness).

Organisation of eye services

The primary prevention of sight loss is intrinsically linked with overall good health. Secondary and tertiary prevention require services to support people. Figure A3 provides an overview of both targeted services across the life course to detect, monitor and treat eye conditions, and universal health services that protect and promote eye health.

Commissioning of eye health services is currently complex and fragmented. CCGs are responsible for commissioning secondary eye care services. NHS England commissions GOS provided by optical practices, screening and specialised services. In addition, primary eye care services provided by optical practices to deliver first contact care, pre-referral assessment and some urgent care services, are commissioned by CCGs.

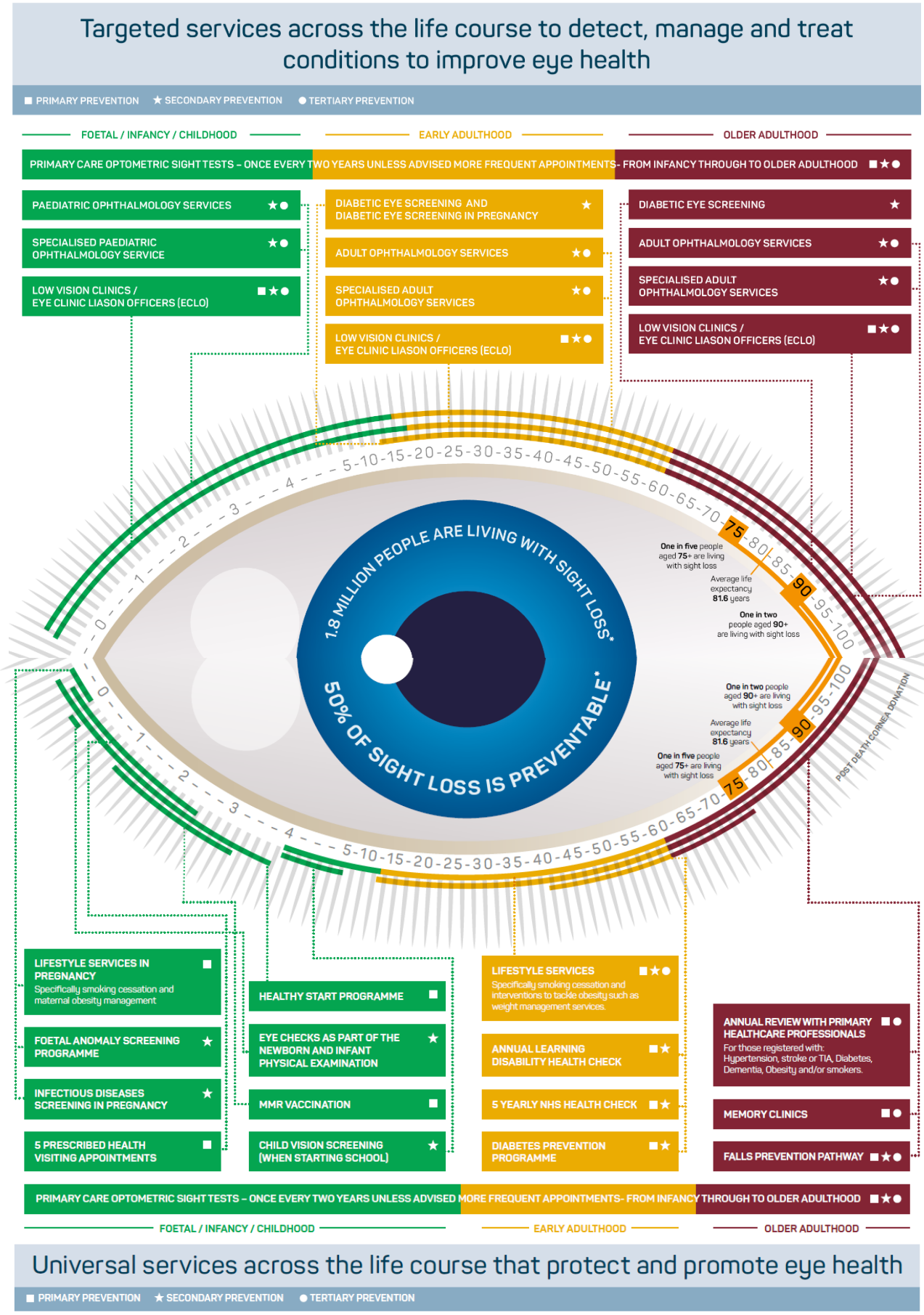
Screening programmes

The UK National Screening Committee (UK NSC) has recommended the following population based screening programmes for eye health:[45]

- the diabetic eye screening programme, a mandated service commissioned universally by NHS England
- the child vision screening programme, commissioned by local areas
- the Newborn and Infant Physical Examination Screening Programme, commissioned by NHS England, includes an eye examination to facilitate early detection of eye problems[46]

[45] National Screening Committee Current UK NSC recommendations [Accessed 04 Jun 2021]
[46] Public Health England (2021) Guidance NIPE newborn eye screening: screen positive pathway [Accessed 28 Jul 2021]

Figure A3: Targeted and universal services for eye health [47]



In addition, the Royal College of Paediatrics & Child Health (RCPCH) in collaboration with the Royal College of Ophthalmologists (RCOphth), British Association of Perinatal Medicine (BAPM) and the premature baby charity BLISS provide clinical guidelines for the screening and treatment of retinopathy of prematurity (ROP) in very premature babies. For further information about ROP see the Preterm birth section.

Diabetic Eye Screening (DES)

In financial year beginning 2018 the England diabetic eye screening programme (DESP) screened 2.3 million people, this is an uptake rate of 82.6%. The DES is commissioned by NHS England and is a mandated service. It is considered a highly successful public health initiative. A review found that for the first time in 50 years diabetic retinopathy/maculopathy was not the major cause of blindness in the working age population and attributed some of this success to the DES programme.[48] For further information about DESP see the Diabetic eye screening chapter.

Child Vision Screening (CVS)

The UK NSC recommends that screening for reduced vision is offered to all children aged 4 to 5 years and should be organised and led by orthoptists.[49] In 2015 the commissioning of CVS transferred from CCGs to upper tier local authorities (UTLA). Public Health England (PHE) has developed service specifications and information materials to support the delivery of the service.[50] As the CVS is not universally commissioned there is local variation in the service provided and there is no requirement for local authorities to collect data on CVS.

In 2019 the British and Irish Ophthalmic Society (BIOS) and Clinical Council for Eye Health Commissioning (CCEHC) undertook a Freedom of Information (FOI) request to all CCGs and UTLAs in England to collect information on the commissioning of CVS.[51] The FOI was answered by 98% of UTLAs. Box A1 summaries the main findings of the FOI.

[47] Public Health England (2018) Eye Health Needs Assessment Of people in Lincolnshire, Rutland, Leicestershire, Derbyshire, Nottinghamshire, Northamptonshire, Hertfordshire and Bedfordshire [Accessed 01 Sep 2020]
[48] Liew G, Michaelides M and Bunce C (2014) A comparison of the causes of blindness certifications in England and Wales in working age adults (16–64 years), 1999–2000 with 2009–2010 BMJ Open. 2014;4:e004015 [Accessed 18 May 2021]0
[49] National Screening Committee (2019) The UK NSC recommendation on Vision defects screening in children [Accessed 06 Jun 2021]
[50] Public Health England Child Vision Screening Service Specifications and Resources [Accessed 04 Jun 2021]
[51] British and Irish Orthoptic Society and Clinical Council for Eye Health Commissioning (March 2020) Vision screening provision in children aged 4-5 years in England Findings from a Freedom of Information Request 2019 [Accessed 04 Jun 2021]

Box A1: FOI Child Vision Screening findings

- 94% of UTLA areas provided some form of a child vision screening service
- only 47% (70 out of 148 areas) of these were fully compliant with PHE service specifications
- 9 UTLA areas had no screening service
- transfer of responsibility for commissioning CVS services remains incomplete. 30% of services continue to be commissioned by CCGs, and a further 5% of services are either not formally commissioned or there is uncertainty over who commissions the service
- there are significant gaps in the information on the availability of screening services for eligible children in different school or educational settings, and on the uptake of the screening offer

The CCEHC has recognised that the COVID-19 pandemic will have caused major interruptions to CVS services with delayed, postponed or cancelled screening for children starting reception year in September 2019 and 2020. In January 2021 the CCEHC published recommendations for alternative, failsafe arrangements for these children to have their vision tested.[52]

Primary care services

Eye care services are available “on-demand”, largely in the high street from the private sector, providing both NHS funded and privately funded sight tests. There are no reporting requirements for private sight tests, so data is not collected centrally. This makes it difficult to fully gauge the true level of public demand for eye care or to measure inequalities that may exist.[53]

Data is collected for the GOS that provide NHS funded sight tests and vouchers for both new and replacement spectacles. The GOS is funded to provide preventative and corrective eye care for children, people aged 60 and over, adults on low incomes and those suffering from or predisposed to eye conditions and diseases. GOS activity data is not representative of the whole population as there will be greater use of NHS funded treatment by populations from more deprived areas and by areas with a higher proportion of those aged 60 and over.[53]

In financial year beginning 2019 the number of NHS funded sight tests carried out in England was 13,355,060 an increase of 1.0% from the previous financial year and of

[52] Clinical Council for Eye Health Commissioning (Jan 2021) Recommendations for the Immediate Management of the Child Vision Screening Backlog for 2019/20 and 2020/21 – in England [Accessed 04 Jun 2021]
[53] NHS Digital (updated 11 June 2020) General Ophthalmic Services activity statistics - Supporting information [Accessed 06 Jun 2021]

38.2% since the financial year beginning 2002. Of all NHS-funded sight tests 3.5%, 462,250, were conducted at the persons home, residential homes and day care centres. In the financial year beginning 2019, 592,334 NHS vouchers for repair or replacement were used, an 3.1% increase since the previous financial year. In total 4,707,088 NHS vouchers were processed in the financial year beginning 2019.[40]

Secondary care services

Core ophthalmology services are provided in most NHS Trusts with specialist services in more than 100 locations providing care on a 'Hub and spoke' model with local hospitals.

CCGs are the main commissioner of secondary care services, this includes; A&E, emergency transport, elective and non-elective treatment, inpatient and outpatient activity, critical care, drugs and devices and other healthcare. Hospital prescribing, specialised and highly specialised eye health services (including ocular genetic disorders, complex corneal disorders, uveitis and surgical treatment for complex glaucoma, for example) are commissioned by NHS England.[54]

Since the financial year beginning 2009, all vision outpatient attendances have increased by 37.6% to the financial year beginning 2019. New analysis for this atlas shows in the financial year beginning 2019 there were 9 million attendances for outpatient appointments for all five vision specialities and subspecialties (ophthalmology, medical ophthalmology, paediatric ophthalmology, orthoptics and optometry) representing 3.4 million people accessing services and treatments with many patients requiring regular ongoing follow-up appointments and treatments to prevent further sight loss. In the financial year beginning 2019 alone 2.2 million people attended outpatients for the first time to begin monitoring or treatment.[55]

Workforce

As a high-volume NHS activity eye health faces the same challenges as the wider NHS with recruitment and retention of staff and workforce shortages.[56] Recent reports have highlighted a shortage of consultant and specialty training posts required to meet the increasing demand for specialist ophthalmic care.[57,58] The RCOphth estimated in 2018 that an extra 203 consultant posts were required within 2 years to meet the demand for services in England.[57] The figures for March 2021, with 1,378 posts in England represented only an increase of 118 from April 2018.[59]

[54] NHS England (updated 11 March 2021) Highly Specialised Services 2019 [Accessed 06 June 2021]
[55] NHS Digital Hospital Outpatient Activity, 2019-20: Treatment specialty [Accessed 06 Aug 2021]
[56] Clinical Council for Eye Health Commissioning (June 2019) Priorities for delivering the NHS LTP for Eye Health [Accessed 21 Jun 2021]
[57] Royal College of Ophthalmologists (January 2019) Workforce Census 2018 [Accessed 18 May 2021]
[58] MacEwen C, Davis A and Chang L (December 2019) Ophthalmology GIRFT Programme National Specialty Report Getting It Right First Time [Accessed 13 Dec 2020]
[59] NHS Digital (March 2021) NHS workforce statistics [Accessed 15 Jul 2021]

The rate of ophthalmology and medical ophthalmology consultants in England has increased, from 1.7 consultants per 100,000 population in September 2009 to 2.5 per 100,000 population in March 2021.[59] The RCOphth estimated for hospital units an ideal consultant rate of 3 to 3.5 per 100,000 population.[57] Across England the rate varies by NHS region from 1.8 per 100,000 population in the East of England to 3.1 per 100,000 in London.[59]

The RCOphth 2018 census also highlighted the need for increases in specialty doctors, staff grades and associate specialists (SAS doctors) and speciality registrars. However, SAS doctors numbers only increased by 1.7%, 40 posts, from April 2018 to March 2021,[59] below the increase of 188 posts the RCOphth recommended for England.[57] The number of ophthalmology speciality registrars have fluctuated between 670 and 830 since 2009 with no clear trend, with 296 registrars in March 2021.[59] The RCOphth commented there are insufficient specialist trainees to fill future posts and meet the expected demands of the service.[57]

Increasingly multidisciplinary teams of ophthalmic nurses, orthoptists, ophthalmic technicians and hospital optometrists play crucial roles alongside medical staff. Getting it right first time (GIRFT) recommends further implementation of specialised ophthalmic multidisciplinary teams (MDTs) and implementation of the training curriculum for non-medical eye health professionals, the Ophthalmic Common Clinical Competency Framework (OCCCF).[60]

Primary care optometrists and community ophthalmic services provide sight tests, preventative and corrective eye care as well as the identification of eye disease and referral of patients to hospital eye services. They can also be part of post-surgical management and ongoing care for patients after discharge. A multidisciplinary, joined up pathway approach for primary and secondary care services is recognised to be more convenient for patients and a helpful step in addressing capacity issues. Frameworks have been developed by the CCEHC to enable the training of staff and commissioning of services to move forward with these approaches.[61, 62, 63]

The latest GOS workforce statistics report that in 2019 there were 14,280 optometrists and ophthalmic medical practitioners in England, an increase of 42% since 2009 from 10,023.[64] This represents 25.5 optometrists and ophthalmic medical practitioners per 100,000 population in 2019, an increase from 19.2 per 100,000 population in 2009. Across England the rate varies by NHS region from 22.9 per 100,000 population in South East of England to 29.5 per 100,000 in London.[64]

[60] Health Education England The Ophthalmic Common Clinical Competency Framework [Accessed 04 Jun 2021]
[61] Clinical Council for Eye Health Commissioning (2018) SAFE: Systems and assurance framework for eye health [Accessed 24 May 2021]
[62] Clinical Council for Eye Health Commissioning (2018) Primary Care Framework [Accessed 24 May 2021]
[63] Clinical Council for Eye Health Commissioning (2020) Community Eye Service Framework [Accessed 24 May 2021]
[64] NHS Digital (31 Dec 2019) General Ophthalmic services workforce statistics [Accessed 15 Jul 2021]

National Eye Care Restoration and Transformation Programme

Prior to the COVID-19 pandemic, improving eye health services was already a key part of the NHSE&I national outpatients transformation programme.[6] The NHS Long Term Plan[65] ambitions, stopping 30 million unnecessary outpatient appointments, offering digital outpatient care and scaling up system working and transformation, could not be achieved without transforming eye services.

The NHS is now moving quickly to restore and recover clinical services following the COVID-19 pandemic.[66] The National Eye Care Restoration and Transformation Programme brings stakeholders together to build on existing guidelines and recommendations to rapidly recover eye services and to drive forward long-term developments and solutions to improve services.

The programme aims to: Prevent irreversible sight loss as a result of delayed treatment and improve access to care for all based on clinical need; Deliver long-term transformation of eye health services across primary, secondary and community care; drive innovative, integrated, safe and sustainable ways of working and meet the needs of the population now and in the future, keeping patients at the centre of all decision making.

The programme resources and Eye Care Restoration Roadmap for 2020/21 will be hosted on the FutureNHS Eye Care Hub.

How should we respond to variation?

The information contained within this atlas is a starting point for CCGs to examine their local outcomes, the quality of their eye services, and to benchmark themselves against other CCGs and the national average. However, to understand what the variation means and whether it is unwarranted variation, further work will be necessary. It is important not simply to just rely on comparison with the national average, but instead to consider what the appropriate figure is based on local need.

Where there is concern identified, further analysis of the data and consultation with stakeholders will usually be required to answer the following questions:

- what are the reasons for the variation?
- is this warranted or unwarranted variation?
- is this concentrated within certain groups or is it equal across the whole population? (Consider undertaking a health equity audit)

[65] NHS England (Jan 2019) NHS Long Term Plan [Accessed 29 Jul 2021]
[66] NHS England (March 2021) 2021/22 priorities and operational planning guidance [Accessed 29 Jul 2021]

RightCare's model of 'diagnose, develop, deliver' (Figure A4) outlines how local areas can respond to variation.

What is RightCare?

The RightCare delivery methodology is based around three simple principles;

Diagnose the issues and identify the opportunities with data, evidence and intelligence
Develop solutions, guidance and innovation
Deliver improvements for patients, populations and systems

Figure A4: RightCare Model

RightCare Methodology

RightCare's offer is aimed at systems and starts with a review of indicative data to identify opportunities to reduce unwarranted variation and improve population healthcare.

Diagnose

RightCare data packs (produced across a range of programme areas e.g. CVD, Respiratory, MSK,) allow local health systems to consider information from across patient pathways to identify the greatest potential improvements in spend and outcomes.

As most health conditions are linked to demographic factors such as deprivation and age, RightCare compares systems to their closest demographically similar geographies. This is to provide realistic comparisons, taking into account the need for healthcare of different populations. Deprived populations will have much higher rates of admissions and worse health outcomes for conditions such as Respiratory, CVD, Cancer, Diabetes.

By comparing 10 demographically similar CCGs, ensures that comparisons are fair and meaningful.

RightCare has developed the 'Similar 10 CCG Explorer tool' which allows users to investigate all the different demographic variables that comprise the similar ten calculations and see how similar their CCG is to the similar 10 CCGs on each these factors. The tool also allows users to create their own bespoke similar ten grouping by changing the weightings of any of the different variables.

The three main data sources which make up a significant number of RightCare indicators combine Secondary Uses Service (SUS+) inpatient data, Quality and Outcomes Framework (QOF) and ePACT prescribing data supplied by the NHS Business Services Authority.

RightCare also provides STPs opportunity data by presenting the sum of all the equivalent opportunities of the CCGs in that area in one pack. They do not include negative opportunities or those which are statistically insignificant.

RightCare data is now included in the Model Health System - a data-driven improvement tool that supports health and care systems to improve patient outcomes and population health. As well as RightCare and GIRFT quality indicators, the Model Health System includes a wide range of health or health related information. These include population health; community, acute, and mental health services; ambulance service activity; prescribing; and electronic staff records. Data is available by trust or STP. RightCare indicators for Eye Care are available at STP level and can be accessed within the 'Ophthalmology' compartment within the 'Acute Hospital Services' lens and the 'Pathway Improvement Programme' compartment in the 'Policy Priorities' lens. All NHS staff can access the Model Health System.

RightCare Pathways and scenarios are designed from a patient point of view starting with prevalence right through to end of life. They are developed in close collaboration with NHS England's National Clinical Directors, patient groups, Public Health England, Royal Colleges, and other key stakeholders.

The data and evidence provides a set of resources to support systems to concentrate their improvement efforts where there is greatest opportunity to address variation and improve population health.

Develop and Deliver

RightCare supplies systems with tools and products to identify improvements using evidence-based best practice, developed with our national partners, at the moment that local clinicians are considering what good looks like in that area of their system.

Data gaps

The first step in identifying unwarranted variation is the 'systematic and routine collation, analysis and publication of such variations'.[67] However, much eye health activity is either not collected or not collected in sufficient detail to allow robust analysis. Significant data gaps that have been identified during the development of this atlas include:

Screening services

Child Vision Screening services are locally commissioned and provided. There is no central data collection and the only recent information available is from the 2019 freedom of information request.

Data on the outcome of eye checks from the Newborn and Infant Physical Examination Screening Programme is not available.

Primary Care Services

The activity and workforce statistics published by NHS Digital for the General Ophthalmic Services (GOS) have reduced in scope in recent years. The data quality no longer meets the standards to be classed as National Statistics and NHS Digital have ceased to publish detailed breakdowns, such as activity by area, as the data is not robust enough.[53] From 2020 a new provider is capturing the GOS data submitted to the Central Ophthalmic Payments System (COPS). NHS Digital have yet to announce what changes this may make to the published statistics.[68]

There is no central collection of data on sight checks that are privately funded. This prohibits any analysis of the demand and uptake of sight checks across the whole population.

Secondary care services

Eye health care is provided predominately in outpatient services. However, the mandated data collection for outpatient activity is not as detailed as inpatient care. There is no mandatory requirement for hospital episode statistics outpatient episodes to be coded by diagnosis (ICD10) or by procedure (OPCS4).

[67] Appleby J, Raleigh V, Frosini F and others (2011) Variation in Healthcare The good, the bad and the inexplicable The King's Fund [Accessed 04 Jun 2021]
[68] NHS Digital (20 December 2019) Consultation on plans to cease NHS Digital General Ophthalmic Services Workforce and Activity publications [Accessed 04 Jun 2021]

Magnitude of variation summary table

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
1a	CCG20	Experimental statistic: Variation in rate of all vision outpatient attendances (2019/20)	Requires local interpretation	9,821 - 24,131	2.5	70 (from 135)	54 (from 135)	No significant change	Significant increasing
1b	CCG20	Experimental statistic: Variation in rate of all vision outpatient attendances (persons based) (2019/20)	Requires local interpretation	4,404 - 8,248	1.9	62 (from 135)	55 (from 135)	Both the 95th to 5th percentile gap and the 75th to 25th percentile gap widened significantly	Significant increasing
1c	CCG20	Experimental statistic: Variation in rate of all vision outpatient first attendances (2019/20)	Requires local interpretation	2,266 - 8,027	3.5	55 (from 135)	64 (from 135)	The 95th to 5th percentile gap widened significantly	Not Significant increasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
1d	CCG20	Experimental statistic: Variation in rate of all vision outpatient follow up attendances (2019/20)	Requires local interpretation	7,056 - 19,468	2.8	70 (from 135)	58 (from 135)	No significant change	Significant increasing
2a	CCG20	Experimental statistic: Variation in rate of all intravitreal injection therapy procedures in people aged 60 years and over (2019/20)	Requires local interpretation	49 - 9,277	188.6	54 (from 135)	58 (from 135)	There has been significant widening of all three measures of variation	Significant increasing
2b	CCG20	Experimental statistic: Variation in rate of first intravitreal injection therapy procedures in people aged 60 years and over (2019/20)	Requires local interpretation	16.6 - 490.2	29.5	22 (from 135)	18 (from 135)	The 75th to 25th percentile gap narrowed significantly	Not Significant increasing
3a	CCG20	Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over (2019/20)	Requires local interpretation	2,462 - 5,299	2.2	57 (from 135)	41 (from 135)	No significant change	Significant increasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
3b	CCG20	Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over (2019/20)	Requires local interpretation	1,371 - 2,943	2.1	38 (from 135)	30 (from 135)	No significant change	Significant increasing
3c	CCG20	Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over (2019/20)	Requires local interpretation	584.0 - 2,053.1	3.5	60 (from 135)	39 (from 135)	No significant change	Not Significant increasing
4	CCG20	Variation in rate of rhegmatogenous retinal detachment surgery in people aged 18 years and over (2019/20)	Requires local interpretation	4.6 - 40.5	8.9	6 (from 135)	17 (from 135)	No significant change	Significant increasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
5a	CCG18	Variation in percentage of those offered diabetic eye screening who attend a routine digital screening event (where images were captured) in people aged 12 years and over (2018/19)	High	73.8 - 92.1	1.2	Significance not calculated	Significance not calculated	Trend data unavailable	Trend data unavailable
5b	DESP area	Variation in percentage of urgent referrals for diabetic eye disease (referred proliferative diabetic retinopathy [R3A]) seen within 6 weeks of screening event in people aged 12 years and over (2018/19)	High	33.3 - 94.6	2.8	Significance not calculated	Significance not calculated	Trend data unavailable	Trend data unavailable

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
5c	DESP area	Variation in percentage of routine referrals for diabetic eye disease (referred pre-proliferative diabetic retinopathy [R2] or maculopathy [M1]) seen within 13 weeks of screening event in people aged 12 years and over (2018/19)	High	15.3 - 88.4	5.8	Significance not calculated	Significance not calculated	Trend data unavailable	Trend data unavailable
6	CA	Variation in incidence rate of uveal, retinal and conjunctival cancers (2013-2018)	Requires local interpretation	0.8 - 1.7	2.2	2 (from 21)	3 (from 21)	Trend data unavailable	Trend data unavailable
7a	UTLA20	Variation in rate of new certifications of visual impairment (CVI) due to age related macular degeneration (AMD) in people aged 65 years and over (2019/20)	Requires local interpretation	16.4 - 174.8	10.7	6 (from 151)	12 (from 151)	Both the 95th to 5th percentile gap and the 75th to 25th percentile gap narrowed significantly	Significant decreasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
7b	UTLA20	Variation in rate of new certifications of visual impairment (CVI) due to glaucoma in people aged 40 years and over (2019/20)	Requires local interpretation	0.0 - 31.3	Not applicable	9 (from 151)	3 (from 151)	No significant change	Not Significant increasing
7c	UTLA20	Variation in rate of new certifications of visual impairment (CVI) due to diabetic eye disease in people aged 12 years and over (2019/20)	Requires local interpretation	0.0 - 8.4	Not applicable	1 (from 151)	0 (from 151)	The 95th to 5th percentile gap narrowed significantly	Significant decreasing
7d	UTLA20	Variation in rate of new certifications of visual impairment (CVI) from all causes in people of all ages (2019/20)	Requires local interpretation	8.7 - 96.9	11.1	23 (from 151)	25 (from 151)	No significant change	Not Significant decreasing
8a	UTLA20	Variation in rate of registered blind or partially sighted people aged 65 to 74 years (2019/20)	Requires local interpretation	58.5 - 1,371.3	23.4	48 (from 151)	36 (from 151)	The 95th to 5th percentile gap narrowed significantly	Not Significant decreasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
8b	UTLA20	Variation in rate of registered blind or partially sighted people aged 75 years and over (2019/20)	Requires local interpretation	393 - 10,278	26.2	48 (from 151)	64 (from 151)	No significant change	Significant decreasing
9	UTLA20	Variation in percentage of social care users aged 18 years and over who have as much social contact as they would like (2019/20)	High	34.3 - 56.6	1.7	Significance not calculated	Significance not calculated	No significant change	Significant increasing
10	LTLA20	Variation in rate of emergency admissions to hospital due to falls in people aged 65 years and over (2019/20)	Low	1,235 - 3,394	2.7	71 (from 314)	93 (from 314)	The 75th to 25th percentile gap widened significantly	Not Significant increasing
11	CCG18	Variation in percentage of people aged 16 years and over who have diabetes (estimated prevalence - undiagnosed and diagnosed) (2017)	Low	6.6 - 11.9	1.8	Significance not calculated	Significance not calculated	Trend data unavailable	Trend data unavailable

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
12	LTLA20	Variation in percentage of people aged 18 years and over classified as overweight or obese (body mass index greater than or equal to 25 kg/m2) (2019/20)	Low	41.6 - 78.3	1.9	Significance not calculated	Significance not calculated	No significant change	Significant increasing
13	LTLA20	Variation in percentage of people aged 19 years and over that meet CMO recommendations for physical activity (150+ moderate intensity equivalent minutes per week) (2019/20)	High	49.4 - 80.2	1.6	51 (from 314)	36 (from 314)	The 95th to 5th percentile gap widened significantly	Not Significant increasing
14a	CCG18	Variation in percentage of people aged 18 years and over self-reporting as smokers (2019)	Low	5.9 - 27.5	4.7	8 (from 195)	12 (from 195)	The 75th to 25th percentile gap narrowed significantly	Significant decreasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
14b	CCG19	Variation in percentage of women who are known to smoke at time of delivery (2019/20)	Low	2.1 - 23.1	10.8	73 (from 191)	58 (from 191)	The 95th to 5th percentile gap narrowed significantly	Significant decreasing
15a	LTLA19	Variation in rate of premature live births (less than 37 weeks gestation) and all stillbirths (2016-18)	Low	56.9 - 112.2	2	24 (from 317)	31 (from 317)	No significant change	Not Significant increasing
15b	CCG19	Variation in percentage of all births (live and stillbirths) with very low weight (under 1,500g) (2018)	Low	0.2 - 2.3	9.7	12 (from 191)	8 (from 191)	No significant change	Significant decreasing
15c	Hospital unit	Variation in percentage of eligible babies screened on-time for retinopathy of prematurity (ROP) (2019)	High	51.8 - 100.0	1.9	Significance not calculated	Significance not calculated	Trend data unavailable	Trend data unavailable
16a	UTLA20	Variation in rate of children with learning difficulties known to schools (2020)	Requires local interpretation	11.3 - 75.1	6.6	54 (from 151)	75 (from 151)	No significant change	Not Significant decreasing

Map	Area type	Title	Optimum value	Range	Fold difference	Number of areas significantly higher than England (99.8% level)	Number of areas significantly lower than England (99.8% level)	Variation trend	Median trend
16b	UTLA20	Variation in rate of people aged 18 years and over with a learning disability getting long-term support from local authorities (2019/20)	Requires local interpretation	2.0 - 6.3	3.2	37 (from 151)	43 (from 151)	The 75th to 25th percentile gap narrowed significantly	Significant increasing

Quick user guide

Maps

1. **Type of statistic** (e.g. rate, proportion)
2. **Geographic boundaries**
3. **Year of data presented**
4. **Rate calculated per x number of people**
5. **Optimum values** Low indicates lower values are preferential (high indicates higher values are preferential). Local interpretation maybe required for some indicators.

Map 1a: Experimental statistic: Variation in rate of all vision outpatient attendances by clinical commissioning group (2019/20)

1 Directly standardised rate per 100,000 population 4
Optimum value: Requires local interpretation 5

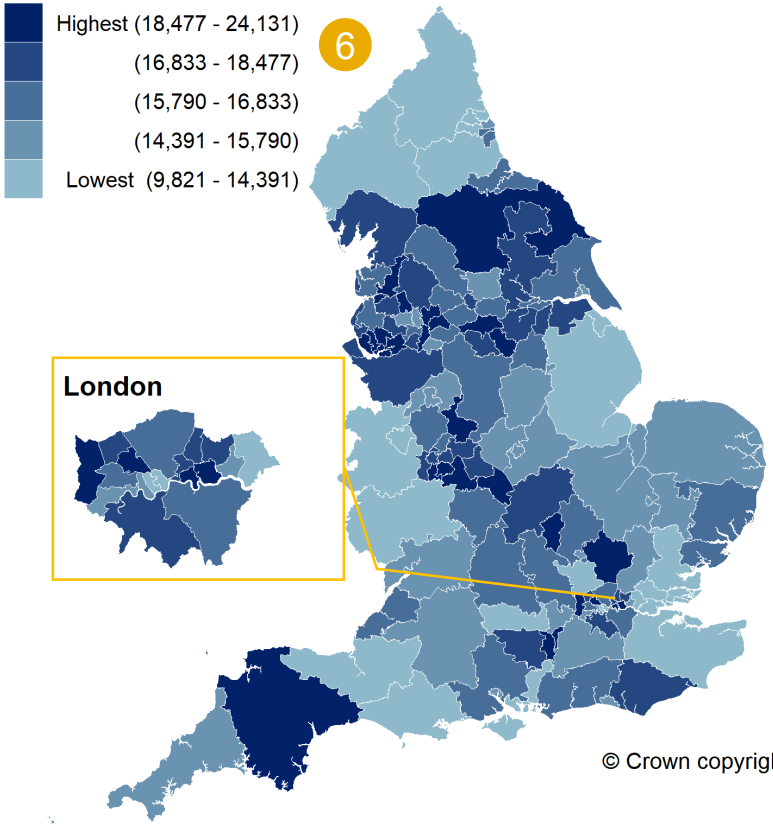
2

3

Equal-sized quintiles of geographies

Highest (18,477 - 24,131)
(16,833 - 18,477)
(15,790 - 16,833)
(14,391 - 15,790)
Lowest (9,821 - 14,391)

6

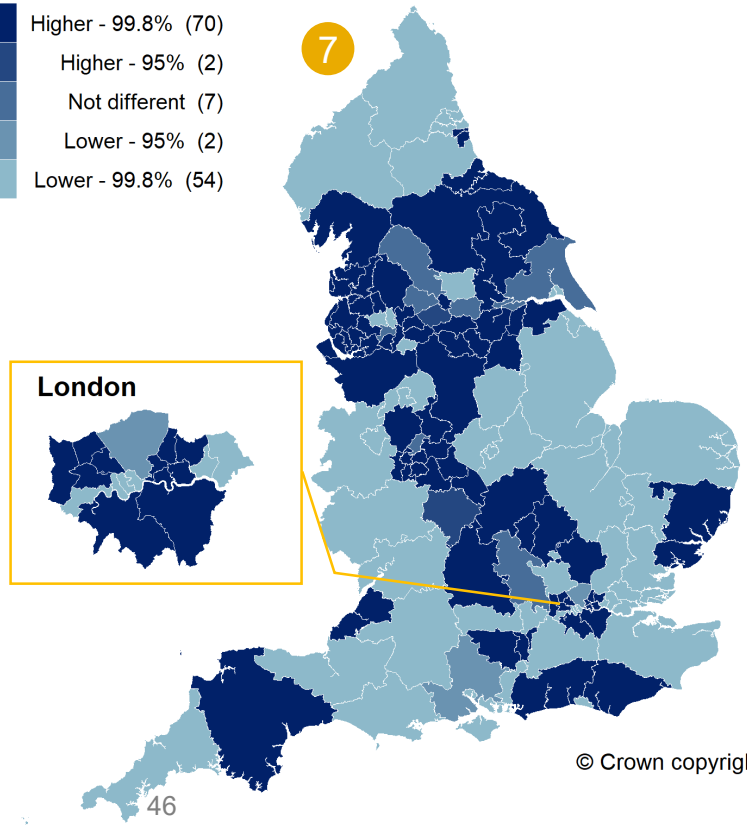


Significance level compared with England

Higher - 99.8% (70)
Higher - 95% (2)
Not different (7)
Lower - 95% (2)
Lower - 99.8% (54)

7

8



6. **Equal sized quintiles** The number of areas presented on the map are divided equally between the 5 categories with those with the highest values forming the 'Highest' group etc.

   For example, in 2020 there were 135 clinical commissioning groups (CCGs), so 27 CCGs are in each category. Darker areas have the highest values.

7. **Significance level compared with England** The darkest and lightest shading on map shows CCGs whose confidence intervals do not overlap with the England value.

   The second darkest and lightest colours show areas where the England value falls between the CCG's 95% and 99.8% CI.

   The number in brackets indicates the number of CCGs in each category.

8. **London** is presented as a separate zoomed in map for clarity.

Quick user guide

Chart, box plot and table

1. Title shows indicator details including: value type, geography and year.
2. The y-axis plots the value and gives details of the value type e.g. rate / proportion and the unit e.g. per 100,000 population.
3. The x-axis shows the geography and the number of areas on chart.
4. The line shows the England average.
5. Each bar represents an area (e.g. a CCG). The height of the bar is relative to the value for that area. Collectively, the bars show the spread of values across England.

   The colour of the bar represents how significant the area's value is in relation to England based on the area's confidence interval. Areas utilise the same colours and categories as the maps.

   Areas that are significantly higher than England at a 99.8% or 95% level are shown as darker bars whereas those with lower significance to England, at a 99.8% or 95% level, are lighter. The colour in the middle represents areas that are not significantly different from England.

   Where the significance bar chart is unavailable, the equal interval map colours have been used.
6. For each indicator, data is presented visually in a time series of box and whisker plots. The box plots show the distribution of data.

   The line inside each box shows the median (the mid-point, so if the 135 CCGs were sorted in order of value, the value halfway between the CCGs in the 67th and 68th position would give the median). The bottom and top of the blue box represents the values which 25% and 75% of the areas fall below. 50% of the areas have a value within this range.

   The whiskers mark the values at which 5% and 95% of areas fall below. The median and maximum values are also shown.

   The time series allows us to see how the median has changed over time, but also whether the gap between the extreme values has changed.

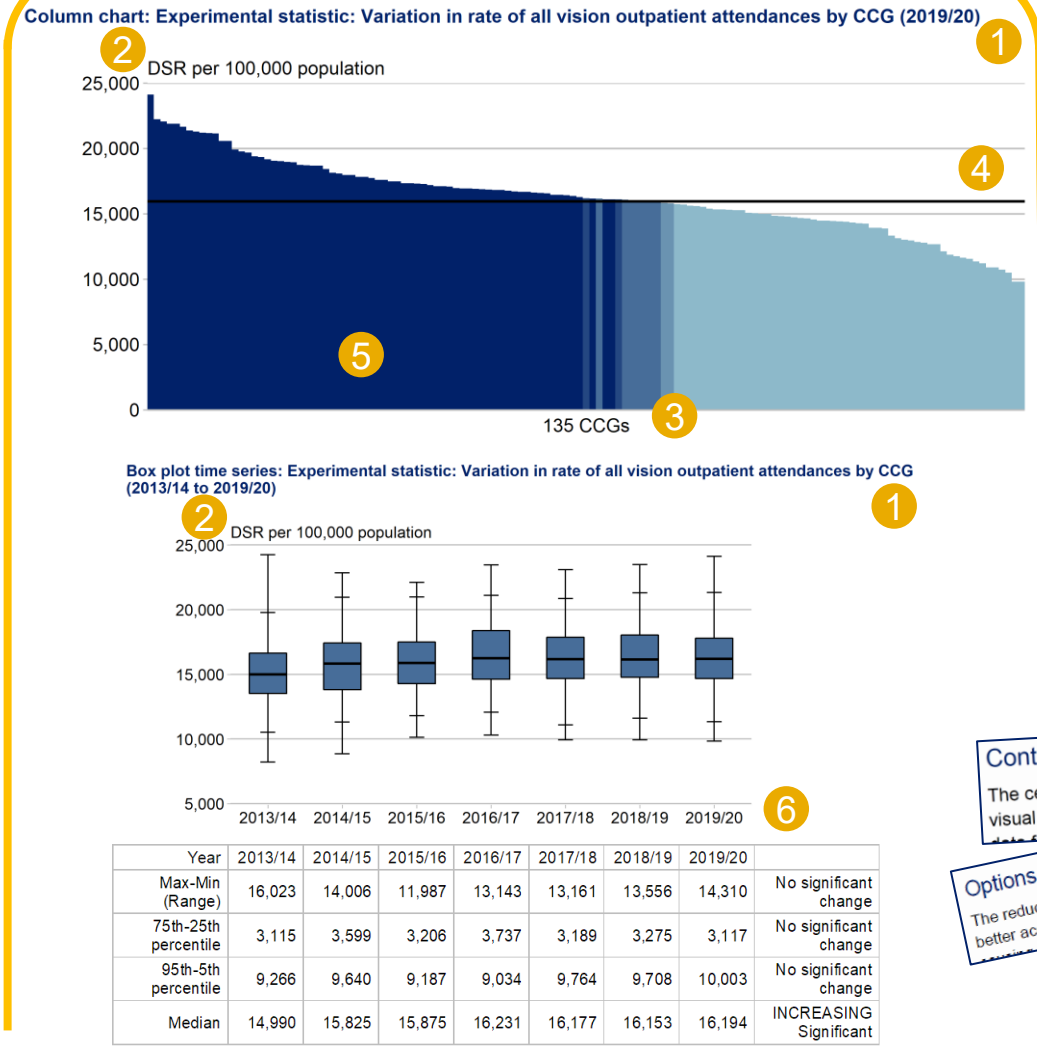
   The table accompanying the box and whisker plots shows whether there has been any statistically significant change in the median, or in the degree of variation over time.
7. **Sections in the chapter**

   Context – an overview of why the indicator is of public health interest

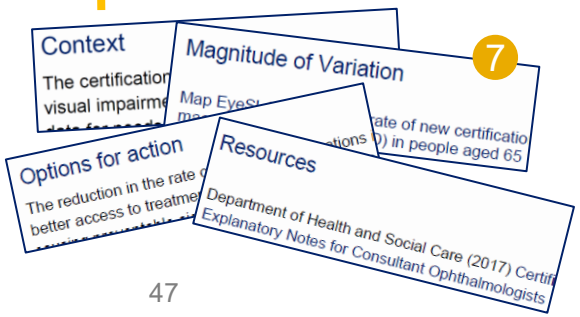
   Magnitude of variation – commentary in relation to the chart, box plot and table

   Options for action – suggestions for best practice

   Resources – links to useful documents



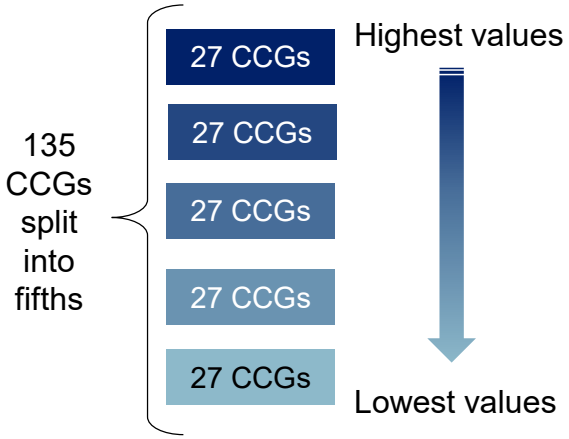
Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	16,023	14,006	11,987	13,143	13,161	13,556	14,310	No significant change
75th-25th percentile	3,115	3,599	3,206	3,737	3,189	3,275	3,117	No significant change
95th-5th percentile	9,266	9,640	9,187	9,034	9,764	9,708	10,003	No significant change
Median	14,990	15,825	15,875	16,231	16,177	16,153	16,194	INCREASING Significant



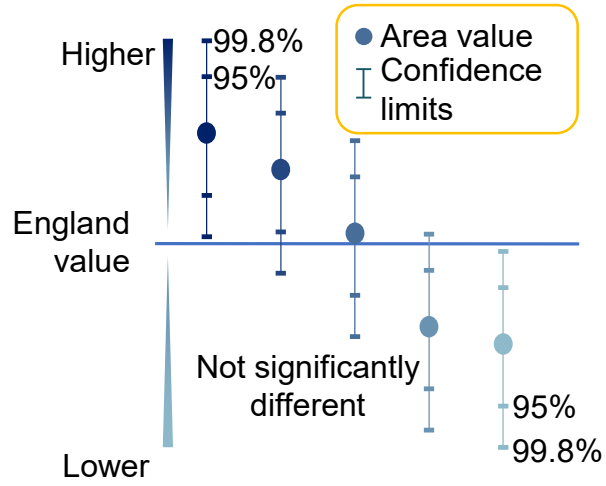
Quick user guide

How were the categories calculated?

Equal-sized quintiles



Significance to England



Confidence intervals give an estimated range in which the true CCG value lies.

Where the CCG's confidence interval does not overlap with the England value, the CCG is classed as being *significantly higher or lower than England at a 99.8% level*.

If the England value lies between the 99.8% and 95% CI, this value is classed as being *significantly higher or lower than England at a 95% level*.

Where the England value is between the upper and lower 95% CI, the CCG is classed as *not being significantly different from England*.

Box & whisker plot

Whiskers
Show the extreme values in the dataset.

Box
50% of the data values lie between the 25th and 75th percentile. The distance between these is known as the inter-quartile range (IQR).

Maximum The value of the area with the highest value.

95th percentile 95% of areas have values below this.

75th percentile 75% of areas have values below this.

Median (50th percentile) The median is the middle value of an ordered dataset. Half of the observations are below it and half above.

25th percentile 25% of areas have values below this.

5th percentile 5% of areas have a value below this.

Minimum The value of the area with the lowest value.

Box plot percentile	CCG rank position (135 CCGs in 2020)
Max	135
95%	Mid value between values of CCGs in ranks 128 and 129
75%	Mid value between values of CCGs in ranks 101 and 102
50% - Median	Mid value rank 68
25%	Mid value between values of CCGs in ranks 34 and 35
5%	Mid value between values of CCGs in ranks 7 and 8
Min	1

Outpatient activity

Context

Ophthalmology is a specialty clinical service provided predominantly in an outpatient setting. Hospital episode statistics (HES) for outpatient activity includes all NHS Trusts in England and NHS commissioned activity within the independent sector.[1] Since the financial year beginning 2009, all vision outpatient attendances have seen an increase of 37.6% in attendances when compared to the financial year beginning 2019 and accounted for 9.4% of all NHS outpatient attendances in the financial year beginning 2019.[2] There is no mandatory requirement to code outpatient attendances by diagnosis or procedure, so data with this level of detail is incomplete. Nevertheless, outpatient data reflect overall trends in activity associated with service provision and are used as a proxy for 'need' to inform service planning and commissioning decisions and for service contract agreements.

The rising outpatient activity has posed significant and increasing pressure on capacity for timely service provision, resulting in delays for follow-up appointments and increasing the risk of harm and adverse outcomes for patients.[3, 4, 5] This has attracted national attention at the highest levels within the NHS with efforts across the sector to address these challenges.[4,5]

The following treatment specialty codes were used for the analyses on variations in all vision outpatient attendance presented in the following sections: ophthalmology (130), paediatric ophthalmology (216), medical ophthalmology (460), orthoptics (655) and optometry (662).

Outpatient activity during the COVID-19 pandemic

The coronavirus (COVID-19) pandemic has impacted greatly on all vision outpatient attendances with attendance levels dropping considerably for both all outpatient and first attendance.

Although attendance did increase from the lower levels of attendance observed during the first wave when routine primary private and NHS sight tests were suspended[6] and

[1] NHS Digital Hospital Episode Statistics (HES) [Accessed 16 Jun 2021]
[2] NHS Digital Hospital Outpatient Activity, 2019-20: Treatment specialty [Accessed 06 Aug 2021]
[3] Healthcare Safety Investigation Branch (2020) Investigation into lack of timely monitoring of patients with glaucoma [Accessed 24 Nov 2020]
[4] NHS England (2019) Transforming Elective Care Services – Ophthalmology [Accessed 08 Jul 2021]
[5] Getting It Right First Time (2019) Ophthalmology GIRFT Programme National Specialty Report [Accessed 24 Jun 2020]
[6] NHS England and NHS Improvement (2020) Resumption of optical services in England [Accessed 19 Jun 2021]

face to face outpatient attendances were only allowed if absolutely necessary, subsequent waves have impacted upon attendance to a lesser extent. However, this does not reflect the true demand position as it does not include the total number of patients waiting to be seen following a new referral, and those risk assessed as low and still waiting to be seen for a routine appointment.

Figure 1.1: Experimental statistic - Provisional data: All vision outpatient attendances in all ages for England (January 2018 to February 2021)

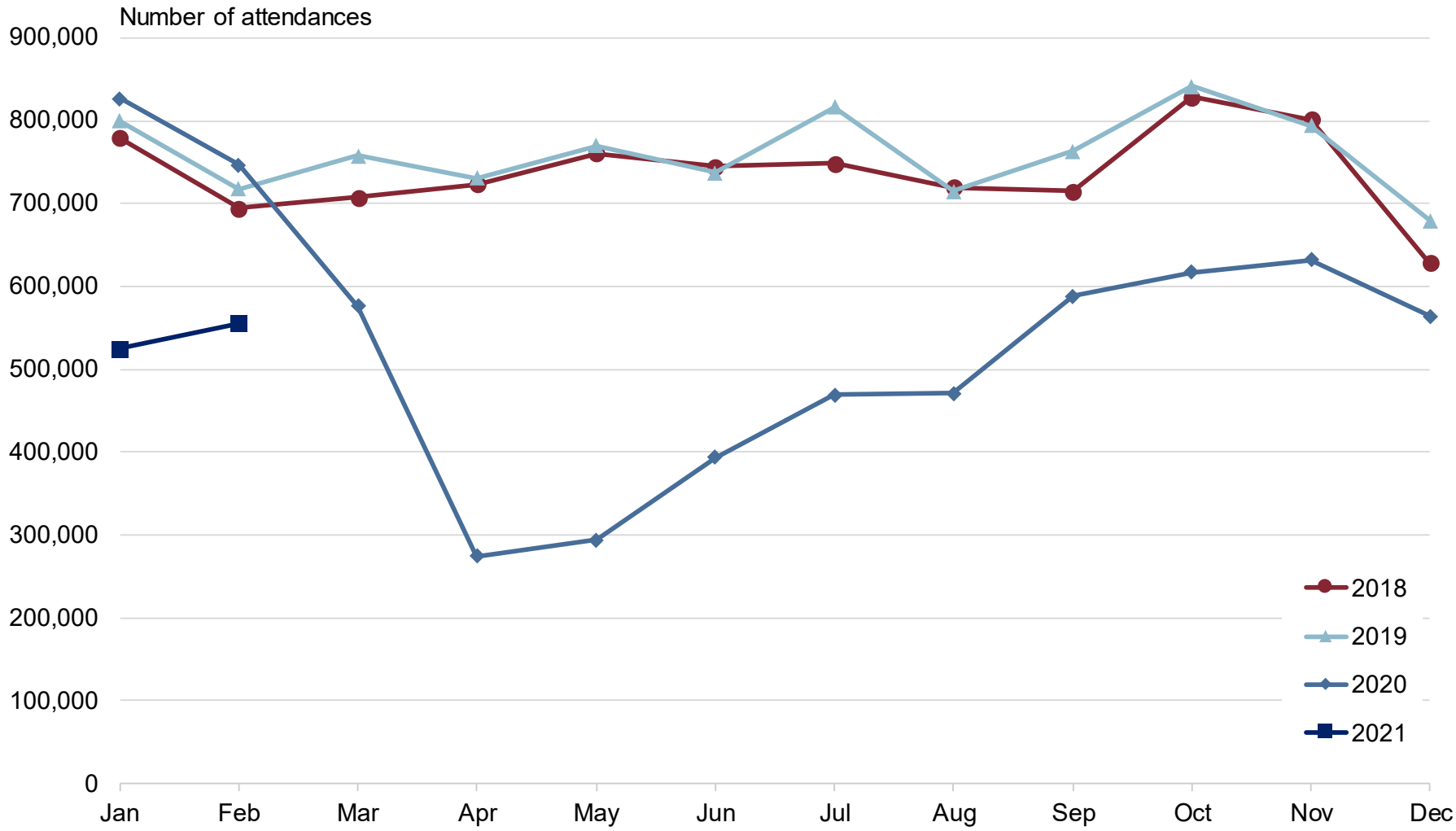
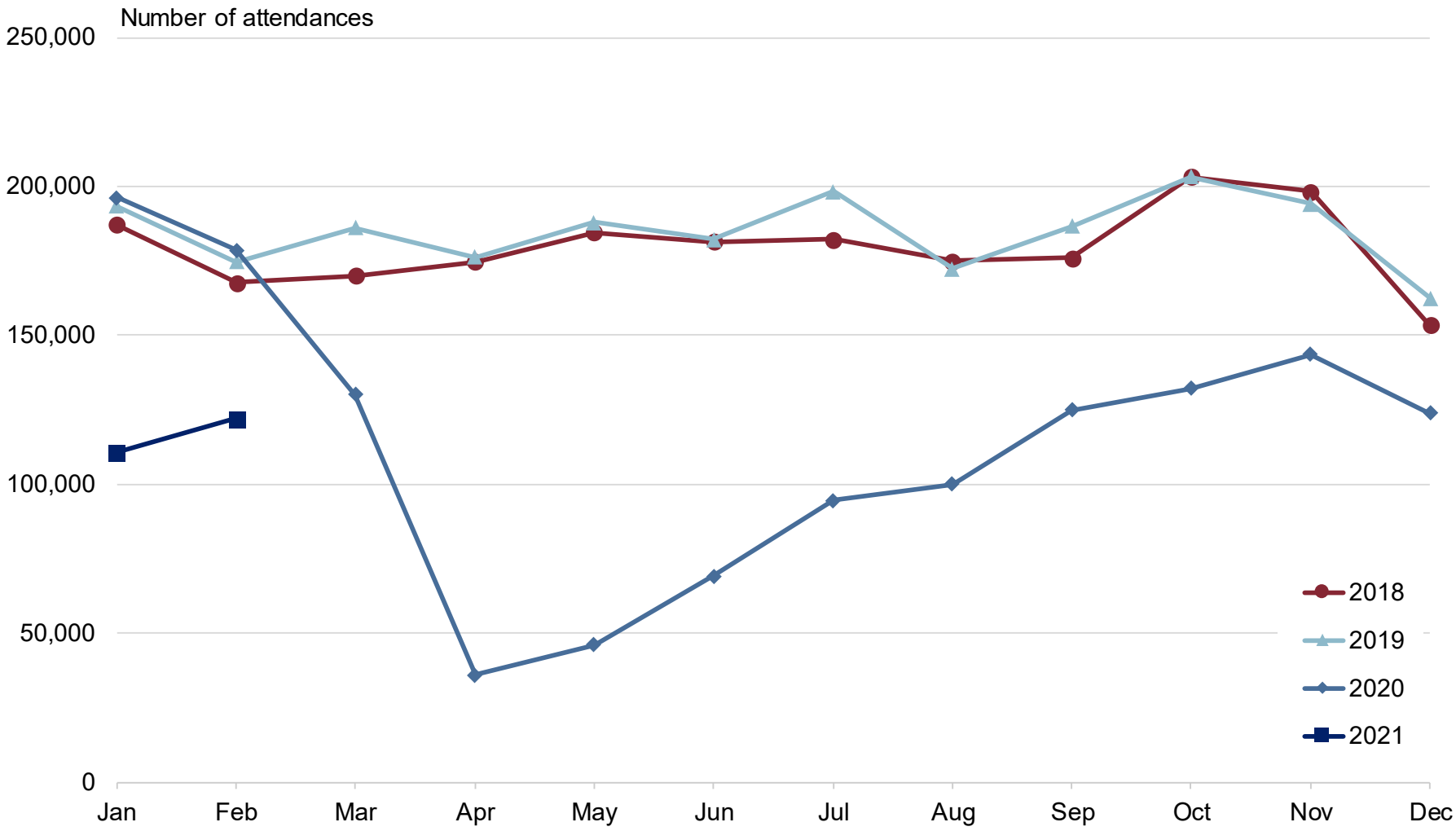
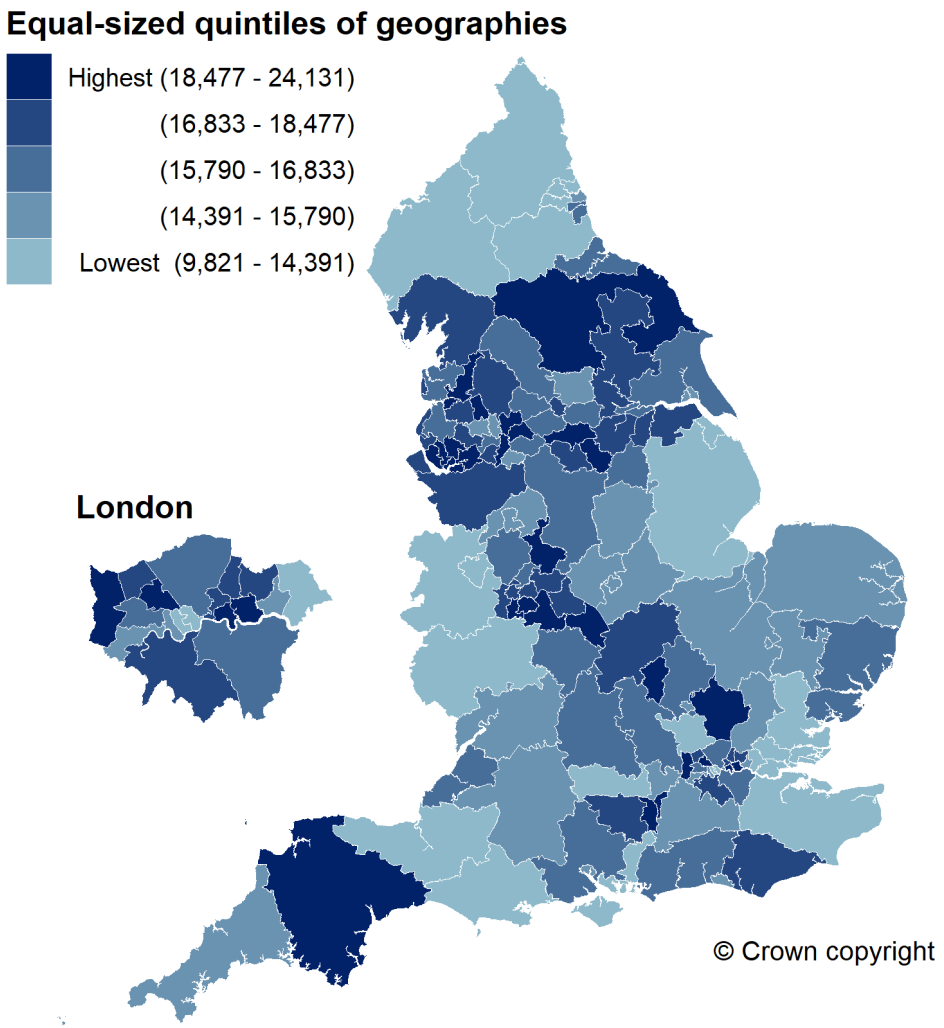


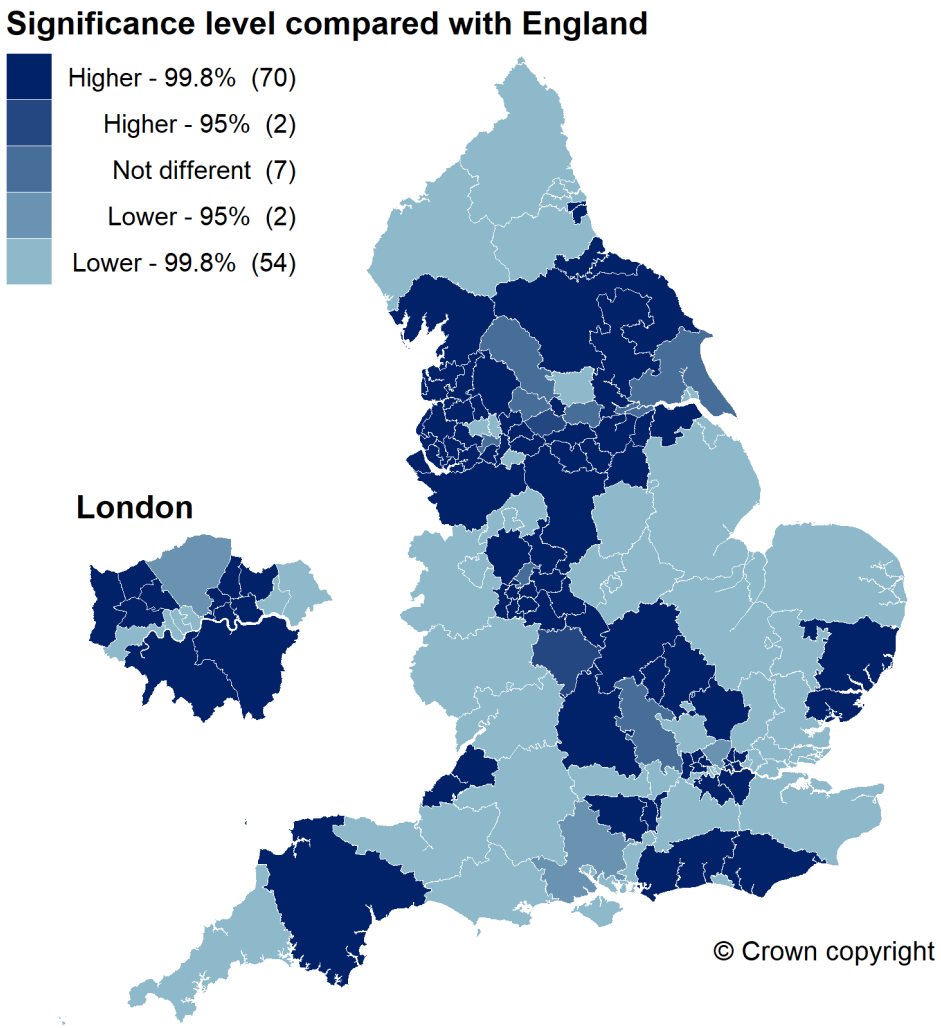
Figure 1.2: Experimental statistic - Provisional data: All vision outpatient first attendances in all ages for England (January 2018 to February 2021)



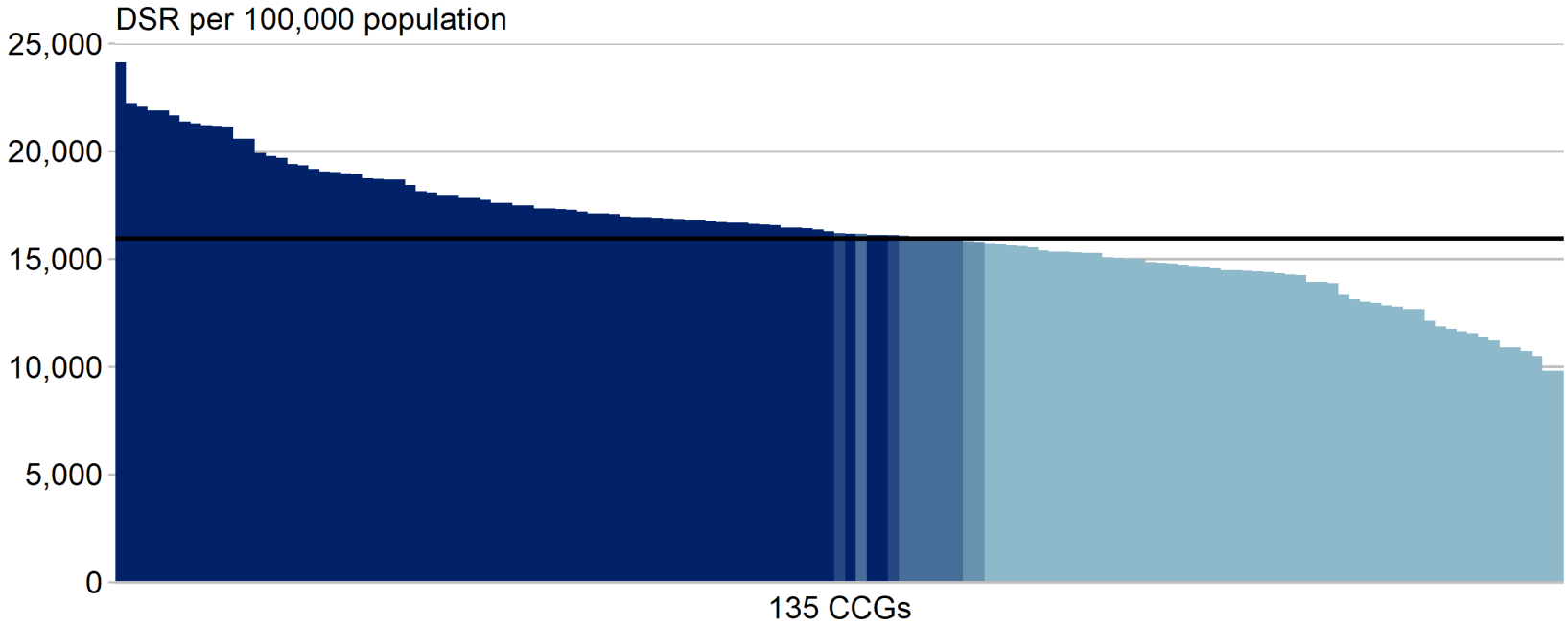
Map 1a: Experimental statistic: Variation in rate of all vision outpatient attendances by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

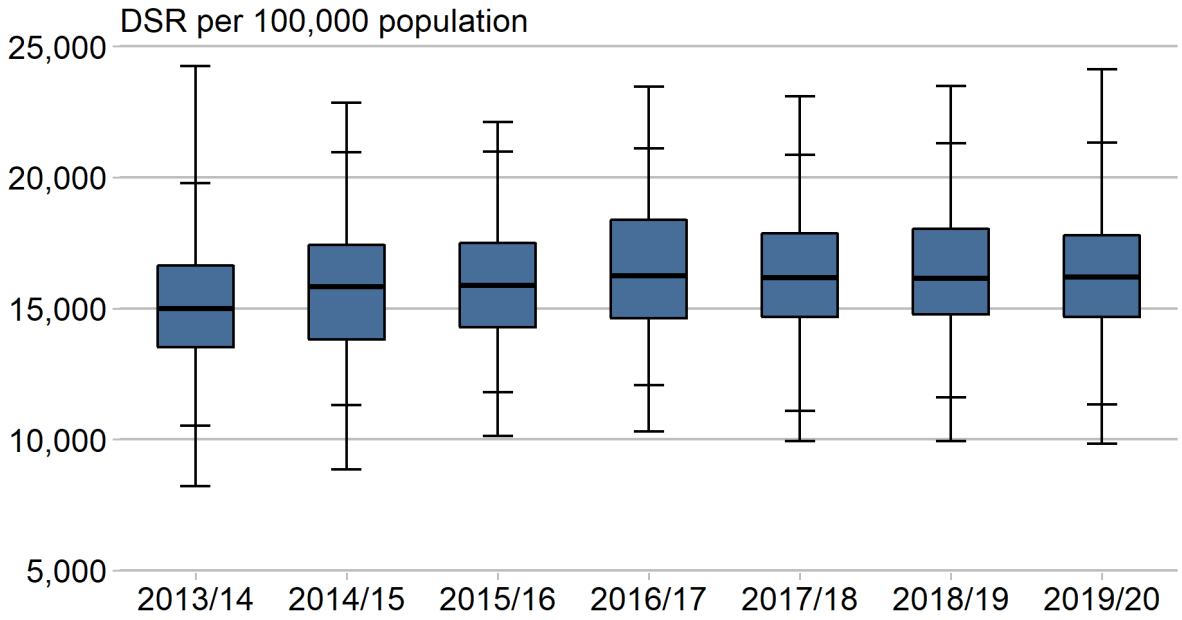




Column chart: Experimental statistic: Variation in rate of all vision outpatient attendances by CCG (2019/20)



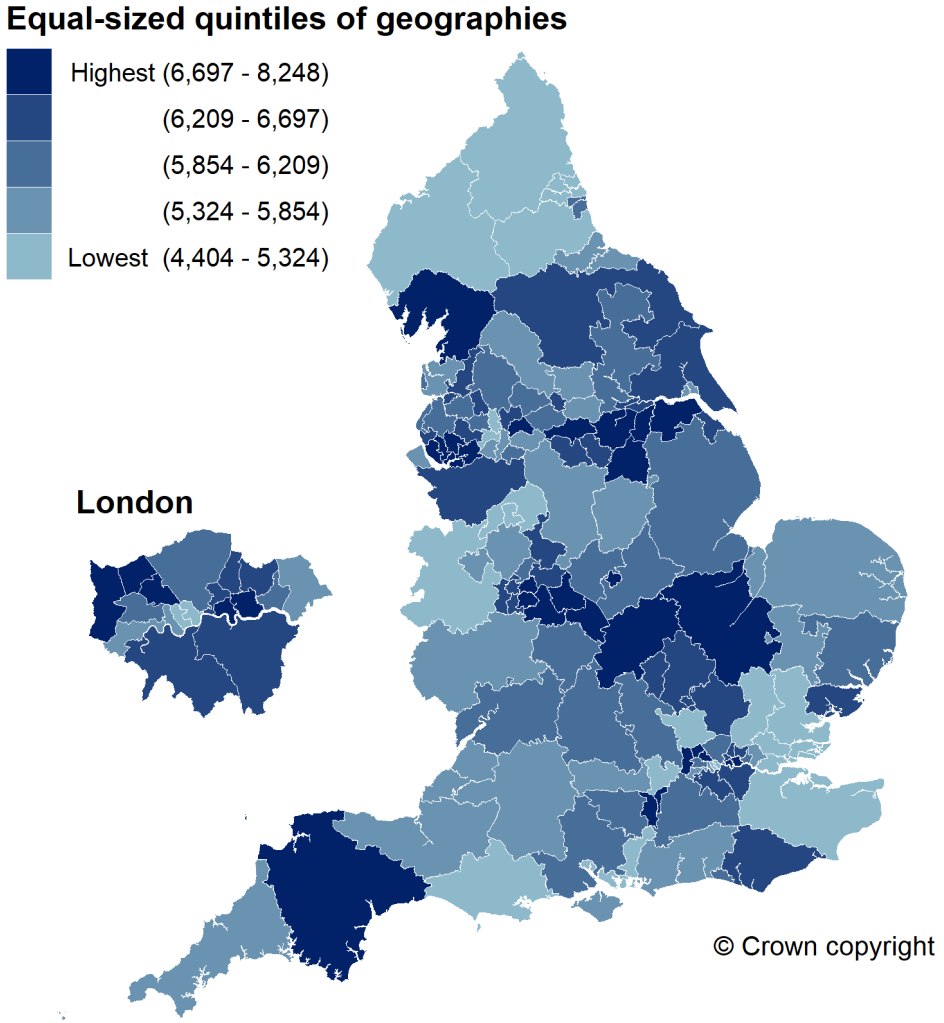
Box plot time series: Experimental statistic: Variation in rate of all vision outpatient attendances by CCG (2013/14 to 2019/20)

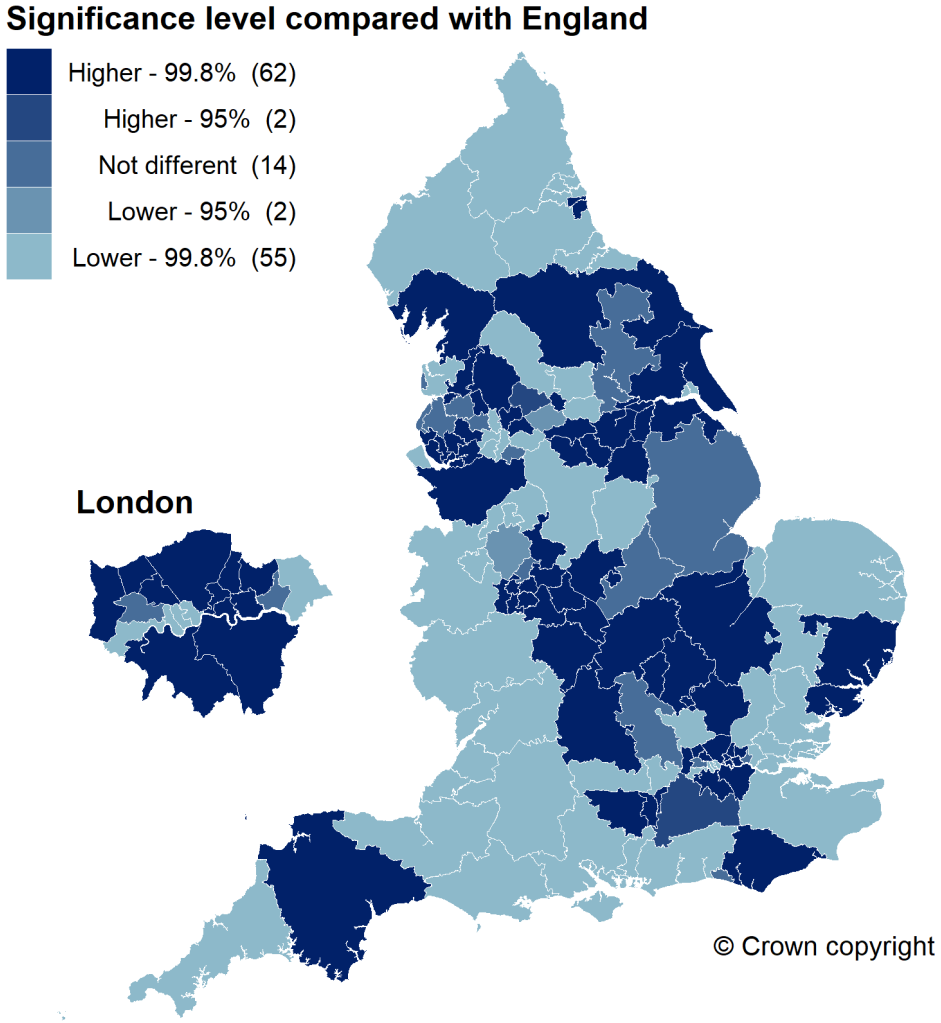


Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	16,023	14,006	11,987	13,143	13,161	13,556	14,310	No significant change
75th-25th percentile	3,115	3,599	3,206	3,737	3,189	3,275	3,117	No significant change
95th-5th percentile	9,266	9,640	9,187	9,034	9,764	9,708	10,003	No significant change
Median	14,990	15,825	15,875	16,231	16,177	16,153	16,194	INCREASING Significant

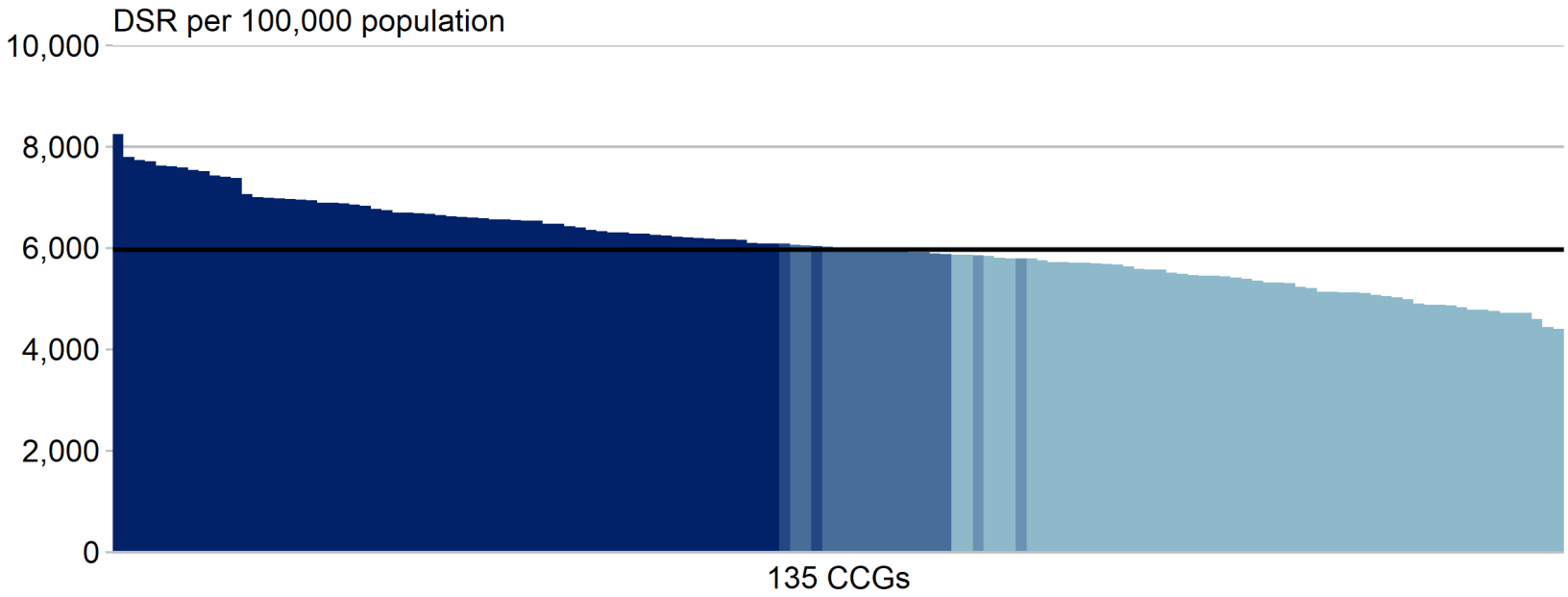
Map 1b: Experimental statistic: Variation in rate of all vision outpatient attendances (persons based) by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

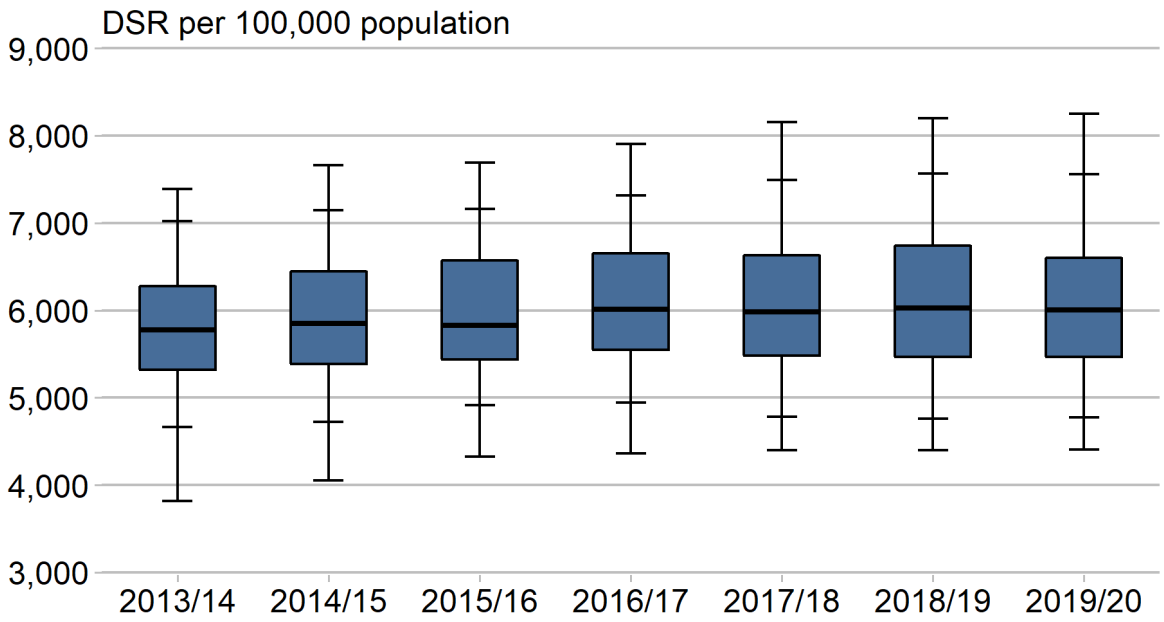




Column chart: Experimental statistic: Variation in rate of all vision outpatient attendances (persons based) by CCG (2019/20)



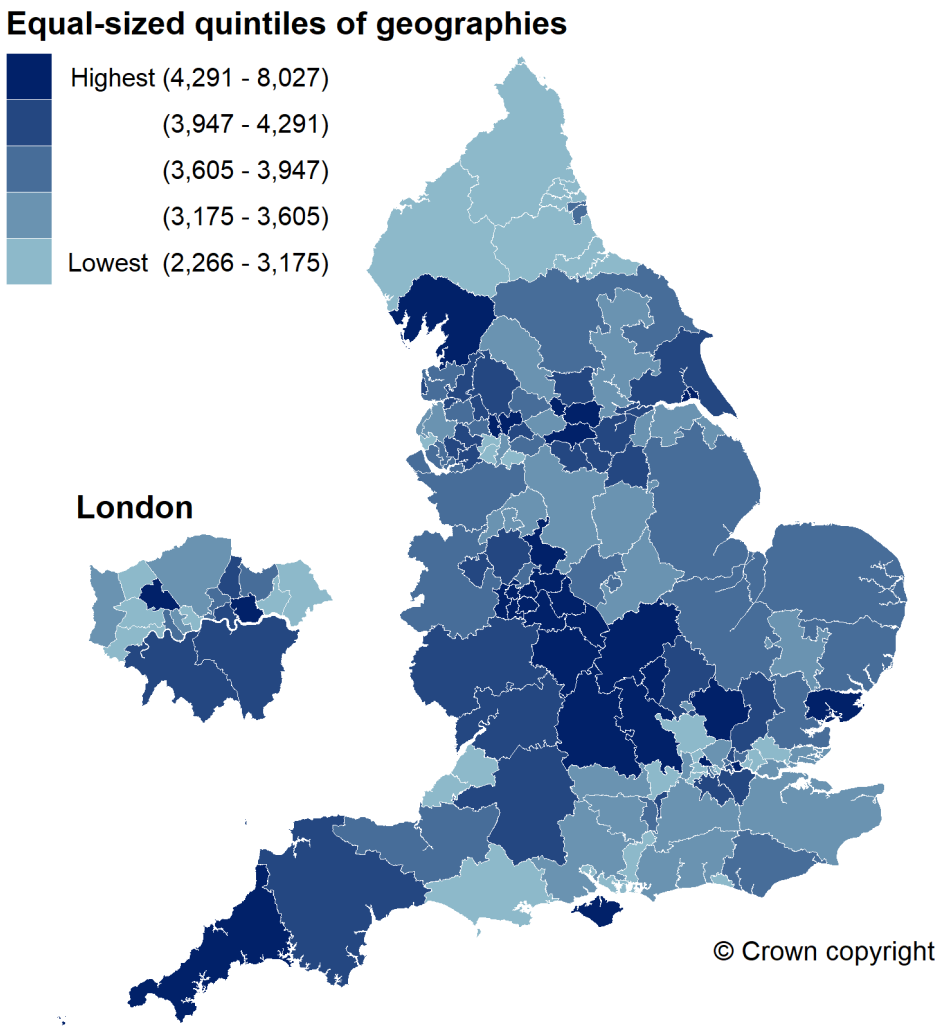
Box plot time series: Experimental statistic: Variation in rate of all vision outpatient attendances (persons based) by CCG (2013/14 to 2019/20)

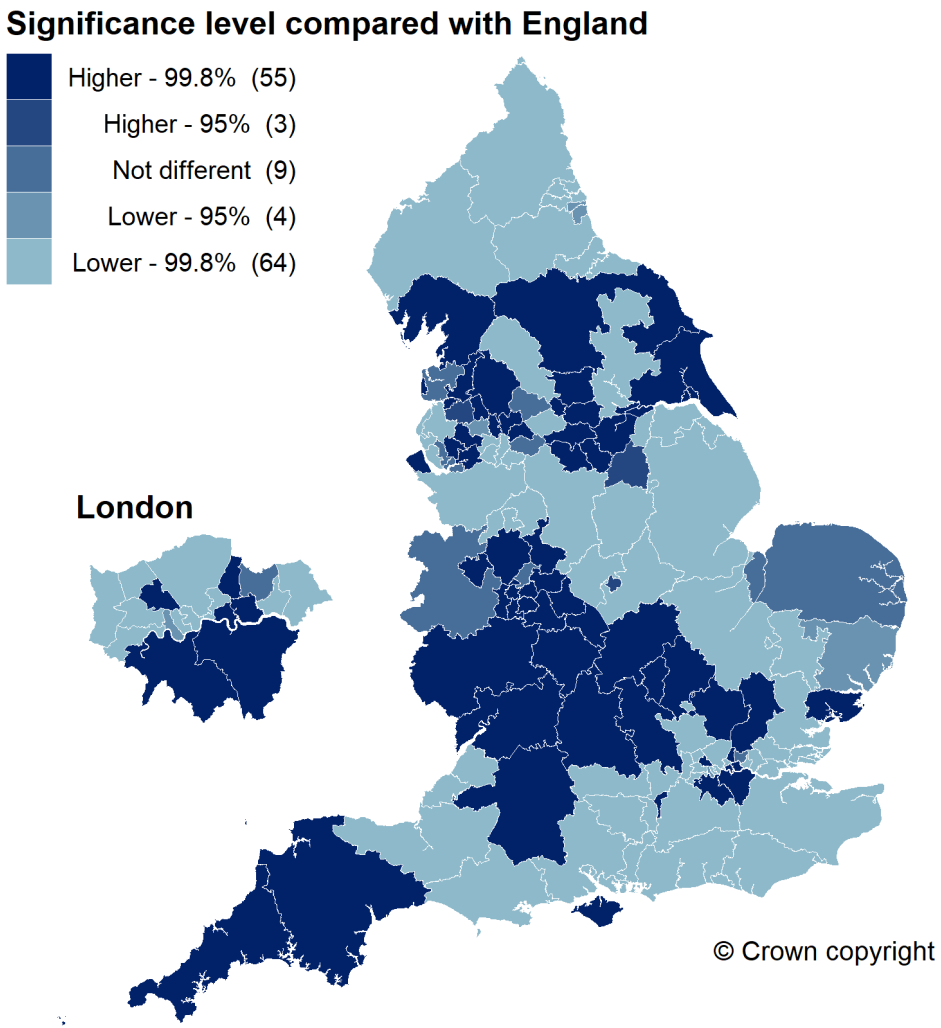


Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	3,576	3,605	3,367	3,546	3,754	3,800	3,843	No significant change
75th-25th percentile	954	1,062	1,130	1,104	1,143	1,278	1,135	WIDENING Significant
95th-5th percentile	2,355	2,424	2,245	2,373	2,712	2,808	2,781	WIDENING Significant
Median	5,776	5,846	5,827	6,008	5,981	6,028	6,002	INCREASING Significant

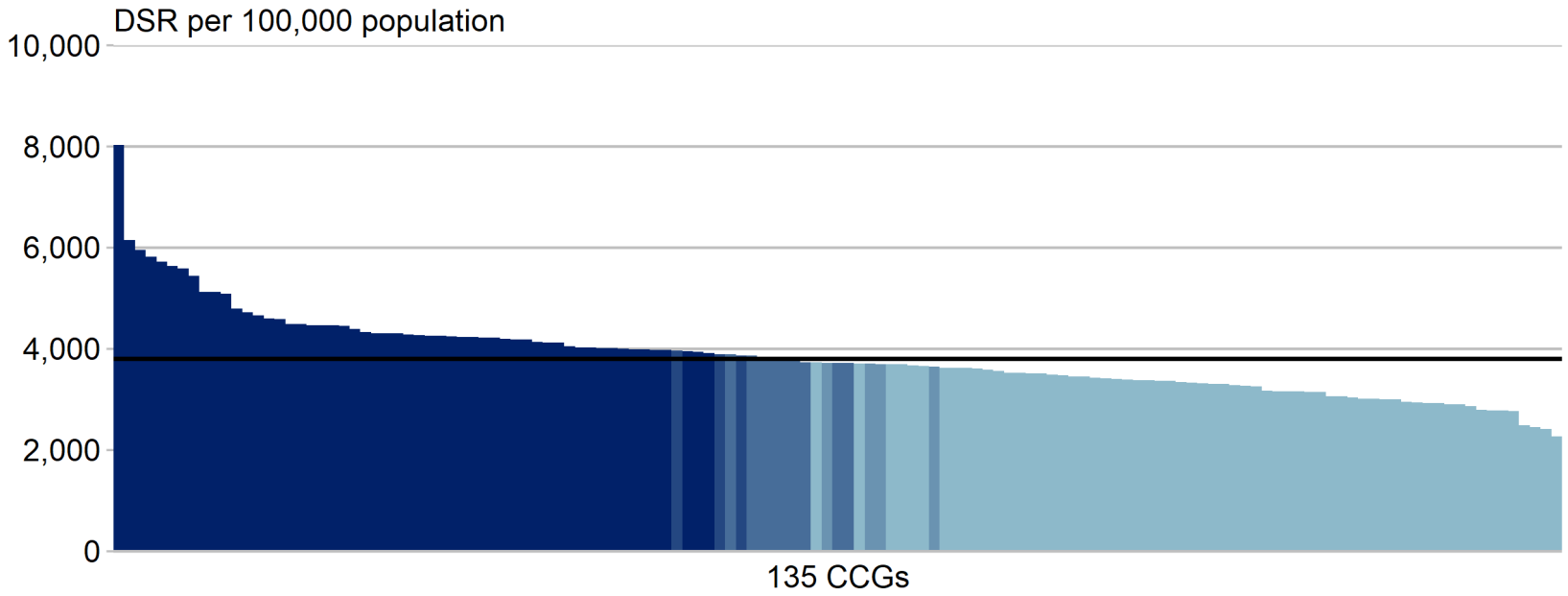
Map 1c: Experimental statistic: Variation in rate of all vision outpatient first attendances by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

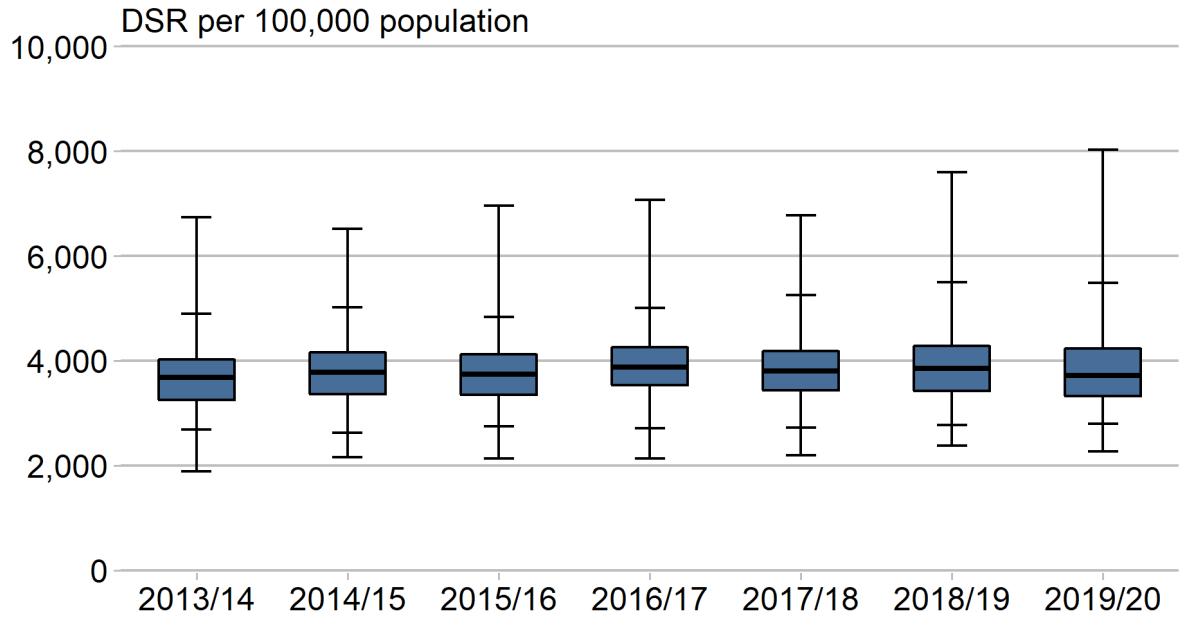




Column chart: Experimental statistic: Variation in rate of all vision outpatient first attendances by CCG (2019/20)



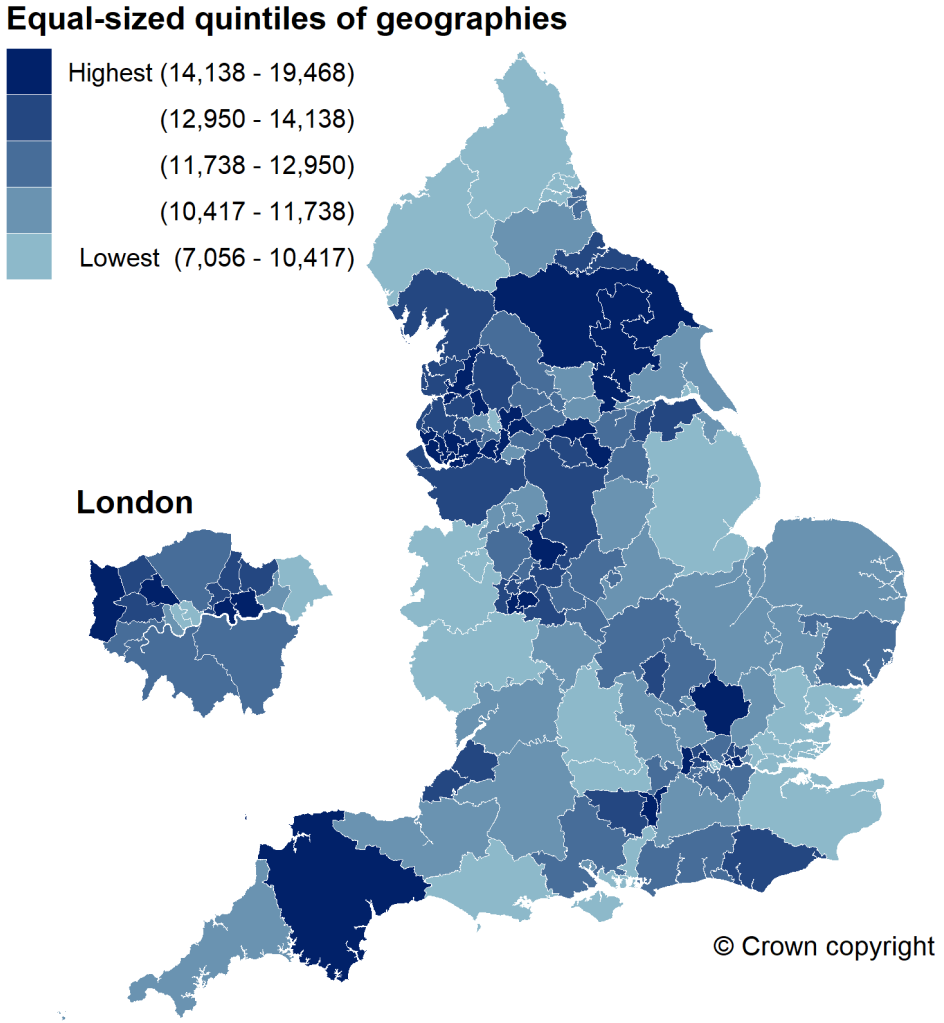
Box plot time series: Experimental statistic: Variation in rate of all vision outpatient first attendances by CCG (2013/14 to 2019/20)

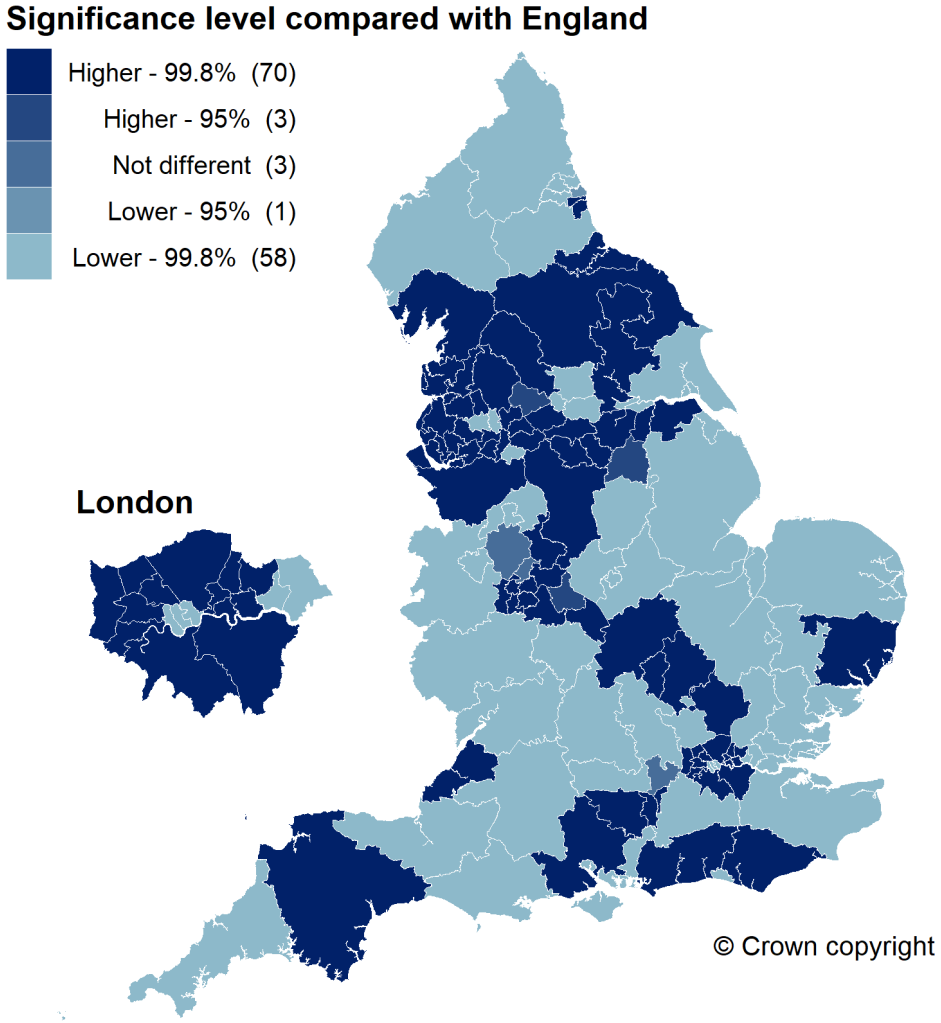


Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	4,843	4,362	4,832	4,937	4,580	5,223	5,760	No significant change
75th-25th percentile	774	804	773	717	751	863	905	No significant change
95th-5th percentile	2,221	2,387	2,087	2,286	2,527	2,728	2,693	WIDENING Significant
Median	3,686	3,777	3,746	3,878	3,802	3,857	3,720	No significant change

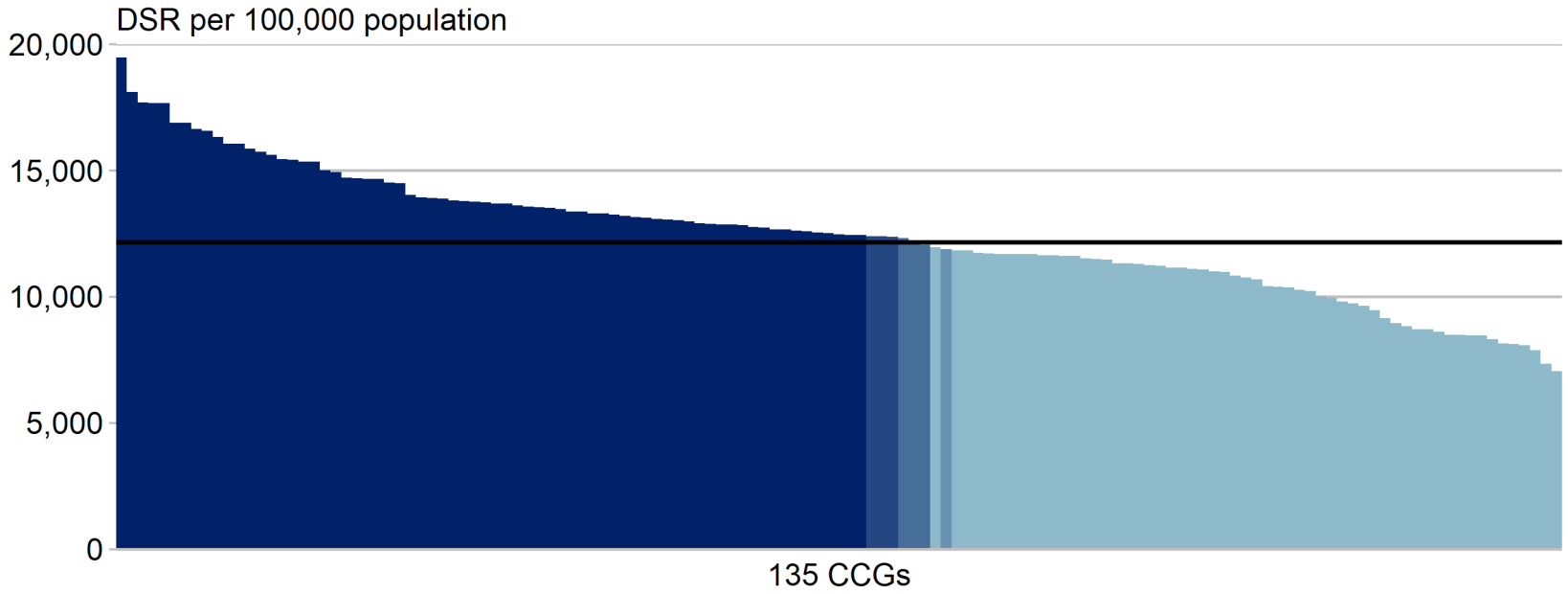
Map 1d: Experimental statistic: Variation in rate of all vision outpatient follow up attendances by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

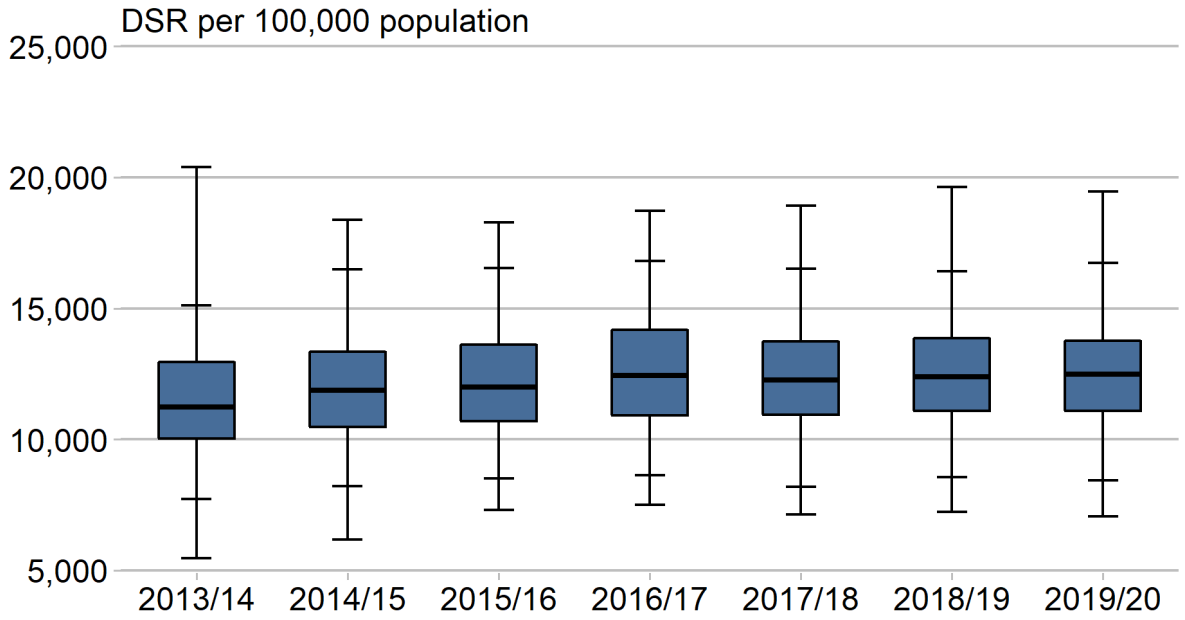




Column chart: Experimental statistic: Variation in rate of all vision outpatient follow up attendances by CCG (2019/20)



Box plot time series: Experimental statistic: Variation in rate of all vision outpatient follow up attendances by CCG (2013/14 to 2019/20)



Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	14,925	12,201	10,965	11,216	11,765	12,400	12,413	No significant change
75th-25th percentile	2,924	2,890	2,931	3,271	2,811	2,774	2,661	No significant change
95th-5th percentile	7,400	8,262	8,016	8,154	8,308	7,860	8,299	No significant change
Median	11,225	11,867	12,002	12,427	12,260	12,379	12,486	INCREASING Significant

Magnitude of Variation

Map 1a: Experimental statistic: Variation in rate of all vision outpatient attendances by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which clinical commissioning group (CCG) values ranged from 9,821 per 100,000 population to 24,131 per 100,000 population, which is a 2.5-fold difference between CCGs.

The England value for 2019/20 was 15,960 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

The median increased significantly from 14,990 per 100,000 population in 2013/14 to 16,194 per 100,000 population in 2019/20.

During 2019/20 there were approximately 9.0 million outpatient attendances (all ages) for the treatment specialty codes relating to hospital-based ophthalmic services. The rate of all outpatient attendance increased over the 7 year period (2013/14 to 2019/20) with no significant change in the level of variation between CCGs.

Factors contributing to these variations are likely to include:

- capacity pressures on service provision to meet the rising demand for outpatient activity
- differences in clinical practice and decision-making
- availability of commissioned services for primary referral optimisation and ongoing monitoring
- differences in data coding and completeness for type of attendance

Map 1b: Experimental statistic: Variation in rate of all vision outpatient attendances (persons based) by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 4,404 per 100,000 population to 8,248 per 100,000 population, which is a 1.9-fold difference between CCGs.

The England value for 2019/20 was 5,969 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

Both the 95th to 5th percentile gap and the 75th to 25th percentile gap widened significantly.

The median increased significantly from 5,776 per 100,000 population in 2013/14 to 6,002 per 100,000 population in 2019/20.

Approximately 3.4 million patients of all ages attended ophthalmology outpatient appointments during 2019/20. The person based rate of attendance increased over the period 2013/14 to 2019/20.

Map 1c: Experimental statistic: Variation in rate of all vision outpatient first attendances by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 2,266 per 100,000 population to 8,027 per 100,000 population, which is a 3.5-fold difference between CCGs.

The England value for 2019/20 was 3,803 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

The 95th to 5th percentile gap widened significantly.

First attendance rates are a proxy indicator of new demand for ophthalmology services in any one year.

Some of the variation observed may be related to differences in service organisation around pre-referral and referral management and how these are commissioned. In addition, differences in coding giving rise to some duplication may also be a factor for example if a patient was seen for the first time by more than one sub-specialty such as for glaucoma and then cataract; or attended an eye emergency clinic and subsequently attended a sub-specialty clinic. Coding by diagnosis is incomplete as it is not mandatory requirement in outpatient settings, and as such quantifying any duplication is not reliable.

Map 1d: Experimental statistic: Variation in rate of all vision outpatient follow up attendances by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 7,056 per 100,000 population to 19,468 per 100,000 population, which is a 2.8-fold difference between CCGs.

The England value for 2019/20 was 12,157 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

The median increased significantly from 11,225 per 100,000 population in 2013/14 to 12,486 per 100,000 population in 2019/20.

Whilst the rate of follow-up attendances increased, there was no significant change in the variations between CCGs. It is likely that this rise in follow-up attendances is driving the rise in all outpatient attendances. This may be explained by changes in clinical management arising from introduction of new interventions and treatment pathways generating multiple episodes of care (for example for age related macular degeneration, and retinal maculopathies)[7, 8, 9, 10, 11, 12, 13] and differences in the organisation of services particularly for chronic disease management from active intervention to monitoring.

Options for action

Ophthalmology outpatient services have been under considerable capacity pressures to meet the rising demand for care for a prolonged period and these have only been further exacerbated by the backlogs arising from the pandemic. The following actions should be considered urgently at place and integrated care system (ICS) level to understand local variations and inform appropriate action to address them.

Capacity

Review outpatient attendance activity together with waiting times for first and follow-up appointments, and demographic factors, as means to assess pressure on service provision and accessibility.

Review referral guidance and clinical protocols

Review referral guidance and clinical protocols to provide consistent, evidence-based clinical decision-making for referral, referral management, active intervention and ongoing monitoring.

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[7] National Institute for Health and Care Excellence (2008 updated 2012) Ranibizumab and pegaptanib for the treatment of age-related macular degeneration (NICE technology appraisal guidance [TA155]) [Accessed 17 May 2021]

[8] National Institute for Health and Care Excellence (2013) Ranibizumab for treating diabetic macular oedema (NICE technology appraisal guidance [TA274]) [Accessed 17 May 2021]

[9] National Institute for Health and Care Excellence (2013) Ranibizumab for treating visual impairment caused by macular oedema secondary to retinal vein occlusion (NICE technology appraisal guidance [TA283]) [Accessed 17 May 2021]

[10] National Institute for Health and Care Excellence (2013) Aflibercept solution for injection for treating wet age-related macular degeneration (NICE technology appraisal guidance [TA294]) [Accessed 17 May 2021]

[11] National Institute for Health and Care Excellence (2014) Aflibercept for treating visual impairment caused by macular oedema secondary to central retinal vein occlusion (NICE technology appraisal guidance [TA305]) [Accessed 17 May 2021]

[12] National Institute for Health and Care Excellence (2015) Aflibercept for treating diabetic macular oedema (NICE technology appraisal guidance [TA346]) [Accessed 17 May 2021]

[13] National Institute for Health and Care Excellence (2016) Aflibercept for treating visual impairment caused by macular oedema after branch retinal vein occlusion (NICE technology appraisal guidance [TA409]) [Accessed 7 Jul 2021]

Data
Improve consistency of mandated coding requirements to avoid duplication and encourage coding by diagnosis and/or procedure to better inform service planning and commissioning to meet demand and need.

Working differently
Build on existing developments for collaborative working across primary and secondary eye care settings[14] and make better use of the range of clinical skills and competencies across primary, community and hospital eye care to manage demand and backlogs.

Service organisation
Commission systems-based delivery of whole pathways which include extended primary eye care services to provide consistent coverage of pre-referral investigations as a means to improve quality of referrals; and community eye services for the management and monitoring of less complex acute conditions and long term conditions at low risk of deterioration. This approach outlined in the systems and assurance framework for eye-health (SAFE)[15], particularly applicable now and achievable for ICS.

Communication
Ensure hospital outcome letter is copied routinely to referring optometrist to provide continuity of care and moderate future referral decision making.

The following documents are directly aligned with current NHS policy and priorities and can be used for service transformation:

- NHS Long Term Plan
- Full implementation of NICE guidelines for Cataracts in adults: management (NICE guideline [NG 77]), Glaucoma: diagnosis and management (NICE guideline [NG 81]) and Age-related macular degeneration (NICE guideline [NG 82])
- Getting It Right First Time - Ophthalmology GIRFT Programme National Specialty Report
- NHS England and NHS Improvement - National Eye Care Transformation and Recovery Programme[16]
- NHS England – the priorities and operational planning guidance 2021-22 and associated implementation guidance
- NHS England - Eye Care Planning & Implementation Guidance annex 2021-22

[14] Royal College of Ophthalmologists and The College of Optometrists (2020) Our vision for safe and sustainable patient eye care services in England during and beyond COVID-19 [Accessed 24 Nov 2020]
[15] Clinical Council for Eye Health Commissioning (2018) SAFE: Systems and assurance framework for eye health [Accessed 24 May 2021]
[16] NHS (2021) 2021/22 priorities and operational planning guidance [Accessed 12 Jul 2021]

All of the above have specifically identified eye health services as an NHS priority, have supporting resources and as such present the ideal opportunity for taking these proposed actions forwards to achieve change and sustainable improvement.

Resources

Getting It Right First Time (2019) Ophthalmology GIRFT Programme National Specialty Report [Accessed 24 Jun 2020]

National Institute for Health and Care Excellence (2017) Cataracts in adults: management (NICE guideline [NG 77]) [Accessed 07 Jun 2021]

National Institute for Health and Care Excellence (2017) Glaucoma: diagnosis and management (NICE guideline [NG 81]) [Accessed 07 Jun 2021]

National Institute for Health and Care Excellence (2018) Age-related macular degeneration (NICE guideline [NG 82]) [Accessed 07 Jun 2021]

Royal College of Ophthalmologists (2021) NHS England Eye Care Planning and Implementation Guidance 2021-22 Summary Annexe [Accessed 24 Nov 2020]

Intravitreal injections

Context

An intravitreal injection is an invasive procedure used to administer a drug or other therapeutic substance directly into the vitreous cavity of the eye to treat several conditions. This route of drug administration has been in use for many decades, predominantly to deliver antibiotic, antiviral or antifungal drugs to treat intraocular infection (endophthalmitis); and steroid drugs to manage intraocular inflammation (uveitis). Until the introduction of a class of drugs for ophthalmic uses known as the anti-vascular endothelial growth factor (anti-VEGF), annual health service activity associated with this procedure was relatively low.[1]

Intravitreal injection therapy with licensed anti-VEGF drugs for ophthalmic use was first introduced in the NHS in 2008.[2] Since then the drugs available in this class and their licensed indications for routine use have widened,[3, 4, 5, 6, 7, 8, 9, 10] making it possible to manage the common and previously untreatable retinal conditions associated with considerable visual morbidity in adults.[11] In addition, they are also used for the management of a variety of other less common retinal and ocular conditions.

Since 2013, Ranibizumab and Aflibercept have been the main licenced, NICE approved, anti-VEGF drugs for the routine management of wet age related macular degeneration (AMD), diabetic macular oedema (DMO) and macular oedema associated with retinal

[1] Keenan TDL, Wotton CJ and Goldacre M (2012) Trends over time and geographical variation in rates of intravitreal injections in England Br J Ophthalmol 2012; 96(3):413-8 [Accessed 17 May 2021]
[2] National Institute for Health and Care Excellence (2008 updated 2012) Ranibizumab and pegaptanib for the treatment of age-related macular degeneration (NICE technology appraisal guidance [TA155]) [Accessed 17 May 2021
[3] National Institute for Health and Care Excellence (2013) Ranibizumab for treating diabetic macular oedema (NICE technology appraisal guidance [TA274]) [Accessed 17 May 2021]
[4] National Institute for Health and Care Excellence (2013) Ranibizumab for treating visual impairment caused by macular oedema secondary to retinal vein occlusion (NICE technology appraisal guidance [TA283]) [Accessed 17 May 2021]
[5] National Institute for Health and Care Excellence (2013) Ranibizumab for treating choroidal neovascularisation associated with pathological myopia (NICE technology appraisal guidance [TA298]) [Accessed 17 May 2021]
[6] National Institute for Health and Care Excellence (2013) Aflibercept solution for injection for treating wet age-related macular degeneration (NICE technology appraisal guidance [TA294]) [Accessed 17 May 2021]
[7] National Institute for Health and Care Excellence (2014) Aflibercept for treating visual impairment caused by macular oedema secondary to central retinal vein occlusion (NICE technology appraisal guidance [TA305]) [Accessed 17 May 2021]
[8] National Institute for Health and Care Excellence (2015) Aflibercept for treating diabetic macular oedema (NICE technology appraisal guidance [TA346]) [Accessed 17 May 2021]
[9] National Institute for Health and Care Excellence (2016) Aflibercept for treating visual impairment caused by macular oedema after branch retinal vein occlusion (NICE technology appraisal guidance [TA409]) [Accessed 17 May 2021]
[10] National Institute for Health and Care Excellence (2017) Aflibercept for treating choroidal neovascularisation (NICE technology appraisal guidance [TA486]) [Accessed 17 May 2021]
[11] Quartilo A, Simkiss P, Zekite A and others (2016) Leading causes of certifiable visual loss in England and Wales during the year ending 31 March 2013 Eye (London) 2016 Apr; 30(4): 602–607 [Accessed 18 May 2021]

vein occlusion (RVO-MO), which are leading causes of certifiable sight impairment and sight loss in adults in England and Wales.[11] The aim of treatment is to stabilise visual acuity.[3, 4, 5, 6, 7, 8, 9, 10] Routine clinical management of these conditions involves multiple administrations, often over a number of years, and is the principal driver for current intravitreal injection therapy activity. Intravitreal injections are a high volume NHS activity performed mainly in adults aged 60 years and over.[12] Initially when first introduced it was delivered as an admitted episode of care often as a day-case procedure, but is now delivered primarily (over 80% of activity) in an outpatient setting,[12,13] in an enclosed, dedicated clean room (as defined by the local infection control team),[12, 13, 14] which may be in a hospital, community or mobile unit environment.

Since February 2021, Brolucizumab has been added to the list of licensed, NICE approved anti-VEGF drugs for wet AMD, but is not established as first line management.[15]

Unlike admitted episodes of care, there is no mandatory requirement for Hospital Episode Statistics outpatient episodes to be coded by diagnosis (ICD10) or by procedure (OPCS4). The indication for treatment given by diagnosis codes (ICD10) is often incomplete, particularly in outpatient settings.[16,17] However, given the volume of activity commissioned and generated and the cost to the NHS for service provision, these procedures are likely to be coded for outpatient and admitted episodes in most circumstances, covering predominantly anti-VEGF drugs, but also to a lesser extent a range of other drugs. Efforts to introduce more specific procedure codes for the ophthalmic use of anti-VEGF drugs (for example for high-cost drugs for subfoveal choroidal neovascularisation)[18] to distinguish these from other drugs used for intravitreal procedures, have not been sustainable and are hardly used.[12,13,18]

Despite these limitations, and for the purpose of this analysis, covering a period of established clinical practice, the OPCS procedure codes in both admitted care and outpatient settings, serve to cover intravitreal injection therapy primarily with the anti-VEGF agents Aflibercept and Ranibizumab for the management of wet AMD, DMO, RVO-MO, and to a much lesser extent for a range of other ocular conditions.

[12] NHS Digital Hospital Admitted Patient Care Activity [Accessed 18 May 2021]
[13] NHS Digital Hospital Outpatient Activity [Accessed 18 May 2021]
[14] Royal College of Ophthalmologists (2018) Ophthalmic Services Guidance: Intravitreal injection therapy [Accessed 18 May 2021]
[15] National Institute for Health and Care Excellence (2021) Brolucizumab for treating wet age-related macular degeneration [NICE technology appraisal guidance [TA672]) [Accessed 18 May 2021]
[16] NHS Digital Hospital Admitted Patient Care Activity 2019/20: Data Quality Statement [Accessed 13 July 2021]
[17] NHS Digital Hospital Outpatient Activity 2019/20: Data Quality Statement [Accessed 13 July 2021]
[18] Hollingworth W, Jones T, Reeves BC and others (2017) A longitudinal study to assess the frequency and cost of anti-vascular endothelial therapy, and inequalities in access in England between 2005 and 2015 BMJ Open 2017;7: e018289 [Accessed 21 May 2021]

Intravitreal injections during the COVID-19 pandemic

Since the onset of the coronavirus (COVID-19) pandemic in March 2020, clinical risk stratification has prioritised patients receiving treatment with anti-VEGF drugs (new and ongoing) for high risk conditions such as wet AMD, above all other indications. Patients classified as having medium and low risk clinical conditions had their management delayed or rescheduled for at least 3 to 6 months later. This is reflected in the significant reduction in activity for first and all episodes during the first wave of the pandemic (April to June 2020), which is followed by some recovery towards expected levels of activity by September 2020 (Figures 2.1 and 2.2).

Patients who need intravitreal injection therapy are more likely to have been classified as being clinically vulnerable to COVID-19 infection or shielding due to systemic comorbidities or their age. Patients may also have been reluctant to attend a hospital clinic especially during the first wave (and possibly subsequent waves). The more pronounced drop in first injection activity could also be attributed to the rescheduling of treatment for new patients presenting with medium and low risk retinal conditions for several months later.

Although there were signs of recovery of activity (first and all) by September 2020, the subsequent waves will have only added to the delays and backlog particularly in the management of retinal conditions other than AMD. New pathways developed to manage the backlogs should be reviewed for their impact on mitigating risk for irreversible disease progression; reducing delays and acceptability to patients.

Figure 2.1: Experimental statistic - Provisional data: All intravitreal injection therapy procedures in people aged 60 years and over for England (January 2018 to February 2021)

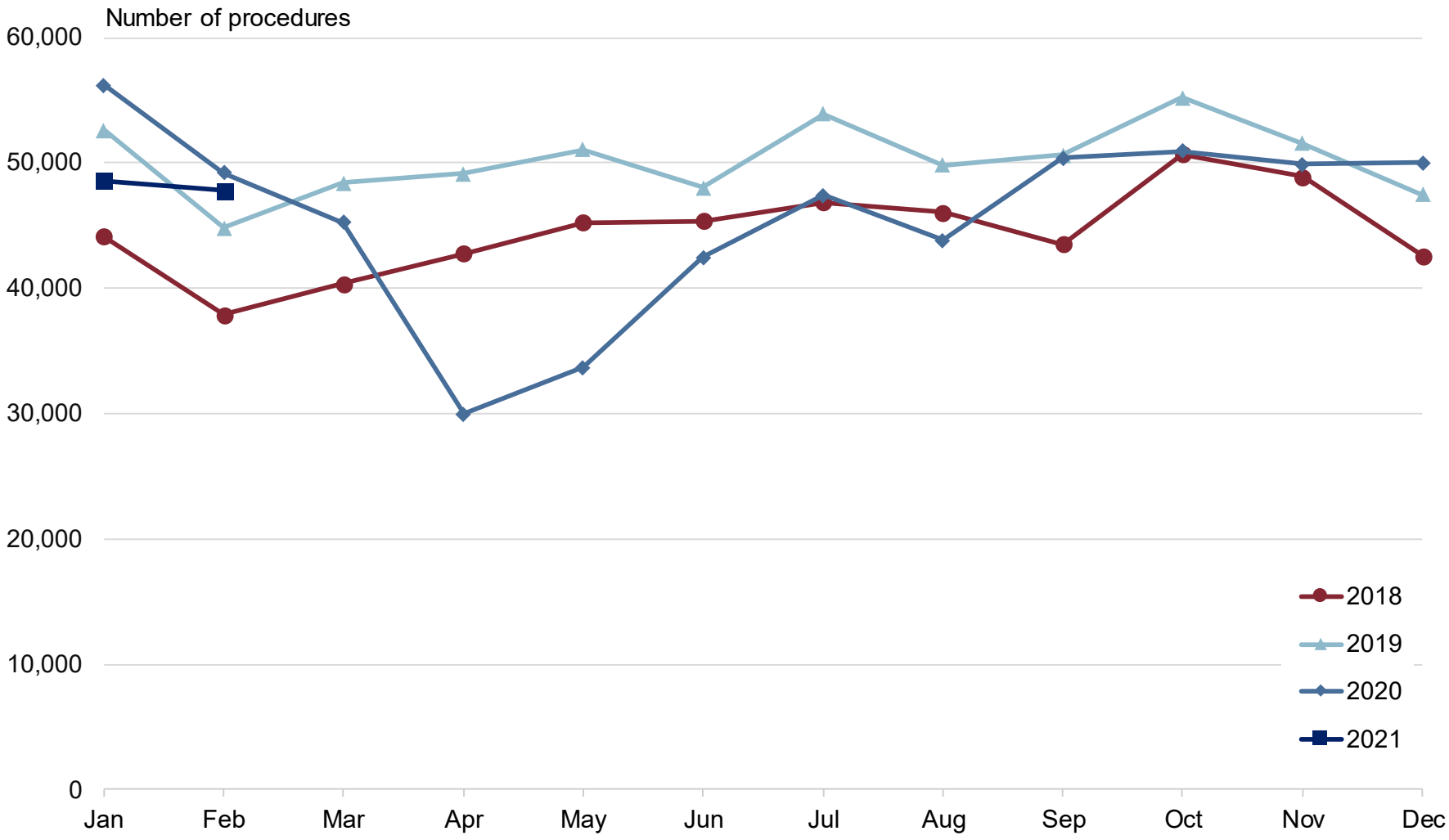
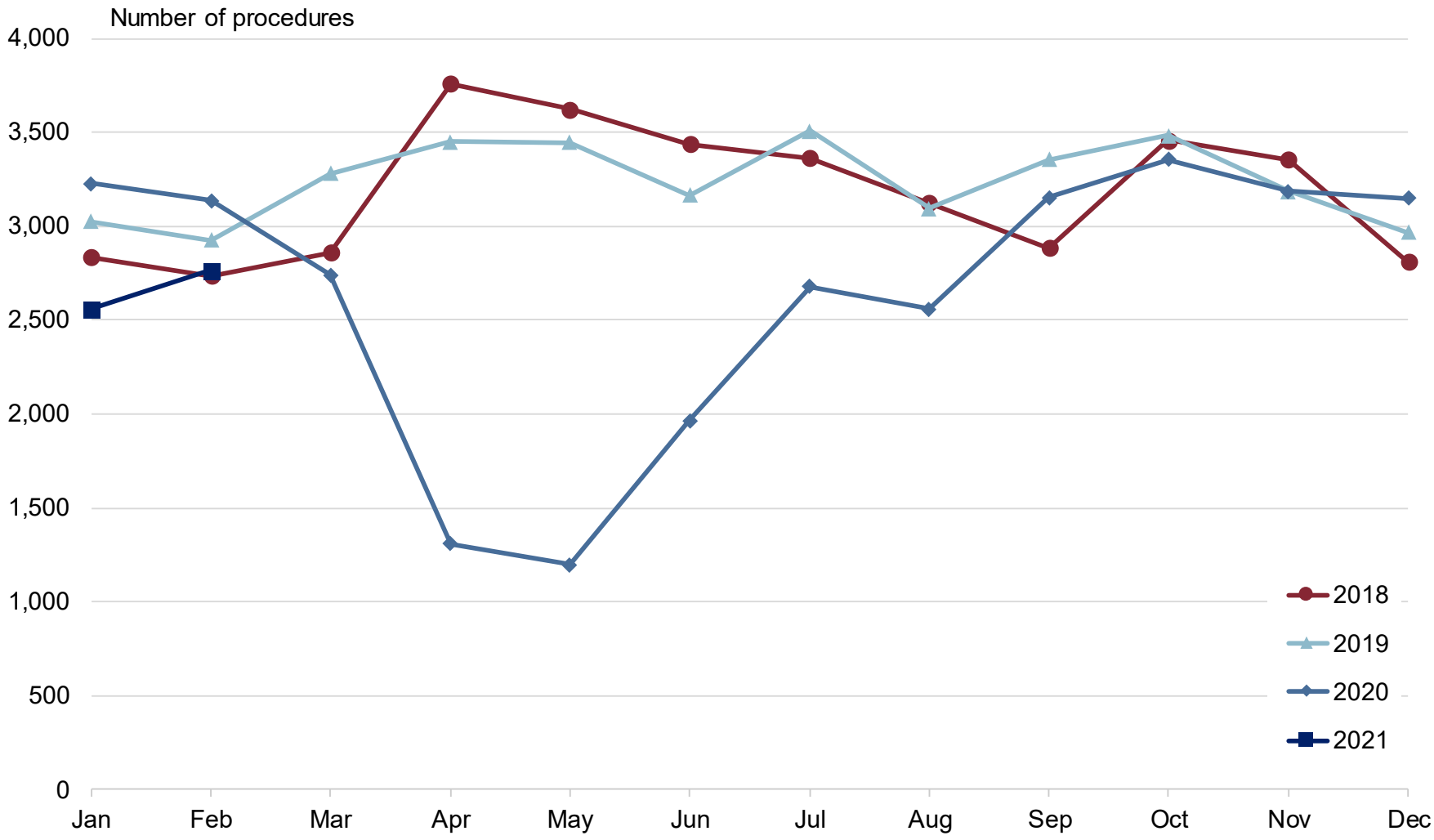
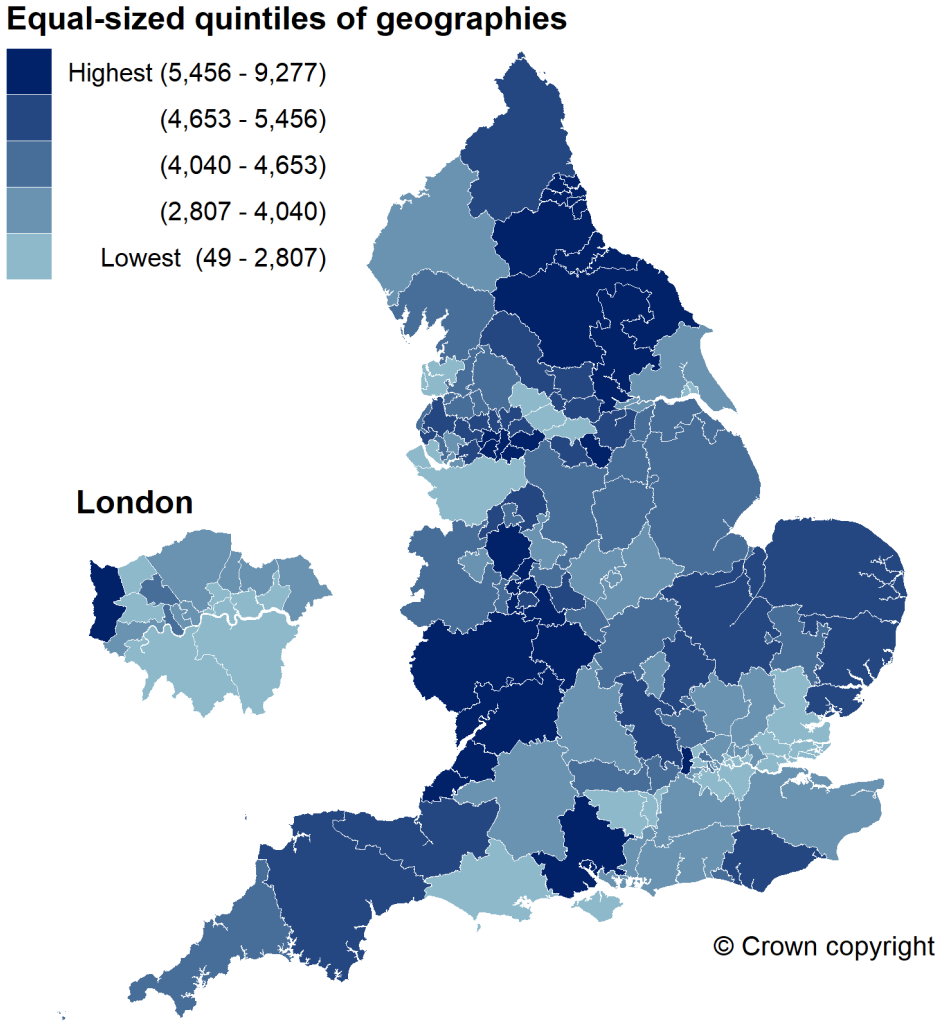


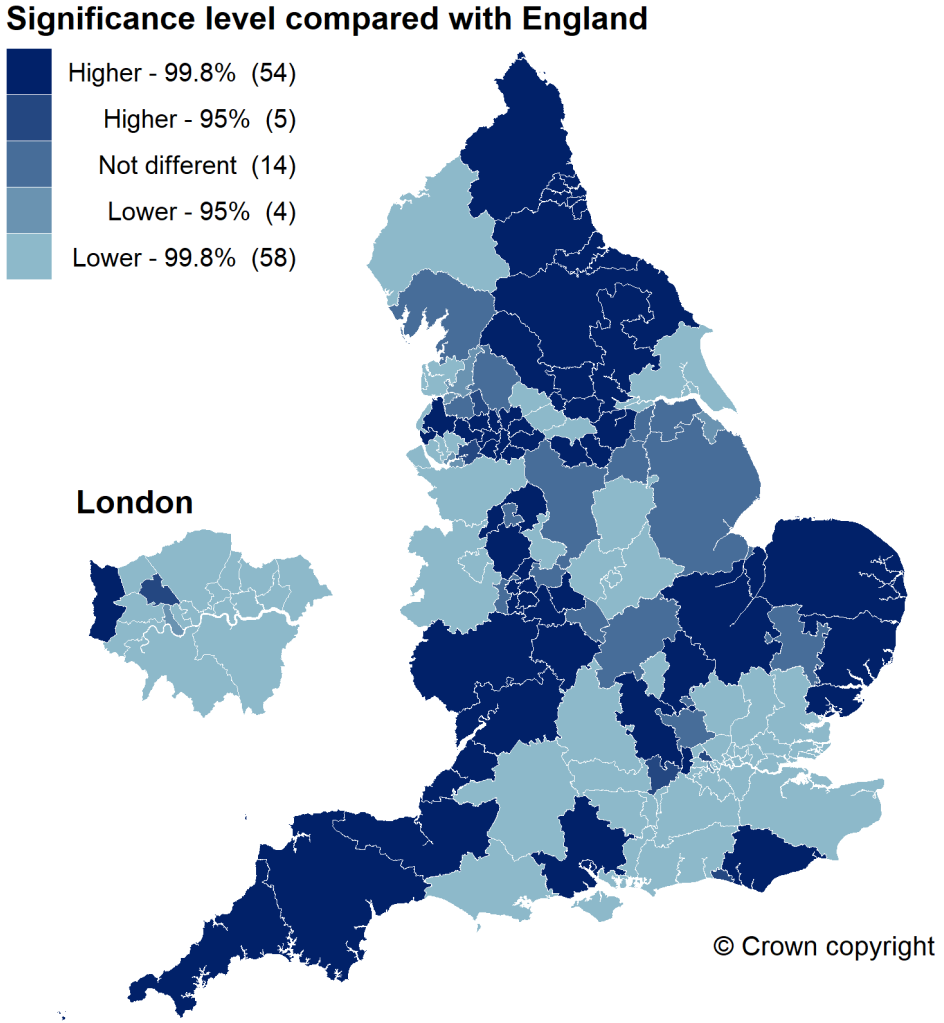
Figure 2.2: Experimental statistic - Provisional data: First intravitreal injection therapy procedures in people aged 60 years and over for England (January 2018 to February 2021)



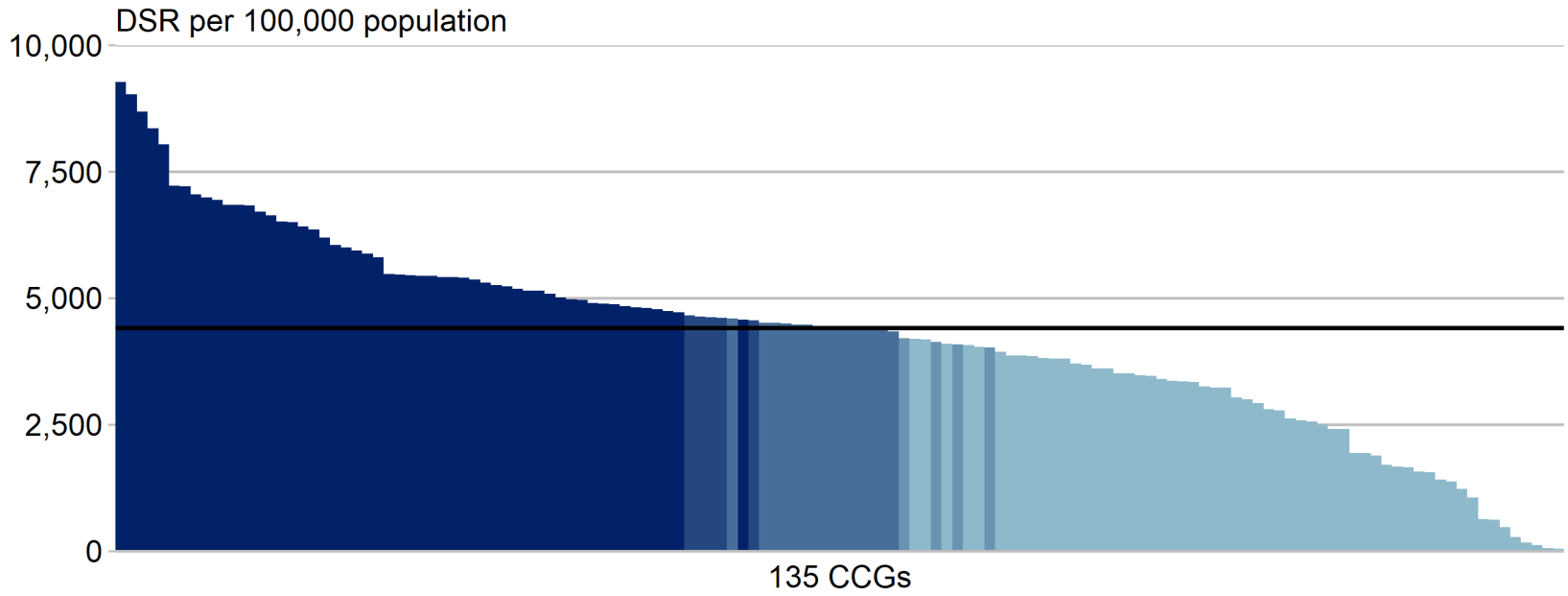
Map 2a: Experimental statistic: Variation in rate of all intravitreal injection therapy procedures in people aged 60 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

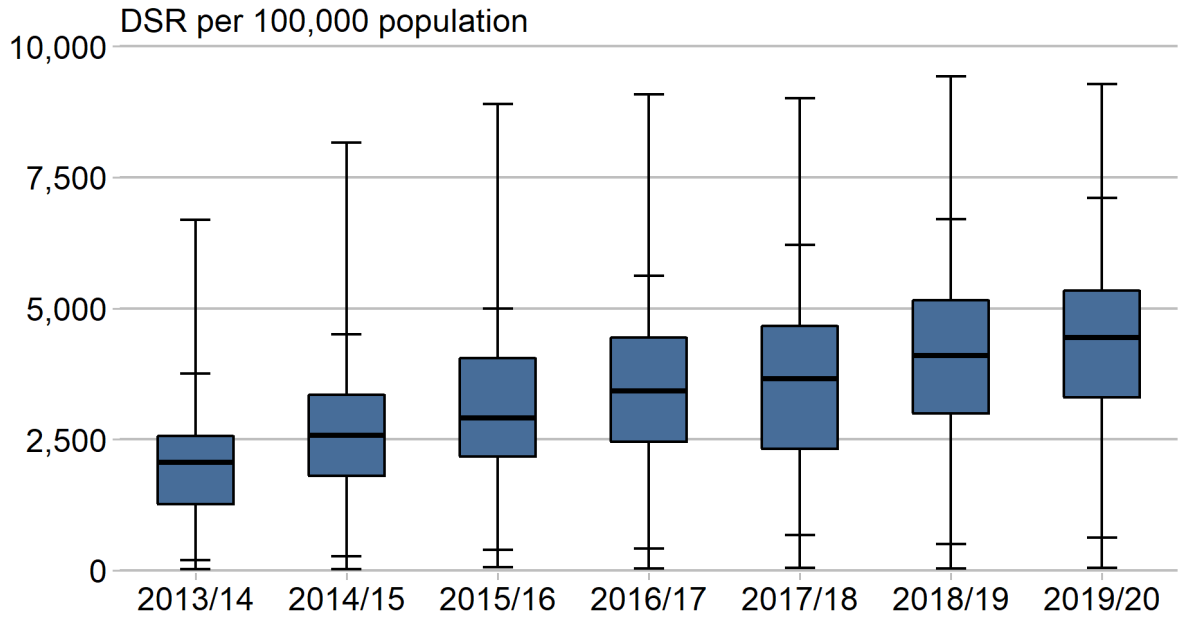




Column chart: Experimental statistic: Variation in rate of all intravitreal injection therapy procedures in people aged 60 years and over by CCG (2019/20)



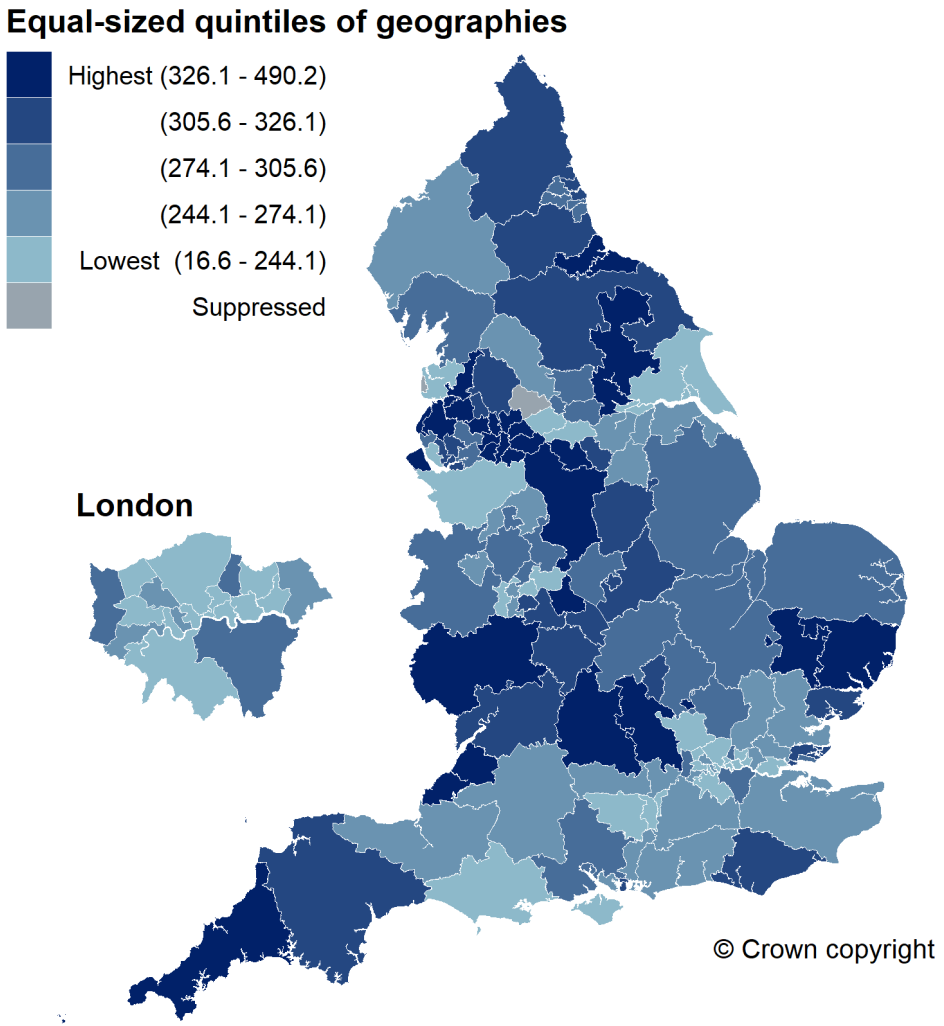
Box plot time series: Experimental statistic: Variation in rate of all intravitreal injection therapy procedures in people aged 60 years and over by CCG (2013/14 to 2019/20)

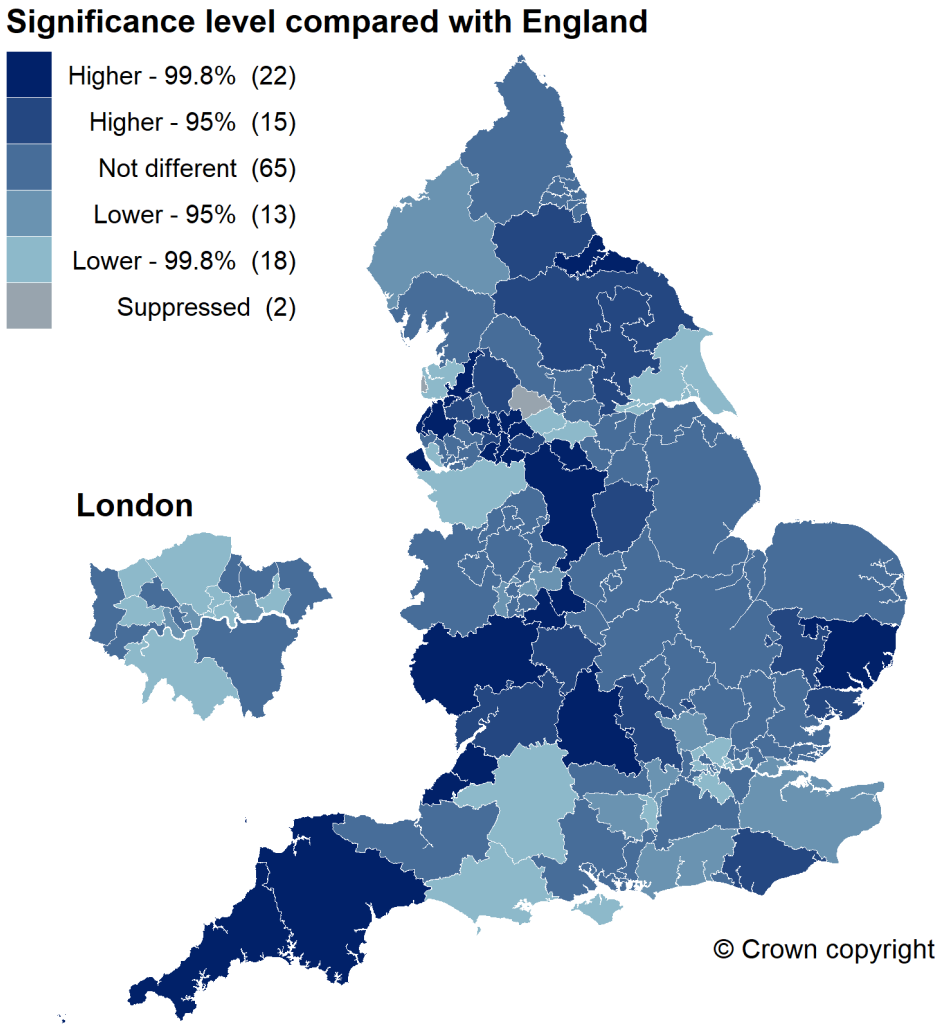


Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	6,657	8,143	8,840	9,047	8,959	9,388	9,228	WIDENING Significant
75th-25th percentile	1,307	1,548	1,868	1,991	2,340	2,157	2,033	WIDENING Significant
95th-5th percentile	3,556	4,236	4,599	5,203	5,536	6,199	6,479	WIDENING Significant
Median	2,063	2,579	2,910	3,427	3,662	4,099	4,436	INCREASING Significant

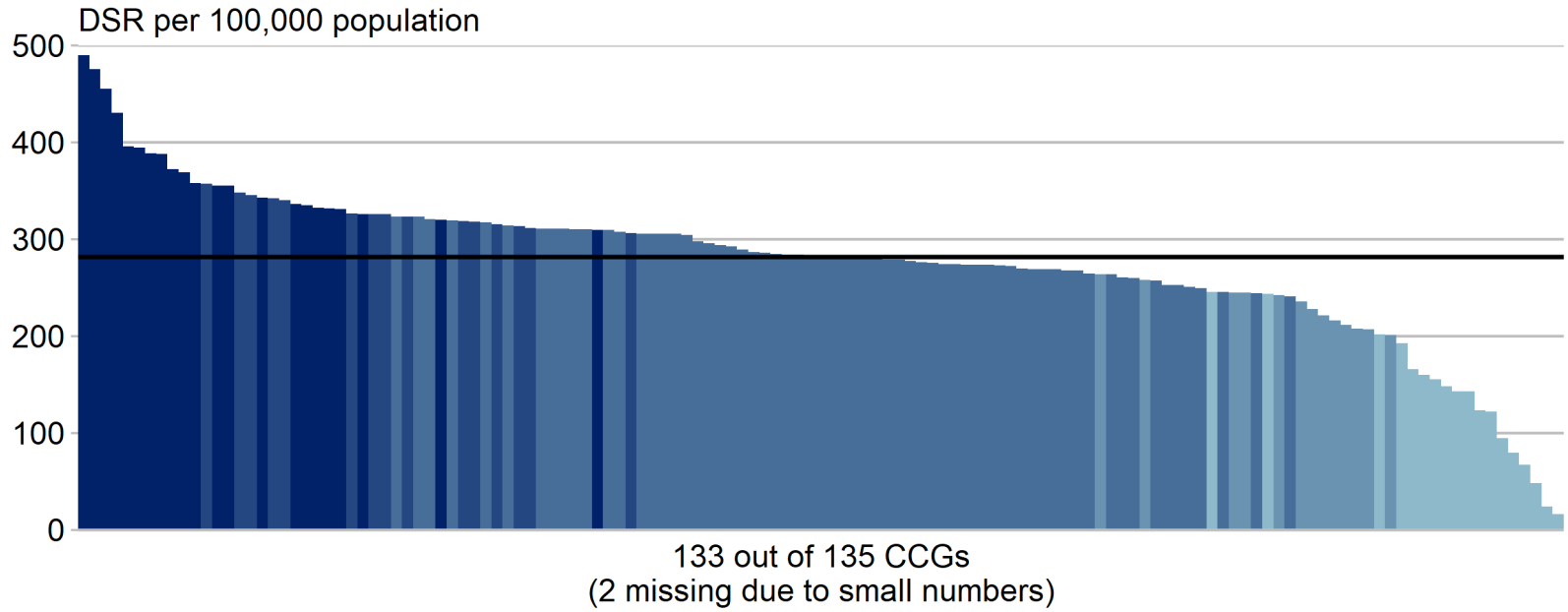
Map 2b: Experimental statistic: Variation in rate of first intravitreal injection therapy procedures in people aged 60 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

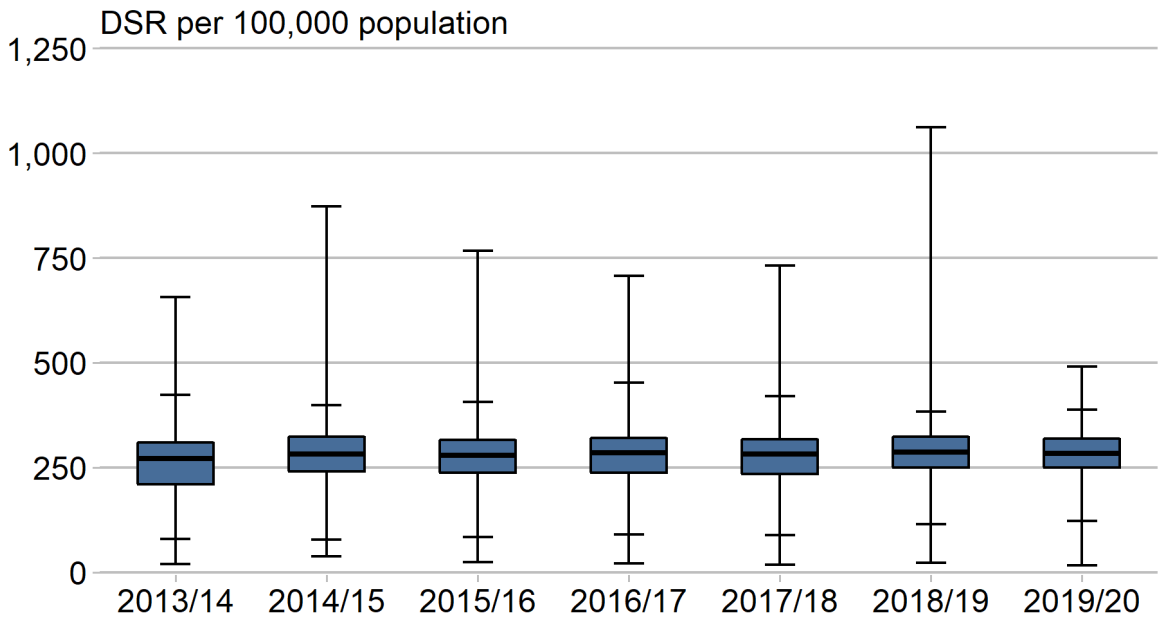




Column chart: Experimental statistic: Variation in rate of first intravitreal injection therapy procedures in people aged 60 years and over by CCG (2019/20)



Box plot time series: Experimental statistic: Variation in rate of first intravitreal injection therapy procedures in people aged 60 years and over by CCG (2013/14 to 2019/20)



Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	637.6	833.9	743.2	685.3	712.6	1,038.2	473.7	No significant change
75th-25th percentile	100.3	82.5	77.9	82.5	83.9	73.3	68.6	NARROWING Significant
95th-5th percentile	344.2	319.4	321.3	361.6	331.9	268.4	265.3	No significant change
Median	271.8	281.6	278.3	284.7	281.5	286.6	283.2	No significant change

Magnitude of Variation

Map 2a: Experimental statistic: Variation in rate of all intravitreal injection therapy procedures in people aged 60 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which clinical commissioning group (CCG) values ranged from 49 per 100,000 population to 9,277 per 100,000 population, which is a 188.6-fold difference between CCGs.

The England value for 2019/20 was 4,411 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

There has been significant widening of all three measures of variation.

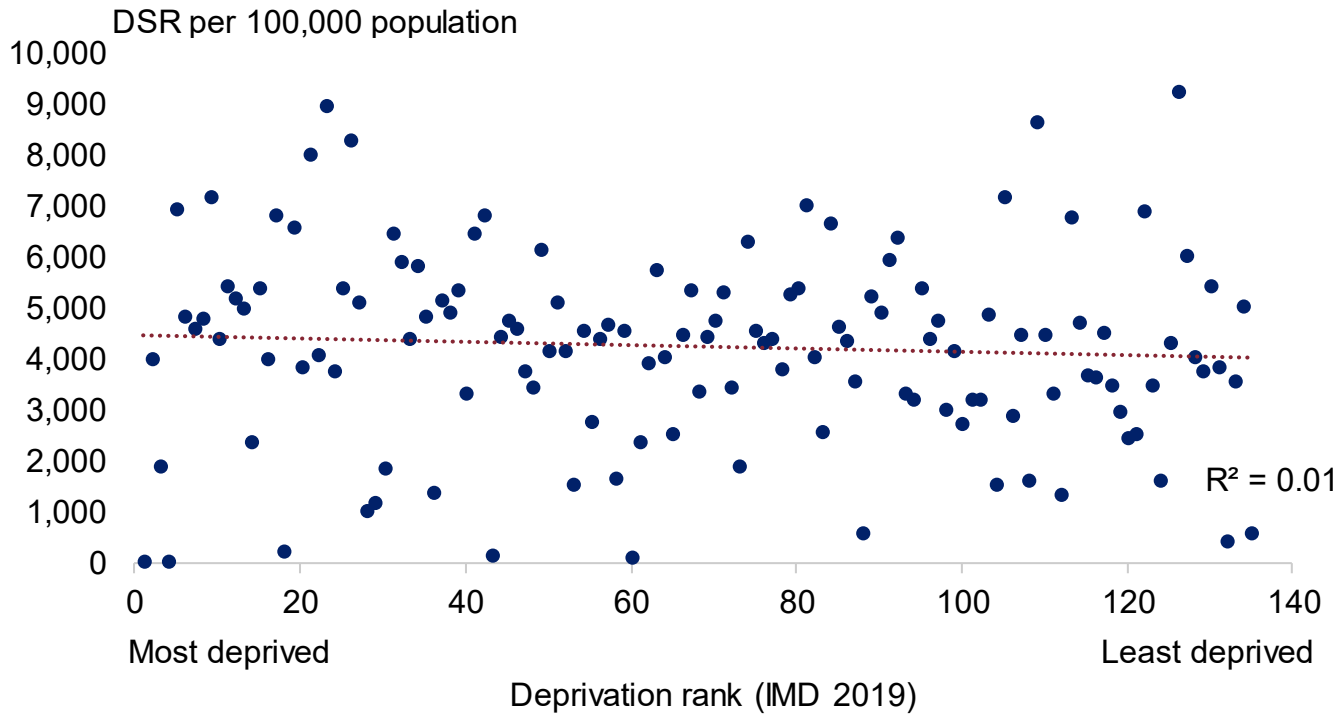
The median increased significantly from 2,063 per 100,000 population in 2013/14 to 4,436 per 100,000 population in 2019/20.

During 2019/20 a total of 608,000 intravitreal injection procedures were performed for 143,000 persons of 60 years of age and over i.e. the population at risk of eye conditions that may need intravitreal injection therapy with anti-VEGF class of drugs.

Over the 7 year period of established practice (2013/14 to 2019/20), the rates for all intravitreal injection procedures rose steadily in the presence of significant and widening variation in activity. Most of the variation lies at the extremes of the distribution of activity. Eighty-three per cent (112/135) of CCGs had procedure rates which were significantly different to the national rate at the 99.8% level.

The deprivation chart (Index of Multiple Deprivation rank) Figure 2.3 shows there is no strong association with the variation of rates for all intravitreal injection procedures at a CCG level, indicating that services currently meet known demand but should be checked locally as this could be compounded by access to services.

Figure 2.3: Scatterplot of all intravitreal injection therapy procedures in people aged 60 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Despite this limitation, the data currently available from over 600,000 procedures performed on a population at risk may additionally reflect the following:

Differences in the distribution of underlying conditions:

Underlying eye conditions, that are treated by intravitreal injection therapy, are known to vary across different ethnic groups.[19, 20, 21]

Differences in clinical protocols:

Care plans for the licenced indications all involve multiple episodes of care at varying intervals and duration.

[19] Wong WL, Su X, Li X and others (2014) Global prevalence of age-related macular degeneration and disease burden projection for 2020 and 2040: a systematic review and meta-analysis Lancet Glob Health 2014; 2: 106-16 [Accessed 24 May 2021]

[20] Sivaprasad S, Gupta B, Gulliford MC and others (2012) Ethnic Variations in the Prevalence of Diabetic Retinopathy in People with Diabetes Attending Screening in the United Kingdom (DRIVE UK) PLoS One 2012;7:e32182 [Accessed 24 May 2021]

[21] Rogers S, McIntosh RL, Cheung N and others (2010) The prevalence of retinal vein occlusion: pooled data from population studies from the United States, Europe, Asia, and Australia Ophthalmology 2010; 117: 313–9.e1 [Accessed 20 May 2021]

Capacity pressure:

Capacity pressures to deliver services and manage the rising clinical activity so generated

Map 2b: Experimental statistic: Variation in rate of first intravitreal injection therapy procedures in people aged 60 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 16.6 per 100,000 population to 490.2 per 100,000 population, which is a 29.5-fold difference between CCGs.

The England value for 2019/20 was 281.7 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

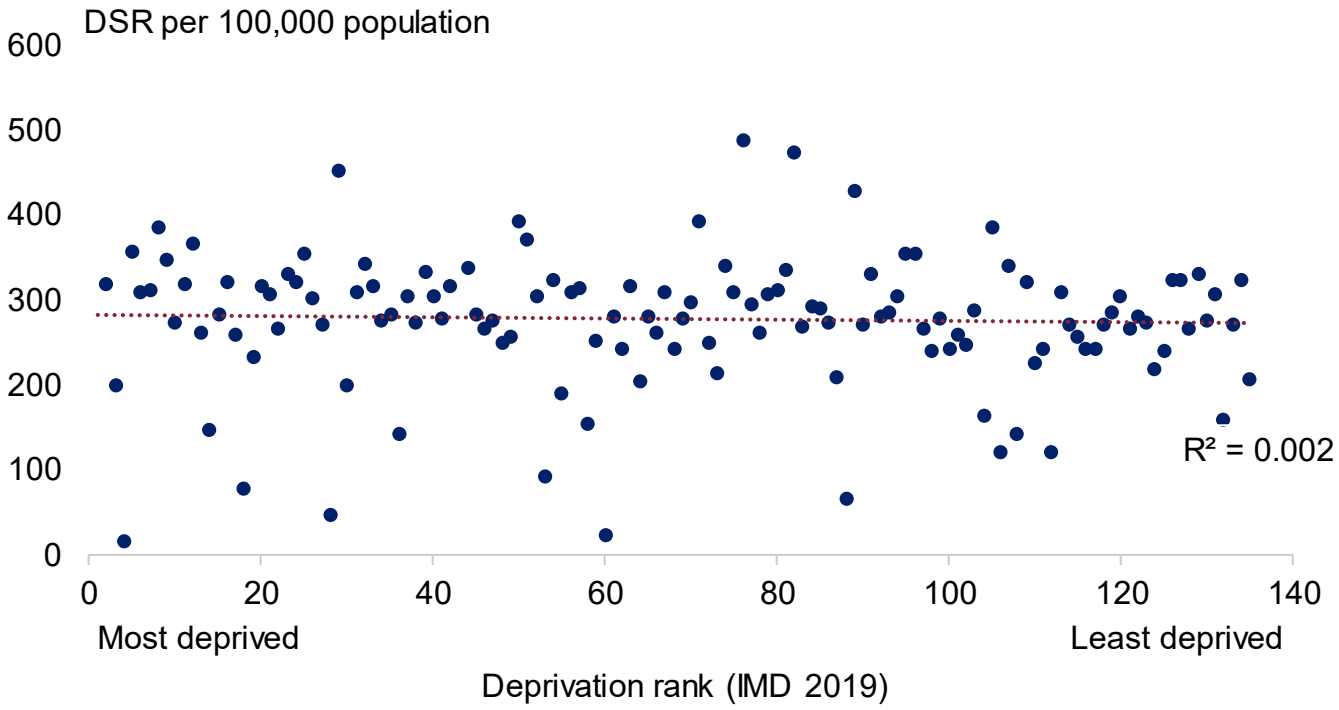
The 75th to 25th percentile gap narrowed significantly.

During 2019/20, almost 39,000 first procedures were performed on persons aged 60 years and over. In 2019/20, the ratio of first to ongoing injection procedures is approximately 1:15, broadly reflecting anecdotal clinical experience.

Over the 7 year period of established practice (2013/14 to 2019/20) there was no significant change in the rate of first injections for the population at risk, but there was a significant decrease in variation as indicated by the narrowing of the difference between the 75th and 25th percentile. Thirty per cent (40/133) of CCGs having rates which were significantly different to the national rate at the 99.8% level.

The deprivation chart (Index of Multiple Deprivation rank) Figure 2.4 shows there to be no strong association with the variation in the rates for first intravitreal injection procedures at a CCG level, indicating that services currently meet known demand but should be checked locally as this could be compounded by access to services.

Figure 2.4: Scatterplot of all first intravitreal injection therapy procedures in people aged 60 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Differences in organisational practice and priorities for OPCS coding data of their activity are the most likely to be the major, systematic factor contributing to the variations, potentially underestimating rates of first injection and masking the existence of true variations.

However, despite this limitation, from the data currently available the variations may also be influenced by:

Levels of need and demand in local populations:

Differences in the risk and distribution of the underlying conditions which are licenced indications for intravitreal injection therapy (health needs), are known to be associated with ethnicity.[19, 20, 21]

Timely access to NHS services:

Although rates for first injection procedures (the new demand) remained unchanged over a period of established practice, the underlying number of people in the population at risk may have changed with subsequent change in the number of episodes of care required to be delivered. New or first episodes of care in ophthalmology are generally prioritised for outpatient settings and rapid access and treatment pathways for wet AMD are recommended and increasingly available,[22] but local circumstances for managing

[22] National Institute for Health and Care Excellence (2018) Age-related macular degeneration (NICE guideline [NG 82]) [Accessed 13 May 2021]

capacity and demand are likely to influence whether these are sufficiently operational or not.

Options for action

Data quality: improve coding of routine NHS activity for Hospital Episode Statistics

It is unlikely that OPCS and ICD coding for all NHS outpatient attendances will be mandated soon. However, given the high volume of NHS activity generated and the total resources consumed (from clinical, patient and health service perspectives), all providers of these NHS commissioned services should be required to code all their intravitreal injection procedures from all settings of service delivery, for their returns to HES.

This information is essential to ensure equitable use of health resources to meet health needs, and to reliably inform capacity and demand management; at local level (place), Integrated Care System (ICS) and national level.

Review clinical protocols: ensure consistent, effective, evidence-based clinical management

The protocols for the licensed indications all require multiple procedures, often over several years. Variations are more likely to arise around interpretation of treat and extend regimes from clinical trials for application into routine practice for ongoing management, rather than around loading courses on starting therapy.

Clinical protocols should be reviewed to ensure provision of effective, evidence-based services, with clear guidance on monitoring of response to active treatment, criteria for stopping therapy, the processes (including duration) for monitoring of stable patients following treatment; and for managing recurrence. In addition, as new anti-VEGF agents are introduced, criteria for potential treatment switches should be agreed for defined and demonstrable clinical need for example Brolucizumab for wet AMD.[15] These should all be applicable at place and ICS level.

Report outcomes of treatment for quality assurance of services

Whilst these are likely to be the subject of departmental audit and discussion, wider reporting and review locally (place) and at ICS level would provide assurance on the quality of services delivered for the population at risk. The following outcomes proposed in the Portfolio of Indicators for Eye Health and Care (Indicator 7),[23] based on data collected during routine clinical care, are a useful starting point and should not incur additional burden for data collection:

[23] Clinical Council for Eye Health Commissioning (2018) SAFE: Portfolio of Indicators for Eye Health and Care [Accessed 09 Aug 2021]

- visual acuity outcomes of anti-VEGF therapy at baseline and at one year after starting treatment for: wet AMD, diabetic macular oedema, and macula oedema complicating retinal vein occlusions

Review service activity by demographic factors such as ethnicity and gender to:

- ensure equity in meeting need and demand within overall service provision
- monitor for unintended consequences of clinical risk stratification
- identify potential health seeking behaviours

The risk of developing wet AMD, diabetic macular oedema and macular oedema associated with retinal vein occlusion, will vary by age and ethnicity.[19, 20, 21] Patients are now risk stratified to prioritise their care as a means to manage backlogs, capacity and demand, which have all been further intensified since the onset of the COVID-19 pandemic. In doing so, some patient groups may be placed at particular risk of ongoing limited or delayed access to care, especially in the context of multiple morbidities (ocular and systemic).

Resources

National Institute for Health and Care Excellence (2018) Age-related macular degeneration (NICE guideline [NG 82]) [Accessed 13 May 2021]

Moorfields Eye Hospital NHS Foundation Trust (2018) Patient Information: Anti-VEGF Intravitreal Injection Treatment [Accessed 18 May 2021]

Cataract surgery

Context

A cataract is defined as any opacity in the natural crystalline lens of the eye. It can develop in one or both eyes. The changes to the transparency and refractive index of the lens result in various levels of vision impairment which can affect a person's quality of life and restrict their ability to carry out their daily activities, and to function independently and safely. The single most important risk factor for the development of a cataract is age.[1] The natural changes in lens proteins that occur with age, develop slowly with gradual onset of symptoms such as blurring and glare.

Cataract surgery is the treatment of choice for symptomatic, age-related cataract and prevention of vision impairment.[2] It is a clinically safe and effective micro-surgical procedure,[3] associated with good functional outcomes for both first and second eye surgery.[4] It remains a high volume NHS activity with surgery predominantly (85%) performed in adults of 65 years of age and over.[5] Whilst cataract is a major cause of global vision impairment and blindness,[6] it infrequently causes certifiable sight impairment in the UK.[7]

Surgical activity has steadily increased and is expected to continue to do so as demand continues to rise with the ageing population.[8] At least a third of all procedures are consistently for second eye surgery.[3, 9, 10] Periodically there have been restrictions on access to surgery (particularly second eye surgery) as a means to reduce costs to

[1] McCarty CA, Nanjan MB, Taylor HR (2000) Attributable risk estimates for cataract to prioritize medical and public health action. Invest Ophthalmol Vis Sci. 2000 Nov;41(12):3720-5 [Accessed 16 Jun 2021]
[2] National Institute for Health and Care Excellence (2017) Cataracts in adults: management (NICE guideline [NG77]) [Accessed 16 Jun 2021]
[3] National Ophthalomology Database Audit (2020) National Ophthalmology Database (NOD) Audit annual report on cataract surgery September 2020. [Accessed 16 Jun 2021]
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[8] Royal College of Ophthalmologists (2017) The Way Forward – Cataract Report [Accessed 16 Jun 2021]
[9] Desai P, Reidy A, Minassian DC (1999) Profile of patients presenting for cataract surgery in the UK: national data collection Br J Ophthalmol 1999, 83:893–896 [Accessed 16 Jun 2021]
[10] Day AC, Donachie PHJ, Sparrow JM, Johnston RL (2015) The Royal College of Ophthalmologists' National Ophthalmology Database study of cataract surgery: report 1, visual outcomes and complications Eye (2015) 29, 552–560 [Accessed 16 Jun 2021]

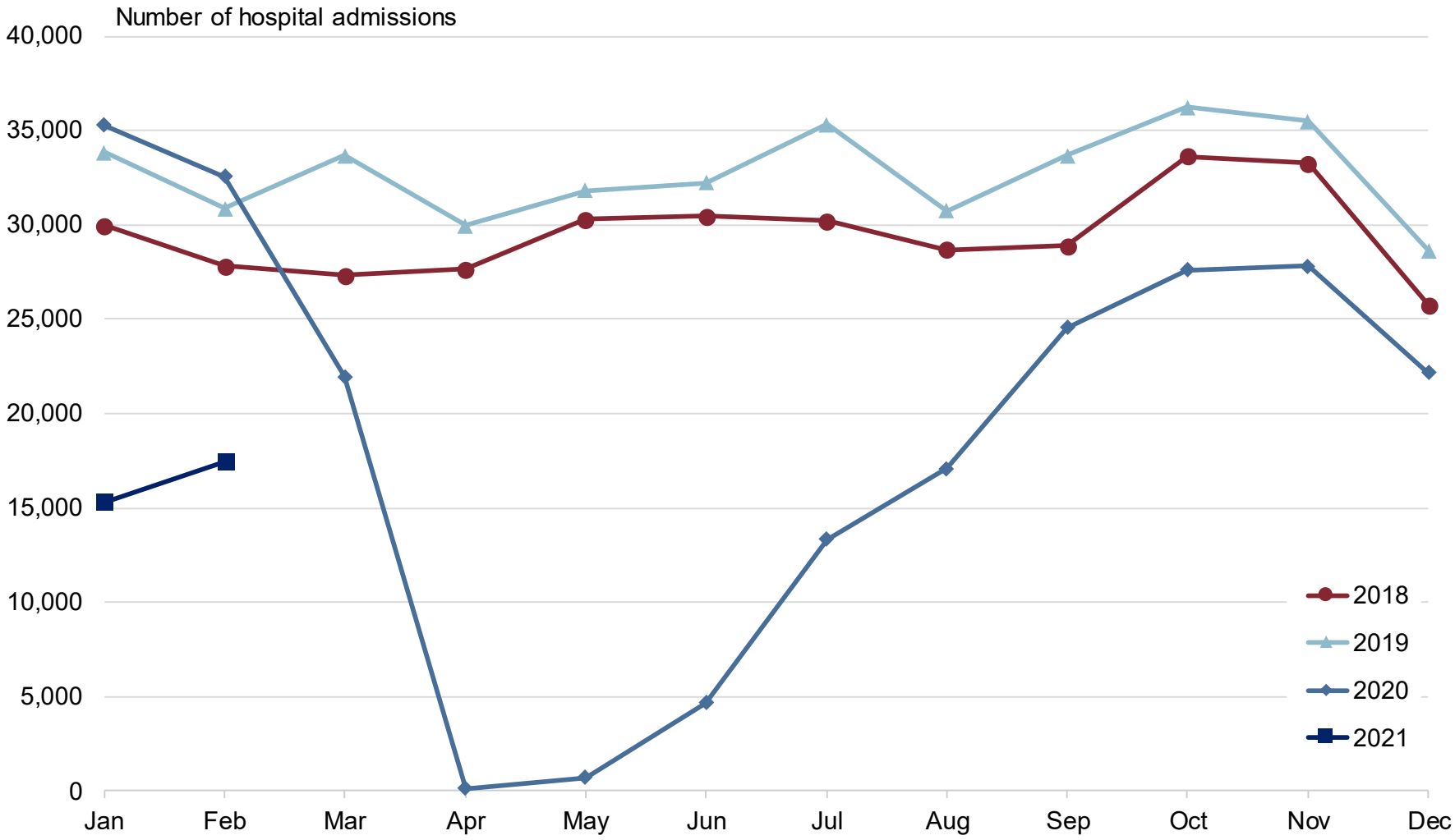
manage health budgetary restrictions.[11, 12, 13] However NICE Guideline NG77 recognises the need for cataract surgery in both eyes, and its contribution to maintaining population eye health.[2]

Cataract surgery during the COVID-19 pandemic

Since the onset of the coronavirus (COVID-19) pandemic in March 2020, clinical activity has been prioritised to manage conditions at high risk of losing sight, with all routine care including cataract surgery delayed. Inevitably, as seen in figure 3.1, this resulted in a sharp drop in surgical activity during the first (April to June 2020) and second (December 2020 to February 2021) wave of the pandemic, with concerted efforts to resume activity towards expected levels in the intervening period. Nevertheless, this has resulted in a backlog of unoperated cases together with new cases arising during the pandemic, all of which would benefit from cataract surgery.

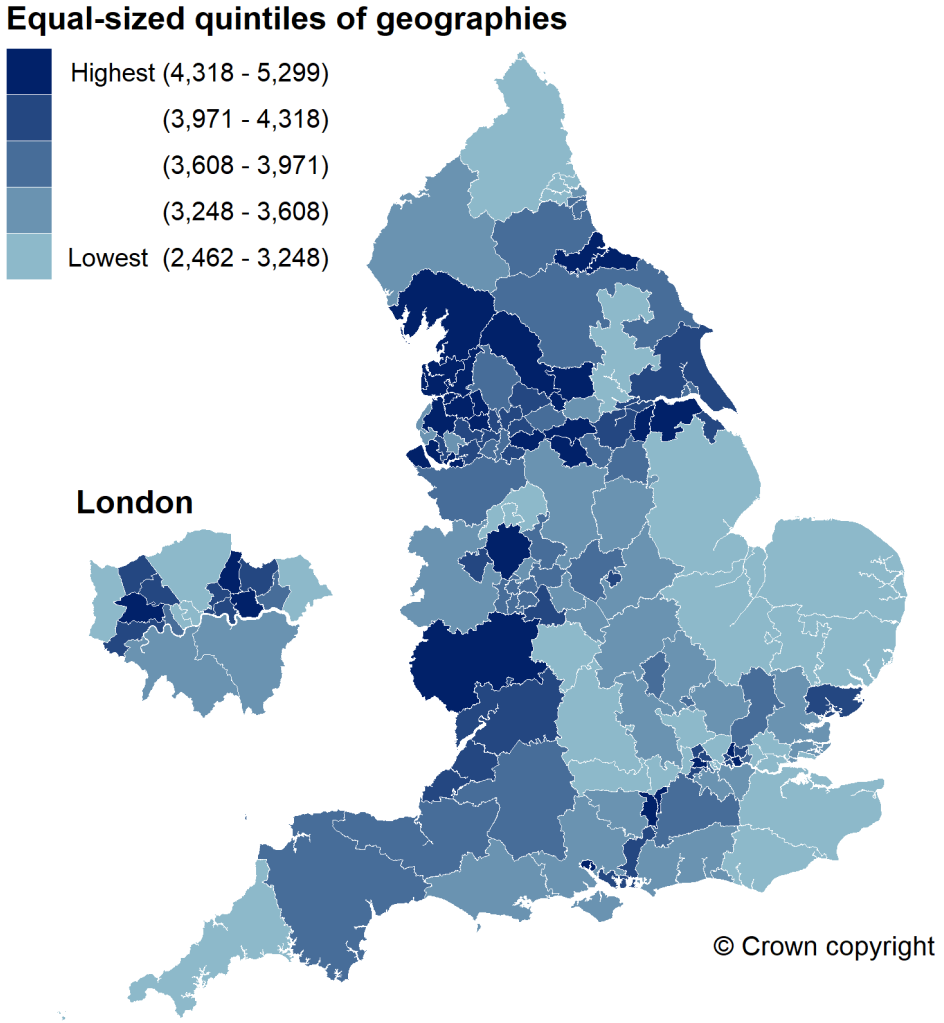
[11] Coronini-Cronberg S, Lee H, Darzi A, and others (2012) Evaluation of clinical threshold policies for cataract surgery among English commissioners J Health Serv Res Policy 2012,17: 241–247 [Accessed 16 Jun 2021]
[12] Burdon M (2019) End the postcode lottery for cataract surgery BMJ 2019, 365:l2293 [Accessed 21 Jun 2021]
[13] Lacobucci G (2019) NHS commissioners are ignoring guidelines by rationing cataract surgery BMJ 2019, 365:l2326 [Accessed 21 Jun 2021]

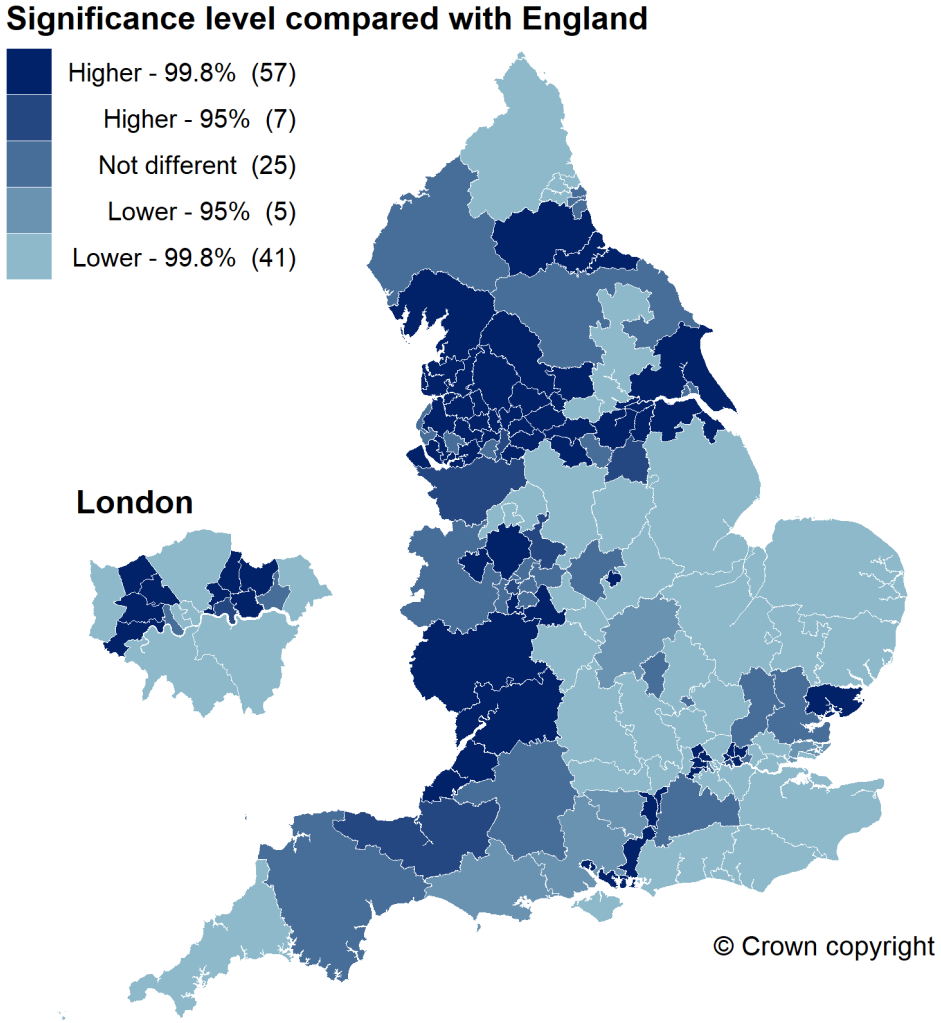
Figure 3.1: Provisional data: Admission to hospital for cataract surgery in people aged 65 years and over for England (January 2018 to February 2021)



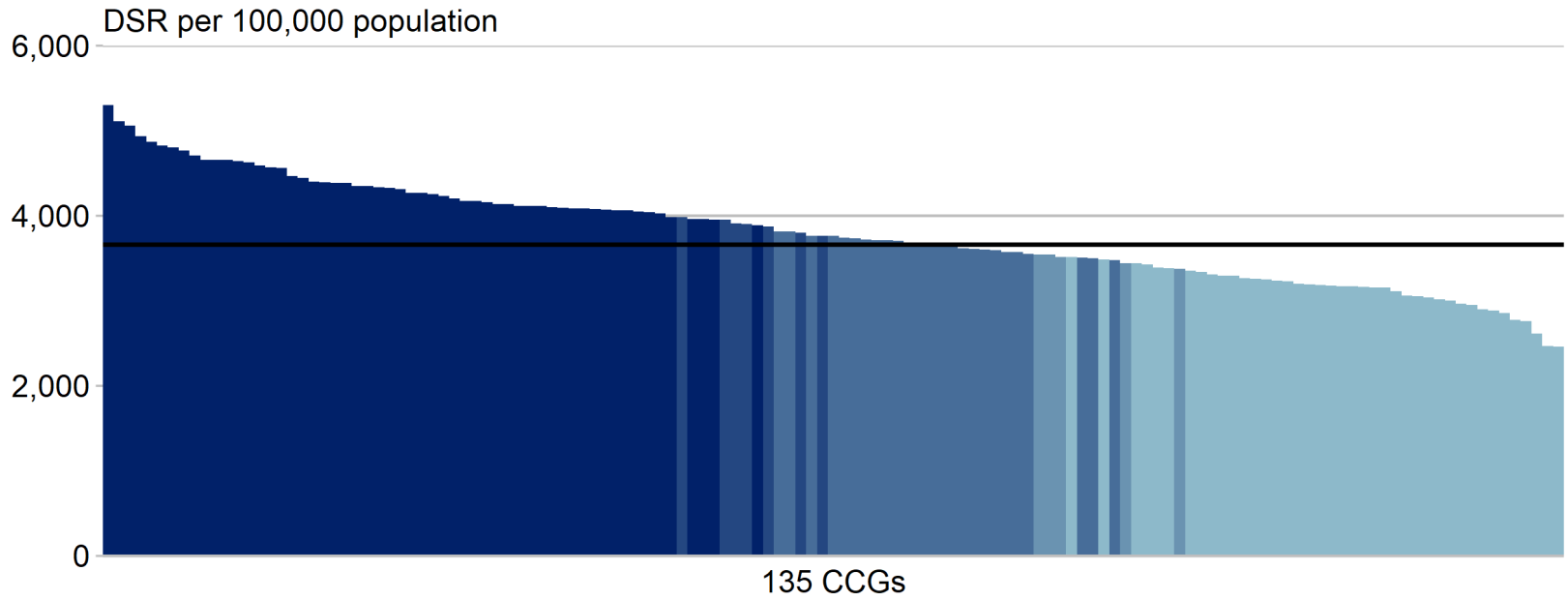
Map 3a: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

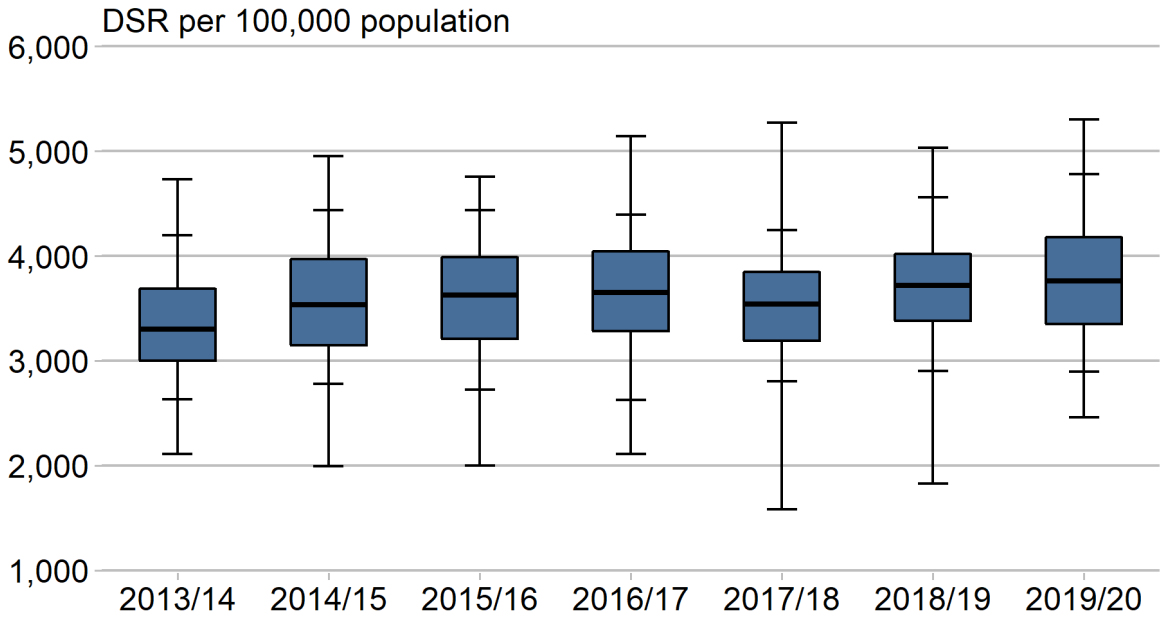




Column chart: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by CCG (2019/20)



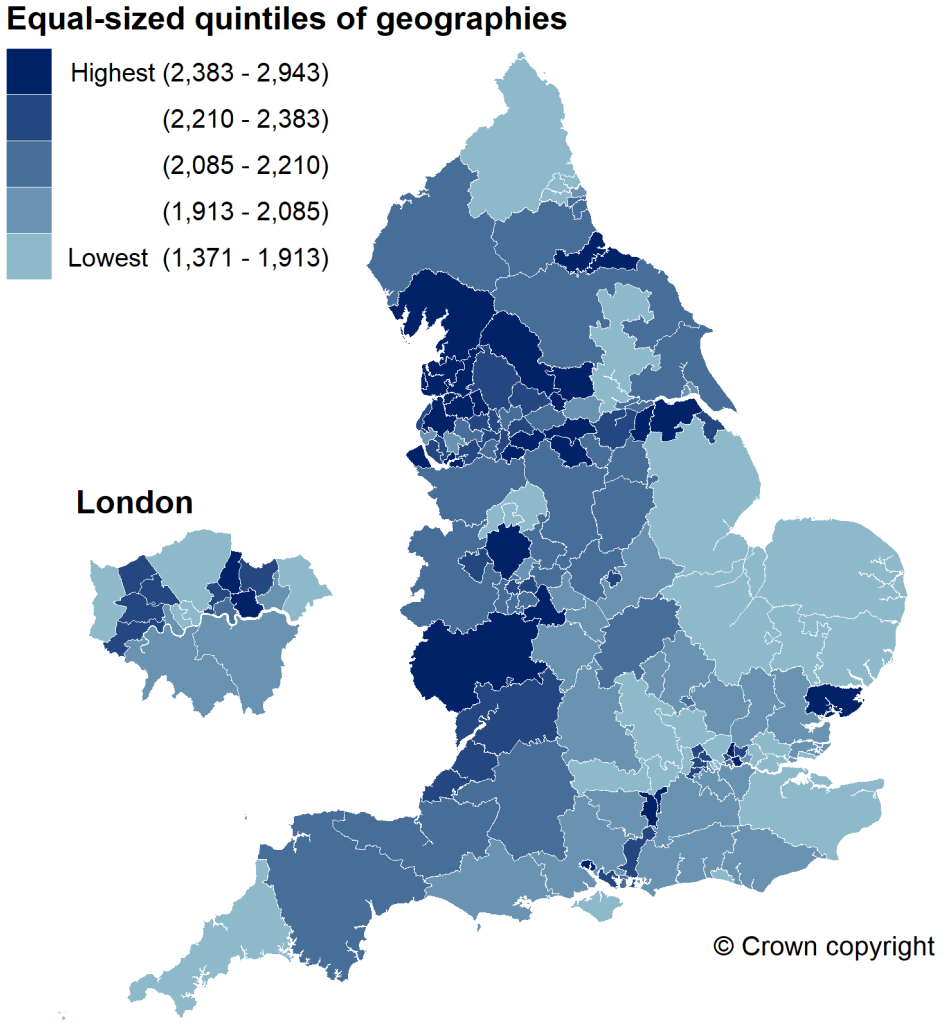
Box plot time series: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by CCG (2013/14 to 2019/20)

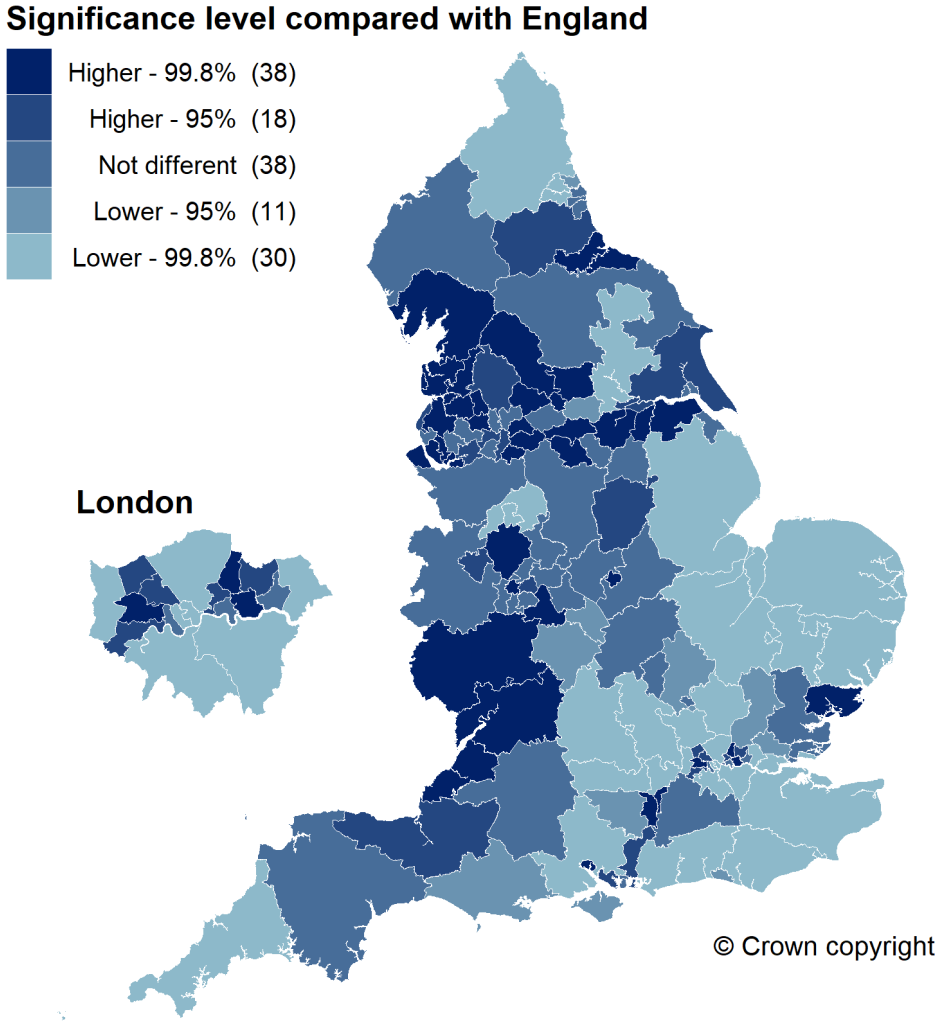


Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	2,621	2,961	2,756	3,032	3,691	3,202	2,837	No significant change
75th-25th percentile	692	818	779	763	657	641	827	No significant change
95th-5th percentile	1,566	1,657	1,712	1,768	1,444	1,656	1,882	No significant change
Median	3,298	3,531	3,623	3,648	3,539	3,718	3,762	INCREASING Significant

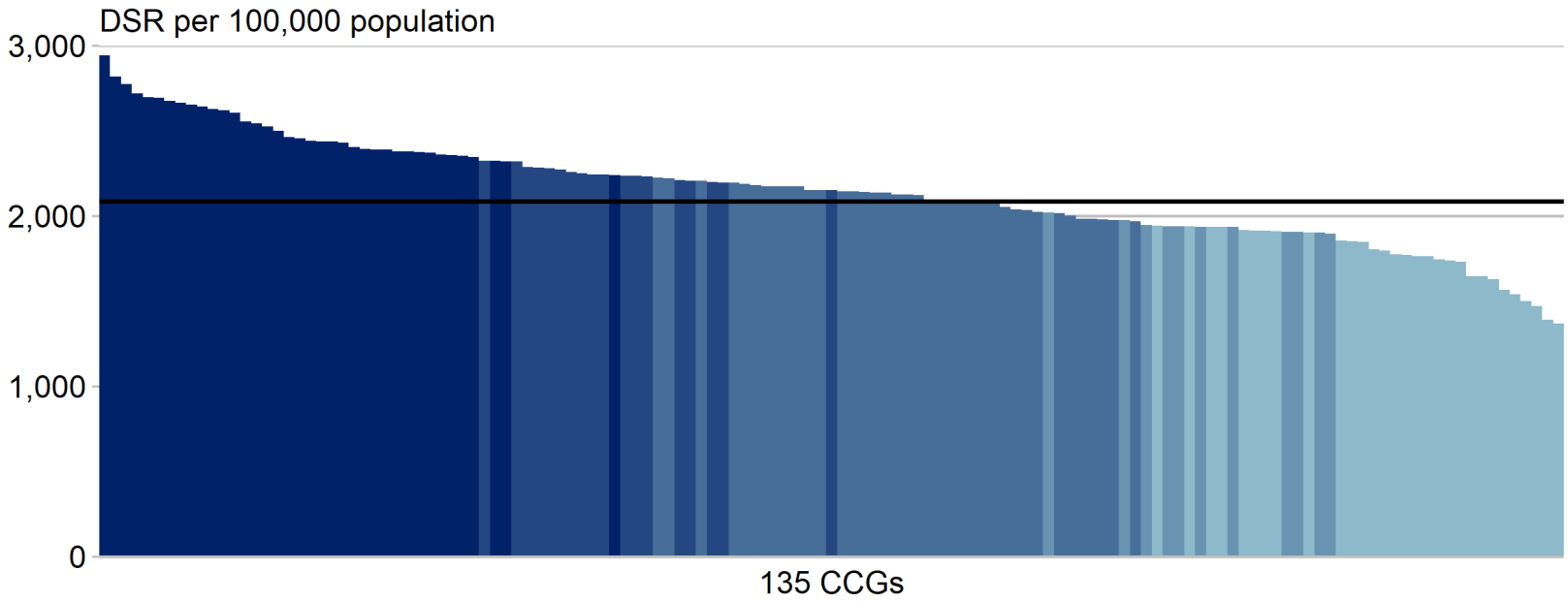
Map 3b: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

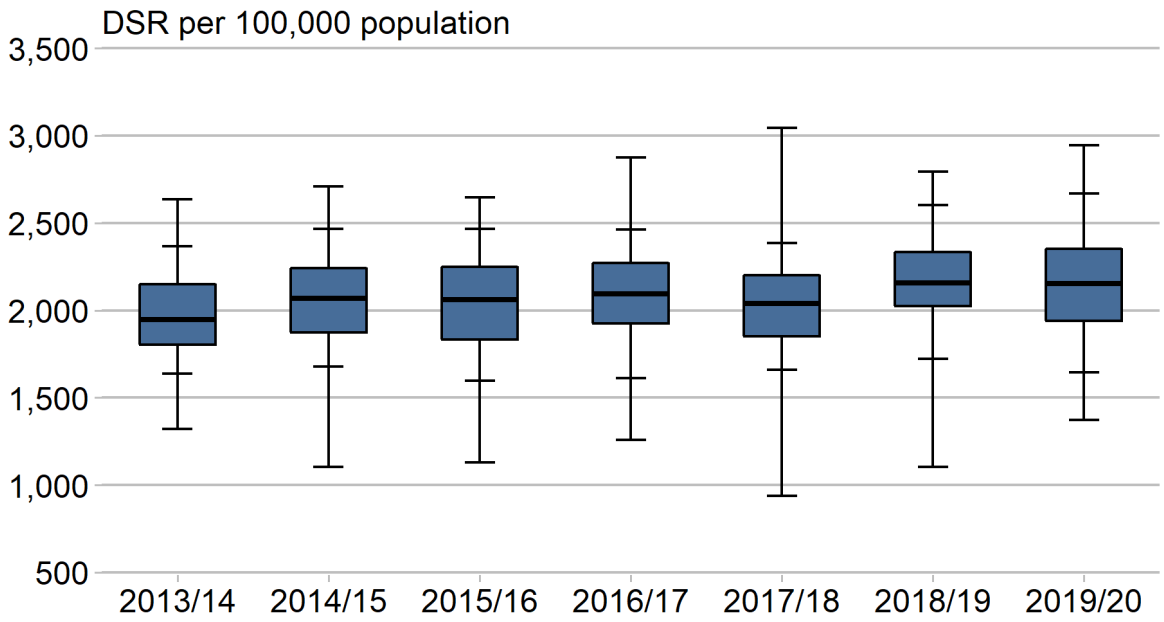




Column chart: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by CCG (2019/20)



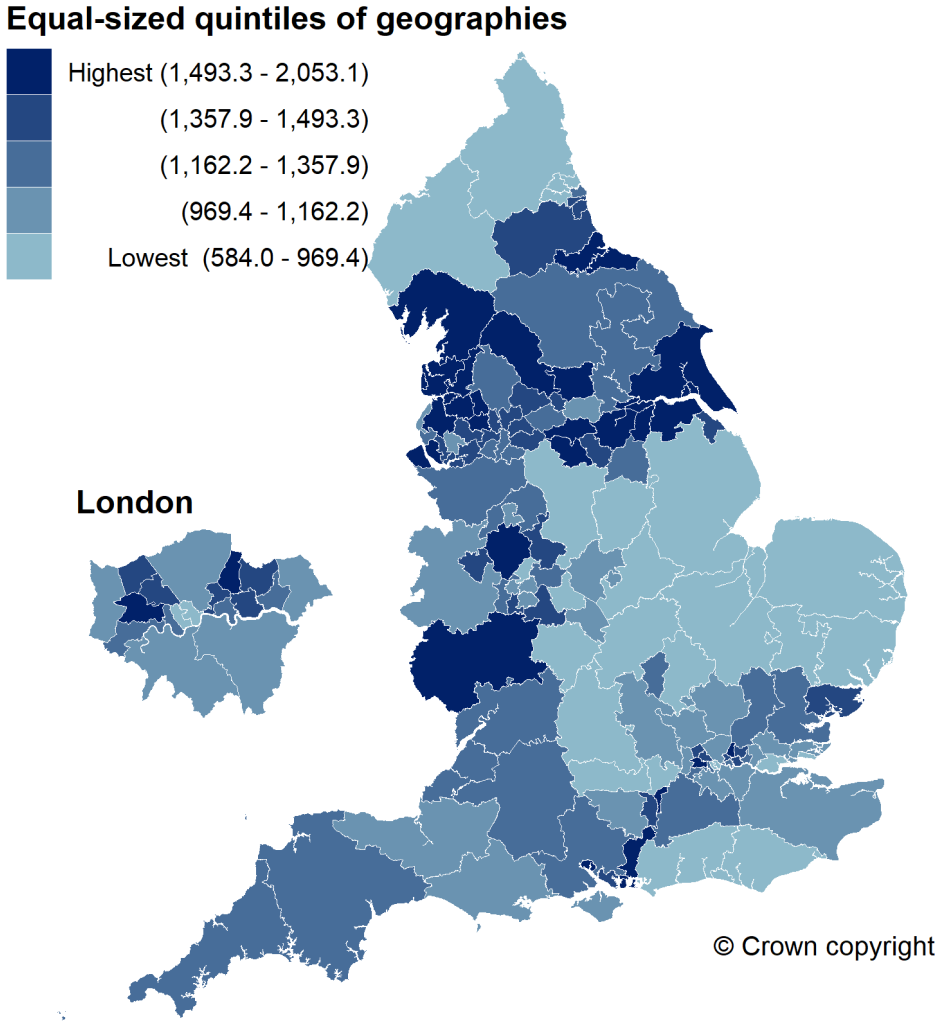
Box plot time series: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by CCG (2013/14 to 2019/20)

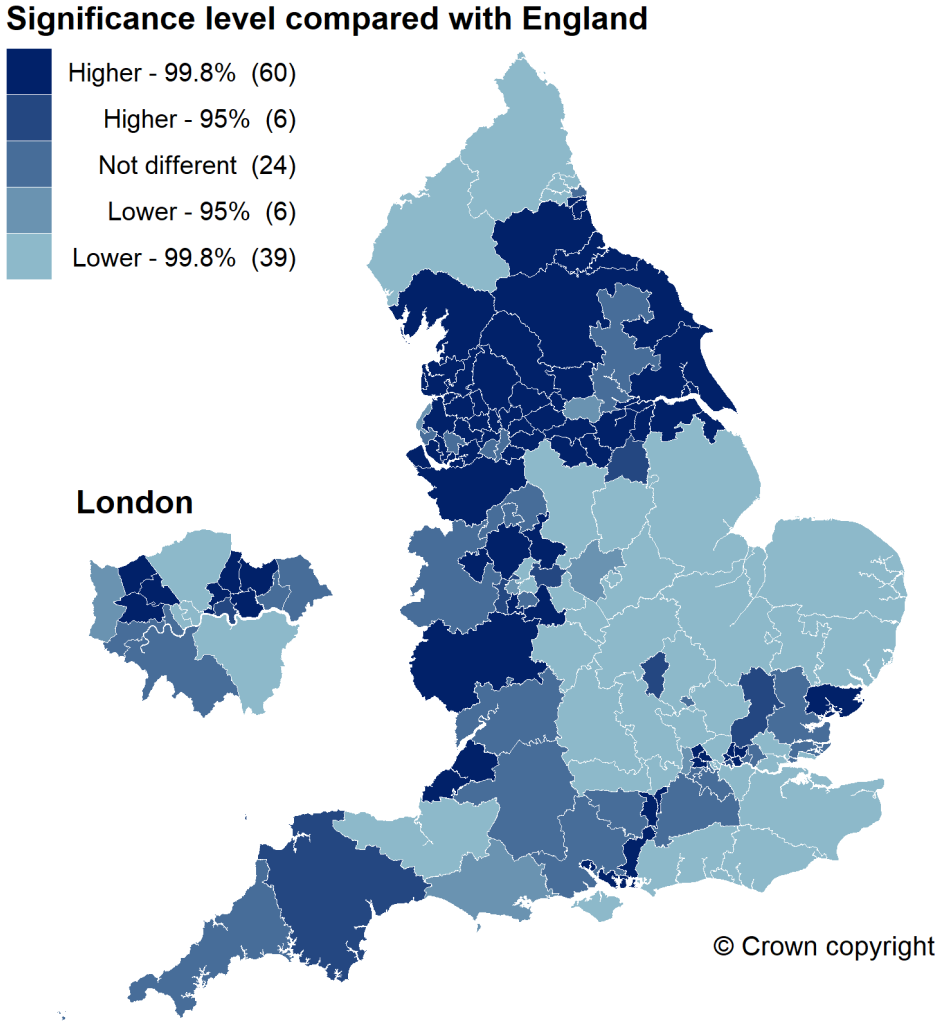


Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	1,314	1,607	1,516	1,616	2,107	1,689	1,572	No significant change
75th-25th percentile	344	366	414	347	349	311	412	No significant change
95th-5th percentile	731	789	867	849	726	880	1,025	No significant change
Median	1,948	2,070	2,059	2,092	2,038	2,158	2,152	INCREASING Significant

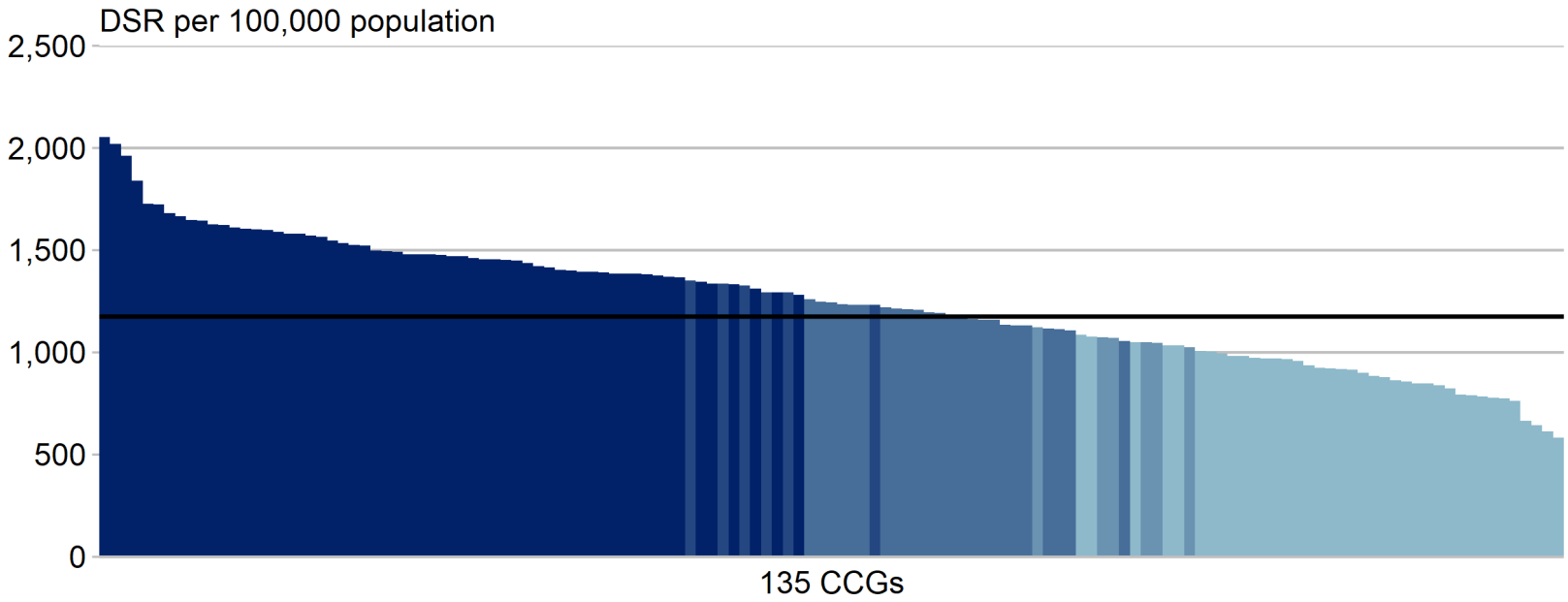
Map 3c: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

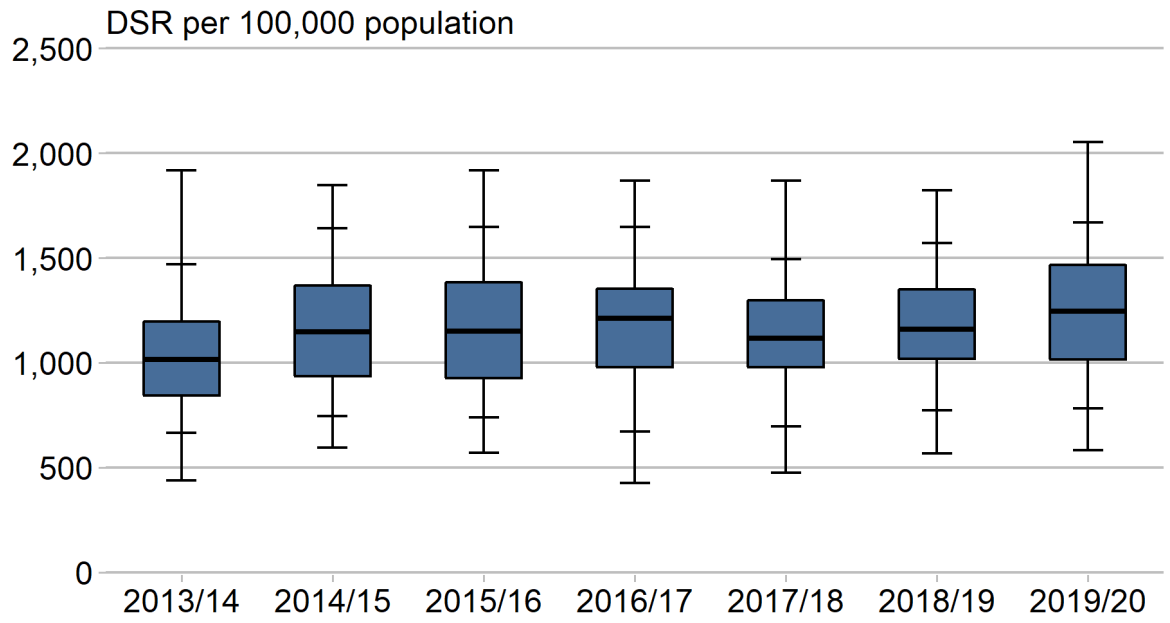




Column chart: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by CCG (2019/20)



Box plot time series: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by CCG (2013/14 to 2019/20)



Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	1,480.8	1,251.0	1,349.2	1,440.0	1,391.6	1,256.0	1,469.1	No significant change
75th-25th percentile	353.4	432.8	458.1	374.7	318.2	331.9	449.7	No significant change
95th-5th percentile	803.6	895.8	910.3	975.4	799.0	795.7	887.5	No significant change
Median	1,016.7	1,146.0	1,151.0	1,211.7	1,117.6	1,160.7	1,244.6	No significant change

Magnitude of Variation

Map 3a: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which clinical commissioning group (CCG) values ranged from 2,462 per 100,000 population to 5,299 per 100,000 population, which is a 2.2-fold difference between CCGs.

The England value for 2019/20 was 3,660 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

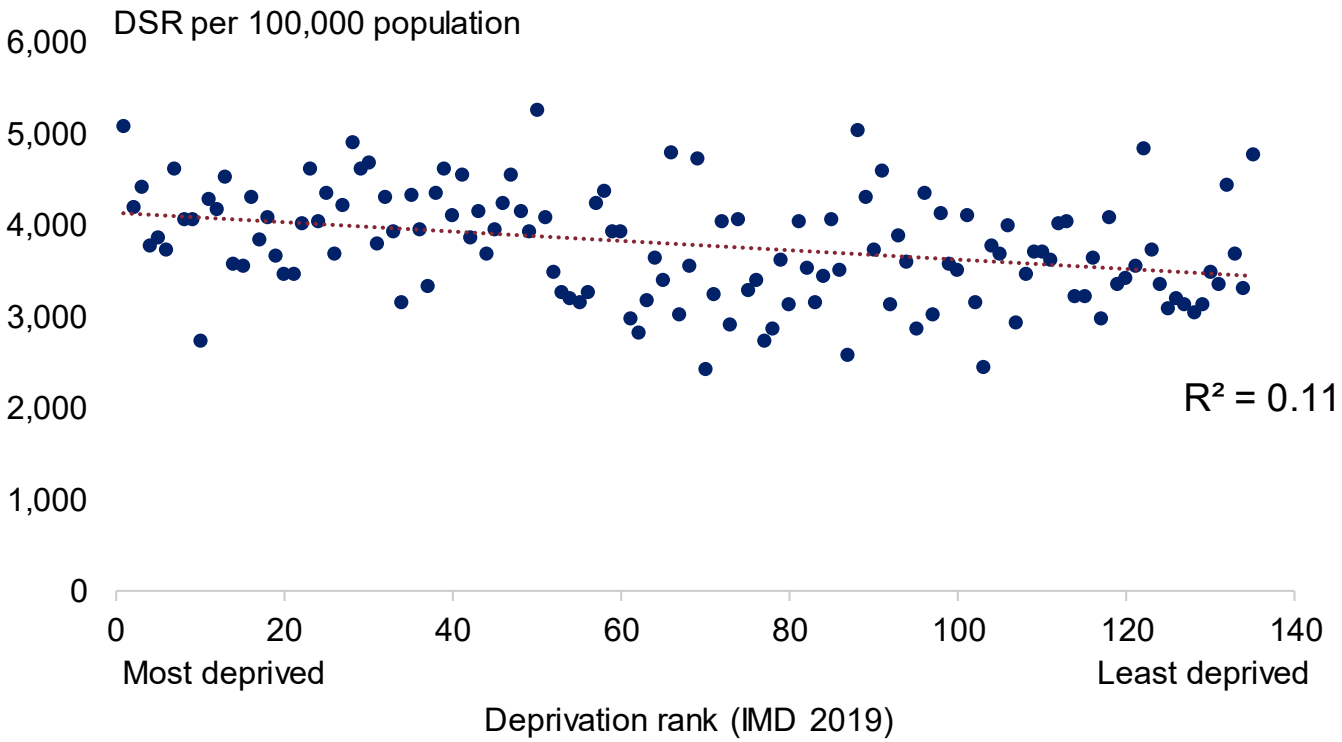
The median increased significantly from 3,298 per 100,000 population in 2013/14 to 3,762 per 100,000 population in 2019/20.

During 2019/20, almost 384,000 cataract operations were performed in the NHS in England on people age 65 years and over. Of these over 123,000 (32%) operations were performed on the second eye within 12 months of the first eye operation, with this proportionate level of activity remaining stable for several decades.[9,10]

The rate of overall cataract surgery increased during the period from 2013/14 to 2019/20 without any change in variation in this activity between CCGs. Most recently much of this 2.2-fold variation is seen to have occurred at the extremes of the distribution of activity, with 73% (98/135) of CCGs having surgical rates significantly different to the national rate at the 99.8% confidence level.

The rising rates for surgery reflect a response to rising demand. The deprivation chart (Index of Multiple Deprivation rank) figure 3.2 shows there to be no strong association with the variation in rate of admission to hospital for cataract surgery at a CCG level, indicating that cataract surgical services meet known demand but should be checked locally as this could be compounded by access to services.

Figure 3.2: Scatterplot of admission to hospital for cataract surgery in people aged 65 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Other factors influencing variation include differences in the level of need and service uptake in local populations, commissioning priorities, and capacity pressures to deliver services for rising demand. In addition, given the wide dispersion of variation, the relative contribution of these factors influencing first, and second eye surgery also need to be considered and are presented in the following sections.

Map 3b: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 1,371 per 100,000 population to 2,943 per 100,000 population, which is a 2.1-fold difference between CCG

The England value for 2019/20 was 2,086 per 100,000 population.

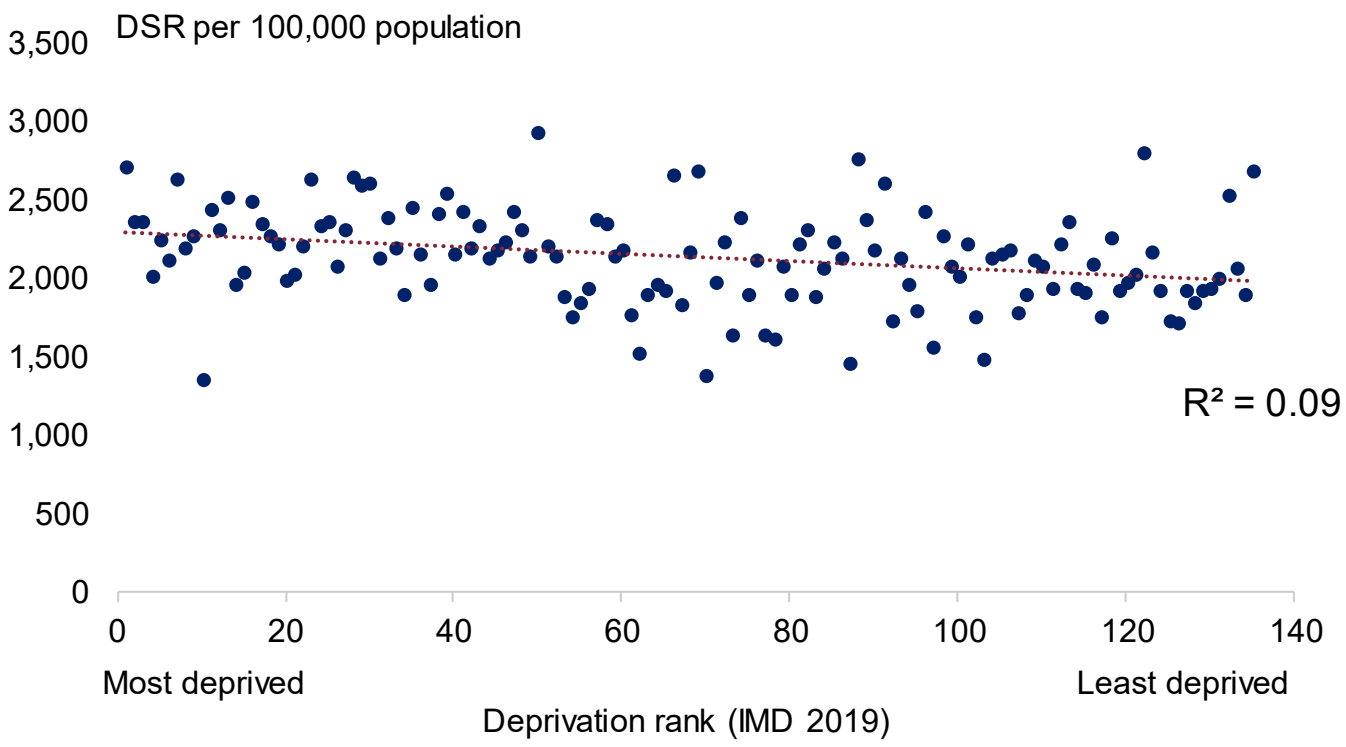
The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

The median increased significantly from 1,948 per 100,000 population in 2013/14 to 2,152 per 100,000 population in 2019/20.

Similarly, the rates for first eye cataract surgery performed in persons aged 65 years and over, increased during the period 2013/14 to 2019/20, and were associated with a persistent greater than 2-fold variation. However, there was less dispersion of this variation, and most recently 50% (68/135) of CCGs had rates significantly different to the national rate for first eye cataract surgery at the 99.8% confidence level.

The rising rates for surgery reflect a response to rising demand and recognition of the benefits conferred by surgery on the population at risk. The deprivation chart (Index of Multiple Deprivation rank) figure 3.3 shows there to be no strong association with the variation in rate of admission to hospital for first cataract surgery at a CCG level, indicating that cataract surgical services meet known demand but should be checked locally as this could be compounded by access to services.

Figure 3.3: Scatterplot of admission to hospital for first cataract surgery in people aged 65 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Variations are also likely to be influenced by factors akin to those operating for all cataract surgery activity: differences in the level of need and service uptake in local populations, commissioning priorities, and capacity pressures to deliver services for rising demand.

Map 3c: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 584 per 100,000 population to 2,053 per 100,000 population, which is a 3.5-fold difference between CCGs.

The England value for 2019/20 was 1,175 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

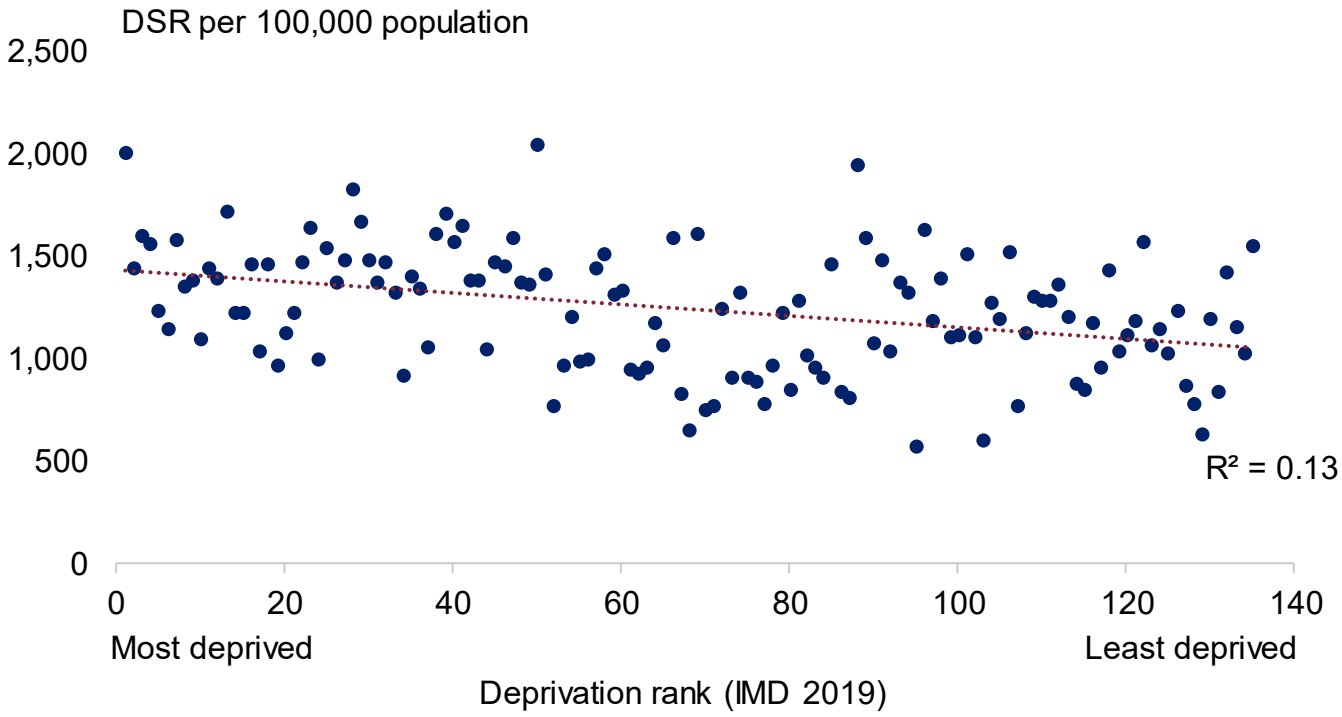
Second eye surgery was defined as a cataract procedure being performed on persons aged 65 and over, within 12 months of their first eye operation, which reflects contemporaneous clinical practice. It accounted for about a third of cataract surgical activity in this age group.

There was no demonstrable change in surgical rates for second eye surgery over the period 2013/14 to 2019/20, and no change in the level of variation associated with this activity. This together with the consistency in proportionate activity for second eye surgery suggests that demand generated following first eye surgery may be met but does not necessarily imply that need for second eye surgery is met.

The 3.5-fold variation during the financial year beginning 2019 was associated with considerable dispersion of this variation. Seventy-three per cent (99/135) of CCGs had rates that were significantly different to the national rate for second eye cataract surgery at the 99.8% confidence level, during 2019/20. It is likely that activity for second eye surgery is a key factor driving the wide dispersion for the rates of all cataract surgery.

The deprivation chart (Index of Multiple Deprivation rank) figure 3.4 shows there to be no strong association with variation in the rate of admission to hospital for second cataract surgery within 12 months indicating that services meet known demand but should be checked locally as this could be compounded by access to services.

Figure 3.4: Scatterplot of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Access to second eye surgery has historically been vulnerable to restrictions as a means to manage limited health budgets. Differences in the clinical and commissioning priorities for second eye surgery, imposed thresholds for intervention, and capacity for service provision, may also be influencing the variations in activity.

Options for action

Differences in age structure and deprivation are not driving the variation in activity or potential inequalities in service access or provision.

The common factors likely to be influencing variation in the rates for all, first and second eye cataract surgery include differences in commissioning and clinical priorities, capacity for service provision, levels of need and demand, and service uptake between CCGs. The dispersion of the variation around these rates may be reflecting how these factors are operating and their impact on prevalent demand for first and second eye surgery.

Local review should take account of these factors for first and second eye separately, together with demographic factors such as gender and ethnicity to identify any potential health needs which may influence uptake of available services.

Careful review of all of these factors will be required to manage the backlog of cases and the new demand arising since the onset of the pandemic, in order to prioritise those at greatest need of cataract surgery in the context of other unmet demand for eye health care. This may involve some readjustment of pre-COVID-19 guidance and practice to ensure equitable use of health resources across the eye health care landscape.

Resources

Clinical Council for Eye Health Commissioning (2018) SAFE - Systems and assurance framework for eye-health: Overview [Accessed 15 Apr 2021]

Clinical Council for Eye Health Commissioning (2018) SAFE - Systems and assurance framework for eye-health: SAFE - Cataract [Accessed 15 Apr 2021]

Fight for Sight (2021) A-Z Eye Conditions: Cataract [Accessed 15 Apr 2021]

Moorfields Eye Hospital NHS Foundation Trust (2001) Eye Conditions: Cataract [Accessed 15 Apr 2021]

National Institute for Health and Care Excellence (2017) Cataracts in adults: management (NICE guideline [NG77]) [Accessed 27 Mar 2021]

National Institute for Health and Care Excellence (2015) Clinical Knowledge Summaries: Cataract [Accessed 27 Mar 2021]

NHS (2020) NHS Health A-Z: Age-related cataracts [Accessed 31 Mar 2021]

NHS (2021) NHS Health A-Z: Cataract-Surgery [Accessed 31 Mar 2021]

Royal College of Ophthalmologists (2018) Cataract Commissioning Guide [Accessed 27 Mar 2021]

Royal College of Ophthalmologists (2017) The Way Forward - Cataract Report [Accessed 27 Mar 2021]

Royal College of Ophthalmologists (2017) The Way Forward: Resources [Accessed 15 Apr 2021]

Royal National Institute of Blind People (RNIB) (2019) Eye Conditions: Cataracts [Accessed 15 Apr 2021]

Rhegmatogenous retinal detachment surgery

Context

The retina is the light-sensitive layer at the back of the eye. Retinal detachment refers to the separation of the retina from the surrounding tissues.[1,2] The process results in progressive loss of vision and can lead to permanent visual loss in the affected eye. Retinal detachment is one of the most common eye emergencies in England.

The most common type of retinal detachment is rhegmatogenous retinal detachment (RRD) associated with a tear or break in the retina.[1,2] The most common sub-group of RRD, are those secondary to pathological posterior vitreous detachment causing tears to form in the retina. Fluid then accumulates underneath the retina (in the subretinal space) causing retinal separation (retinal detachment).[3] Risk factors for this type of retinal detachment include age, myopia, eye injuries, ophthalmic operations, and familial or genetic risk factors. From the data presented in the atlas, the rate of surgery for RRD in England during the financial year beginning 2019, was 23.5 per 100,000 of the adult population affecting approximately 10,600 people a year.

The main symptoms of a retinal detachment are new or worsening floaters and sudden-onset painless and progressive visual field loss or blurred vision.[2] Patients presenting with one or more of these symptoms should be referred for immediate assessment by an ophthalmologist.[4] Prompt recognition and referral may allow early surgical repair – before the macula, the part of the retina responsible for central and colour vision, is detached – reducing the risk of permanent impairment of visual acuity,[5] or even preventing retinal detachment by retinopexy to any retinal tears before progression to retinal detachment has commenced. Symptomatic retinal detachment invariably results in lifelong loss of vision if left untreated.[5]

[1] Yanoff M (editor) and Duker J (2018) Ophthalmology 5th ed St Louis, USA: Elselvier
[2] Fraser S and Steel D (2010) Retinal detachment BMJ Clin Evid. 2010;2010;0710 [Accessed 03 June 2020]
[3] Ang A, Poulson AV, Snead DR and others (2005) Posterior vitreous detachment: current concepts and management Compr Ophthalmol Update. 2005; 6: 167-175 [Accessed 11 May 2021]
[4] Kang HK and Luff AJ (2008) Management of retinal detachment: a guide for non-ophthalmologists BMJ. 2008;336(7665):1235-1240 [Accessed 03 June 2020]
[5] Royal College of Ophthalmologists (2010) Ophthalmic Services Guidance: Management of acute retinal detachment [Accessed 03 June 2020]

Rhegmatogenous retinal detachment surgery during the COVID-19 pandemic

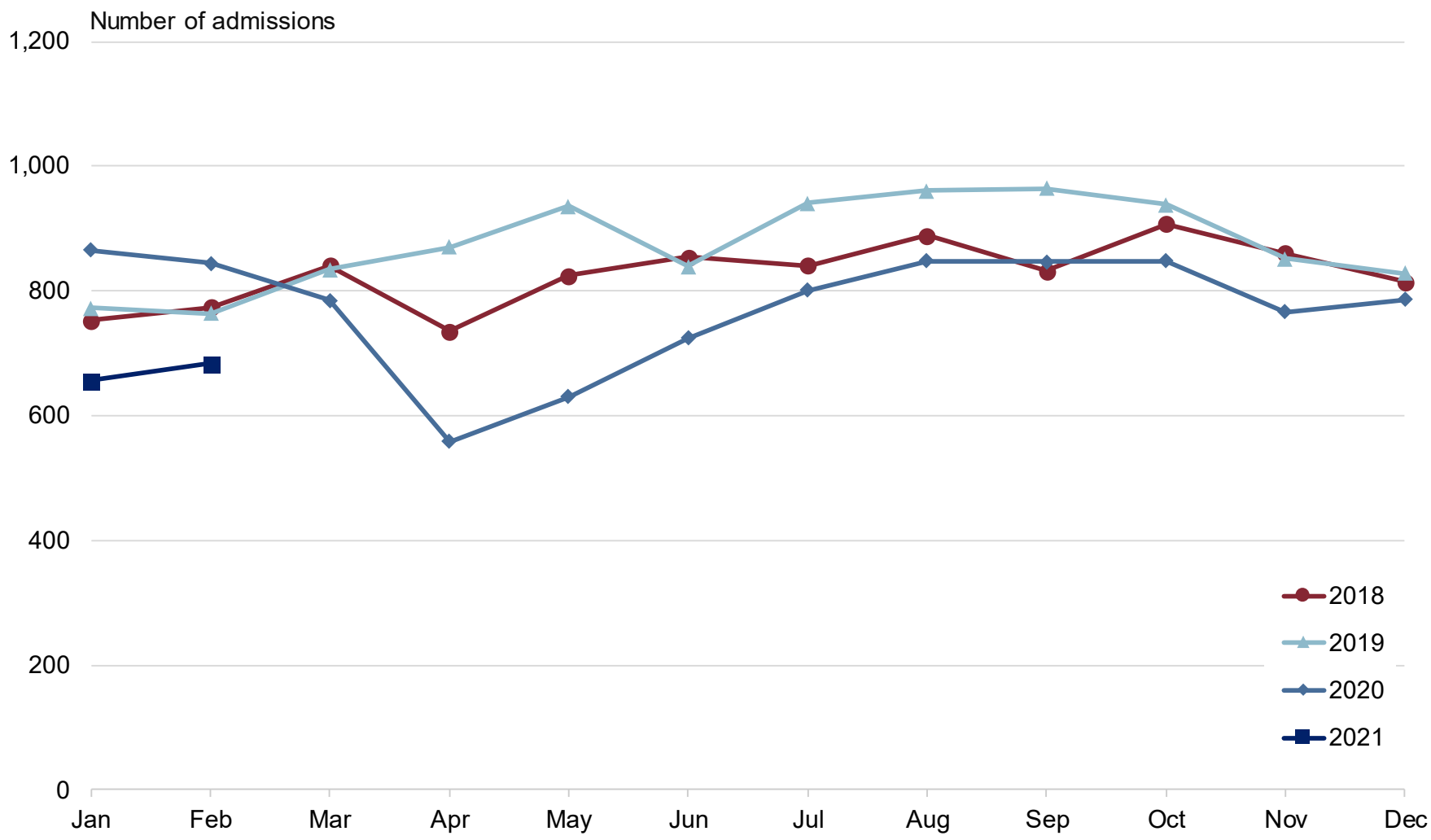
In 2020, starting from March, the number of admissions for retinal detachment repair fell when compared with previous years, showing a decrease of around 36% in April as compared to 2019. January 2021 also showed a marked decrease in admissions for retinal detachment repair. The timing for these decreases coincides with the timeline of lockdown measures imposed by the UK government in response to the coronavirus (COVID-19) pandemic.

It is very likely that these figures for reduced retinal detachment repair are not due to a fall in the prevalence of retinal detachment, but rather a fall in the number of symptomatic people seeking help from a physician. In the week following the first lockdown, primary care physicians saw a 30% drop in consultations, and would not see consultation rates recover for at least 3 months.[6] While retinal detachment is a serious condition requiring immediate treatment, patients who first experience symptoms such as flashes and floaters may underestimate the potential severity of these. As a result, they may Choose not to go to their GP for fear of increasing the burden on the overstretched healthcare system. They may also be worried about contracting COVID-19 in a high risk hospital environment. Additionally, as many people switched to virtual work-from-home arrangements, they could have incorrectly attributed their visual symptoms to the digital eye strain caused by increased usage of digital devices.[7]

As many GPs often lack the equipment, knowledge or confidence to diagnose retinal detachment, patients with flashes and floaters are often referred to optometrists for further investigation. During the COVID-19 pandemic, many optometry clinics were closed, and a large proportion of optometrists were furloughed.[8] As a result, many patients were unable to be seen by their usual primary care optometrist, and several optometrists expressed concerns regarding accessibility of their services and regarding referral pathways from GPs during the pandemic.[8]

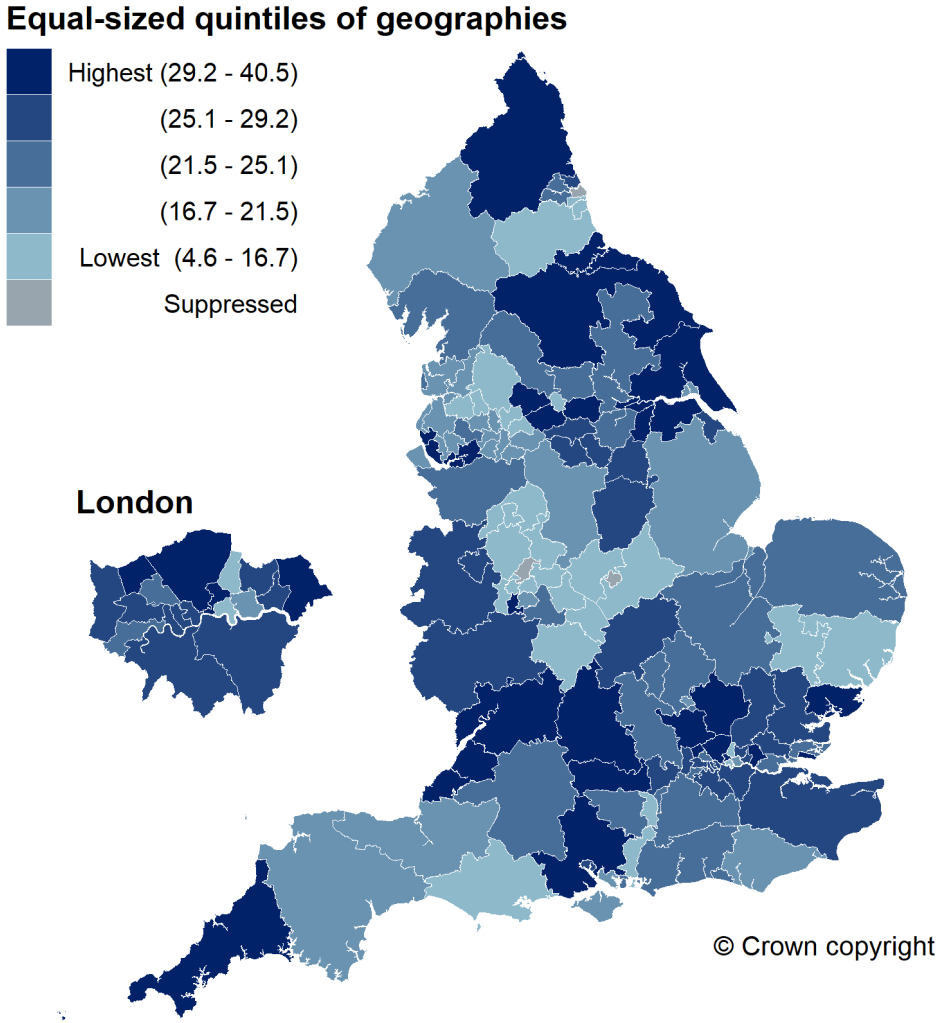
[6] Watt T, Firth Z, Fisher R and others (2020) Use of primary care during the COVID-19 pandemic The Health Foundation. [Accessed 07 May 2021]
[7] Sheppard AL, Wolffsohn JS (2018) Digital eye strain: prevalence, measurement and amelioration. BMJ Open Ophthalmol. 2018 Apr 16;3(1):e000146. [Accessed 07 Jun 2021]
[8] Nagra M, Allen P M, Norgett Y and others (2021). The effect of the COVID-19 pandemic on working practices of UK primary care optometrists. Ophthalmic & physiological optics: the journal of the British College of Ophthalmic Opticians (Optometrists) 2021 Mar; 41(2): 378–392 [Accessed 11 May 2021]

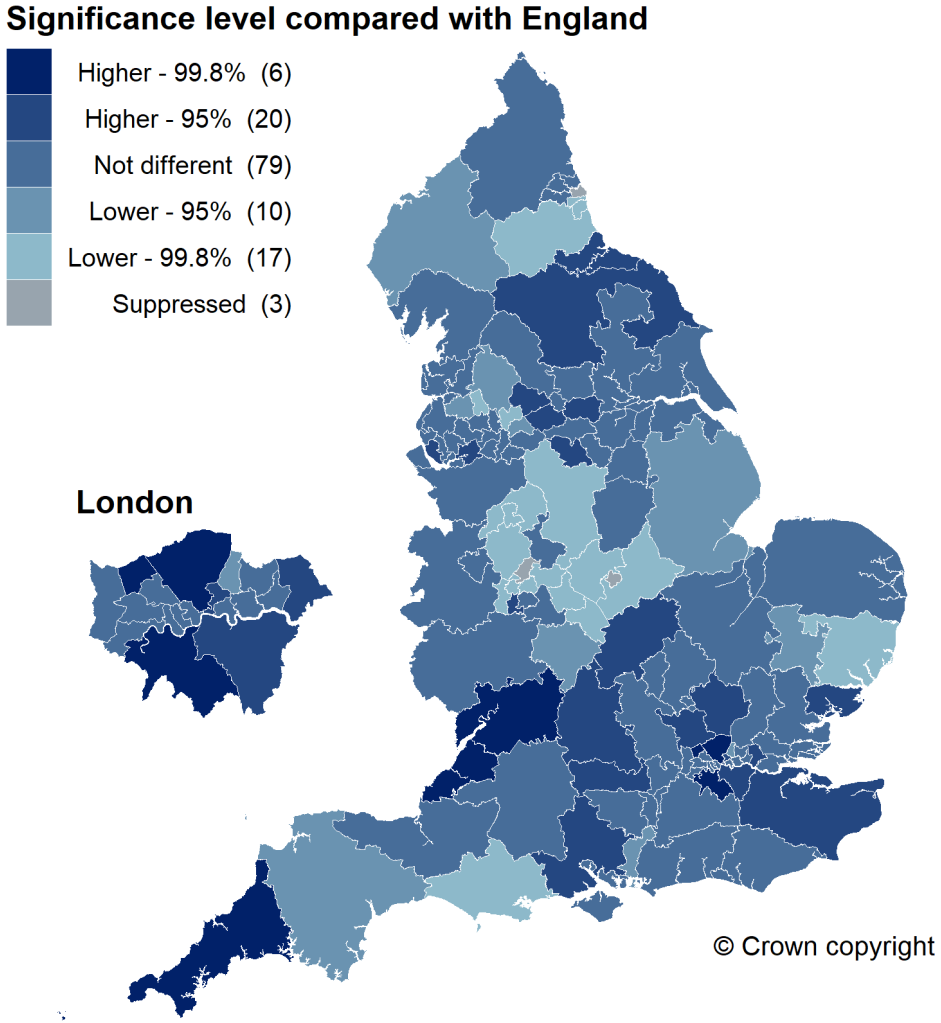
Figure 4.1: Provisional data: Rhegmatogenous retinal detachment surgery in people aged 18 years and over for England (January 2018 to February 2021)



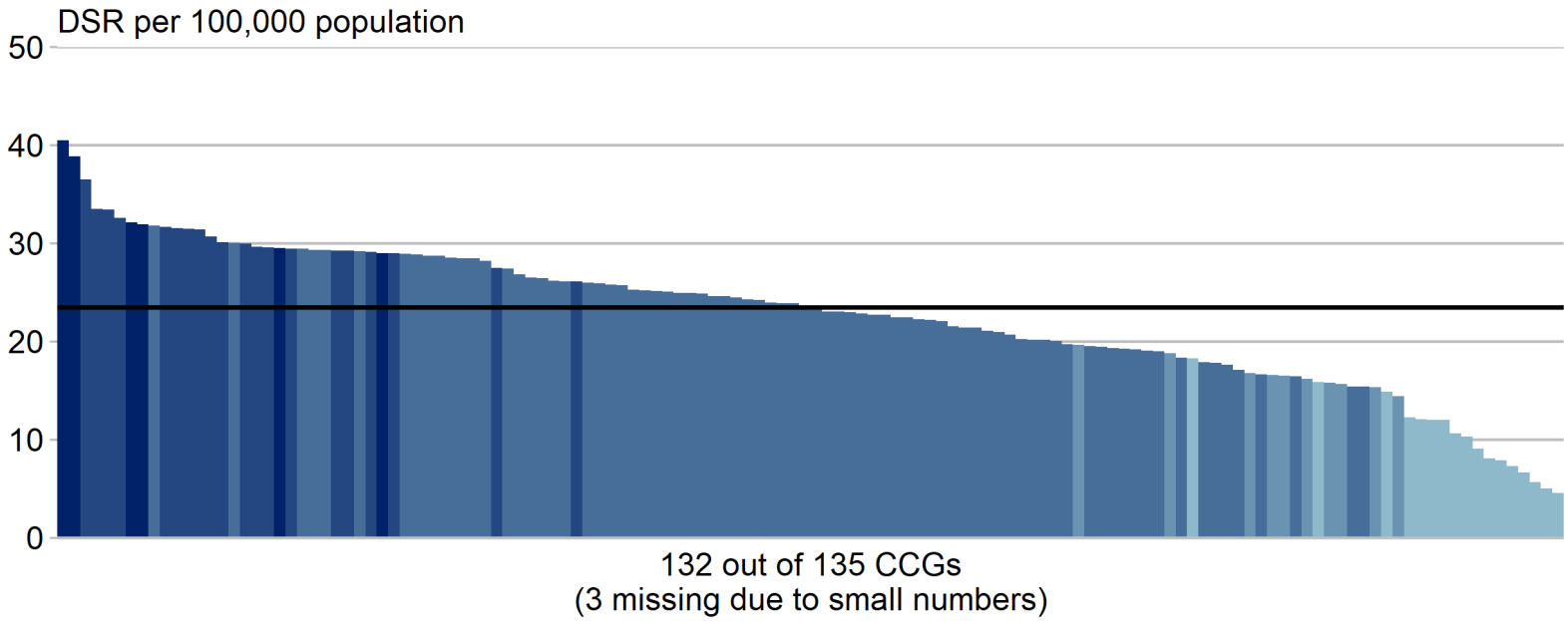
Map 4: Variation in rate of rhegmatogenous retinal detachment surgery in people aged 18 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation

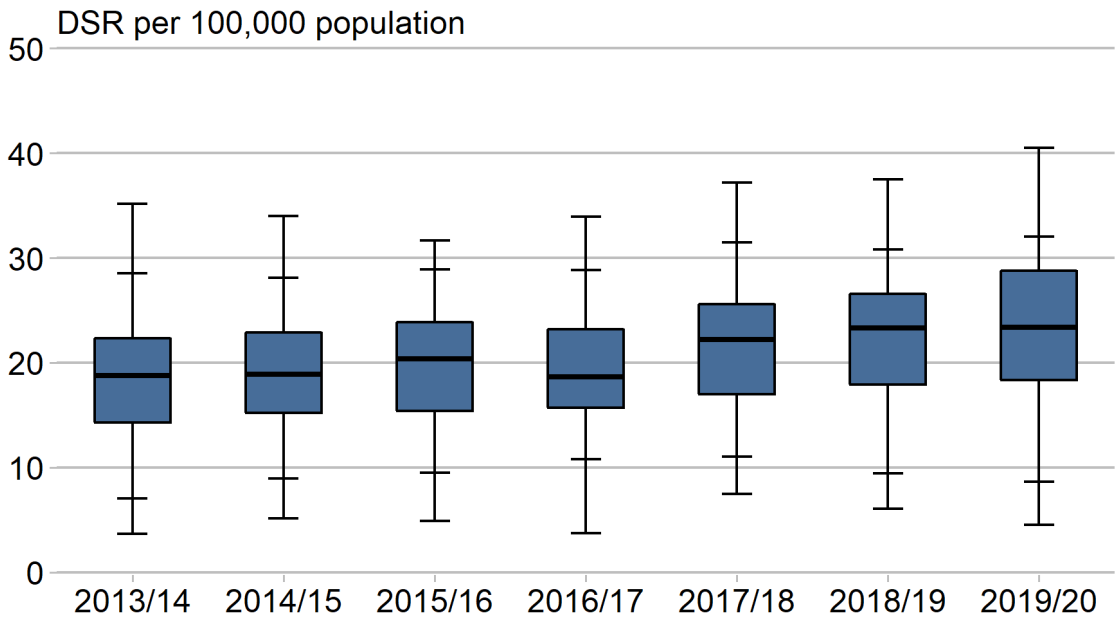




Column chart: Variation in rate of rhegmatogenous retinal detachment surgery in people aged 18 years and over by CCG (2019/20)



Box plot time series: Variation in rate of rhegmatogenous retinal detachment surgery in people aged 18 years and over by CCG (2013/14 to 2019/20)



Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	31.4	28.8	26.7	30.2	29.8	31.4	36.0	No significant change
75th-25th percentile	8.1	7.7	8.5	7.5	8.6	8.6	10.4	No significant change
95th-5th percentile	21.5	19.1	19.4	18.0	20.4	21.4	23.4	No significant change
Median	18.8	18.9	20.3	18.7	22.2	23.3	23.4	INCREASING Significant

Magnitude of Variation

Map 4: Variation in rate of rhegmatogenous retinal detachment surgery in people aged 18 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which clinical commissioning group (CCG) values ranged from 4.6 per 100,000 population to 40.5 per 100,000 population, which is a 8.9-fold difference between CCGs.

The England value for 2019/20 was 23.5 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

There was no significant change in any of the three variation measures between 2013/14 and 2019/20.

The median increased significantly from 18.8 per 100,000 population in 2013/14 to 23.4 per 100,000 population in 2019/20.

Variation in recorded rates of vitreoretinal surgical activity for rhegmatogenous retinal detachment between CCGs may be due to:

Differences in re-operation rates and case-mix:

Depending on case-mix, some rhegmatogenous retinal detachments may require multiple procedures. Some health care providers may have a higher rate of re-operation than others reflecting those providing tertiary level surgical services for more complex cases, or differences in service effectiveness.

Ethnic differences between local populations:

It has been shown that White people are 3 times as likely as Asians to present with retinal detachment in the UK.[9]

Difference in gender ratios between local populations:

Males are more likely to develop traumatic rhegmatogenous retinal detachment as compared to females.[9,10]

[9] Mowatt L, Shun-Shin G, Price N (2003) Ethnic differences in the demand incidence of retinal detachments in two districts in the West Midlands Eye 2003;17(1): 63–70 [Accessed 08 May 2021]
[10] Limeira-Soares PH, Lira RP, Arieta CE and others (2006) Demand incidence of retinal detachment in Brazil Eye (Lond) 2007 Mar; 21(3):348-52 [Accessed 08 May 2021]

Differences in underlying risk factors for rhegmatogenous retinal detachment:

Differences in underlying risk factors for example posterior vitreous detachment, myopia or ocular trauma.[11,12]

Data quality - accuracy and completeness of coding for diagnosis and procedures

The increase in rate of retinal detachment surgery over time may be due to:

- myopia, a predisposing factor to retinal detachment, becoming increasingly prevalent globally[13]
- increasing awareness of the symptoms of retinal detachment, and when to seek medical treatment
- ageing UK population[14]

Options for Action

As posterior vitreous detachment accounts for the majority of acute emergency cases of rhegmatogenous retinal detachment, identifying those patients at risk at an early stage of posterior vitreous detachment is likely to be more effective in terms of prevention of retinal detachment. As such, it is recommended that a peripheral retinal examination is conducted within 6 weeks for patients with symptoms of posterior vitreous detachment, and within 2 days for patients at risk following the algorithm in Figure 4.2.

In addition, the following is recommended:

- healthcare workers are trained to identify symptoms of posterior vitreous detachment even before retinal detachment has occurred
- better information is provided by NHS111 to people experiencing posterior vitreous detachment symptoms

Patients at risk of rhegmatogenous complications include people with myopia (including those who have undergone previous refractive surgery and may no longer be refractively myopic), those who have experienced RRD or retinal tear in the fellow eye, those with family history of RRD, and those with early onset cataract or early cataract surgery below the age of 60.

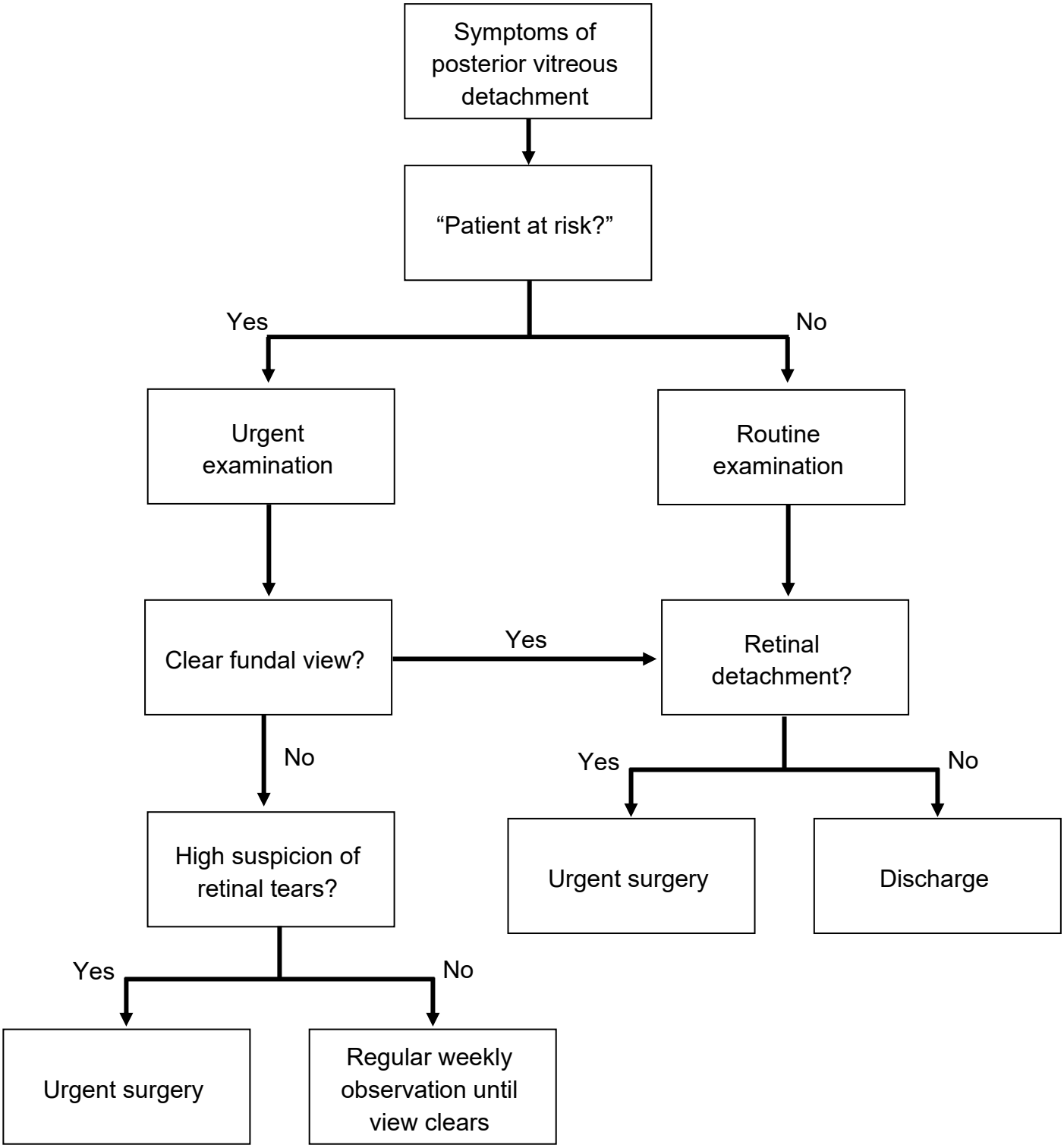
[11] Mitry D, Charteris DG, Fleck BW and others (2009) The epidemiology of rhegmatogenous retinal detachment: geographical variation and clinical associations British Journal of Ophthalmology, 94(6), 678–684 [Accessed 08 May 2021]

[12] Snead MP, Snead DR, James S and others (2008) Clinicopathological changes at the vitreoretinal junction: posterior vitreous detachment Eye, 22, 1257 – 1262 [Accessed 17 May 2021]

[13] Holden BA, Fricke TR, Wilson DA and others (2016) Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050 Ophthalmology 2016 May;123(5):1036-42 [Accessed 10 May 2021]

[14] Office for National Statistics (2020) Population estimates for the UK, England and Wales, Scotland and Northern Ireland: mid-2019 [Accessed 10 May 2021]

Figure 4.2: Primary management algorithm for acute posterior vitreous detachment[15]



[15] Diagram adapted from algorithms 1 and 2 in Ang A, Poulson AV, Snead DR and others (2005) Posterior vitreous detachment: current concepts and management Compr Ophthalmol Update. 2005; 6: 167-175 [Accessed 11 May 2021]

Resources

Cambridge University Hospital NHS Foundation Trust Vitreoretinal Service [Accessed 17 May 2021]

Fight for Sight A-Z Eye Conditions: Retinal detachment [Accessed 03 Jun 2020]

Moorfields Eye Hospital NHS Foundation Trust Conditions: Retinal detachment [Accessed 03 Jun 2020]

National Institute for Health and Care Excellence (2019) Clinical Knowledge Summaries: Retinal detachment [Accessed 03 Jun 2020]

NHS Health A-Z: Detached Retina (retinal detachment) [Accessed 03 Jun 2020]

Royal College of Ophthalmologists (2010) Ophthalmic Services Guidance: Management of acute retinal detachment [Accessed 03 Jun 2020]

Royal National Institute of Blind People (RNIB) Eye Conditions: Posterior Vitreous Detachment [Accessed 11 May 2021]

Royal National Institute of Blind People (RNIB) Eye Conditions: Retinal detachment [Accessed 03 Jun 2020]

Diabetic eye screening

Context

The prevalence of diabetes mellitus (diagnosed and undiagnosed) is rapidly increasing in the UK, with an estimated 4.2 million people (aged 16 and over) being affected in England in 2020, with this set to rise to 5.1 million by 2035,[1] making diabetes an urgent public health concern. Studies have documented diabetic eye disease, that is diabetic retinopathy (DR) and diabetic macula oedema (DMO), to affect 48% of type 1 and 28% of type 2 people with diabetes in the UK.[2] In some cases this may lead to significant visual loss with diabetes accounting for around 14% of blindness certifications in working age adults in England and Wales.[3,4]

DR in its early stages is largely asymptomatic, and therefore retinopathy screening is crucial to enable early detection of sight-threatening retinopathy, permitting patients to be referred to hospital services for treatment, prior to the onset of significant visual loss. Knowledge regarding earlier stages of retinopathy also informs overall diabetes care and permits risk factor modification.[5]

The countries of the United Kingdom were the first in the world to introduce a national, population-based screening programme to detect diabetic eye disease. The diabetic eye screening programme (DESP) commenced in 2003 and reached population coverage in 2008,[6] and is now pivotal in the management of diabetic eye disease in the UK.[7] In England, screening is commissioned by NHS England. Public Health England advises, develops standards and provides specific services that help the local NHS implement and run screening services consistently across the country. DESP along with overall improvement in systemic management and care of people with diabetes has been highly successful as evidenced by the fact that diabetic retinopathy is now no longer the

[1] Public Health England (2015) Diabetes prevalence estimates for CCGs by GP registered populations [Accessed 15 Jun 2021]
[2] Mathur R, Bhaskaran K, Edwards E and others (2017) Population trends in the 10-year incidence and prevalence of diabetic retinopathy in the UK: a cohort study in the Clinical Practice Research Datalink 2004–2014 BMJ Open. 2017 Feb 28;7(2):e014444 [Accessed 17 Feb 2021]
[3] Liew G, Michaelides M, Bunce C (2014) A comparison of the causes of blindness certifications in England and Wales in working age adults (16–64 years), 1999–2000 with 2009–2010 BMJ Open. 2014;4:e004015 [Accessed 16 Feb 2021]
[4] Rahman F, Zekite A, Bunce C and others (2020) Recent trends in vision impairment certifications in England and Wales Eye (London) 2020 Jul;34(7):1271-1278 [Accessed 16 Feb 2021]
[5] Harding S, Greenwood R, Aldington S (2003) Grading and disease management in national screening for diabetic retinopathy in England and Wales Diabetic Medicine 2003 Dec;20(12):965-71 [Accessed 17 Feb 2021]
[6] Scanlon PH (2017) The English National Screening Programme for diabetic retinopathy 2003-2016 Acta Diabetol. 2017;54(6):515-525 [Accessed 16 Jan 2021]
[7] Scanlon PH (2021) The contribution of the English NHS Diabetic Eye Screening Programme to reductions in diabetes-related blindness, comparisons within Europe, and future challenges Acta Diabetol 2021; 58(4): 521–530 [Accessed 20 Jul 2021]

leading cause for certification of visual impairment in the working age population in England and Wales.[3,4]

Certifications for diabetic eye disease continue to decline, from 3.6 per 100,000 people aged 12 years or over in the financial year beginning 2010, to 2.9 per 100,000 people aged 12 years or over in the financial year beginning 2019.[4,8]

Diabetic eye screening is offered every year to all eligible people, aged 12 years and over, with diabetes in England (excluding gestational diabetes). Individuals are required to have light perception as a minimum in at least one eye. People with diabetes already under an ophthalmologist and certain other categories (e.g. those who are terminally ill) are not invited. DESP identifies eligible individuals through an electronic data extraction (GP2DRS)[9] and by collaborating with GP practices to create, validate and maintain, on at least a quarterly basis, a register of all people with diabetes mellitus.[10]

Screening tools for DR grading have evolved over the years in line with technological advances and two field mydriatic digital photography is currently the gold standard for DR screening in England. England uses a feature-based grading system for screening, developed by the Diabetic Retinopathy Grading and Disease Management Working Party,[5] that is supported by evidence from the Early Treatment Diabetic Retinopathy Study (ETDRS) grading system.

Briefly the nomenclature describes:

- R0- No retinopathy
- R1- Background retinopathy
- R2- Pre-proliferative retinopathy
- R3- Proliferative retinopathy
    - R3A: Active proliferative retinopathy
    - R3S: Stable treated proliferative retinopathy
- M0- No maculopathy
- M1- Maculopathy present
- P0- Photocoagulation absent
- P1- Photocoagulation present
- U- Ungradable

Retinopathy grading then determines further management,[11] with patients deemed to have R0, R1 or M0 called for annual review by the DESP, those with R2 or M1 being

[8] Public Health England (2021) Public Health Profiles: Indicator ID 41203 [Accessed 16 Jun 2021]
[9] NHS Digital (2021) GP2DRS (Diabetic eye screening programme) [Accessed 20 Jul 2021]
[10] Public Health England with NHS England and NHS Improvement (2019) NHS public health functions agreement 2019-20 Service specification no.22 NHS Diabetic Eye Screening Programme [Accessed 16 Feb 2021]
[11] Public Health England (2017) NHS Diabetic Eye Screening Programme – Grading definitions for referable disease [Accessed 16 Jun 2021]

referred to hospital eye services and patients with R3 disease requiring urgent referral to hospital eye services for consideration of panretinal photocoagulation/laser treatment.

Quality assurance of grading and graders is measured and maintained in the Test and Training (TAT) system, recognised to be a valid indicator in assuring high quality grading in diabetic eye screening. This is achieved by setting minimum standards of >85% sensitivity and >80% specificity to detect referable diabetic retinopathy (M1, R2 and R3A).[11,12]

Each local screening provider is responsible for continually monitoring and collecting data regarding its delivery of the service. This enables benchmarking between areas within the eligible screening programme population using several standards[13] and key performance indicators (KPI) as outlined below. The acceptable level should be achieved as a minimum by all programmes.[6]

KP1: The proportion of those offered routine digital screening who attend a digital screening event where images are captured. Acceptable ≥ 75.0% Achievable ≥ 85%

KP2: Time between routine digital screening/digital surveillance/slit lamp biomicroscopy and printing of results letters to the person with diabetes, GP and relevant health professionals. Acceptable: 85% < 3 weeks and 99% < 6 weeks.

KP3: Time between screening event and first attended consultation at hospital eye services or digital surveillance

1. Urgent
   Acceptable: ≥ 80% 6 weeks

2. Routine
   Acceptable: ≥ 70% 13 weeks
   Achievable: ≥ 95% 13 weeks

In the financial year beginning 2018, the England DESP invited 2.8 million people with diabetes for retinopathy screening with an uptake of 82.6% (2.3 million). 9,053 (0.3% of patients screened) were urgently referred to hospital eye services (R3, proliferative retinopathy), and 83,137 (3.2%) routine referrals were made for patients with R2 and

[12] Keenan TDL, Johnston RL, Donachie PHJ and others (2013) United Kingdom National Ophthalmology Database Study: Diabetic Retinopathy; Report 1: prevalence of centre-involving diabetic macular oedema and other grades of maculopathy and retinopathy in hospital eye services Eye (London) 2013 Dec;27(12):1397-404 [Accessed 17 Feb 2021]
[13] NHS Screening Programmes: Diabetic Eye (2016) The management of grading quality: Good practice in the quality assurance of grading [Accessed 16 Feb 2021]

M1.[14] Review of these patients by hospital eye services within specified timescales is imperative so that treatment can be offered, as appropriate, to minimise the risk of visual loss.

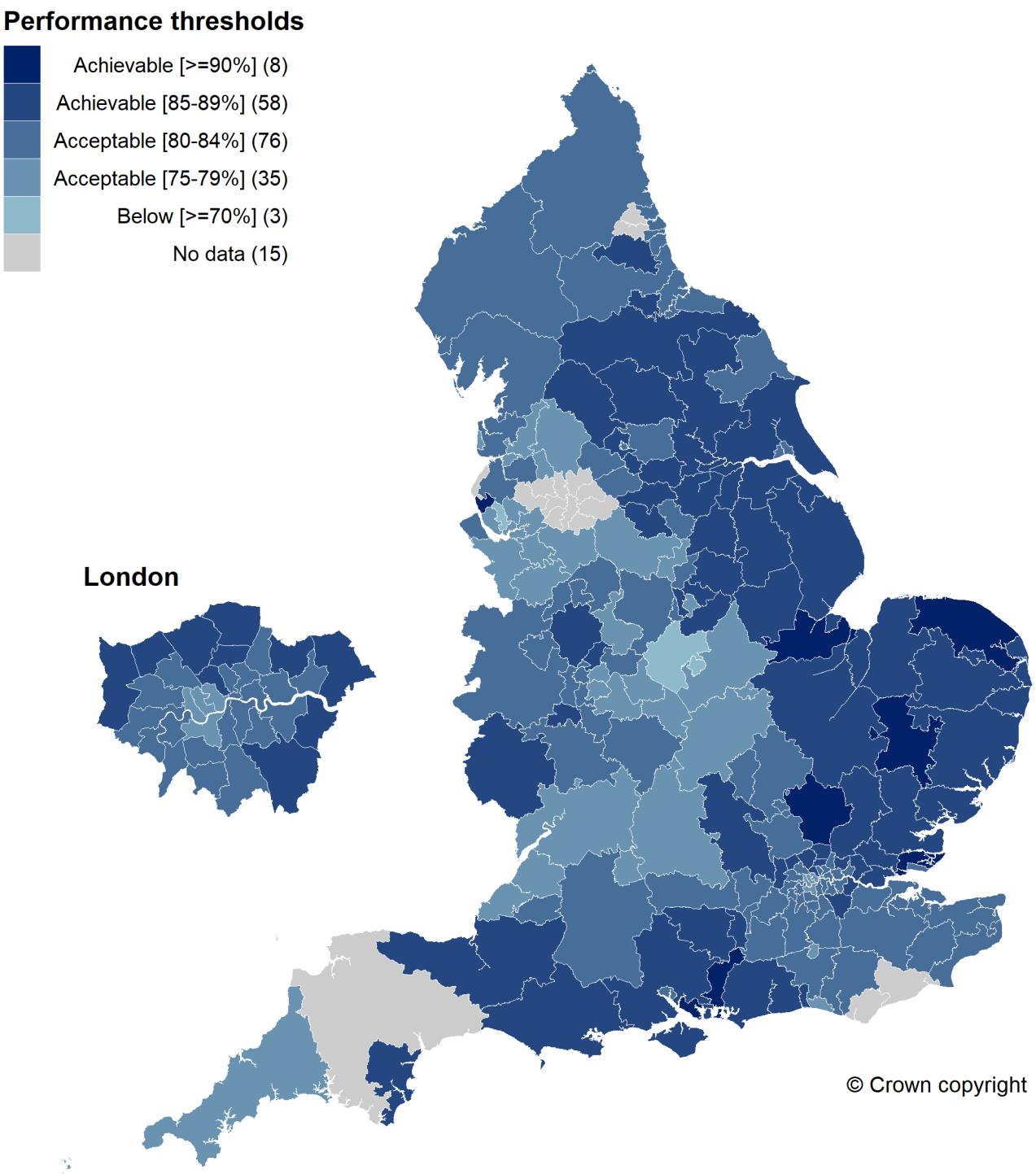
Diabetic eye screening during the COVID-19 pandemic

More recently, the coronavirus (COVID-19) pandemic has posed many challenges to DESP with nationwide screening being temporarily suspended. Furthermore, the population of people with diabetes being at higher risk meant many were shielding and restrictions to transportation services have led to understandably poorer uptake, which will impact outcomes in the financial year beginning 2020 and beyond.

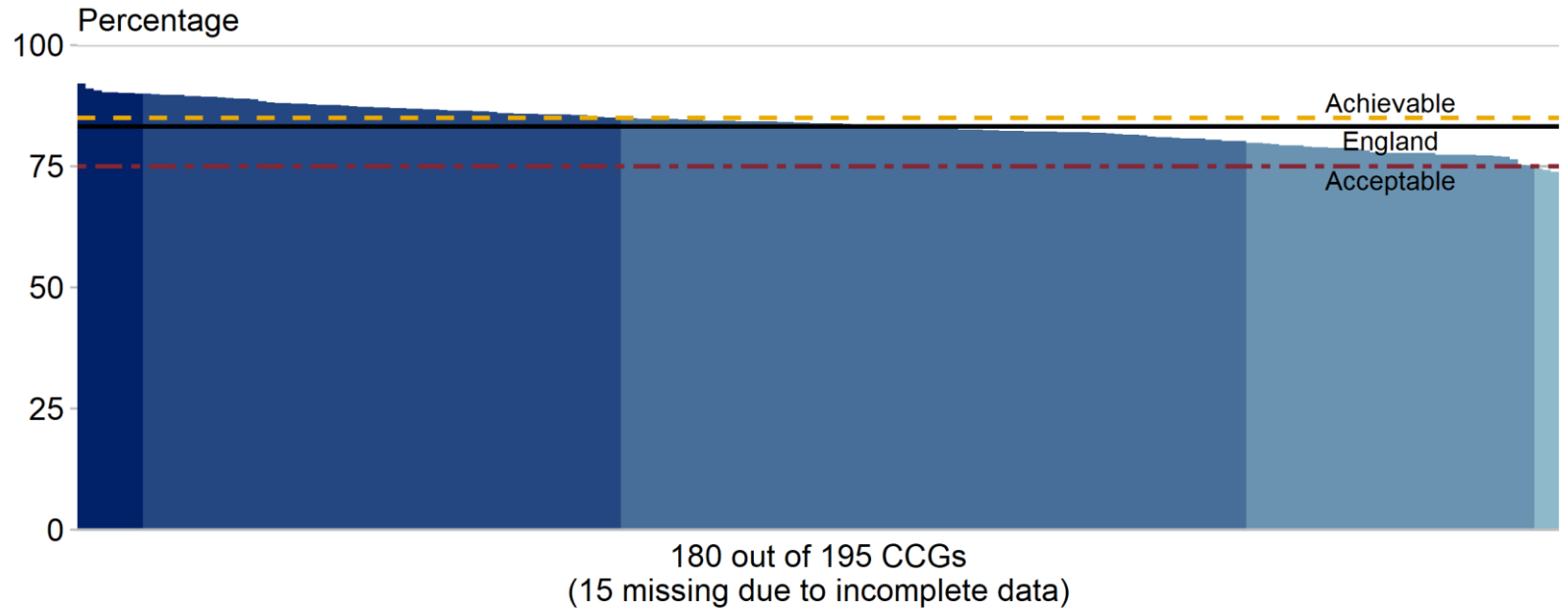
[14] Public Health England (2020) Diabetic eye screening: 1 April 2018 to 31 March 2019 data table [Accessed 14 Jun 2021]

Map 5a: Variation in percentage of those offered diabetic eye screening who attend a routine digital screening event (where images were captured) in people aged 12 years and over by clinical commissioning group (2018/19)

Optimum value: High



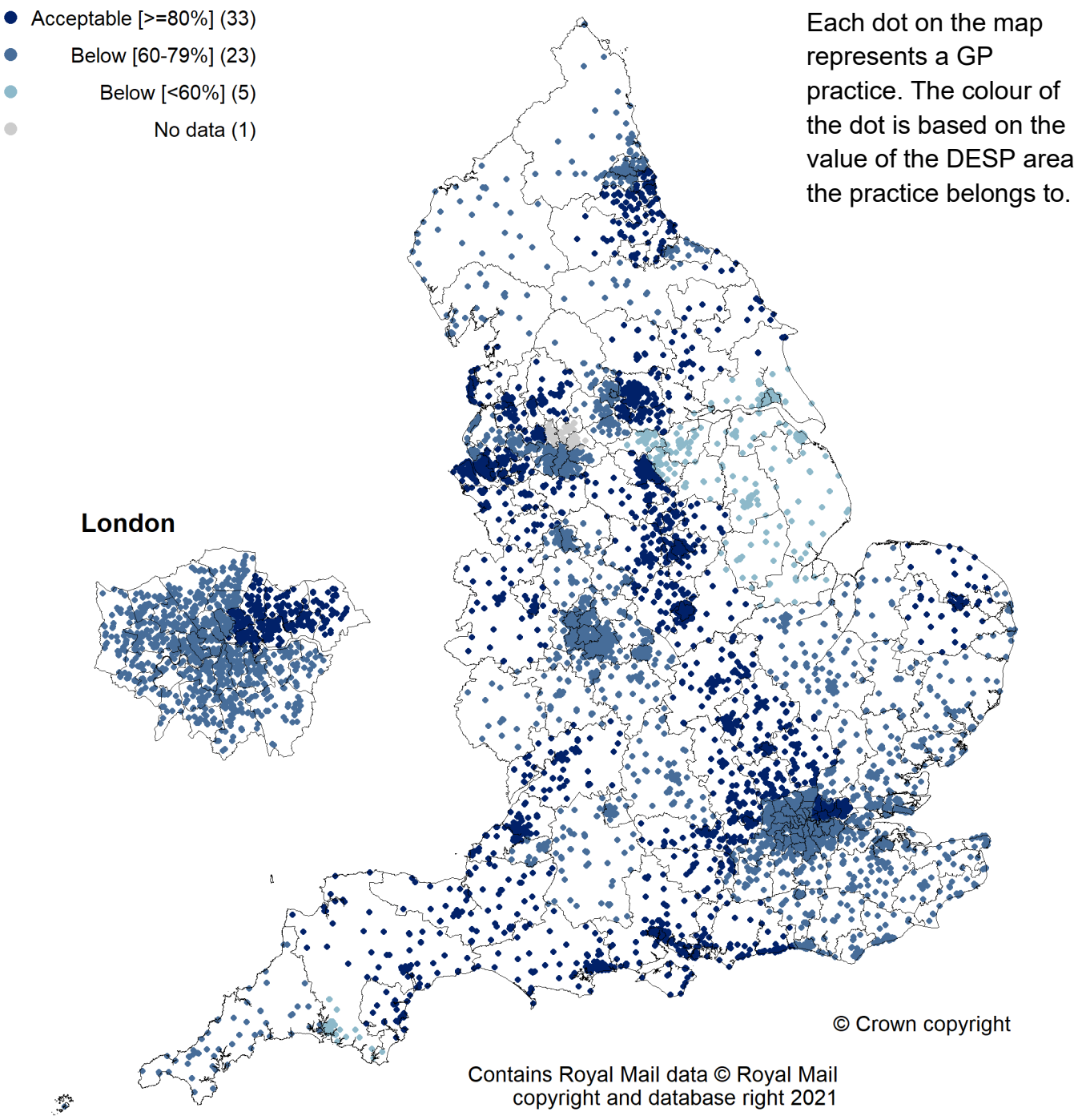
Column chart: Variation in percentage of those offered diabetic eye screening who attend a routine digital screening event (where images were captured) in people aged 12 years and over by CCG (2018/19)



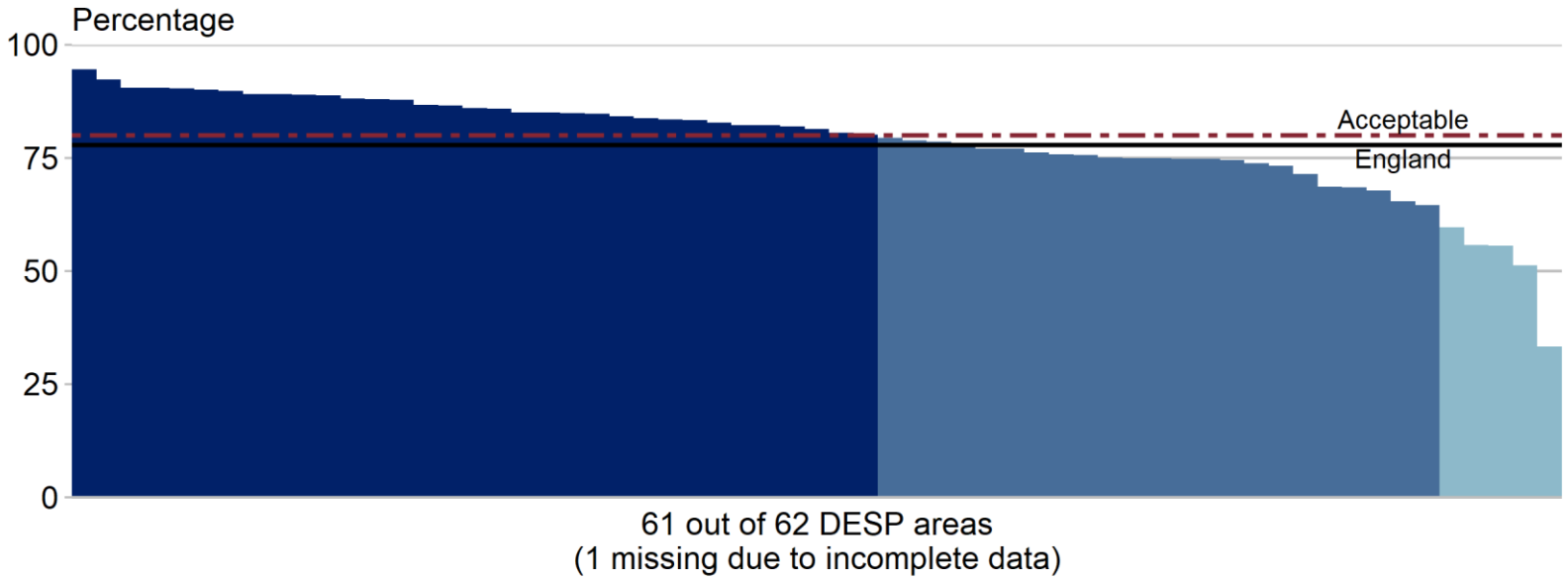
Note: Column chart colours correspond to indicator performance thresholds

Map 5b: Variation in percentage of urgent referrals for diabetic eye disease (referred proliferative diabetic retinopathy [R3A]) seen within 6 weeks of screening event in people aged 12 years and over by DESP area (2018/19)

Optimum value: High



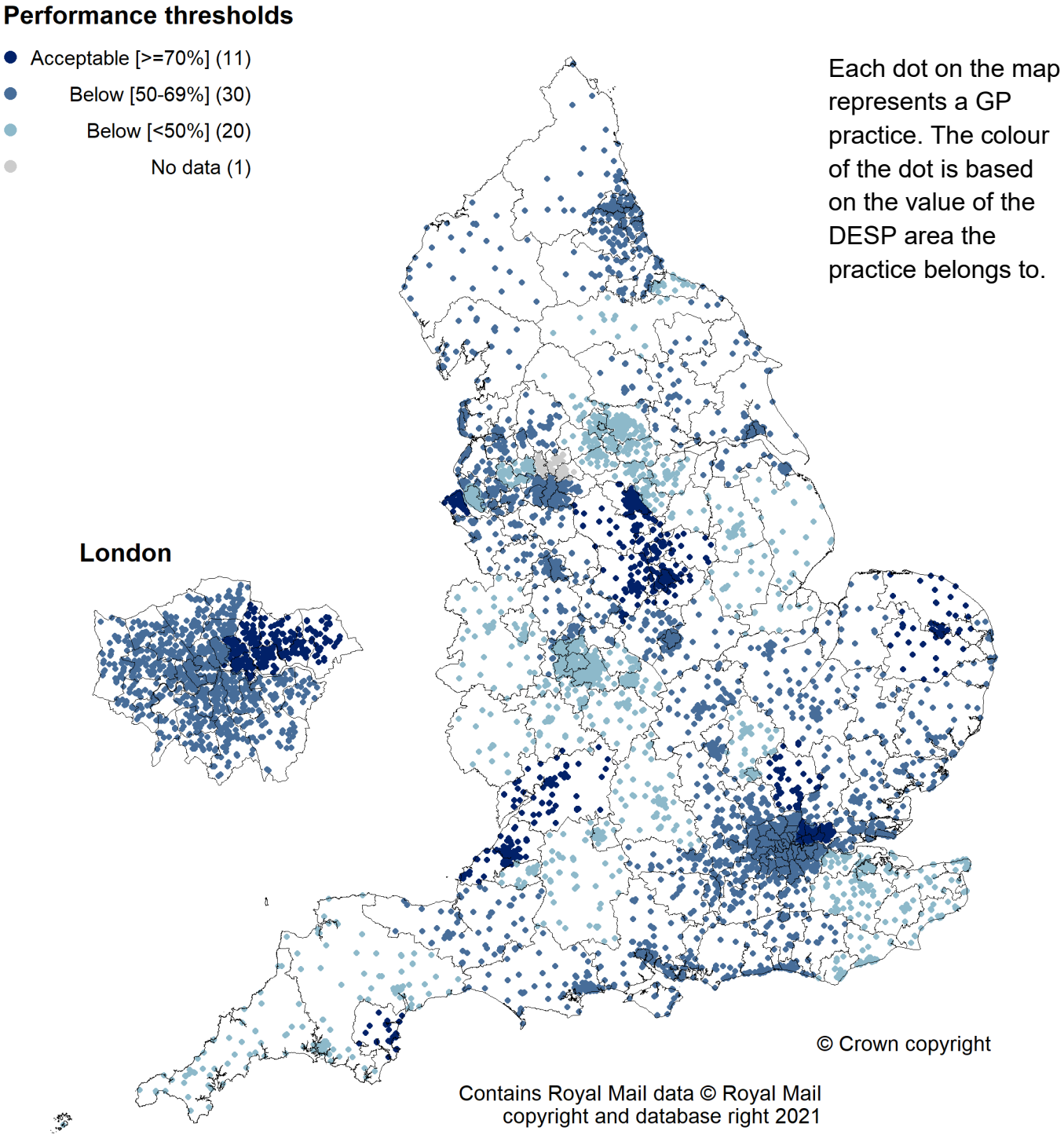
Column chart: Variation in percentage of urgent referrals for diabetic eye disease (referred proliferative diabetic retinopathy [R3A]) seen within 6 weeks of screening event in people aged 12 years and over by DESP area (2018/19)



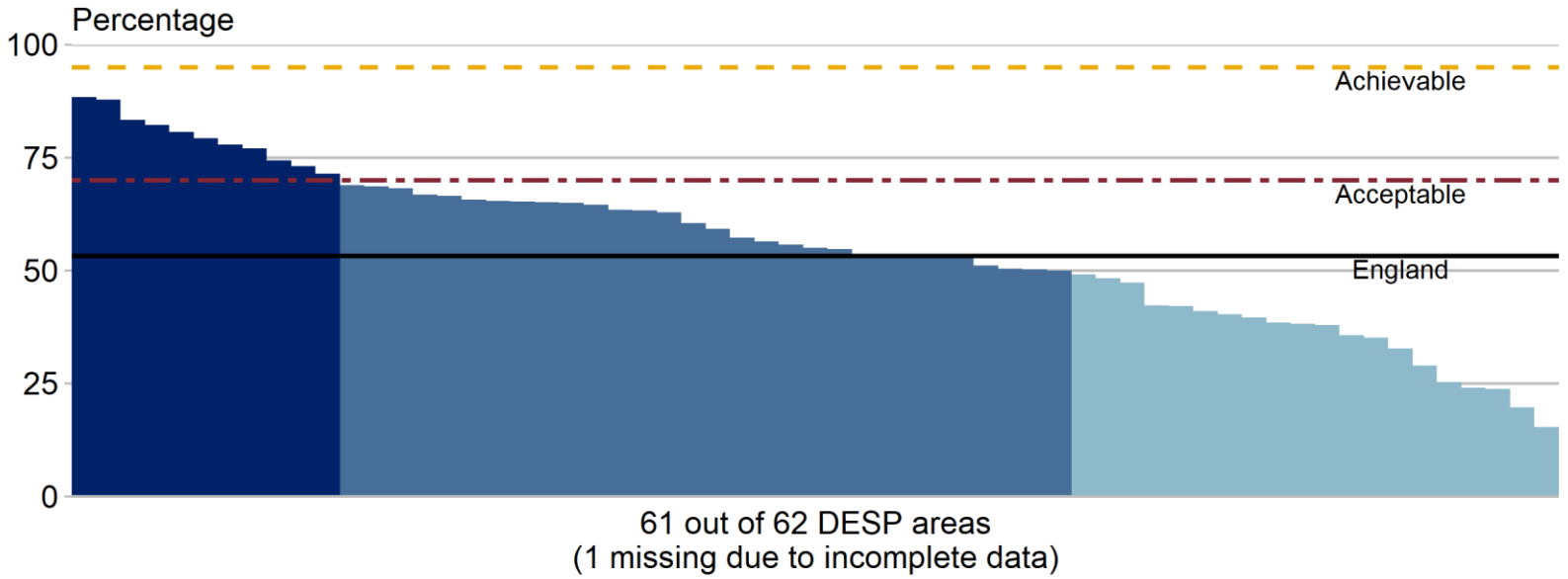
Note: Column chart colours correspond to indicator performance thresholds

Map 5c: Variation in percentage of routine referrals for diabetic eye disease (referred pre-proliferative diabetic retinopathy [R2] or maculopathy [M1]) seen within 13 weeks of screening event in people aged 12 years and over by DESP area (2018/19)

Optimum value: High



Column chart: Variation in percentage of routine referrals for diabetic eye disease (referred pre-proliferative diabetic retinopathy [R2] or maculopathy [M1]) seen within 13 weeks of screening event in people aged 12 years and over by DESP area (2018/19)



Note: Column chart colours correspond to indicator performance thresholds

Magnitude of Variation

Map 5a: Variation in percentage of those offered diabetic eye screening who attend a routine digital screening event (where images were captured) in people aged 12 years and over by clinical commissioning group

The map and column chart display the latest period (2018/19), during which clinical commissioning group (CCG) values ranged from 73.8% to 92.1%, which is a 1.2-fold difference between CCGs.

The England value for 2018/19 was 83.2%.

Overall, uptake of diabetic eye screening met the acceptable standard in 2018/19 177 out of 180 CCGs (for which data were available) meeting this level, and 66 out of 177 meeting the achievable standard.

A number of factors are known to adversely affect the uptake of diabetic screening, including both younger and older age groups, social deprivation, being of an ethnic minority background, poorer blood sugar control, smoking and a lack of awareness of the risk of visual loss.[15, 16, 17, 18]

A large number barriers to screening have been reported including accessibility to the screening clinic, time (such as competing demands), scheduling and referral difficulties, doctor-patient communication, lack of awareness of the condition, lack of awareness of screening and confusion between this and routine eye tests, absence of symptoms and perceived necessity of screening.[16,19]

[15] Hwang J, Rudnisky C, Bowen S and others (2015) Socioeconomic factors associated with visual impairment and ophthalmic care utilization in patients with type II diabetes Canadian Journal of Ophthalmology 2015 Apr;50(2):119–26 [Accessed 20 May 2021]
[16] Kliner M, Fell G, Gibbons C and others (2012) Diabetic retinopathy equity profile in a multi-ethnic, deprived population in northern England Eye 2012;26(5):671–7 [Accessed 20 May 2021]
[17] Moreton RBR, Stratton IM, Chave SJ and others (2017) Factors determining uptake of diabetic retinopathy screening in Oxfordshire Diabetic Medicine. 2017 Jul;34(7):993-999 [Accessed 20 May 2021]
[18] Graham-Rowe E, Lorencatto F, Lawrenson JG and others (2018) Barriers to and enablers of diabetic retinopathy screening attendance: a systematic review of published and grey literature Diabetic Medicine 2018 Oct;35(10):1308-1319 [Accessed 20 May 2021]
[19] Lindenmeyer A, Sturt JA, Hipwell A, and others (2014) Influence of primary care practices on patients' uptake of diabetic retinopathy screening : a qualitative case study British Journal of General Practice, 64 (625): e484-e492 [Accessed 05 Aug 2021]

Map 5b: Variation in percentage of urgent referrals for diabetic eye disease (referred proliferative diabetic retinopathy [R3A]) seen within 6 weeks of screening event in people aged 12 years and over by DESP area

The map and column chart display the latest period (2018/19), during which DESP area values ranged from 33.3% to 94.6%, which is a 2.8-fold difference between DESP areas.
The England value for 2018/19 was 77.9%.

The mean England value for review of urgent referrals within 6 weeks was slightly below the acceptable standard of 80%. However, there is large variation across regions. Approximately half, 33 out of 61 (for which data were available), DESP areas met the acceptable standard.

Map 5c: Variation in percentage of routine referrals for diabetic eye disease (referred pre-proliferative diabetic retinopathy [R2] or maculopathy [M1]) seen within 13 weeks of screening event in people aged 12 years and over by DESP area

The map and column chart display the latest period (2018/19), during which DESP area values ranged from 15.3% to 88.4%, which is a 5.8-fold difference between DESP areas.

The England value for 2018/19 was 53.2%.

The mean England value for review of routine referrals within 13 weeks was below the acceptable standard of 70%, with marked variation across England. Only 11 out of 61 (for which data were available) DESP areas met the acceptable standard.

The factors described above with regards to screening uptake, such as social deprivation,[16] also affect patient attendance at secondary care appointments. Patients referred with proliferative or pre-proliferative retinopathy, or maculopathy (outcomes Map 5b and Map 5c) may have poorer glycaemic control as reflected by their stage of retinopathy, which could also result in other comorbidities, illness and hospital admissions that would reduce their attendance in the hospital eye service. Studies have demonstrated end organ involvement and depression as risk factors for failure to attend appointments.[20] Other barriers reported include long waiting times, other medical conditions, forgetting, and inability to leave work.[21]

[20] Chen AJ, Hwang V, Law PY and others (2018) Factors Associated with Non-compliance for Diabetic Retinopathy Follow-up in an Urban Safety-Net Hospital Ophthalmic Epidemiology 06 Aug 2018, 25(5-6):443-450 [Accessed 20 May 2021]
[21] Lu J, Chen J, Hwang V and others (2019) Analysis of Patient-Reported Barriers to Diabetic Retinopathy Follow-Up Ophthalmic Surgery Lasers and Imaging Retina. 2019 Feb 1;50(2):99-105 [Accessed 20 May 2021]

A further important factor is a lack of hospital capacity to accommodate appointments in a timely manner, given increasing pressure on medical retina clinics in the hospital eye service, that are required to also accommodate urgent referrals for other conditions such as age-related macular degeneration. This may result in cancellations or delays in appointments in hospital eye services due to inadequate staffing and or resources to meet the increasing prevalence and burden of diabetes mellitus.

Delays in timely review of routine referrals (outcome Map 5c), with less than a fifth of DESP areas meeting the acceptable standard, may particularly impact patients with diabetic maculopathy (M1) who may require treatment. Studies have shown that delayed treatment for diabetic macular oedema may potentially reduce gains in vision that might be achieved with existing NICE approved anti-VEGF therapy.[22,23]

Options for action

Given the diversity of factors that have been identified to affect uptake of screening and attendance at hospital eye appointments, improving outcomes requires a multi-faceted approach. However, common themes in many studies are a lack of awareness regarding the disease and the importance of recommendation by other healthcare professionals.[16, 17, 18, 20, 21, 22, 24]

Patient education is therefore key to improve an understanding of the risks of diabetes and diabetic retinopathy, the need for pre-symptomatic identification and early treatment of eye disease, and to address any concerns. NICE guidance for type 2 diabetes advises offering patients structured education around the time of diagnosis with annual review.[25] Rates of offering structured education (approximately 50% in people with type 1 diabetes and over 80% in people with type 2 diabetes), and attending (approximately 15% in each group), have changed little over the past few years, though both increasingly occur sooner after diagnosis, and ongoing work is required to improve engagement with this.[25] Engagement with patient organisations is important and specific efforts should be targeted at reaching out to younger patients and ethnic minority communities via community networks and disseminating information in different languages.

[22] Sadda SR, Campbell J, Dugel PU and others (2020) Relationship between duration and extent of oedema and visual acuity outcome with ranibizumab in diabetic macula oedema: A post hoc analysis of Protocol I data Eye (London) 2020 Mar;34(3):480-490 [Accessed 20 May 2021]**Error! Hyperlink reference not valid.**
[23] National Institute for Health and Care Excellence (2013) Ranibizumab for treating diabetic macular oedema Technology appraisal guidance (NICE guideline [TA274]) [Accessed 15 Jun 2021]
[24] van Eijk KND, Blom JW, Gussekloo J and others (2012) Diabetic retinopathy screening in patients with diabetes mellitus in primary care: incentives and barriers to screening attendance Diabetes Research and Clinical Practice 2012;96(1):10–6 [Accessed 20 May 2021]
[25] NHS Digital (2020) National Diabetes Audit Diabetes Prevention Programme- Quarterly Report: 1 January to 31 December 2020 [Accessed 15 Jun 2021]

Communication between the different groups of healthcare professionals involved in care of people with diabetes is also pivotal. Strengthening ongoing interaction between DESP, hospital eye services and professionals in primary and secondary care managing people with diabetes will encourage the latter groups to promote retinopathy screening and attend hospital appointments. In many regions there are close links between DESP and hospital eye services, and in regions where Map 5b and Map 5c outcomes fall below the acceptable standard, these links could be used to identify local factors for intervention to improve uptake and attendance at hospital appointments. A lack of capacity or resources within hospital eye services such as space, medical and administrative staff may also need to be evaluated.

Studies also identify convenience as a barrier to attendance for both screening and hospital appointments. Improving the accessibility of hospital eye services, providing more flexibility and integrating diabetes care have all been proposed as enablers of uptake,[18] although these are more challenging to achieve given the need for funding and infrastructure change. An important development is the introduction of more digital surveillance clinics within DESP for monitoring of low risk maculopathy which does not require referral to hospital eye services. This is done via the use of optical coherence tomography (OCT) assessments, which are not currently included in NHS England commissioned DES services. Public Health England has recently provided guidance (July 2020) on provision of the use of OCT.[26] A more widespread, consistent commissioning of DESP OCT surveillance across England will help refine routine referrals (Map 5c) and prioritise those that need specialist intervention for treatment in hospital eye services, thus reducing delays in starting treatment for high risk maculopathy. This would aid managing COVID-19 related backlogs in hospital eye services, as well as being aligned with the NHS long term plan.[27,28] The COVID-19 pandemic has also accelerated the use of imaging or virtual appointments within hospital eye services,[29] which may also reduce the delays, be more cost effective and improve patient experience.

Resources

Public Health England (2020) Diabetic eye screening standards valid for data collected from 1 April 2019 [Accessed 22 Feb 2021]

[26] Public Health England (2020) Optical coherence tomography (OCT) in diabetic eye screening (DES) surveillance clinics [Accessed 20 May 2021]
[27] Leal J, Luengo-Fernandez R, Stratton IM and others (2019) Cost-effectiveness of digital surveillance clinics with optical coherence tomography versus hospital eye service follow-up for patients with screen-positive maculopathy Eye (London) 2019 Apr;33(4):640-647 [Accessed 20 May 2021]
[28] NHS England (Jan 2019) NHS Long Term Plan [Accessed 29 Jul 2021]
[29] Faes L, Fu DJ, Huemer J and others (2020) A virtual-clinic pathway for patients referred from a national diabetes eye screening programme reduces service demands whilst maintaining quality of care Eye (London) 2020 Oct 30:1-10 [Accessed 20 May 2021]

Eye cancer

Intraocular and ocular surface cancers

Context

Despite being the most common primary intraocular cancer in adults, uveal melanoma is still relatively rare. The estimated incidence of uveal melanoma in Europe is approximately 2 to 8 per million per year.[1] In races with brown eyes the incidence is significantly lower. Eye preserving treatment in the form of radiotherapy can be used to treat the majority of small or medium sized melanomas. Large melanomas are treated by enucleation (eye removal). Survival following treatment for uveal melanoma can be predicted based on American Joint Committee on Cancer (AJCC) stage, genetic changes within the tumour, particularly changes in chromosome 3 and 8, and histological changes within the tumour. Overall, 50% of patients with uveal melanoma eventually develop metastases.[2] Current treatments for metastatic uveal melanoma are limited and the majority of patients with metastatic uveal melanoma die within one year of diagnosis.[2]

The most common intraocular cancer in childhood is retinoblastoma with a worldwide incidence of between 1:15,000 and 1:20,000.[3] Eighty per cent of cases of retinoblastoma occur in the developing world.[4] Untreated, retinoblastoma is universally fatal. With modern multimodal treatment, survival from retinoblastoma can reach almost 100%.[5] The genetics of retinoblastoma are well understood and key to the management of children with retinoblastoma and their families is good genetic testing and counselling. Due to a lack of treatment resources and because of late presentation there is huge disparity in survival between regions of the world. In the developing world, retinoblastoma survival is predicted to be around 30%.[6] The main treatment for retinoblastoma is chemotherapy, which can be delivered systemically, to the eye by intra-ophthalmic artery chemotherapy or into the vitreous. Local treatments such as

[1] Jager MJ, Shields CL, Cebulla CM and others (2020) Uveal Melanoma Nature Reviews. 2020 apr;6(24):1-25 [Accessed 21 Jun 2021]
[2] Virgili G, Gatta G, Ciccolallo L and others (2008) Survival in patients with uveal melanoma in Europe Arch Ophthalmol. 2008 Oct;126(10):1413-1418 [Accessed 21 Jun 2021]
[3] Kivelä T (2009) The epidemiological challenge of the most frequent eye cancer: retinoblastoma, an issue of birth and death Br J Ophthalmol 2009 Sep;93(9):1129-1131 [Accessed 21 Jun 2021]
[4] Global Retinoblastoma Study Group (2020) Global retinoblastoma presentation and analysis by national income level JAMA Oncol 2020 May;6(5):685-695 [Accessed 21 Jun 2021]
[5] Shields CL, Bas Z, Tadepalli S and others (2020) Long-term (20-year) real-world outcomes of intravenous chemotherapy (chemoreduction) for retinoblastoma in 964 eyes of 554 patients at a single centre Br J Ophthalmol. 2020 Nov;104(11):1548-1555 [Accessed 21 Jun 2021]
[6] Ancona-Lezama D, Dalvin LA, Shields CL (2020) Modern treatment of retinoblastoma: A 2020 review Indian Journal of Ophthalmology 2020 Nov;68(11):2356-2365 [Accessed 21 Jun 2021]

laser, cryotherapy or plaque radiotherapy may be needed. However, advanced disease is still treated by enucleation of the eye.[7]

Ocular surface cancers most commonly arise from either conjunctival squamous cells or from conjunctival melanocytes. Both tumours often arise from precursor non-malignant lesions. Sunlight appears to be a significant risk factor for the development of ocular surface squamous neoplasia (OSSN). HIV and HPV infection are also implicated. The incidence of OSSN is highest in equatorial regions and in older white men. In the USA the incidence is between 0.3 and 8.4 per million people per year.[8,9] In Australia it is 19 per million people per year.[10] In a UK based 12 month prospective observational study, the reported incidence of OSSN was 0.53 cases per million people per year.[11] The incidence of worldwide conjunctival melanoma is increasing and is estimated to be between 0.24 to 0.8 cases per million.[12] Again, sunlight has been proposed as a risk factor for its development but the evidence for this is equivocal.

The main treatment for ocular surface tumours is surgery. Topical chemotherapy and radiotherapy can be used as adjuvant treatments. Systemic monitoring for metastatic spread is particularly important for conjunctival melanoma. The frequency of systemic metastasis in conjunctival melanoma is around 19%.[12]

Data quality

This is the first publication of intraocular and ocular surface cancer incidence with a geographical breakdown from Public Health England's National Cancer Registration and Analysis Service (NCRAS) data. The data have been carefully quality assured and the analysis accurately reflects the data stored in the national disease registration database, however as with any new publication it is possible that variation in the reported incidence may reflect previously undetected variation in the quality of submissions to the registry (for example, if one Trust did not submit eye cancer patients, the rates in their area may appear artificially low). The indicator was chosen through multiple discussions with clinicians and NCRAS staff. All the data used was supplied by NCRAS.

[7] Dimaras H, Corson TW, Cobrinik D and others (2015) Retinoblastoma Nature reviews Disease primers. 2015 Aug;1, 15021 [Accessed 21 Jun 2021]
[8] Emmanuel B, Ruder E, Lin SW and others (2012) Incidence of squamous-cell carcinoma of the conjunctiva and other eye cancers in the NIH-AARP Diet and Health Study Ecancermedicalscience. 2012 May;6:254 [Accessed 21 Jun 2021]
[9] Sun EC, Fears TR, Goedert JJ Epidemiology of squamous cell conjunctival cancer. Cancer Epidemiol Biomarkers Prev. 1997;6(2):73–77 [Accessed 03 Aug 2021]
[10] Lee GA, Hirst LW. Incidence of ocular surface epithelial dysplasia in metropolitan brisbane: A 10-year survey. Archives of Ophthalmology. 1992;110(4):525–527 [Accessed 03 Aug 2021]
[11] Kiire CA, Stewart RMK, Srinivasan S, and others (2019) A prospective study of the incidence, associations and outcomes of ocular surface squamous neoplasia in the United Kingdom Eye (Lond). 2019 Feb;33(2):283-294 [Accessed 21 Jun 2021]
[12] Wong JR, Nanji AA, Galor A and others (2014) Management of conjunctival malignant melanoma: a review and update Expert Rev Ophthalmol. 2014 Jun;9(3):185-204 [Accessed 21 Jun 2021]

NCRAS codes cancer according to the International Classification of Diseases for Oncology Third Edition (ICDO3) and provides a mapping for all cancers to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD10) Version for 2010. For this indicator only the coding system of ICD10 was used. This group is what we considered traditionally as being 'eye' cancers and are treated by eye cancer specialists. They include cancers coded to C69.0 to C69.4 in ICD10 (see Table 6.1 below for full description).

The registration of these cancers follows the recommended principles for the registration process which relies on multiple data sources, enhanced follow-up with trusts and expert processing by cancer registration officers.[13] We expect population level coverage of all eye cancers in England. Cancer registration has very complete data, the very small number of cases missed tend to be clinically diagnosed untreated cancers where the patient is still alive, or cases treated entirely outside the NHS.

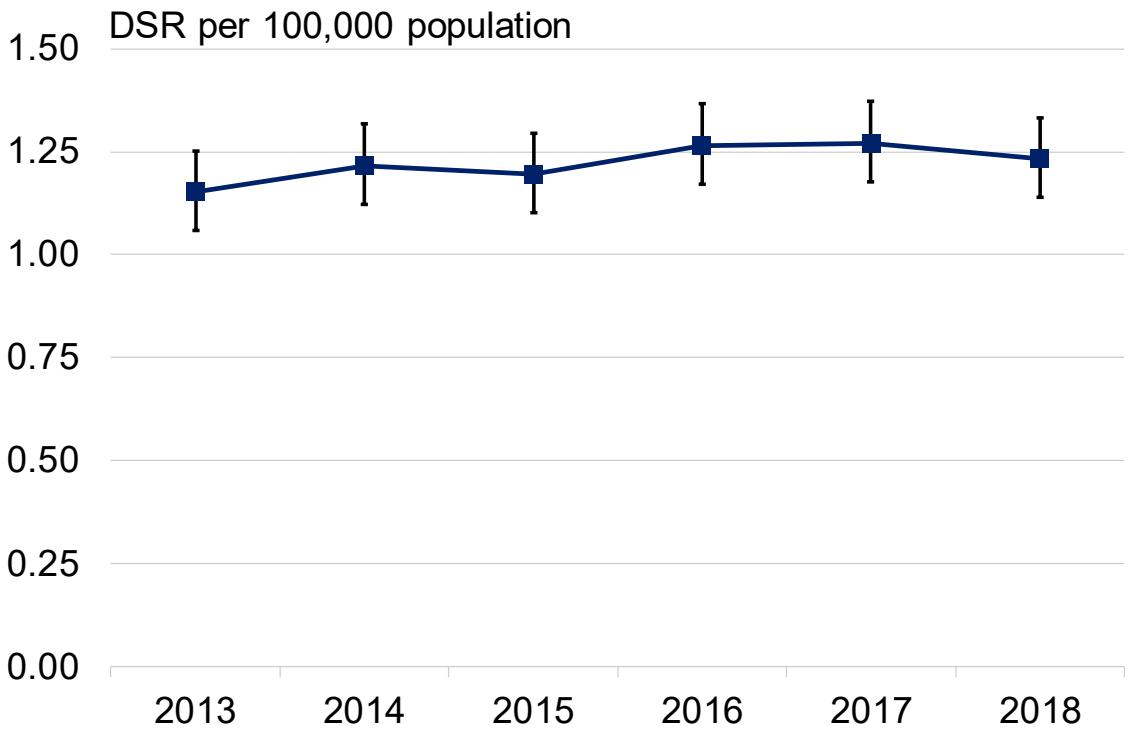
Imprecise coding could affect this indicator. If cases of the eye are coded to C69.9 (Eye, not otherwise specified) they would not be included in this indicator. However, numbers of these cases are small.

Table 6.1: Indicator codes and description

ICD10 Code	Description
C69.0	Malignant neoplasm of conjunctiva
C69.1	Malignant neoplasm of cornea
C69.2	Malignant neoplasm of retina
C69.3	Malignant neoplasm of choroid
C69.4	Malignant neoplasm of ciliary body

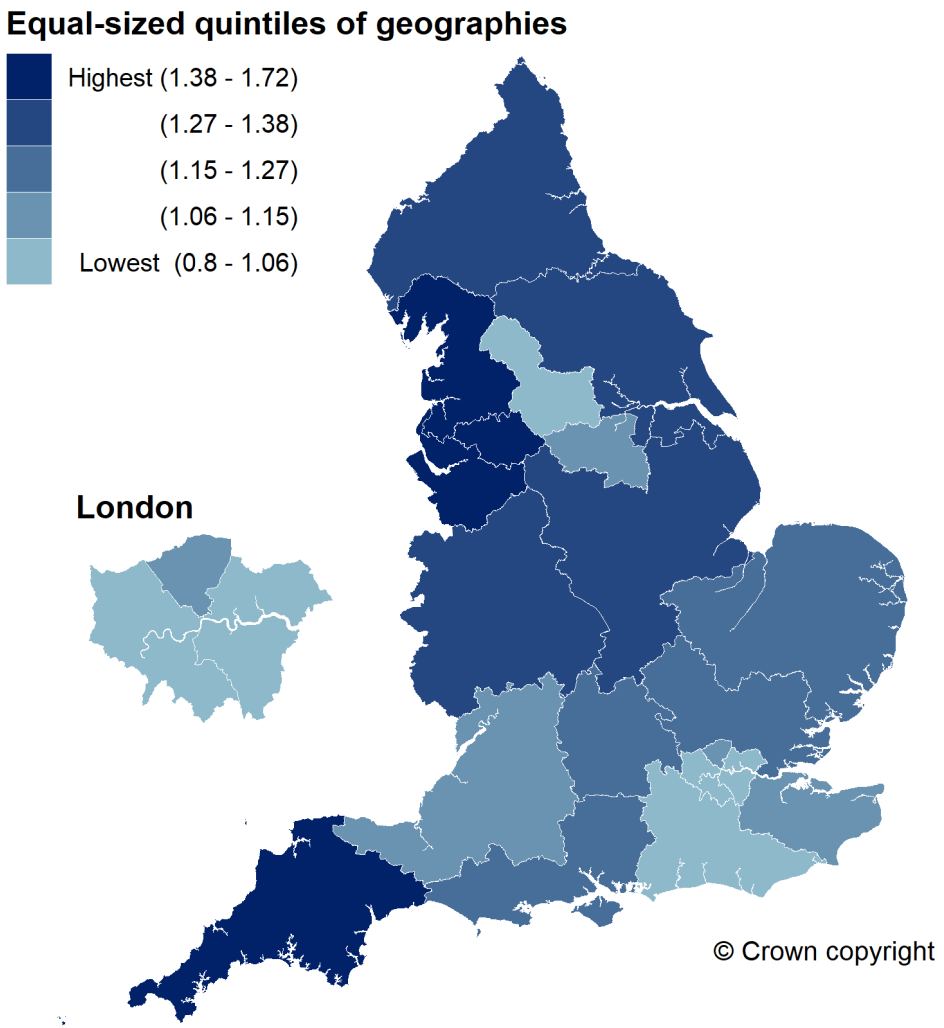
[13] Henson KE, Elliss-Brookes L, Coupland VH and others (2020) Data Resource Profile: National Cancer Registration Dataset in England International Journal of Epidemiology, Volume 49, Issue 1, February 2020, Pages 16–16h [Accessed 05 August 2021]

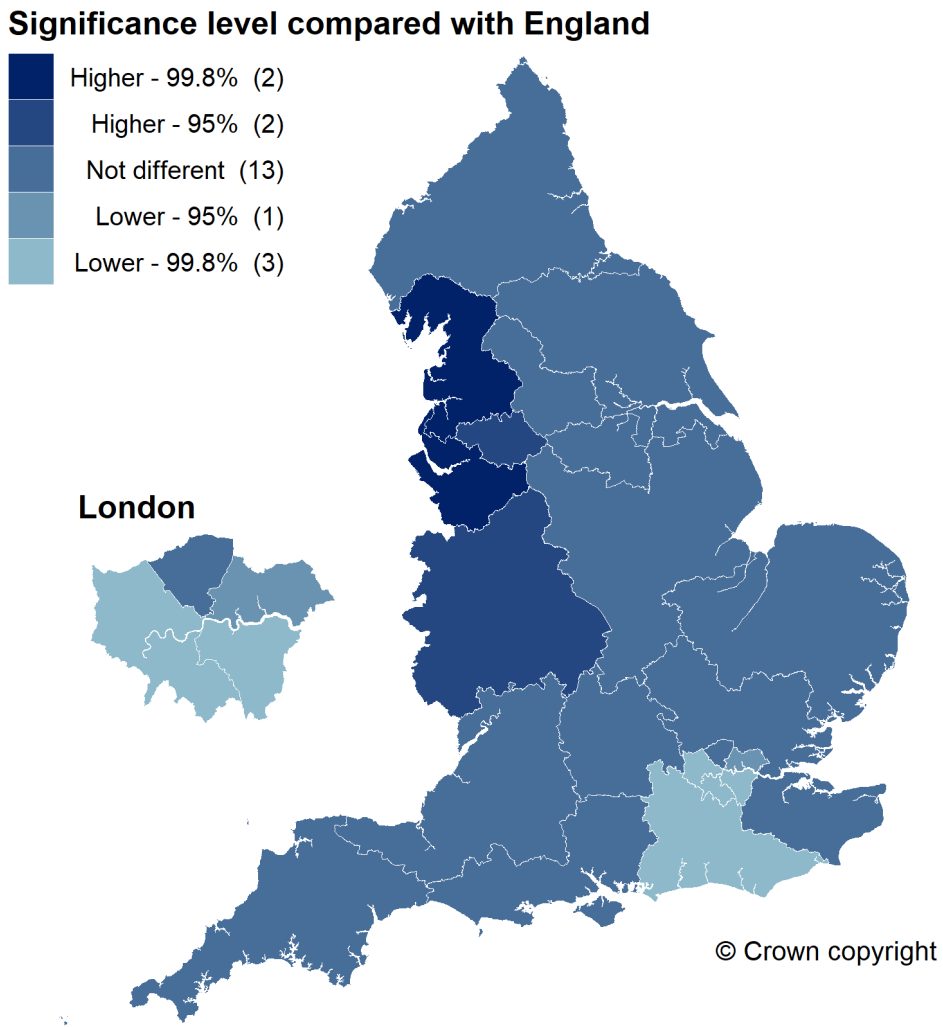
Figure 6.1: Incidence rate of uveal, retinal and conjunctival cancers for England (2013 to 2018)



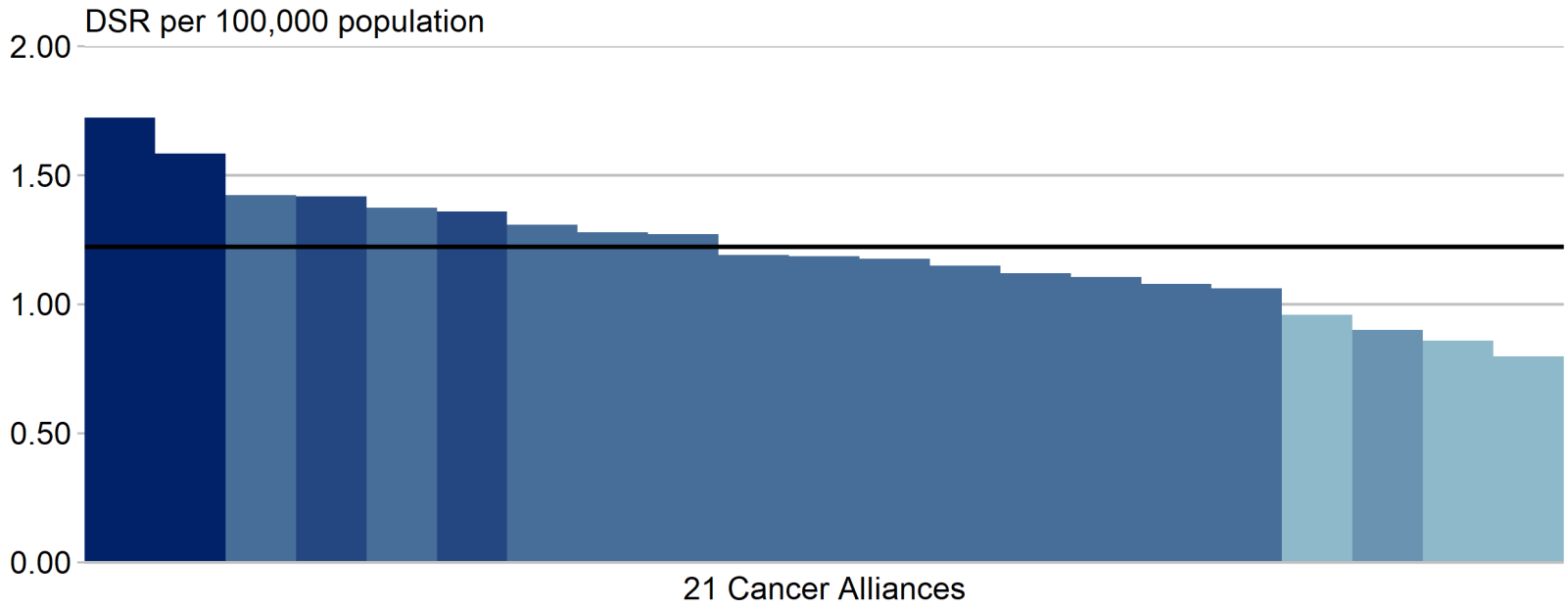
Map 6: Variation in incidence rate of uveal, retinal and conjunctival cancers by cancer alliance (2013-2018)

Directly standardised rate per 100,000 population
Optimum value: Requires local interpretation





Column chart: Variation in incidence rate of uveal, retinal and conjunctival cancers by Cancer Alliance (2013-2018)



Magnitude of Variation

Map 6: Variation in incidence rate of uveal, retinal and conjunctival cancers by cancer alliance

The maps and column chart display the latest period (2013-2018), during which cancer alliance values ranged from 0.8 per 100,000 population to 1.7 per 100,000 population, which is a 2.2-fold difference between cancer alliances.

The England value for 2013-2018 was 1.2 per 100,000 population.

Ethnicity and skin type are important risk factors for ocular tumours in adults. The variation seen within England may be partly explained by differences in demography throughout the country and in differences in patient's willingness to seek hospital care.

An important consideration in uveal tumours is that they are rarely diagnosed by biopsy. Instead, clinicians use multimodal imaging (for example ultrasound, photography and optical coherence tomography) to give clues as to the likely diagnosis. Distinguishing between small melanomas and benign naevi using imaging can be difficult, subjective and open to geographic variation in opinion. There are three adult ocular oncology centres in England based in Liverpool, Sheffield and London. The variation in incidence seen within the country may partly be due to differences between centres, and between ophthalmologists and optometrists who refer to these centres, in where the line is drawn between benign naevi and melanomas.

Options for action

Continuing collaboration between English ocular oncology centres to agree on defined criteria for distinguishing between naevi and melanomas may help in reducing variation in incidence. Educating non-ocular oncologist ophthalmologists and optometrists so they know when and how to refer patients may also be helpful.

In the future, the best option for reducing subjectivity in diagnosis and thus some of the variation in incidence would be to have a biochemical test that was non-invasive with no side effects that could distinguish between a benign choroidal naevus and melanoma. Liquid biopsies of blood to detect circulating melanoma DNA or circulating melanoma cells hold promise in this area.[14]

Local areas are recommended to review their own data and identify if rates look unusual or unexpected, noting any associated data quality issues and exploring the potential reasons for variation and suggested options for action. Areas are encouraged to contact

[14] Jin E, Burnier JV (2021) Liquid Biopsy in Uveal Melanoma: Are We There Yet? Ocul Oncol Pathol. 2021 Mar;7(1):1-16 [Accessed 21 Jun 2021]

the National Cancer Registration and Analysis Service (NCRAS) to discuss any data issues arising from this.

Resources

Royal College of Ophthalmologists (2019) Referral pathways for adult ocular tumours [Accessed 21 Jun 2021]

The College of Optometrists (2020) Clinical Management Guidelines Guidance on Pigmented Fundus Lesions [Accessed 21 Jun 2021]

OcuMelUK Welcome page [Accessed 22 Jul 2021]

Sight loss outcomes

New certificates of vision impairment

Context

The primary purpose of the process of certification of vision impairment is to formally acknowledge a level of impairment in need of services for care and support in the community, to maintain independence and inclusion. The primary purpose of the data arising from the certification process is to identify and quantify this specific need.
The secondary use of the data arising from certification is for monitoring trends in the causes and distribution of vision impairment in the population to inform service planning and development and to be used as a proxy indicator of population eye health.
There are two categories of sight impairment, sight impairment and severe sight impairment. Each takes account of both visual acuity and field. Certification category is a key factor taken into consideration by local authorities when assessing levels of support that may be deemed appropriate. The criteria for these categories have been defined by the Department of Health and Social Care as follows:[1]

Certifiable sight impairment:

- Snellen visual acuity between 3/60 and 6/60 (or equivalent), with full field of vision
- Snellen visual acuity between 6/60 and 6/24 (or equivalent), with moderate visual field loss
- Snellen visual acuity 6/18 or better (or equivalent) with marked visual field loss for example homonymous hemianopia

Certifiable severe sight impairment:

- Snellen visual acuity worse than 3/60 (or equivalent) with a full visual field
- Snellen visual acuity between 3/60–6/60 with severe visual field loss
- Snellen visual acuity 6/60 or better (or equivalent) with clinically significant contraction of visual field e.g. bi-temporal hemianopia or reduction of inferior field

Patients meeting the criteria for either of these categories in their better seeing eye are eligible for certification by a consultant ophthalmologist.[1] Certification is neither mandatory nor automatic. It is a voluntary process requiring patient consent. Once a certificate of vision impairment (CVI) has been issued, a copy is given to the patient. In addition and with the patient's consent, copies are sent to the patient's GP, to their local authority for registration, and to the CVI data repository that is held at Moorfields Eye Hospital NHS Foundation Trust on behalf of the Royal College of Ophthalmologists.[1]

[1] Department of Health and Social Care (2017) Certificate of Vision Impairment: Explanatory Notes for Consultant Ophthalmologists and Hospital Eye Clinic Staff in England [Accessed 15 Jul 2021]

The main causes of all types of certifiable vision impairment[2] in adults are:

- degeneration of the macula and posterior pole (mostly age related macular degeneration), 51.4% of all certifications
- glaucoma, 9.0% of all certifications
- inherited retinal disorders, 6.4% of all certifications
- diabetic retinopathy and maculopathy (diabetic eye disease), 5.9% of all certifications

In adults aged 16 to 64 years, the main cause of certifiable severe vision impairment is now inherited retinal disorders (20% of all severe sight impairment certifications), followed by diabetic retinopathy and maculopathy (14%).[3,4]

Since its establishment in 2012, the Public Health Outcomes Framework (PHOF) has included CVI as an indicator of preventable sight loss (indicator E12 within Domain E: healthcare and premature mortality).[5] The data for this indicator are provided by the CVI Data Repository. PHOF indicator E12 includes crude rates of all certification (both categories) for the three main causes of adult certification (age related macular degeneration (AMD), glaucoma and diabetic eye disease) and all cause certification. These are considered in detail in the following sections, but their inclusion in the PHOF provides a means for their regular reporting and review at local and national level.

More recently, National Institute for Health and Care Excellence (NICE) quality standards for adults with serious eye disorders also recommend timely certification as soon as they become eligible.[6]

Certifications during the COVID-19 pandemic

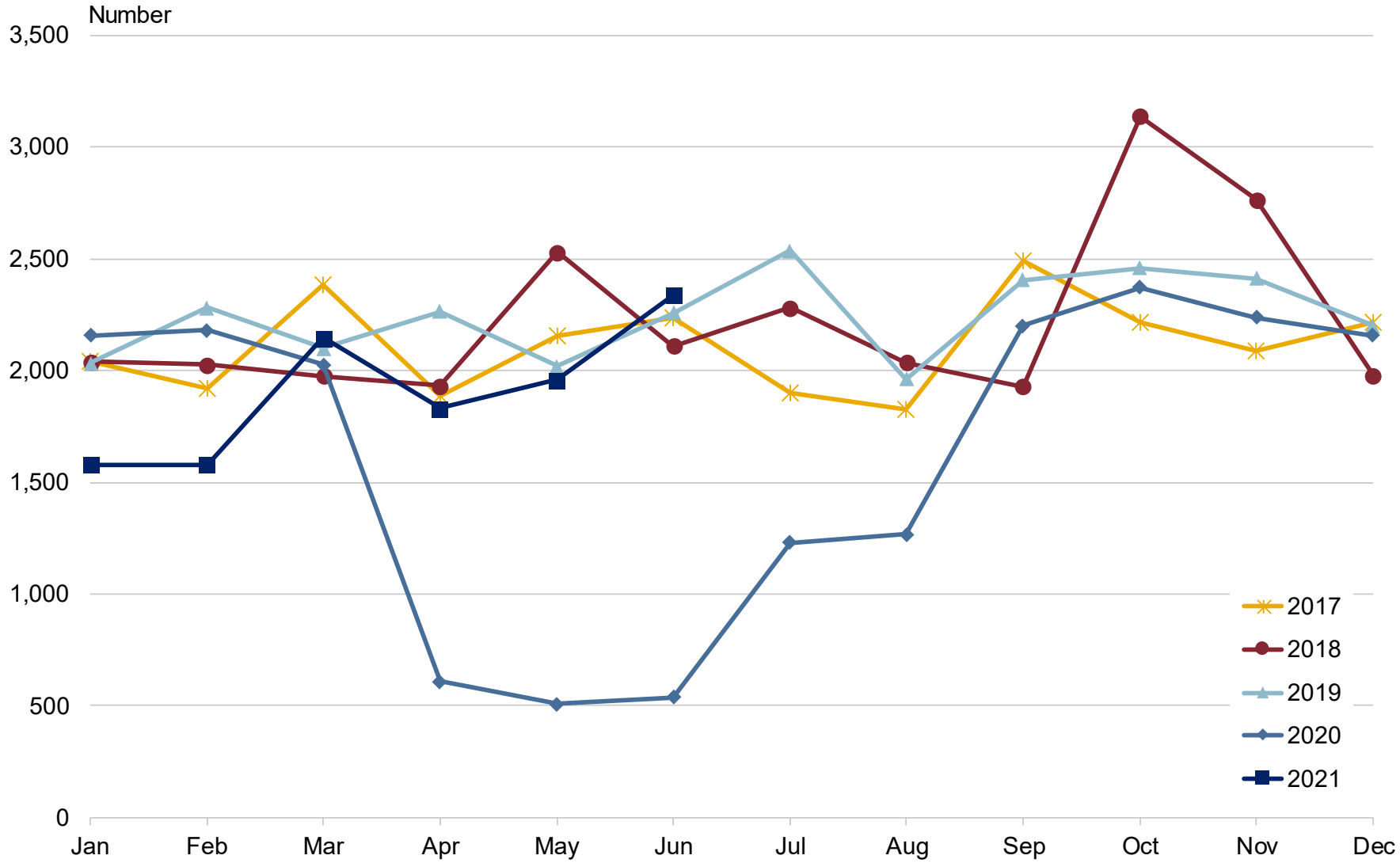
Considerable efforts were made during the first and second waves of the pandemic to maintain ophthalmic services for new and existing patients at risk of permanent visual loss from delays in their treatment. As such there was a considerable drop in outpatient attendances, but also due in part to patient concerns about acquiring infection during their hospital visit, or that they had been classified as being vulnerable or were

[2] Quartilo A, Simkiss P, Zekite A and others (2016) Leading causes of certifiable visual loss in England and Wales during the year ending 31 March 2013 Eye (Lond) 2016 Apr; 30(4): 602–607 [Accessed 15 Jul 2021]
[3] Liew G, Michaelides M, Bunce C (2014) A comparison of the causes of blindness certifications in England and Wales in working age adults (16–64 years), 1999–2000 with 2009–2010 BMJ Open. 2014;4:e004015 [Accessed 15 Jul 2021]
[4] Rahman F, Zekite A, Bunce C and others (2020) Recent trends in vision impairment certifications in England and Wales Eye (London) 2020 Jul;34(7):1271-1278 [Accessed 15 Jul 2021]
[5] Public Health England Public Health Outcomes Framework [Accessed 15 Jul 2021]
[6] National Institute for Health and Care Excellence (2019) Serious eye disorders - quality statement 6: Certificate of vision impairment (NICE quality standard [QS180]) [Accessed 15 Jul 2021]

shielding.[7,8] The numbers of certifications during the period January 2017 to April 2021 are shown in Figure 7.1, demonstrating the impact of the pandemic. There was a sharp drop in the number of certifications during the first (April to June 2020) and second wave (January to February 2021) of the pandemic, with some recovery towards expected numbers during the intervening period. Nevertheless there is likely to be a backlog of eligible patients who have not yet been certified, and it is possible that in addition some patients may have suffered irreversible sight loss due to delays in treatment during the pandemic and have become eligible for certification. This is currently being investigated in a number of studies.

[7] Wickham L, Hay G, Hamilton R, and others (2020) The impact of COVID policies on acute ophthalmology services - experiences from Moorfields Eye Hospital NHS Foundation Trust Eye 34, 1189–1192 [Accessed 15 Jul 2021]
[8] Jayaram H, Strouthidis NG, and Gazzard G (2020) The COVID-19 pandemic will redefine the future delivery of glaucoma care Eye 34, 1203–1205 [Accessed 15 Jul 2021]

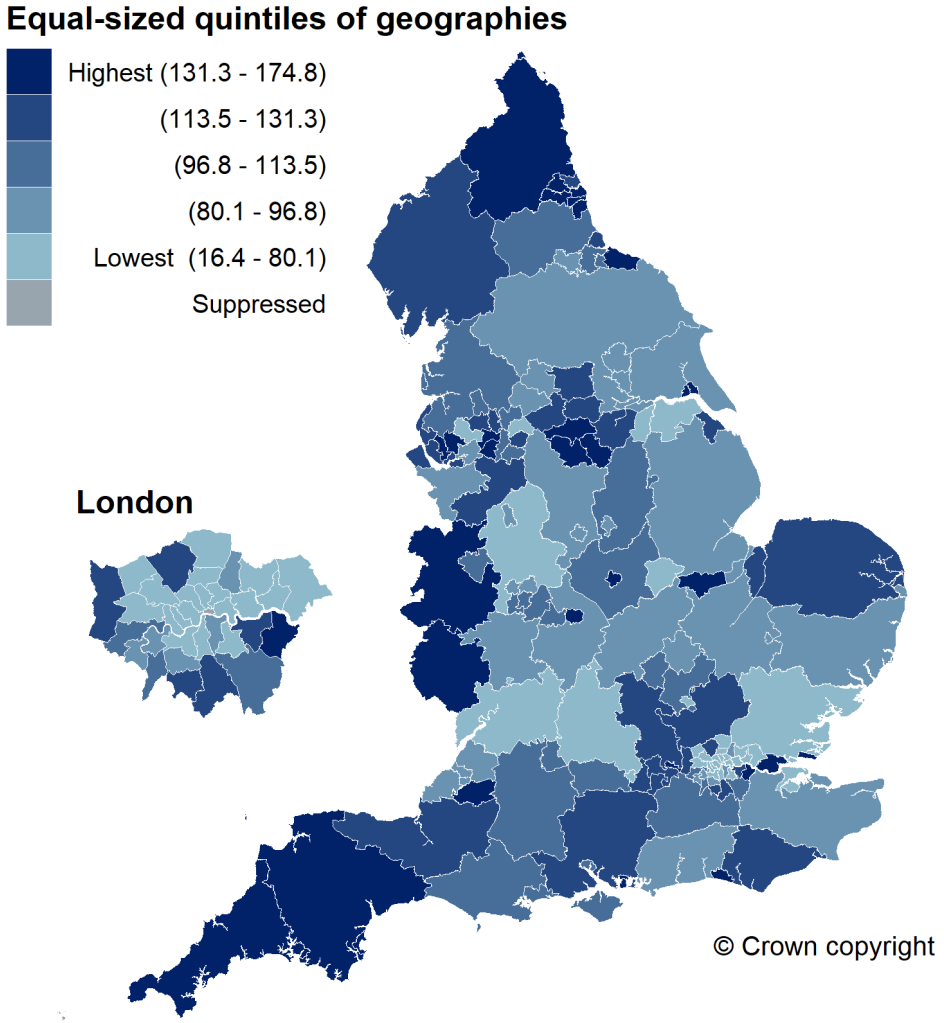
Figure 7.1: Numbers of certificates of visual impairment for epidemiological analysis received at the Royal College of Ophthalmologists for England and Wales (January 2017 to June 2021)[9]

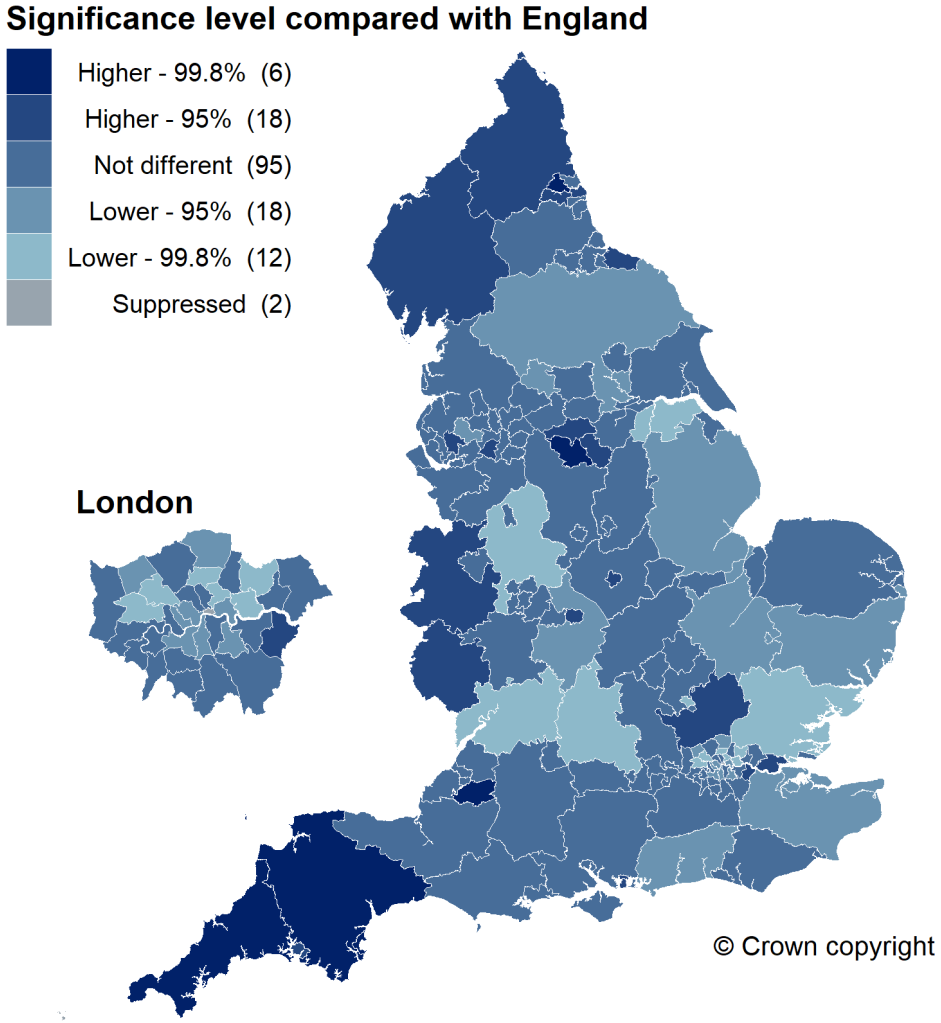


[9] Data source: Royal College of Ophthalmologists Certifications Office based at Moorfields Eye Hospital

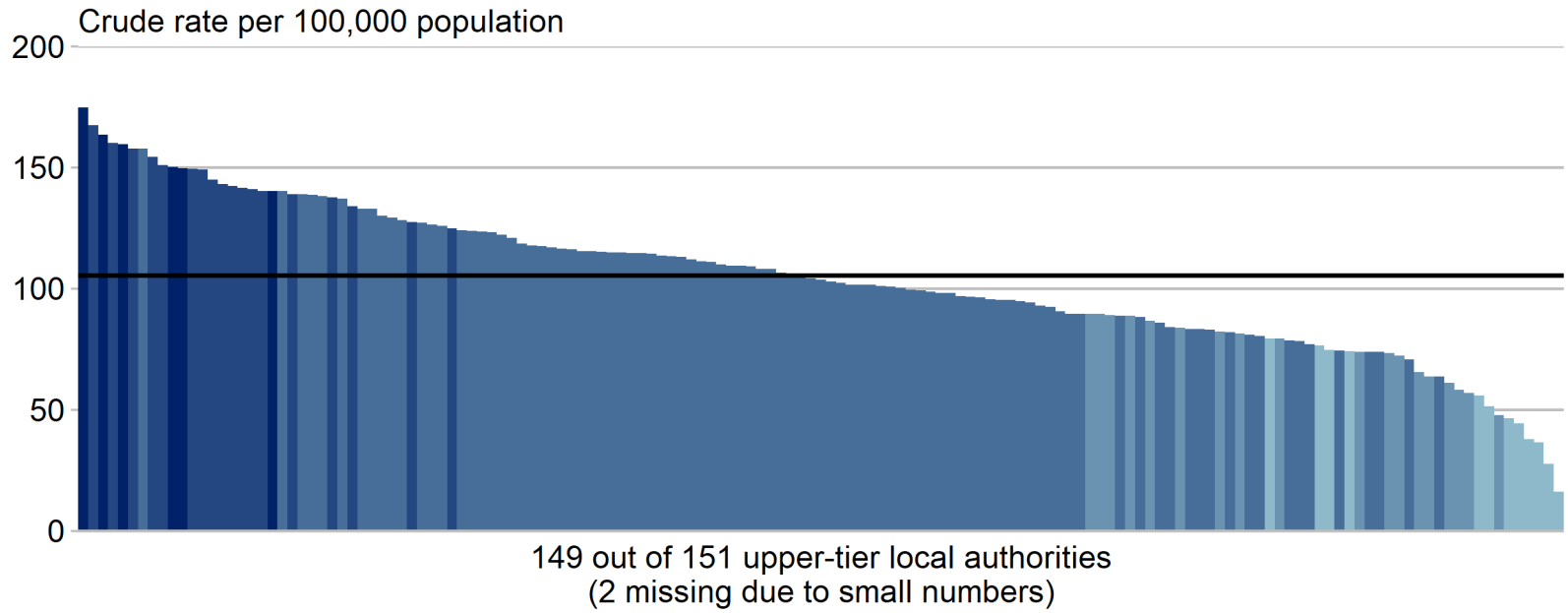
Map 7a: Variation in rate of new certifications of visual impairment (CVI) due to age related macular degeneration (AMD) in people aged 65 years and over by upper-tier local authority (2019/20)

Crude rate per 100,000 population
Optimum value: Requires local interpretation

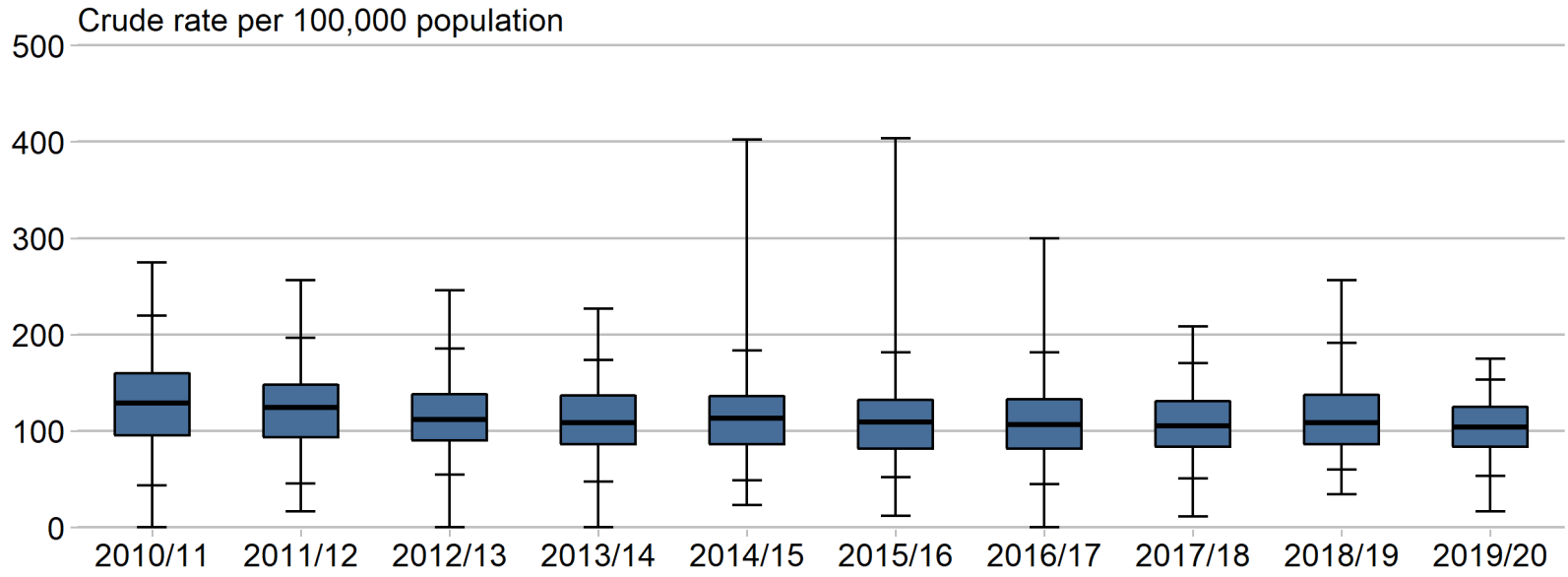




Column chart: Variation in rate of new certifications of visual impairment (CVI) due to age related macular degeneration (AMD) in people aged 65 years and over by upper-tier local authority (2019/20)



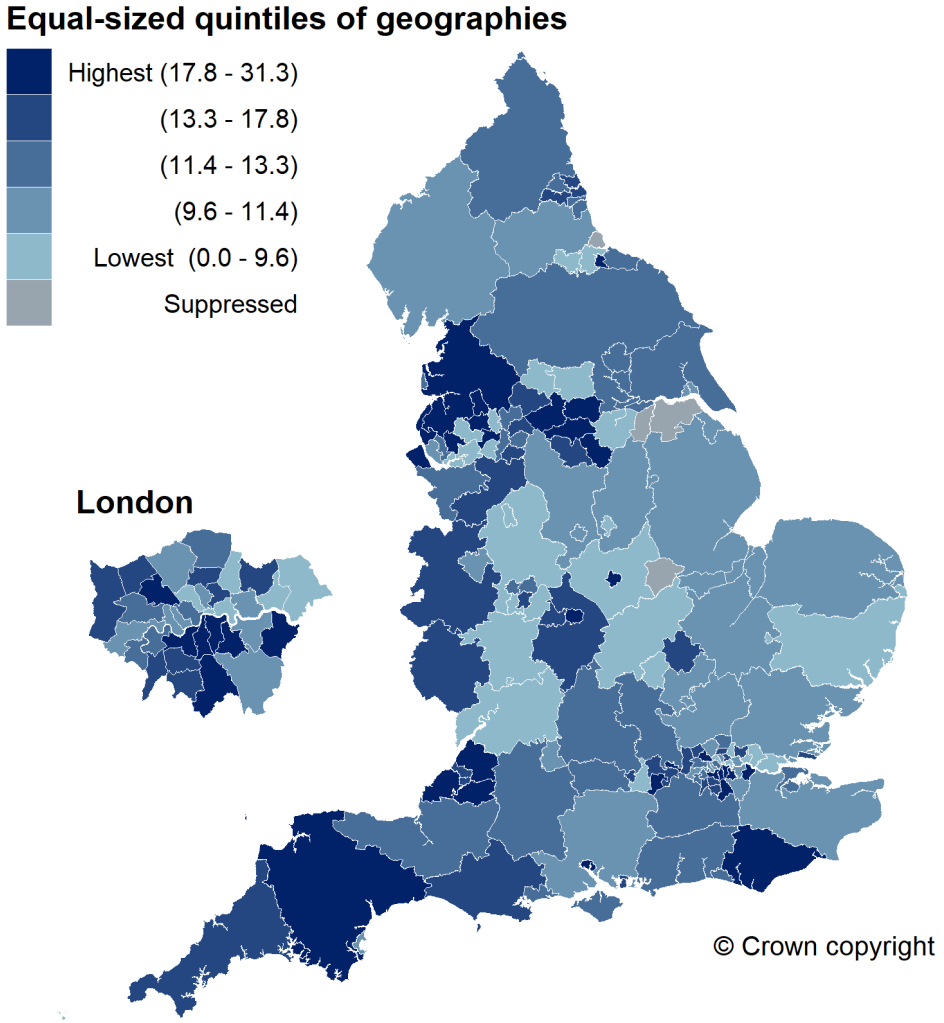
Box plot time series: Variation in rate of new certifications of visual impairment (CVI) due to age related macular degeneration (AMD) in people aged 65 years and over by upper-tier local authority (2010/11 to 2019/20)

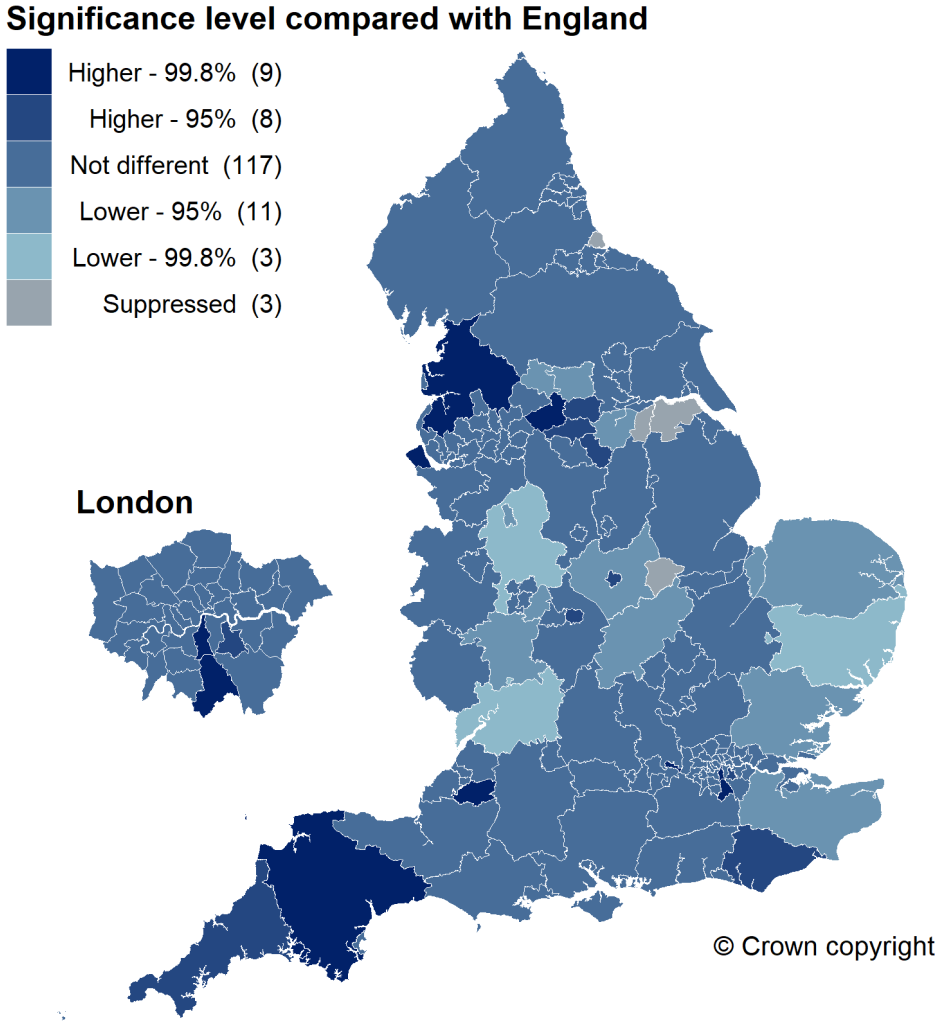


Year	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	274.5	239.5	246.0	227.1	378.9	391.8	299.6	196.9	222.1	158.4	No significant change
75th-25th percentile	64.3	54.5	48.4	50.9	50.1	50.5	51.4	47.9	51.6	41.5	NARROWING Significant
95th-5th percentile	176.2	151.3	130.6	126.2	135.1	129.2	136.7	119.3	131.7	99.9	NARROWING Significant
Median	128.8	124.5	111.6	108.5	113.2	109.3	106.6	105.3	108.2	103.9	DECREASING Significant

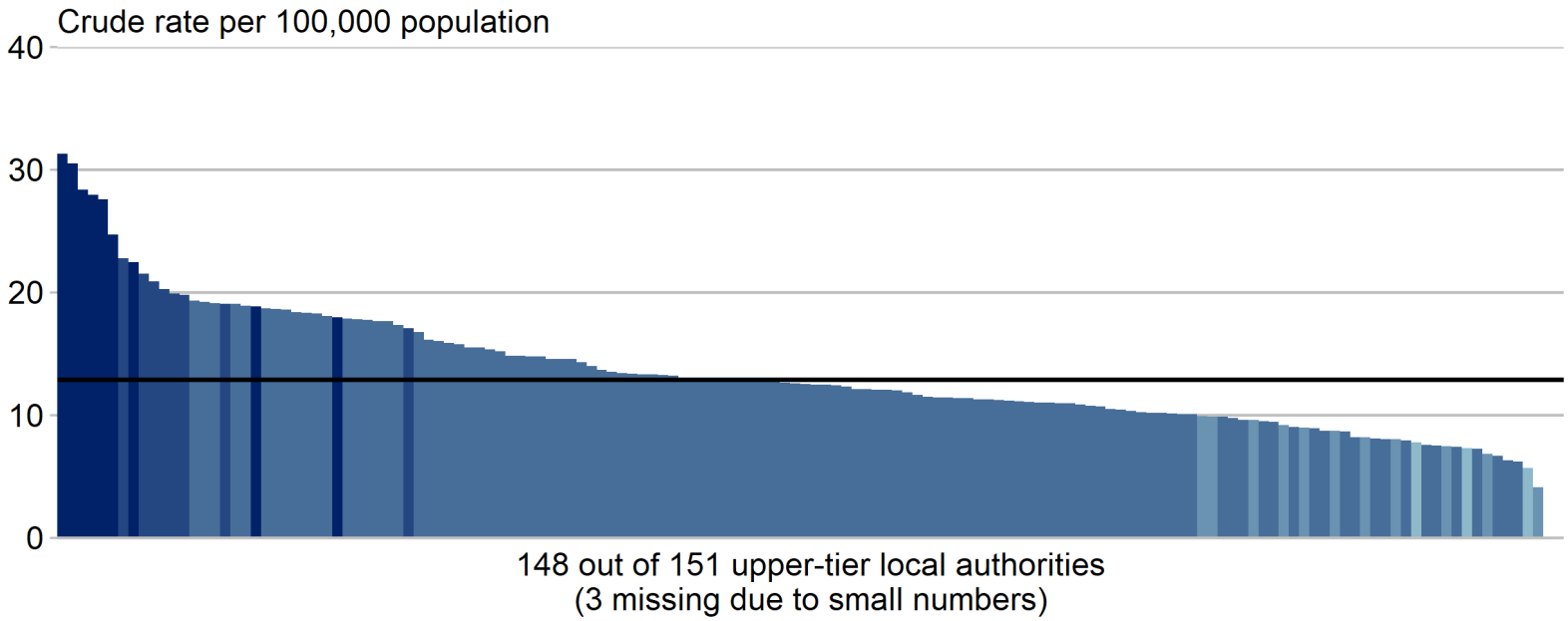
Map 7b: Variation in rate of new certifications of visual impairment (CVI) due to glaucoma in people aged 40 years and over by upper-tier local authority (2019/20)

Crude rate per 100,000 population
Optimum value: Requires local interpretation

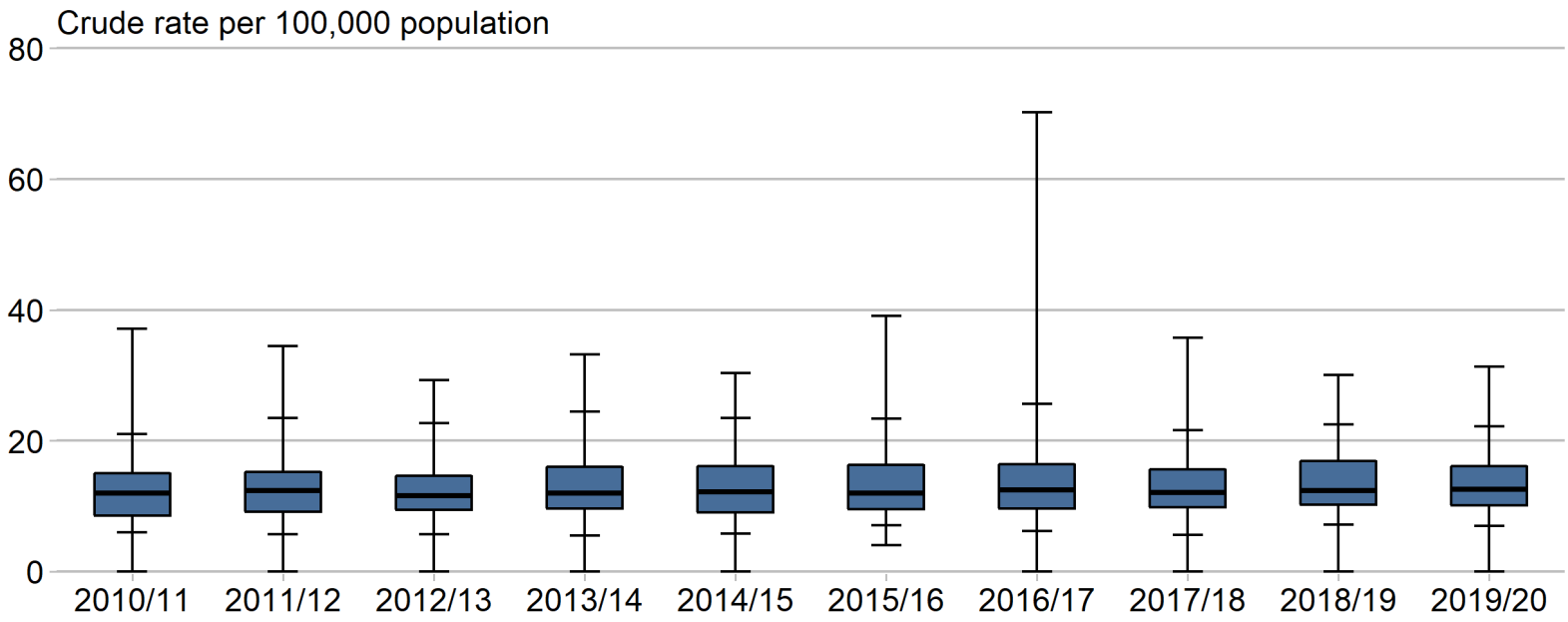




Column chart: Variation in rate of new certifications of visual impairment (CVI) due to glaucoma in people aged 40 years and over by upper-tier local authority (2019/20)



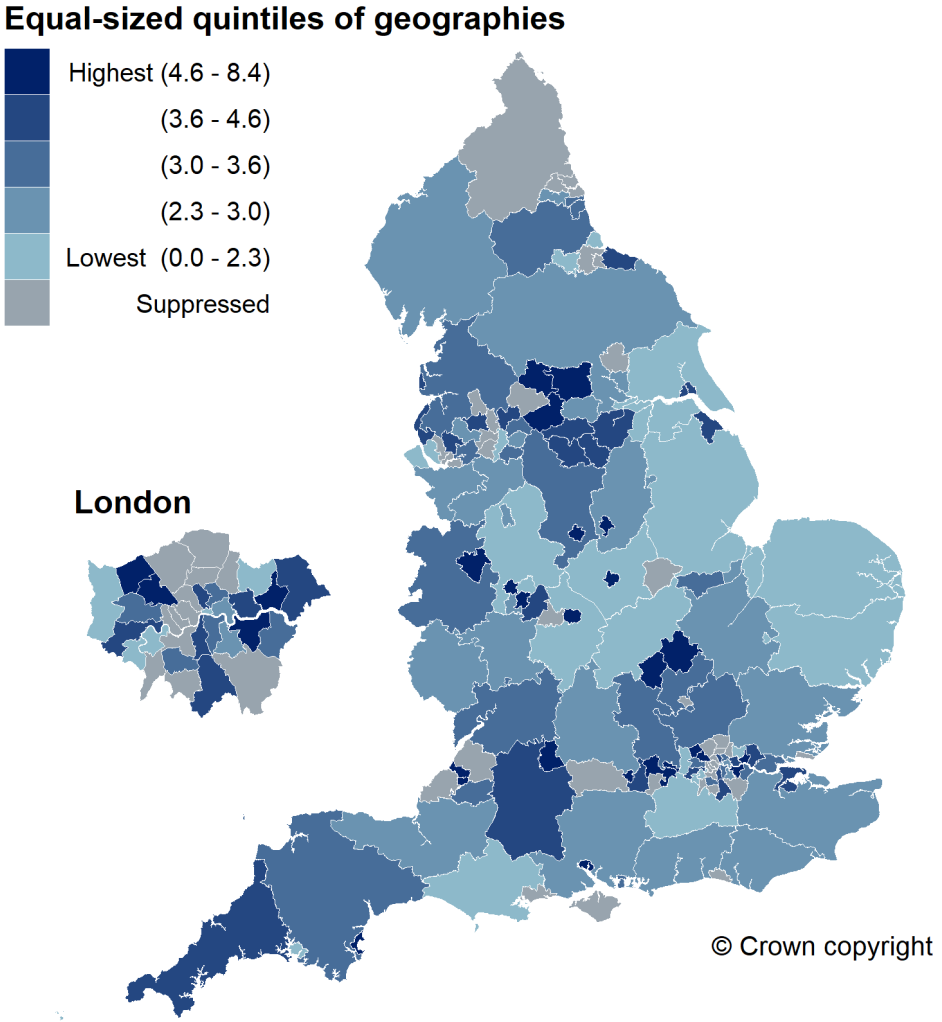
Box plot time series: Variation in rate of new certifications of visual impairment (CVI) due to glaucoma in people aged 40 years and over by upper-tier local authority (2010/11 to 2019/20)

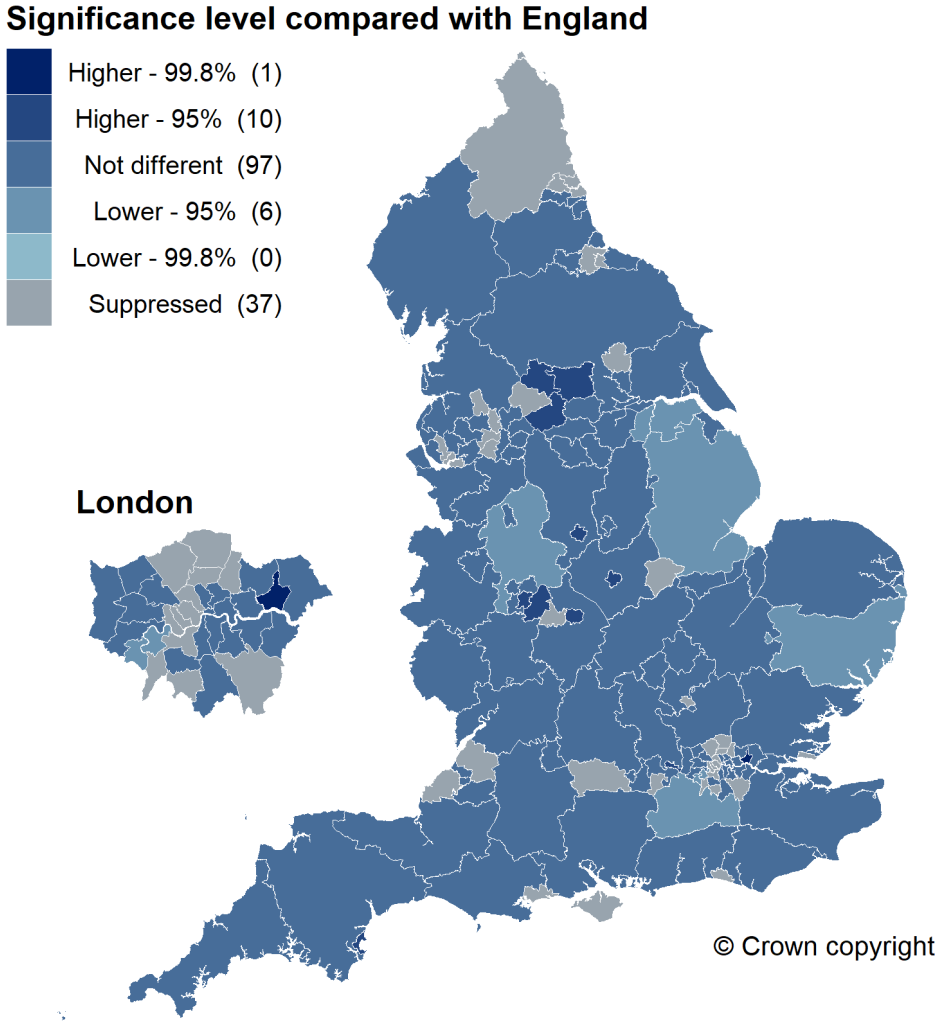


Year	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	37.1	34.5	29.3	33.2	30.3	35.1	70.2	35.8	30.1	31.3	No significant change
75^{th}-25^{th} percentile	6.5	6.1	5.2	6.4	7.1	6.8	6.8	5.8	6.6	6.0	No significant change
95^{th}-5^{th} percentile	15.1	17.7	17.0	18.9	17.7	16.3	19.4	16.0	15.4	15.1	No significant change
Median	11.9	12.4	11.6	11.9	12.1	12.0	12.4	12.1	12.4	12.5	No significant change

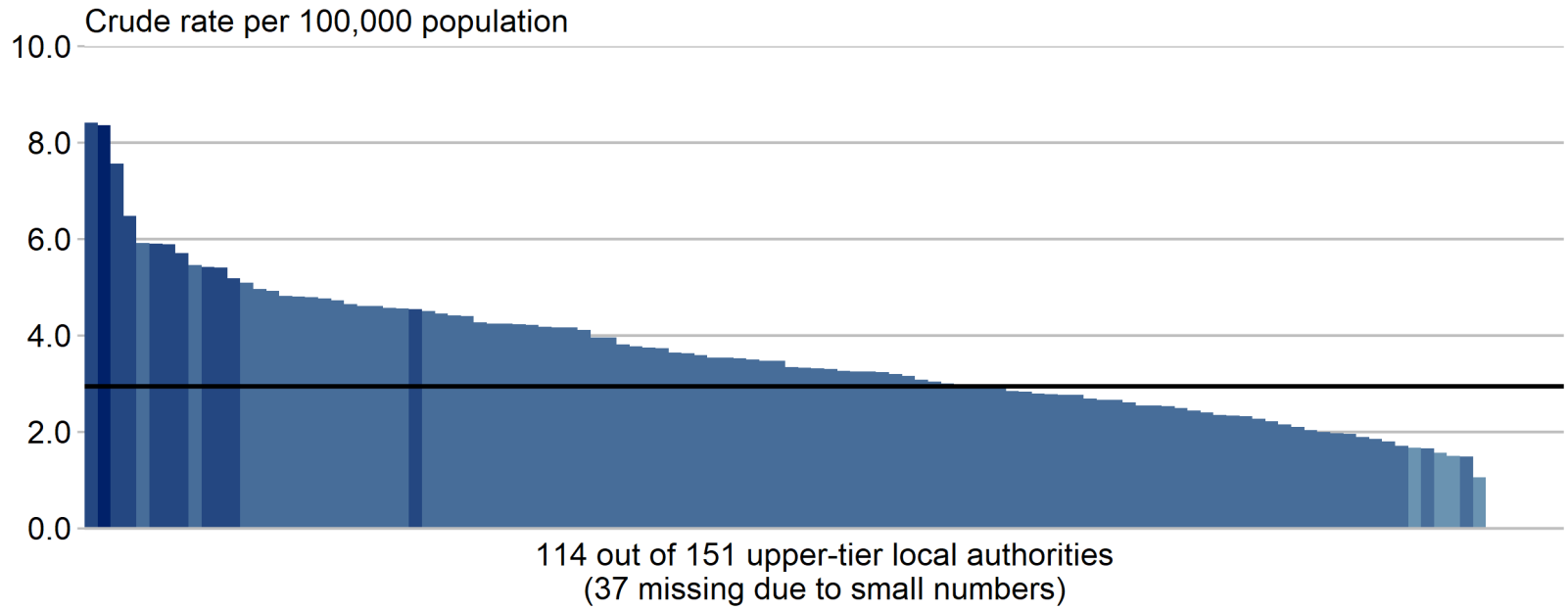
Map 7c: Variation in rate of new certifications of visual impairment (CVI) due to diabetic eye disease in people aged 12 years and over by upper-tier local authority (2019/20)

Crude rate per 100,000 population
Optimum value: Requires local interpretation

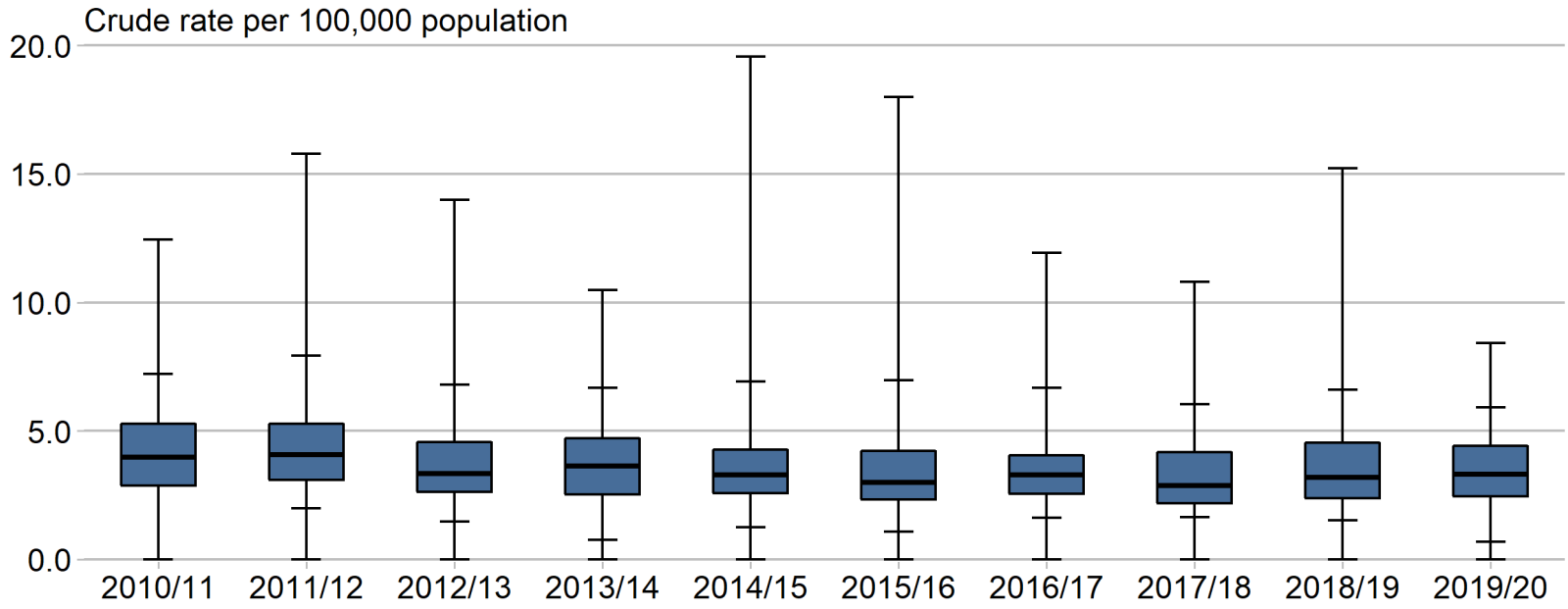




Column chart: Variation in rate of new certifications of visual impairment (CVI) due to diabetic eye disease in people aged 12 years and over by upper-tier local authority (2019/20)



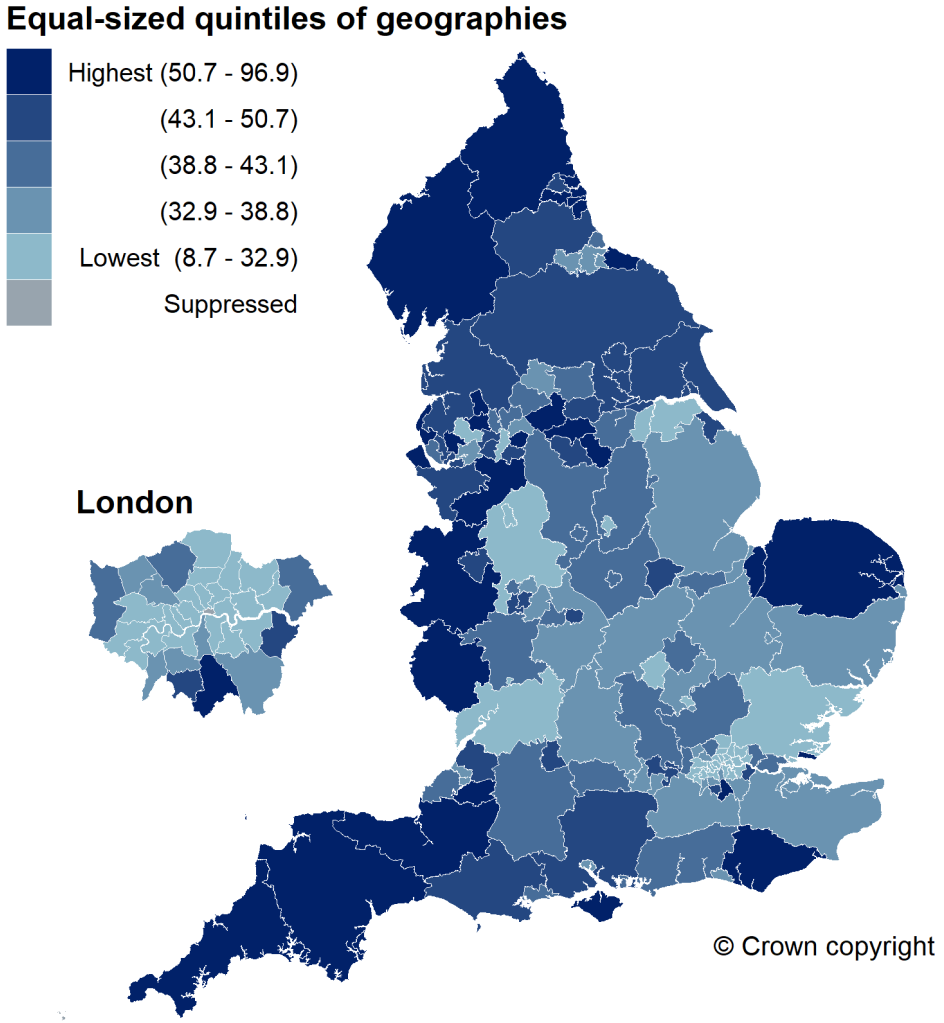
Box plot time series: Variation in rate of new certifications of visual impairment (CVI) due to diabetic eye disease in people aged 12 years and over by upper-tier local authority (2010/11 to 2019/20)

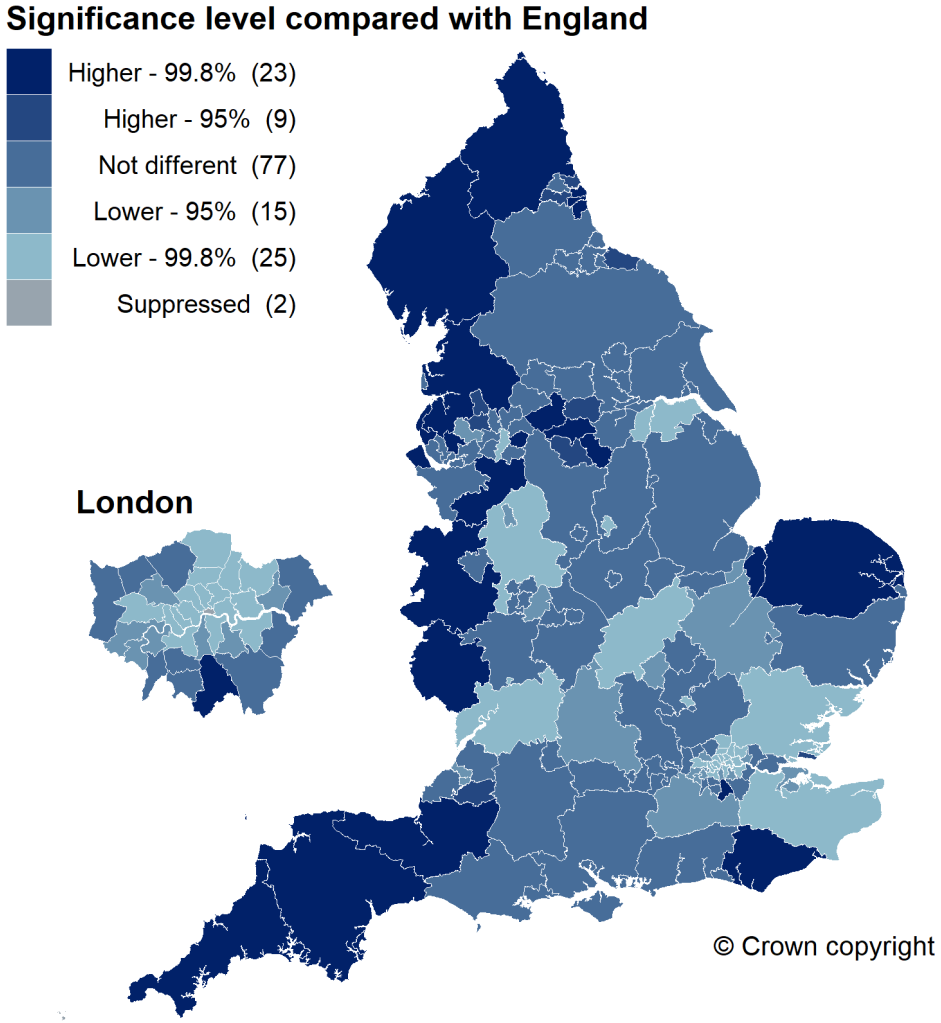


Year	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	12.5	15.8	14.0	10.5	19.6	18.0	11.9	10.8	15.2	8.4	No significant change
75th-25th percentile	2.4	2.2	1.9	2.2	1.7	1.9	1.5	2.0	2.2	2.0	No significant change
95th-5th percentile	7.2	5.9	5.3	5.9	5.7	5.9	5.1	4.4	5.1	5.2	NARROWING Significant
Median	4.0	4.1	3.3	3.6	3.3	3.0	3.3	2.9	3.2	3.3	DECREASING Significant

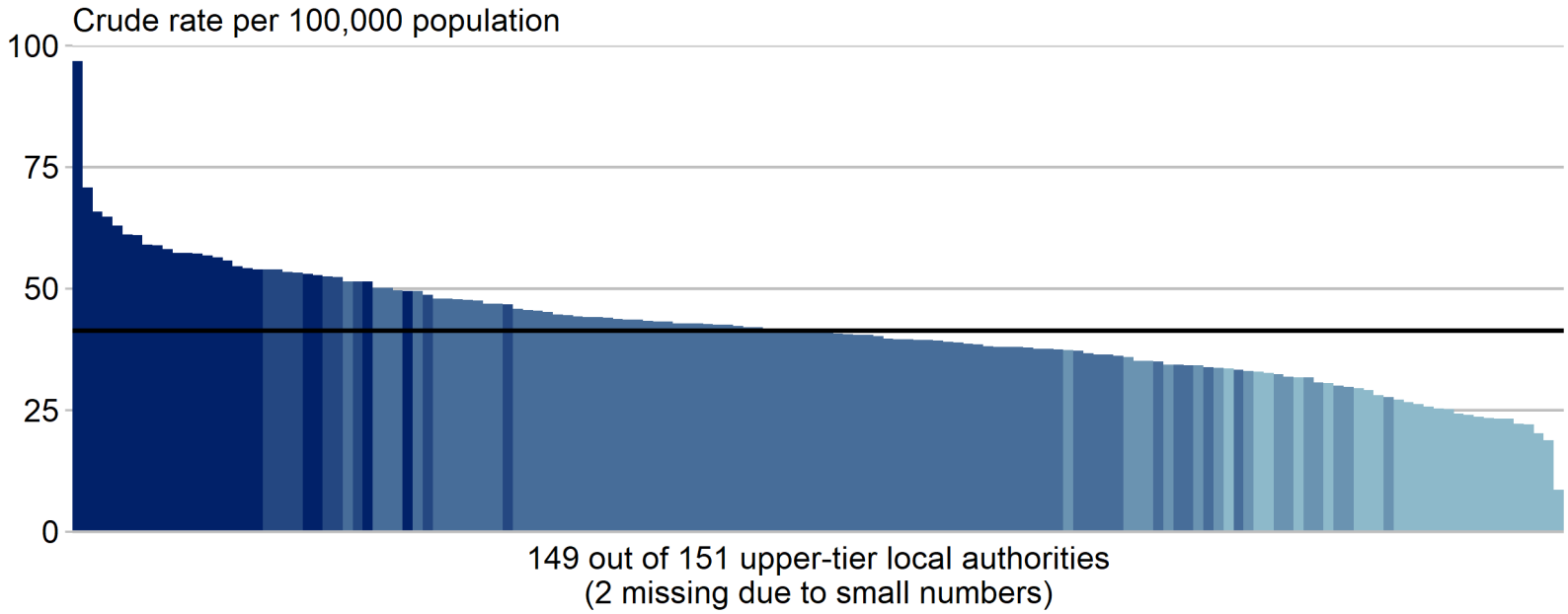
Map 7d: Variation in rate of new certifications of visual impairment (CVI) from all causes in people of all ages by upper-tier local authority (2019/20)

Crude rate per 100,000 population
Optimum value: Requires local interpretation

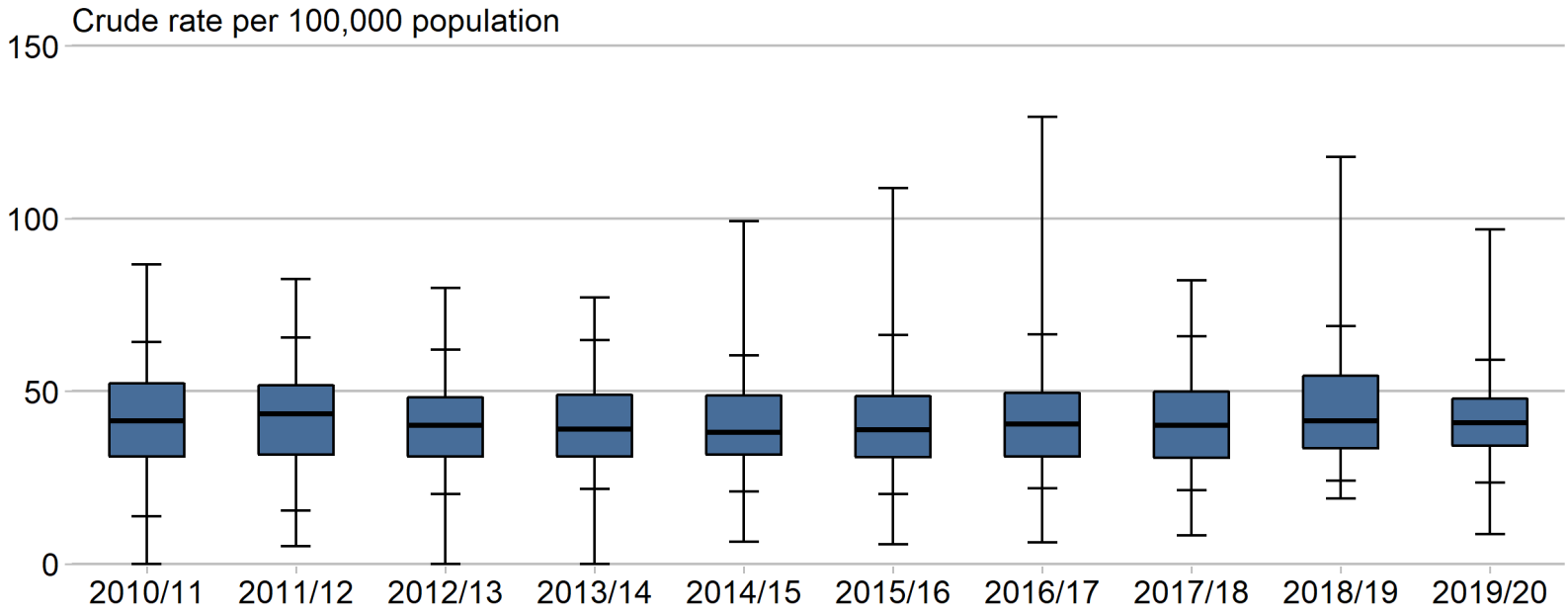




Column chart: Variation in rate of new certifications of visual impairment (CVI) from all causes in people of all ages by upper-tier local authority (2019/20)



Box plot time series: Variation in rate of new certifications of visual impairment (CVI) from all causes in people of all ages by upper-tier local authority (2010/11 to 2019/20)



Year	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	86.8	77.4	79.8	77.2	92.8	103.1	123.2	73.8	99.0	88.2	No significant change
75th-25th percentile	21.1	19.9	17.1	17.9	17.2	17.7	18.5	19.1	21.0	13.6	No significant change
95th-5th percentile	50.4	50.2	41.8	43.1	39.4	46.0	44.5	44.6	44.7	35.6	No significant change
Median	41.3	43.3	40.0	39.1	38.1	38.9	40.6	40.1	41.3	40.9	No significant change

Magnitude of Variation

Common factors contributing to variations observed:

As explained in the context certification category is a key factor taken into consideration by local authorities when assessing levels of support that may be deemed appropriate. However, both categories of certification are reported collectively therefore masking potential variations between sight impairment and severe sight impairment and the potential onward access to support services.

Crude rates of certification (sight impairment and severe sight impairment) are presented and as such differences in upper tier local authority age structures may contribute to the variations observed as the distribution of underlying conditions are age dependent.

The annual numbers of certifications (particularly cause-specific) by upper tier local authority are relatively small, making it difficult to demonstrate significant trends or important differences within regions or across England.

Map 7a: Variation in rate of new certifications of visual impairment (CVI) due to age related macular degeneration (AMD) in people aged 65 years and over by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 16.4 per 100,000 population to 174.8 per 100,000 population, which is a 10.7-fold difference between upper-tier local authorities.

The England value for 2019/20 was 105.4 per 100,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20. Both the 95th to 5th percentile gap and the 75th to 25th percentile gap narrowed significantly.

The median decreased significantly from 128.8 per 100,000 population in 2010/11 to 103.9 per 100,000 population in 2019/20.

During 2019/20, 10,916 people aged 65 years and over in England, were certified as being sight impaired or severely sight impaired due to both forms of AMD (wet and dry).[5] Sixty-four per cent (95/149) of upper tier local authorities with presented values had certification rates comparable to the national rate. Over the 10 year period reported, there has been a demonstrable decrease in the rate and variation of certification.

The decrease in crude rates of certification from this cause may be associated with routine availability of treatment with anti-VEGF drugs for the management of wet AMD;

but delays in certification whilst patients are undergoing active treatment may also introduce a lag or delays in time to certification.

There is currently no treatment for the dry form of AMD which is associated with varying rates of progression in both disease severity and vision impairment. Many of these patients are often under self-monitoring as health services are focused on delivering intervention for wet AMD; and they may experience potential delays in certification.

Map 7b: Variation in rate of new certifications of visual impairment (CVI) due to glaucoma in people aged 40 years and over by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 0.0 per 100,000 population to 31.3 per 100,000 population.

The England value for 2019/20 was 12.9 per 100,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20.

There were 3,631 people aged 40 years and over in England who were certified with glaucoma as the main cause for their impairment during 2019/20.[5]

Seventy-nine per cent (117/148) of upper tier local authorities with presented values had certification rates comparable to the national rate.

Whilst there was no significant change in the rate of certification or variation, differences in clinical practice and awareness of the purpose of certification, as well as differences in the uptake of an offer of certification by patients may be operating.

Map 7c: Variation in rate of new certifications of visual impairment (CVI) due to diabetic eye disease in people aged 12 years and over by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 0.0 per 100,000 population to 8.4 per 100,000 population.

The England value for 2019/20 was 2.9 per 100,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20.

The 95th to 5th percentile gap narrowed significantly.

The median decreased significantly from 4.0 per 100,000 population in 2010/11 to 3.3 per 100,000 population in 2019/20.

There were 1,416 people of 12 years and over who were certified with diabetic eye disease (diabetic retinopathy and diabetic maculopathy), as the main cause during 2019/20.[5]

Eighty-five per cent (97/114) of upper tier local authorities with presented values had certification rates comparable to the national rate.

Whilst little variation in the rates of certification was demonstrable, it is notable that data from 25% (37/151) of upper tier local authorities had data suppressed due to small numbers. It is also not entirely plausible that some areas had no new certifications attributable to diabetic eye disease as the primary cause. Both health service (clinical practice and awareness) and patient uptake of the offer of certification are likely to be key factors.

The overall decrease in crude rates of certification may reflect earlier detection of sight threatening diabetic eye disease through the national screening programme for onward referral for treatment, together with improvements in the overall systemic management of diabetes.

Patients with sight threatening and treatable disease may have certification delayed whilst under active management and may contribute to the overall decrease in certification rates. For example, patients undergoing retinal laser treatment for proliferative diabetic retinopathy and patients with centre involving diabetic maculopathy (previously untreatable but now routinely managed with intravitreal anti-VEGF therapy), may not be certified until their course of treatment has been completed.

A wide age group including children, young people, and adults of all ages are covered by this indicator. Children and young people that become eligible for certification may have alternative processes to access care and support services and may be under reported through the CVI route.

Map 7d: Variation in rate of new certifications of visual impairment (CVI) from all causes in people of all ages by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 8.7 per 100,000 population to 96.9 per 100,000 population, which is a 11.1-fold difference between upper-tier local authorities.

The England value for 2019/20 was 41.4 per 100,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20.

There were 23,285 people of all ages having new all cause certifications during 2019/20.[5]

Fifty-two per cent (77/149) of upper tier local authorities with presented values had certification rates comparable to the national rate.

There has been no change in the measures of variation over the ten year period 2010/11 to 2019/20. Most recently, during 2019/20 there was an 11-fold variation between upper tier local authorities, with 32% of areas with presented values (48/149) having rates which were significantly different to the national rate at the 99.8% level.

Factors likely to be contributing to the variations include:

- the contribution of less frequent causes or those emerging as significant determinants of vision impairment to the overall rates of certification for example inherited retinal disorders
- differences in distribution of demographic factors associated with eye health and risk of vision impairment; access and uptake of health services, and uptake of an offer of certification
- differences in clinical practice and awareness of the purpose of certification to provide a timely offer to certify
- delays in processing completed certifications for returns to the CVI data repository due to lack of administrative and clerical support

Options for action

Timely certification and support for all eligible patients:

Improve awareness and provision of accessible information on the purpose of certification and availability of local support services, for patients, people with sight impairment, their carers and health and social care professionals involved in their care.

Review service specifications and clinical protocols to ensure these include a discussion and offer of certification of vision impairment for eligible patients (all ages), as an integral part of their care pathway which is supported by the availability of an appropriate low vision aids assessment and access to an eye clinic liaison officer.

Data collection and management:

Continue to increase electronic returns of completed CVI forms to the CVI data repository. CVI forms provide the facility for containing coded data meeting data standards on demography, diagnosis of main and contributory causes of vision impairment, to support data collection and good data quality, especially when completed electronically. Currently a third of returns to the CVI data repository are paper based.

Electronic returns reduce the burden of data collection and management, reduce delays in processing and acting on the information, and support good information governance.

NHS hospital eye services should include the facility for electronic CVI completion in their development plans for electronic medical records.

Audit certification of visual impairment (CVI):
Regular CVI audit and review both locally and at integrated care system (ICS) level would provide assurance that eligible patients are identified and offered the opportunity for certification; as well as a means to monitor likely needs for ongoing support and care provided by social services, and trends in the distribution and causes of significant vision impairment.

The Portfolio of Indicators for Eye Health and Care (Indicator 12)[10] is recommended to audit CVI for adults where the primary cause of vision impairment is due to AMD, glaucoma and diabetic eye disease. It is also recommended for children by primary cause. These audits, based on data collected during routine clinical care, are a useful starting point and should not incur additional burden for data collection. The indicator calls for these to be audited by patient profile (age, gender and ethnicity) to identify any differences in identification and uptake of certification by these characteristics. Where possible these audits should also include registration outcomes. It is also recommended to use the NICE quality standard for adults with serious eye disorders.[6]

Resources

Department of Health and Social Care (2017) Certificate of Vision Impairment: Explanatory Notes for Consultant Ophthalmologists and Hospital Eye Clinic Staff in England [Accessed 30 Jan 2021]

Department of Health and Social Care The Care Act: Statutory Guidance Chapter 22: Sight Registers [Accessed 22 Jul 2021]

National Institute for Health and Care Excellence (2019) Serious eye disorders – quality statement 6: Certificate of vision impairment (NICE quality standard [QS180]) [Accessed 27 Oct 2020]

[10] Clinical Council for Eye Health Commissioning (2018) SAFE: Portfolio of Indicators for Eye Health and Care [Accessed 24 May 2021]

Blind and partially sighted registrations

Context

The purpose of registering as a blind or partially sighted person with a local authority is to access a range of social care support and services, although it is not the only means for accessing these.

Individuals who have agreed to be certified as being sight impaired or severely sight impaired, and have received a certificate of vision impairment (CVI) from an ophthalmologist, can then choose whether or not to be included in their local authority's register of blind or partially sighted people. The terminology used by the registers has not consistently been updated to align with that used for certification. The term ’blind’ used in the registers refers to severe sight impairment (certification), and the term ’partial sight’ employed by the registers refers to vision impairment (certification).

The Care Act 2014[1] deals with adult social care for anyone over the age of 18 years. Section 77 subsection 1 of this act requires all local authorities (or equivalent) across the UK to establish and maintain a register of blind and partially sighted adults who are ordinarily resident in its area.[2] The Children and Families Act 2014 (Part 3) requires local authorities to identify, assess and provide education, health and care support for children and young people with special educational needs or disabilities (including vision impairment).[3] There is a sub-group of young people between 18 to 25 years who will be entitled to support through both pieces of legislation. Each UK nation makes its own arrangements for its relationship with the certification process and for maintaining their registers. In England, aggregate data from these local registers are published every 3 years as national statistics by NHS Digital.[4]

Registration is neither automatic nor mandatory, so not everyone who has been certified as having vision impairment is included in a local authority register. Once a CVI has been issued it is sent to the local authority social services. The Department of Health recommends a period of 5 days to complete the CVI and send to local social services.[5] The individual is then contacted by social services and offered registration. Those that accept and register become eligible for certain concessions and locally determined support services. The Association of Directors of Adult Social Services (ADASS) in England recommends 10 days to contact the individual upon receipt of the CVI.[5]

[1] UK Government (2014) Care Act 2014 [Accessed 24 May 2021]
[2] UK Government (2014) Care Act 2014 Section 77: Registers of sight-impaired adults, disabled adults etc [Accessed 24 May 2021]
[3] UK Government (2014) Children and Families Act 2014 [Accessed 24 May 2021]
[4] NHS Digital (2021) Registered Blind and Partially Sighted People [Accessed 24 May 2021]
[5] Royal College of Ophthalmologists (2014) Certification and Registration - The Differences [Accessed 24 May 2021]

The most recent report from NHS Digital on Registered Blind and Partially Sighted People in England covered individuals registered with 151 Local Authorities for the period 1 April 2019 to 31 March 2020.[6] As at 31st March 2020, 276,690 people of all ages were registered as blind or partially sighted, amounting to 5 registrations per 1000 people in England. Fifty-nine per cent (163,820) of all people registered were aged 75 years and over.[6] Just over half (51%) or 140,390 people of all ages were registered as partially sighted. About 1 in 3 people on the register overall had an additional disability and this has remained broadly unchanged since the last collection (2016/2017). During 2019/20 there were 20,945 new registrations overall, of which 55% (11,515) were for partial sight.

If an adult holding a CVI chooses not to be registered, they are still able to access support from their local authority.[7] In 2019/20, there were 6,820 adults receiving long term support from social care and a primary support reason (PSR) of visual impairment, with a further 1,975 adults supported for dual impairment.[7] Long term social care is provided on an ongoing basis, ranging from high intensity provision such as nursing care to lower intensity support in the community. The PSR indicates the main reason a person is receiving support, so this figure may not include all adults with a visual impairment supported by their local authority. It is also not possible to identify adults with a PSR of visual or dual impairment on the blind and partial sight registers. As such these sources cannot be used individually or summed together to obtain a definitive list but may provide an indicative list of visually impaired persons known to a local authority to estimate local needs.

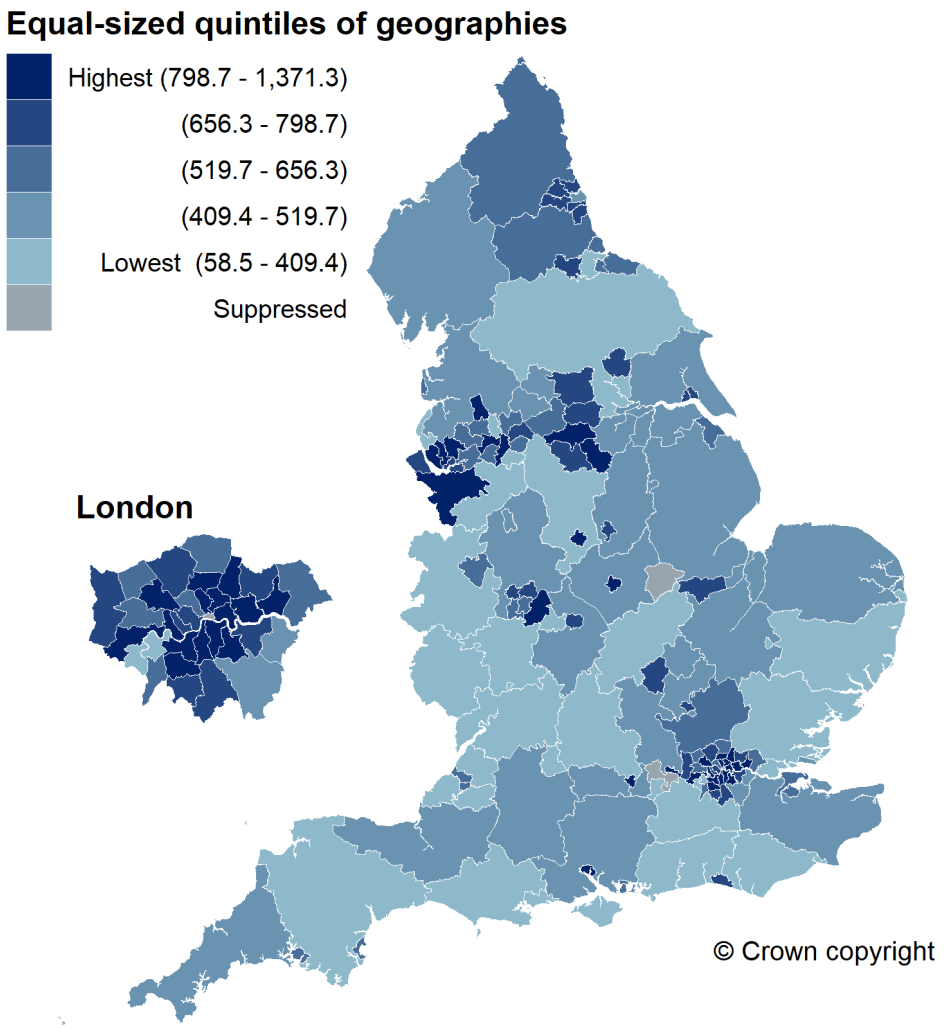
Similarly, children with vision impairment recognised as having special educational needs may access the appropriate support without being certified or registered.[4] As such, reports using certification and registration data alone are likely to underestimate the burden of significant vision impairment in children.

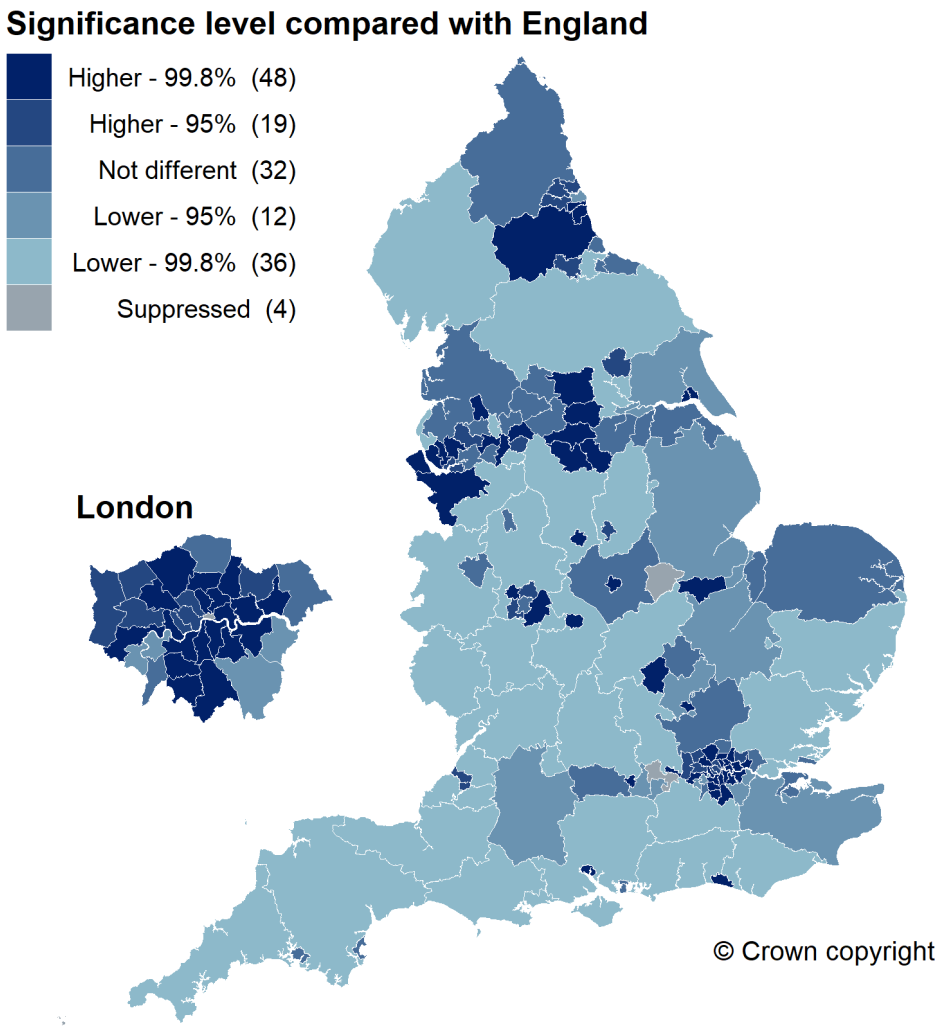
Ten per cent of adults certified with a vision impairment choose not to be registered, and this has remained relatively consistent since 2013, with minor fluctuations.[6,8] New registration rates for the age groups 65 to 74 years and 75 years and over are considered in more detail below. They are included in the Public Health Profiles as indictors for the Productive Healthy Ageing Profile.[9,10] Together these age groups account for 75% of all new registrations[6] whilst also covering the main causes of sight loss in adults.

[6] NHS Digital (2021) Registered Blind and Partially Sighted People, England 2019-20 [Accessed 24 May 2021]
[7] NHS Digital (2020) Adult Social Care Activity and Finance Report, England, 2019-20 [Accessed 24 May 2021]
[8] Public Health England Public health outcomes framework: Indicator E12d 2019/20 [Accessed 24 May 2021]
[9] Public Health England (2021) Public Health Profiles: Indicator ID 1179 [Accessed 22 Jul 2021]
[10] Public Health England (2021)Public Health Profiles: Indicator ID 1180 [Accessed 22 Jul 2021]

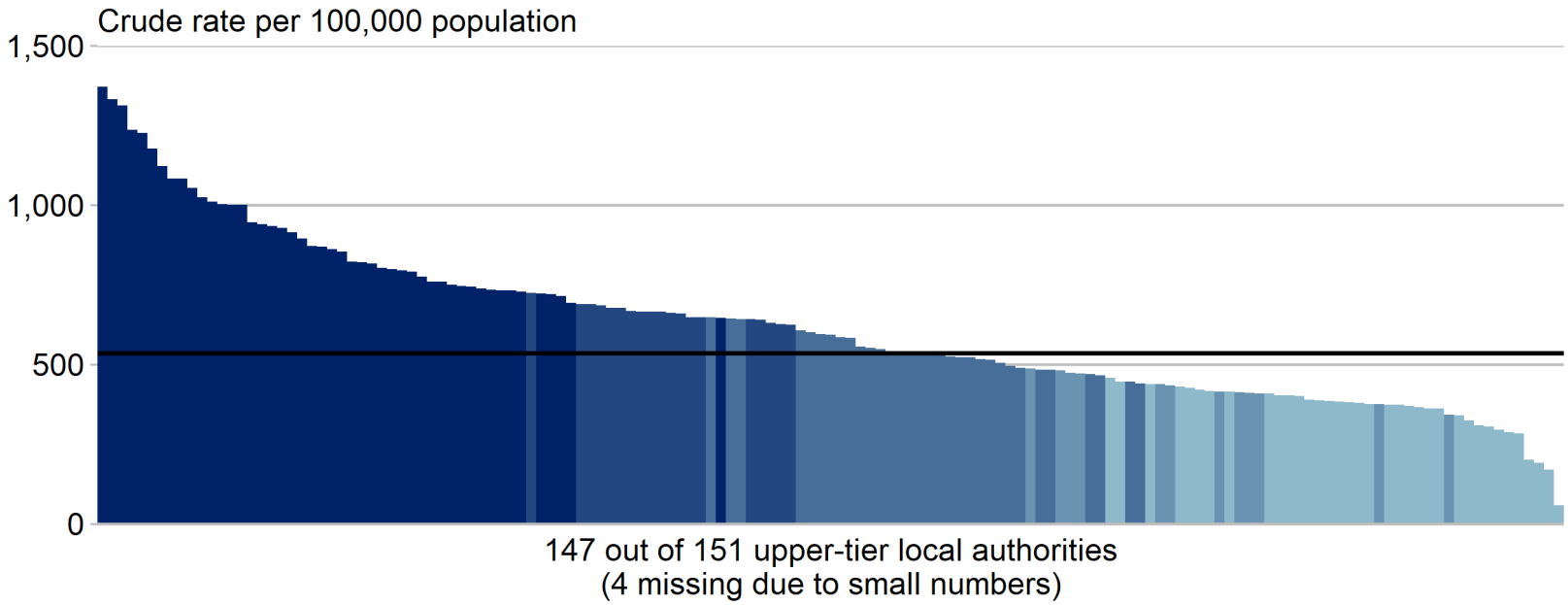
Map 8a: Variation in rate of registered blind or partially sighted people aged 65 to 74 years by upper-tier local authority (2019/20)

Crude rate per 100,000 population
Optimum Value: Requires Local Interpretation

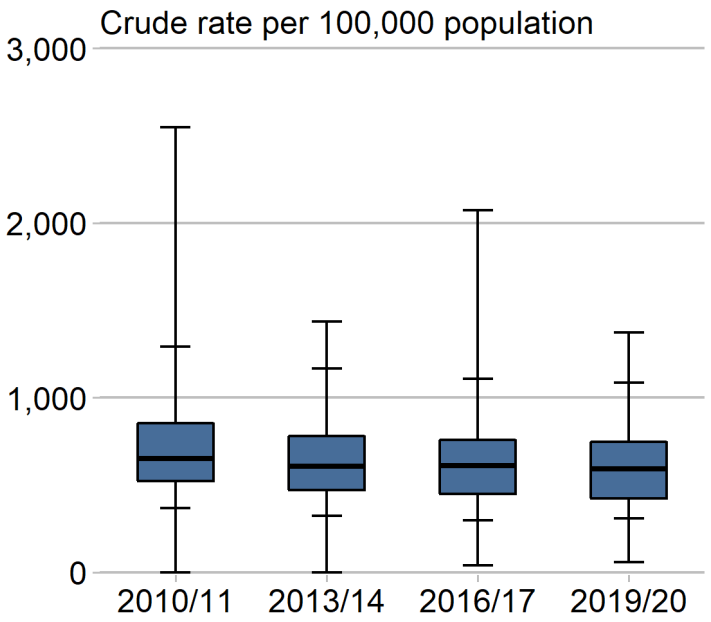




Column chart: Variation in rate of registered blind or partially sighted people aged 65 to 74 years by upper-tier local authority (2019/20)



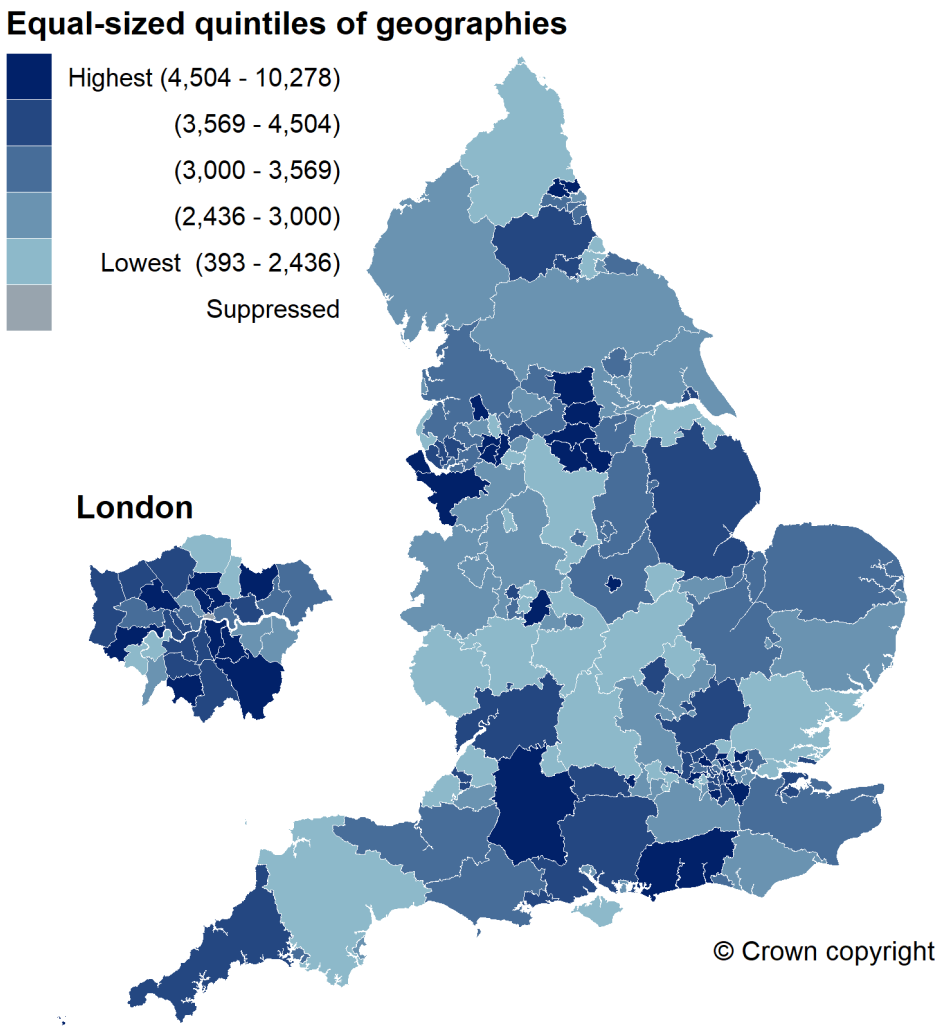
Box plot time series: Variation in rate of registered blind or partially sighted people aged 65 to 74 years by upper-tier local authority (2010/11 to 2019/20)

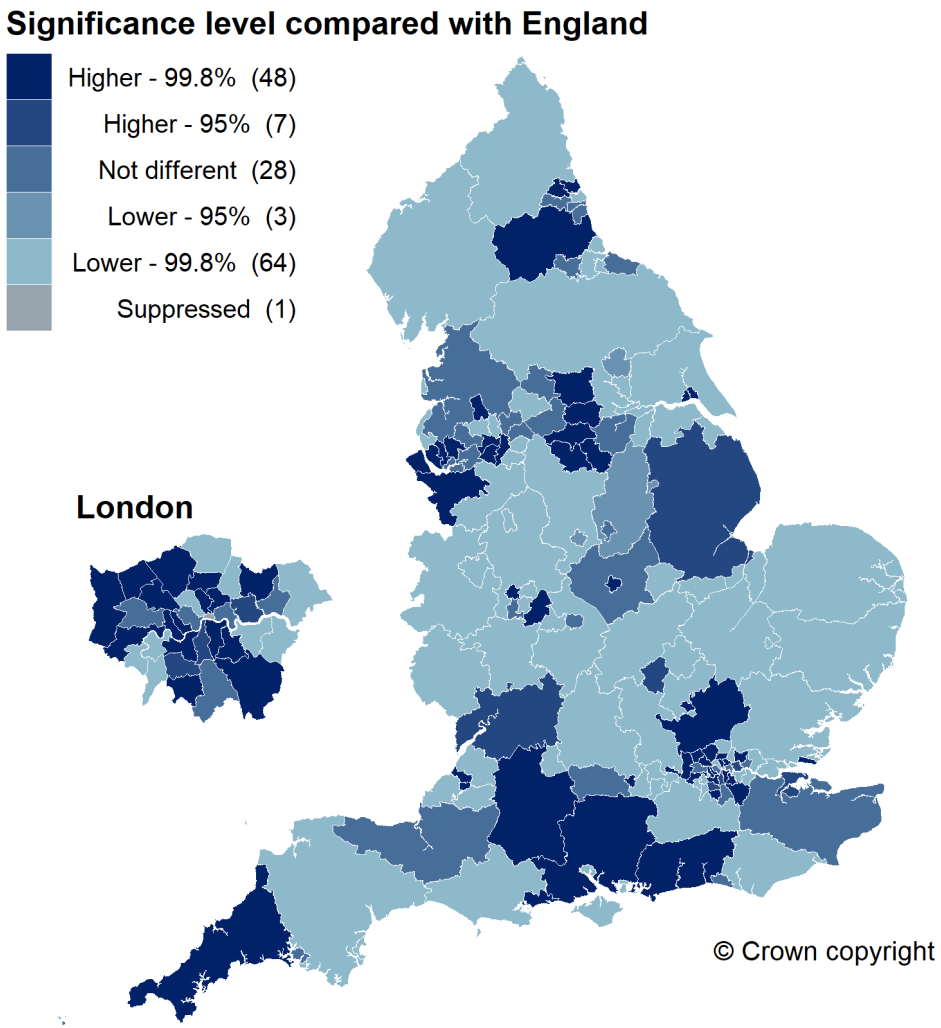


Year	2010/11	2013/14	2016/17	2019/20	
Max-Min (Range)	2,548.2	1,435.8	2,032.2	1,312.8	No significant change
75th-25th percentile	331.5	310.6	307.6	321.6	No significant change
95th-5th percentile	923.7	842.0	810.1	776.8	NARROWING Significant
Median	650.2	607.1	609.7	593.7	No significant change

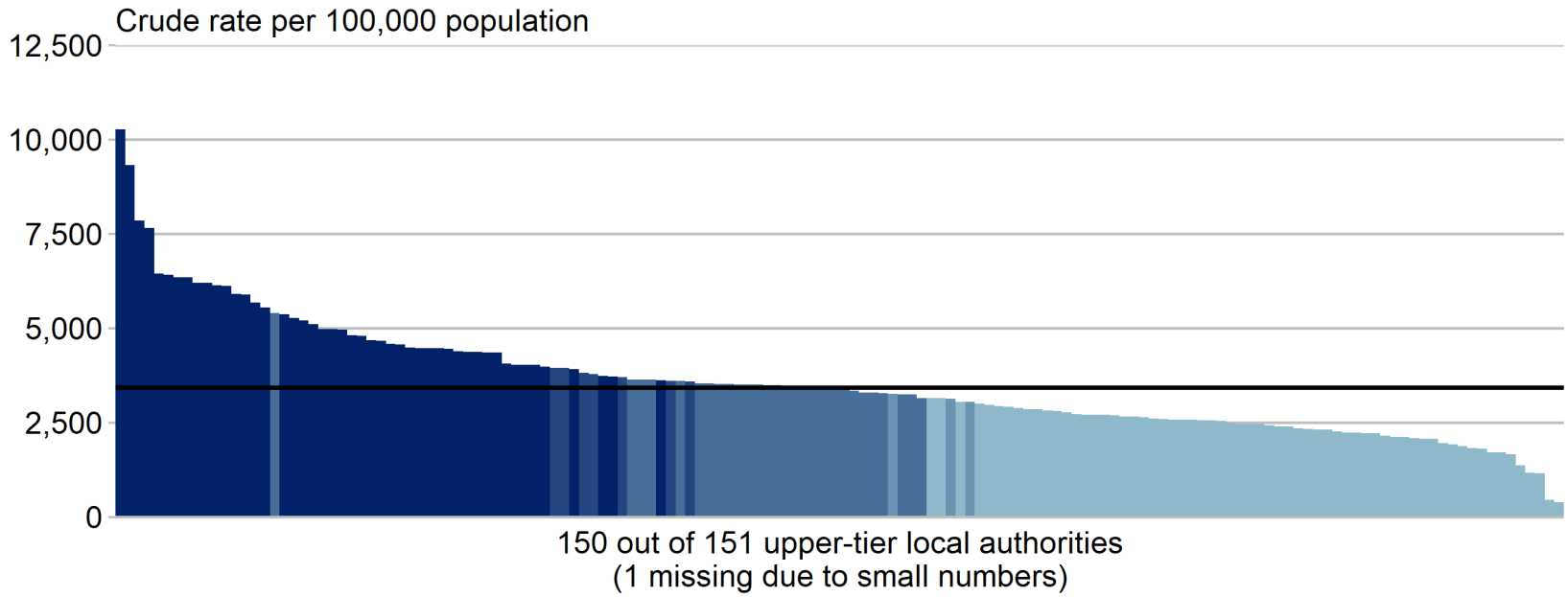
Map 8b: Variation in rate of registered blind or partially sighted people aged 75 years and over by upper-tier local authority (2019/20)

Crude rate per 100,000 population
Optimum Value: Requires Local Interpretation

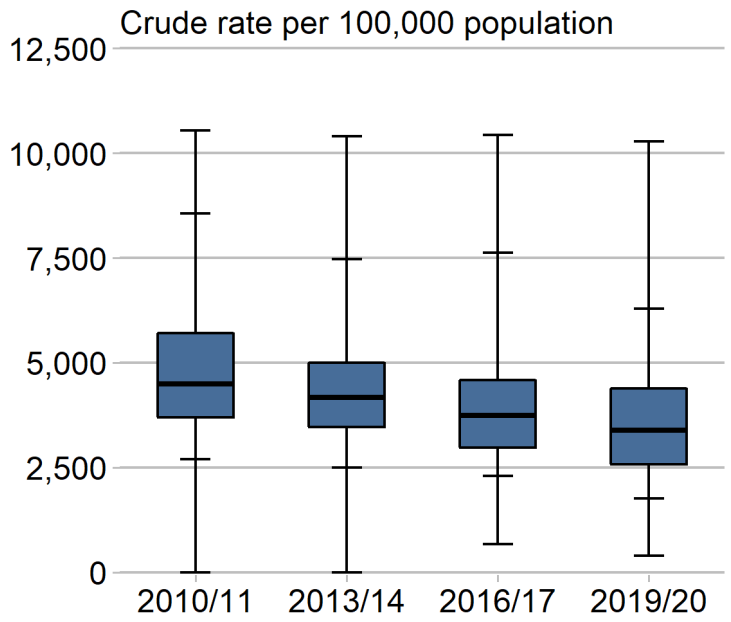




Column chart: Variation in rate of registered blind or partially sighted people aged 75 years and over by upper-tier local authority (2019/20)



Box plot time series: Variation in rate of registered blind or partially sighted people aged 75 years and over by upper-tier local authority (2010/11 to 2019/20)



Year	2010/11	2013/14	2016/17	2019/20	
Max-Min (Range)	10,533	10,403	9,759	9,885	No significant change
75th-25th percentile	1,995	1,539	1,615	1,809	No significant change
95th-5th percentile	5,865	4,972	5,331	4,530	No significant change
Median	4,499	4,176	3,736	3,396	DECREASING Significant

Magnitude of Variation

Common factors contributing to variations observed:

- capacity pressures in social services / local authorities. This can impact on the time taken to process the receipt of certification of vision impairment information into an offer to register and to complete the local registration process
- local priorities for maintaining and updating the register
- differences in uptake of registration following certification of vision impairment by demographic characteristics
- differences in local authority population profiles

Map EyeSL5: Variation in rate of registered blind or partially sighted people aged 65 to 74 years by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 58.5 per 100,000 population to 1,371.3 per 100,000 population, which is a 23.4-fold difference between upper-tier local authorities.

The England value for 2019/20 was 535.7 per 100,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20.

The 95th to 5th percentile gap narrowed significantly.

There were 2,305 new registrations of blind and partially sighted people age 65 to 74 years, during 2019/20 representing 11% of all new registrations.[6]

Although there was some narrowing of the variation, there was no significant change in the rate of registration in this age group between 2010/11 to 2019/20. Most recently in 2019/20, 57% (84/147) of upper tier local authorities with presented values had registration rates significantly different to the national rate at the 99.8% level.

Map EyeSL6: Variation in rate of registered blind or partially sighted people aged 75 years and over by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 393 per 100,000 population to 10,278 per 100,000 population, which is a 26.2-fold difference between upper-tier local authorities.

The England value for 2019/20 was 3,429 per 100,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20.

There was no significant change in any of the three variation measures between 2010/11 and 2019/20.

The median decreased significantly from 4,499 per 100,000 population in 2010/11 to 3,396 per 100,000 population in 2019/20.

There were 13,415 new registrations of blind and partially sighted people aged 75 years and over during 2019/20, with this age group accounting for 64% of all new registrations.[6]

Most of the variation between the upper tier local authorities was at the extremes of the distribution of rates of new registrations, with 75% (112/150) of upper tier local authorities with presented values having rates significantly different to the national rate at the 99.8% level.

Over the 10 year period 2010/11 to 2019/20, the median rate of new registrations in this age group decreased without any significant change in the level of variation.

Options for action

Registration data and the services associated with it are held and provided by health and social care respectively. Until such time as health and social care are integrated, recommendations from a health service perspective rather than options for action are put forward to discuss with colleagues in social care and local authorities.

Registration is a means to access holistic support services. Such services enable sight impaired persons of all ages to maintain independence and inclusion in society, tailored to their needs for example by age. Registration data, in combination with other data sources, can serve to estimate local needs, and inform planning and provision of appropriate more holistic support and services for sight impaired people. Wider comorbidities such as frailty and mental health should be taken into account to ensure they are included in relevant rehabilitation and prevention programmes (for example mobility and falls prevention).

Registration uptake can be increased by improving awareness and provision of accessible information on the availability of local support services for patients, people with sight impairment, their carers and health and social care professionals involved in their care.

Engage with eye clinic liaison officers to provide continuity between the health and social care services for people registered as blind or partially sighted

Review service quality: people with sight impairment should have equitable access to:

- timely assessment and review following registration
- consistent levels of support and services based on identified need and agreed outcomes

Resources

Department of Health and Social Care (2017) Certificate of Vision Impairment: Explanatory Notes for Consultant Ophthalmologists and Hospital Eye Clinic Staff in England [Accessed 30 Jan 2021]

Department of Health and Social Care The Care Act: Statutory Guidance Chapter 22: Sight Registers [Accessed 22 Jul 2021]

Population at risk of poor eye health

Social isolation and loneliness

Context

Social isolation and loneliness lead to significant adverse health consequences. Loneliness is a known risk factor for comorbid chronic illnesses,[1] greater risk of cognitive decline and dementia,[2] falls, and mortality.[3] Visual impairment may predispose individuals to social isolation and loneliness in a number of ways; good visual acuity is often required for many social and functional activities such as driving, exercising, using a telephone or watching television. Reduced mobility and functional limitations (both potential consequences of visual impairment) can directly result in social isolation by reducing access to social networks.[4]

Risk of isolation and loneliness increases with age.[5] Females are particularly at risk given they live longer than men on average[6] and often outlive male spouses[7] and being widowed, divorced or unmarried is a strong predictor of social isolation.[8] Vision loss has been indirectly linked to social isolation and is bidirectional. Visual impairment is associated with reduced social interaction[9] and decreased social network size[10] and inversely social isolation is also related to poorer eye health.[11] Consequently, people with poor vision are at risk of reduced access to healthcare and subsequent depreciating vision and poorer health outcomes. This is particularly pertinent in light of the recent coronavirus (COVID-19) pandemic.

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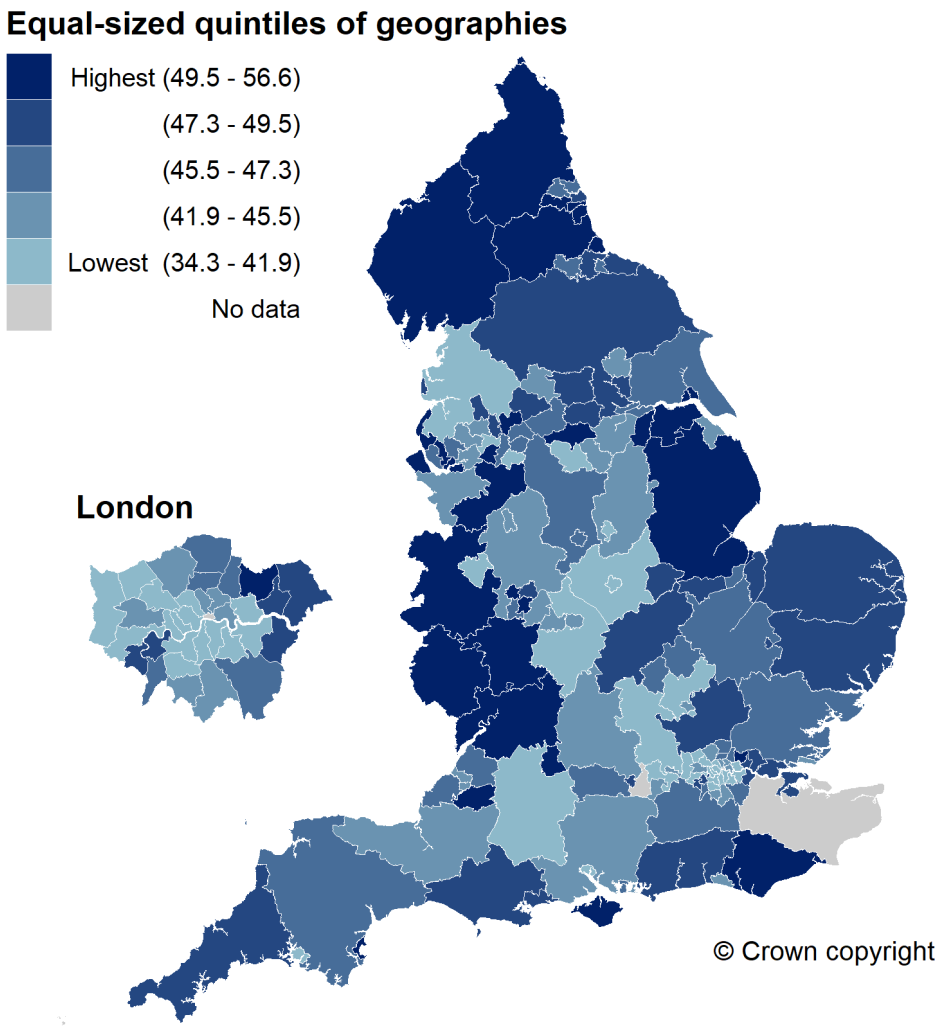
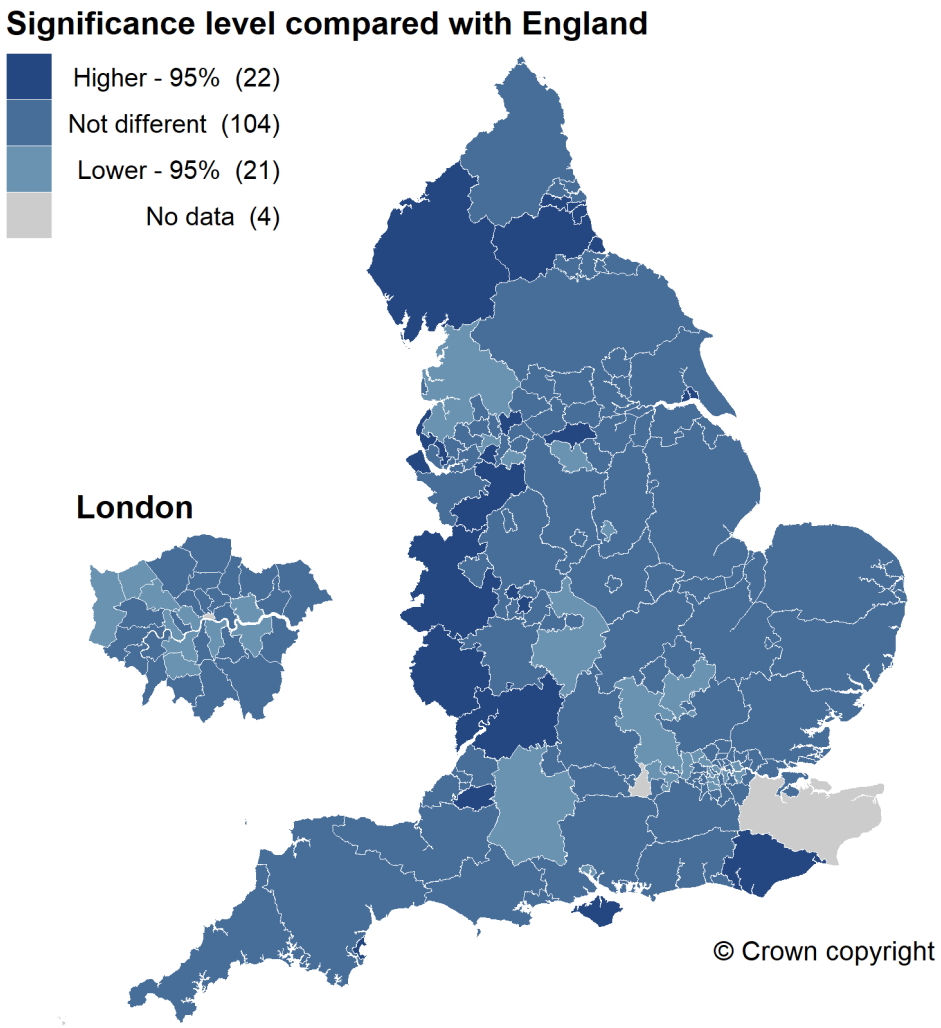
[1] Valtorta NK, Kanaan M, Gilbody S, and others (2016) Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies Heart 2016 Apr;102(13):1009-1016 [Accessed 17 Jun 2021]
[2] Cacioppo JT and Cacioppo S (2014) Older adults reporting social isolation or loneliness show poorer cognitive function 4 years later Evidence-based nursing. 2014 Jun;17(2):59-60 [Accessed 17 Jun 2021]
[3] Holt-Lunstad J, Smith TB, Baker M and others (2015) Loneliness and social isolation as risk factors for mortality: a meta-analytic review Perspect Psychol Sci. 2015 Mar;10(2):227-37 [Accessed 16 Jun 2021]
[4] McLaughlin D, Vagenas D, Pachana NA, and others (2010) Gender Differences in Social Network Size and Satisfaction in Adults in Their 70s Journal of Health Psychology. 2010;15(5):671-679 [Accessed 10 May 2021]
[5] Davidson S, Rossall P (2015) Loneliness in Later Life Evidence Review London: Age UK [Accessed 17 Jun 2021]
[6] Thornton J (2019) WHO report shows that women outlive men worldwide BMJ 2019 Apr;5:365-1631 [Accessed 17 Jun 2021]
[7] Compton J and Pollak R (2021) The Life Expectancy of Older Couples And Surviving Spouses PLoS ONE 2021;16(5): e0250564 [Accessed 17 Jun 2021]
[8] Cudjoe TKM, Roth DL, Szanton SL, and others (2020) The Epidemiology of Social Isolation: National Health and Aging Trends Study J Gerontol B Psychol Sci Soc Sci 2020 Jan;75(1):107-113 [Accessed 17 Jun 2021]
[9] Crews JE and Campbell VA (2004) Vision Impairment and Hearing Loss Among Community-Dwelling Older Americans: Implications for Health and Functioning Am J Public Health 2004 May; 94(5):823-9 [Accessed 10 May 2021]
[10] Wang SW and Boerner K (2008) Staying connected: re-establishing social relationships following vision loss Clin Rehabil 2008 Sep; 22(9):816-24 [Accessed 10 May 2021]
[11] Leveziel N, Marillet S, Braithwaite T and others (2020) Self-reported visual difficulties in Europe and related factors: a European population-based cross-sectional survey Acta Ophthalmol. 2020 Oct [Accessed 02 Jun 2021]

Developing a better understanding of the association between different measures of visual impairment and social isolation and loneliness will enhance our ability to screen for and act upon social isolation and loneliness risk factors.

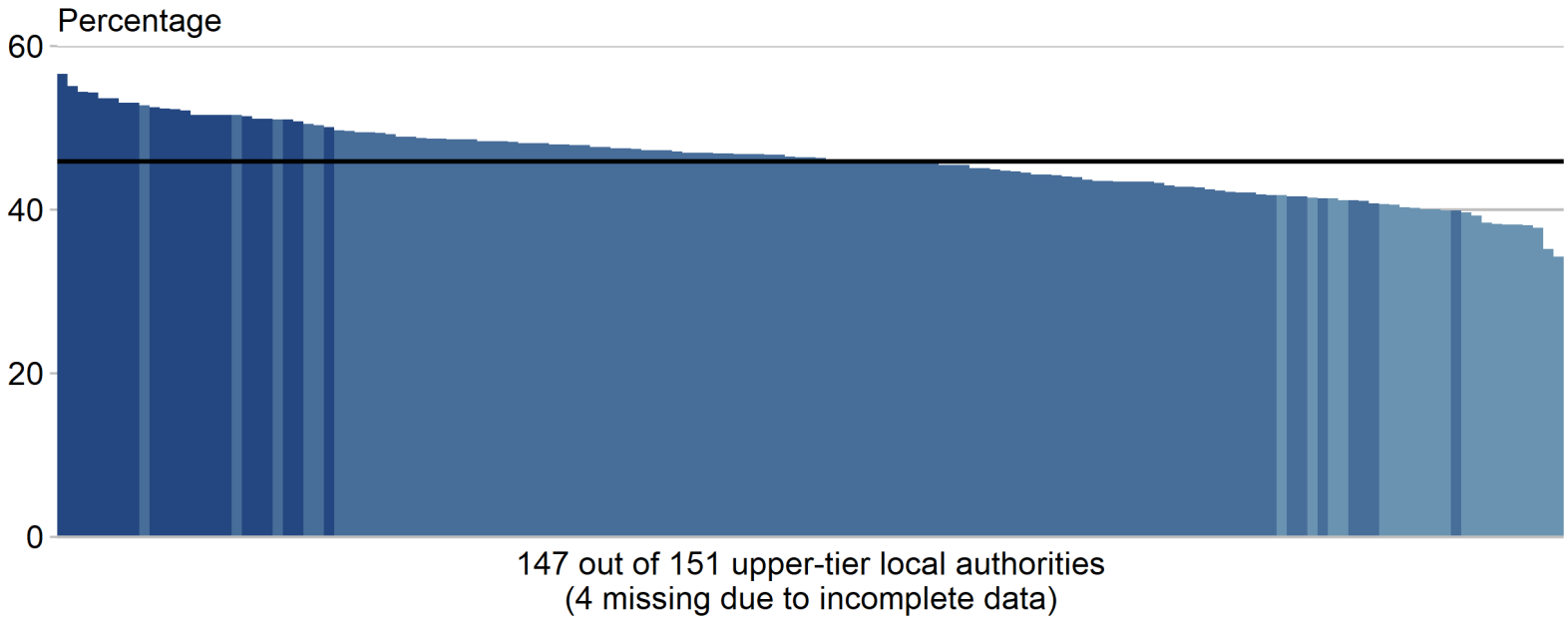
Map 9: Variation in percentage of social care users aged 18 years and over who have as much social contact as they would like by upper-tier local authority (2019/20)

Optimum value: High

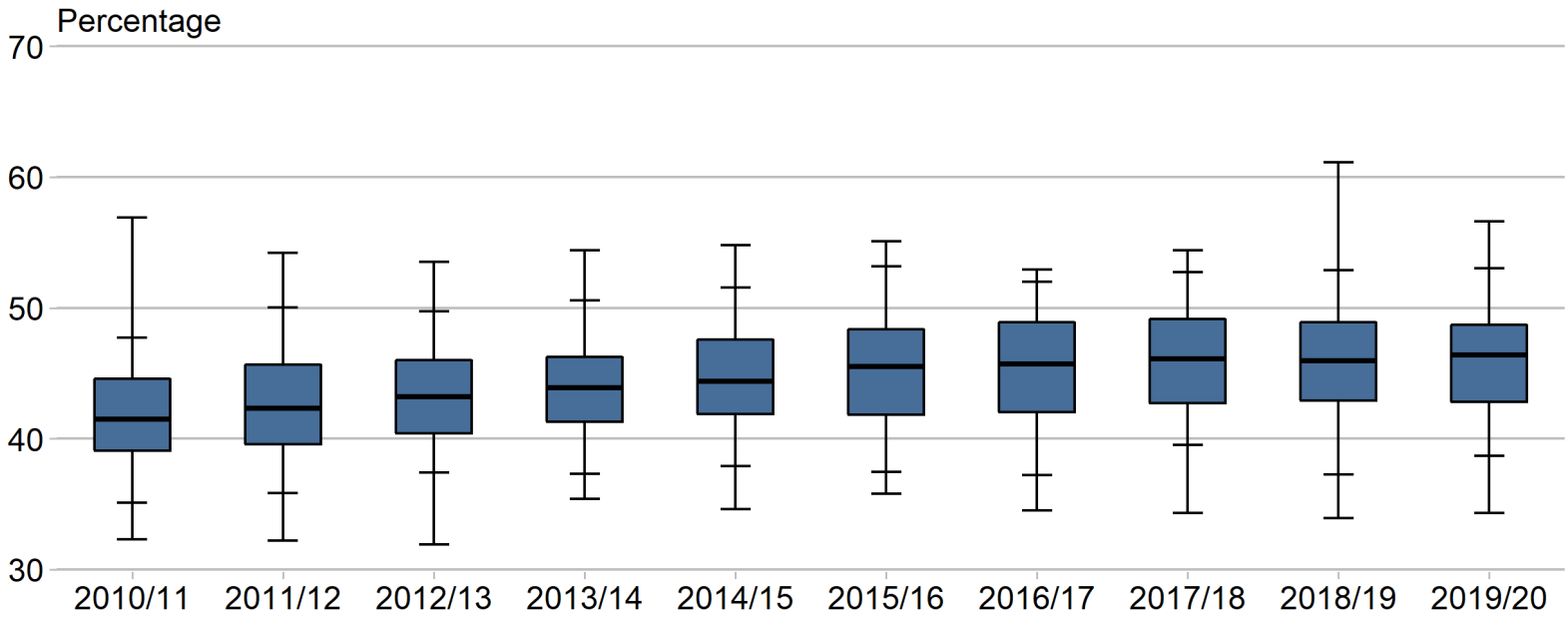




Column chart: Variation in percentage of social care users aged 18 years and over who have as much social contact as they would like by upper-tier local authority (2019/20)



Box plot time series: Variation in percentage of social care users aged 18 years and over who have as much social contact as they would like by upper-tier local authority (2010/11 to 2019/20)



Year	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	24.6	22.0	21.6	19.0	20.2	19.3	18.4	20.1	27.2	22.3	No significant change
75th-25th percentile	5.5	6.1	5.6	5.0	5.7	6.5	6.9	6.5	6.0	5.9	No significant change
95th-5th percentile	12.6	14.2	12.3	13.3	13.7	15.7	14.8	13.2	15.6	14.3	No significant change
Median	41.5	42.3	43.2	43.9	44.4	45.5	45.7	46.1	46.0	46.4	INCREASING Significant

Magnitude of Variation

Map 9: Variation in percentage of social care users aged 18 years and over who have as much social contact as they would like by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 34.3% to 56.6%, which is a 1.7-fold difference between upper-tier local authorities.

The England value for 2019/20 was 45.9%.

The box plot shows the distribution of upper-tier local authority values for the period 2010/11 to 2019/20.

The median increased significantly from 41.5% in 2010/11 to 46.4% in 2019/20.

It is important to note that this data is related to social care users, as opposed to the general population as a whole. Interpretation is therefore limited.

Variation in social isolation is widely influenced by age, geographical restriction, community resources and poorer health and vision. The majority of these factors are in themselves influenced by socioeconomics, which therefore plays a key role in social isolation. In particular, access to digital resources vary by age and wealth, with older adults being less adept at using the internet and digital inclusion resources. Research highlights that people who do not use the internet have higher rates of feeling isolated.[12]

Options for action

It is important to identify populations at risk of social isolation and ensure integrated community support services can be offered to people most at risk. Education regarding the availability of community resources is paramount for increasing the uptake of such interventions.

The National Institute for Health and Care Excellence (NICE) has published quality standards[13] and guidance[14] on how to identify those at risk of reduced social interaction and the interventions that can be used to overcome social isolation and loneliness in those aged 65 or older.

[12] Age UK (2020) Loneliness and digital inclusion [Accessed 10 May 2021]
[13] National Institute for Health and Care Excellence (2016) Mental wellbeing and independence for older people – Quality statement 3: Social participation (NICE quality standard [QS137]) [Accessed 10 May 2021]
[14] National Institute for Health and Care Excellence (2015) Older people: independence and mental wellbeing (NICE guideline [NG32]) [Accessed 10 May 2021]

Interventions include activities to build social participation such as:

- singing programmes
- creative arts activities
- intergenerational activities such as young people providing older people with support to use new technologies
- tailored community-based physical activity programmes

Having access to the internet and the ability to use digital services can help older adults to stay socially connected. Age UK has developed digital inclusion projects[15,16] that include one-to-one support, classroom-based services and larger community awareness sessions in order to increase the digital capabilities of older adults.

Blind and partially sighted individuals are at much higher risk of social isolation and loneliness than the general population of older adults, as visual impairment may reduce access to social networks, social and functional activities. Modifying existing programmes for individuals with vision impairments and limited social networks is an important consideration.

Recommendations from the Royal National Institute of Blind People (RNIB) for managing social isolation and loneliness risks in blind and partially sighted individuals include:

- early interventions to address the needs of blind or partially sighted individuals
- visual impairment rehabilitation
- community care assessment of eligibility for social care services

Resources

Age UK (2020) Loneliness and digital inclusion [Accessed 10 May 2021]

National Institute for Health and Care Excellence (2016) Mental wellbeing and independence for older people – Quality statement 3: Social participation (NICE quality standard [QS137]) [Accessed 10 May 2021]

National Institute for Health and Care Excellence (2015) Older people: independence and mental wellbeing (NICE guideline [NG32]) [Accessed 10 May 2021]

Royal National Institute of Blind People (2013) Facing blindness alone [Accessed 10 May 2021]

[15] Time to Shine What we've Learned - Digital Angels [Accessed 15 Jun 2021]
[16] Age UK Programmes & innovation One Digital [Accessed 15 Jun 2021]

Falls

Context

Falls are a significant cause of morbidity and mortality in older adults. Falls related injuries and admissions are estimated to cost the NHS more than £2.3 billion per annum.[1] Postural stability and balance are primarily dependent on good visual and vestibular sensory input. Increasing age can result in a decline of these inputs as well as key contributing factors such as proprioception, muscle strength and reaction times.

The increased risk of falls in older adults is thought to be multifactorial. Factors include:

- increasing age
- previous falls
- gait disorder/postural stability
- foot health
- continence
- dependency in activities of daily living
- visual impairment
- hearing impairment
- less social activity outside of the home
- neurological and cardiovascular disease
- medications
- environmental factors

Impairments in any major component of vision, such as visual field, acuity, contrast sensitivity and stereopsis can contribute to increased incidences of falls. Age related macular degeneration (AMD) primarily affects central vision. Symptoms include distortion of lines and difficulty recognising faces. Peripheral vision is relatively unaffected in this disease. Despite this, patients with AMD have a significantly increased risk of falls.[2] Studies exploring the underlying pathology for increased falls risk in patients with AMD suggest that reduced contrast sensitivity in particular was associated with postural instability and gait disturbance.[3] Balance training has shown promising results in reducing falls risk in the general population[4] and has shown improvements in visuomotor function in patients with AMD.[5]

[1] National Institute for Health and Care Excellence (2013) Falls in older people: assessing risk and prevention - Introduction (NICE clinical guideline [CG161]) [Accessed 11 May 2021]
[2] Szabo SM, Janssen PA, Khan K and others (2008) Older Women with Age-Related Macular Degeneration Have a Greater Risk of Falls: A Physiological Profile Assessment Study J Am Geriatr Soc. 2008; 56: 800–807 [Accessed 11 May 2021]
[3] Wood JM, Lacherez PF, Black AA and others (2009) Postural stability and gait among older adults with age-related maculopathy Invest Ophthalmol Vis Sci. 2009; 50: 482–487 [Accessed 02 Jun 2021]
[4] Gillespie LD, Robertson MC, Gillespie WJ and others (2012) Interventions for preventing falls in elderly people Cochrane Database Syst Rev. 2012 Sep;2012(9) [Accessed 02 Jun 2021]
[5] Radvay X, Duhoux S, Koenig-Supiot F and others (2007) Balance training and visual rehabilitation of age-related macular degeneration patients J Vestib Res. 2007; 17: 183–193 [Accessed 11 May 2021]

Glaucoma causes visual field losses, which are a well established cause of falls. Visual field loss diminishes visual input, with the consequence of decreased postural stability and increased risk of colliding with objects obstructed from the patients field of view. However, even patients with mild field defects were shown to be more than three times more likely to have fallen over a 1 year period.[6]

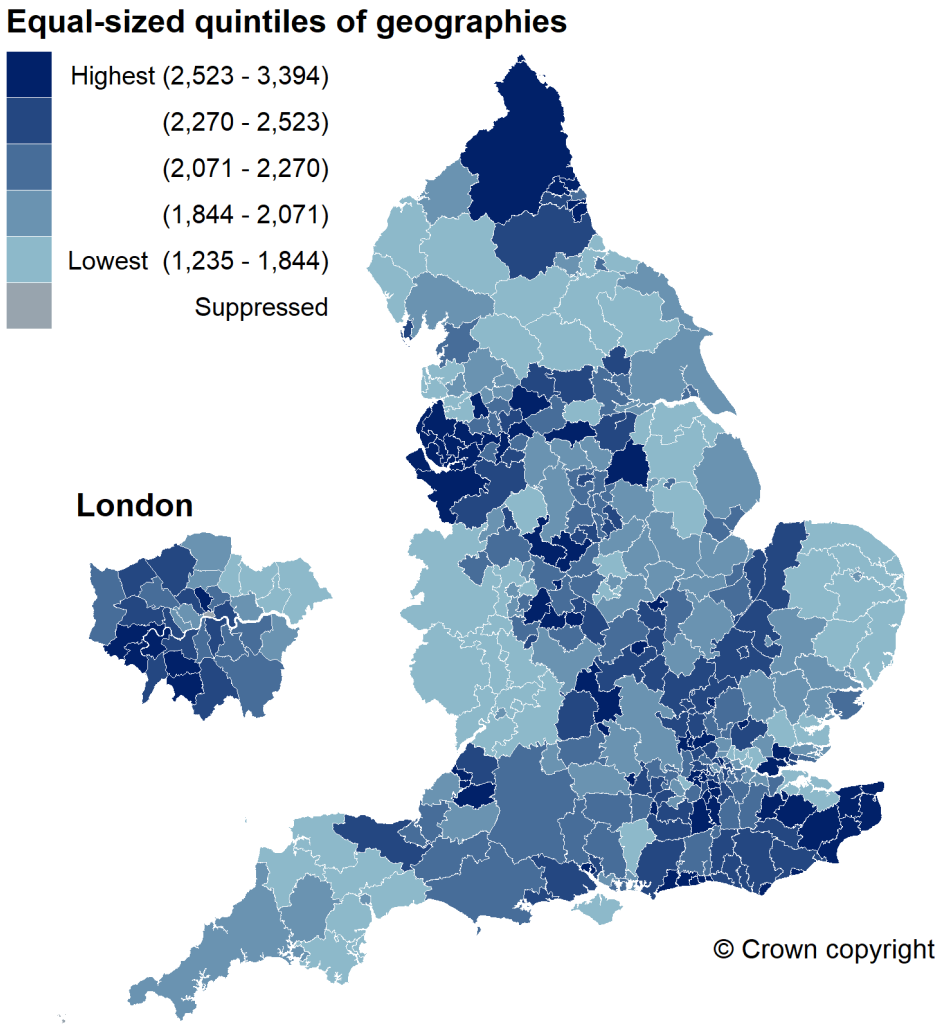
Cataracts are the commonest reversible cause of visual impairment in the elderly.[7] Cataract surgery has been shown to reduce the risk of falls.[8] Additionally, patients who wait more than 6 months for cataract surgery may experience an increased rate of falls and a reduced quality of life during the waiting period.[9]

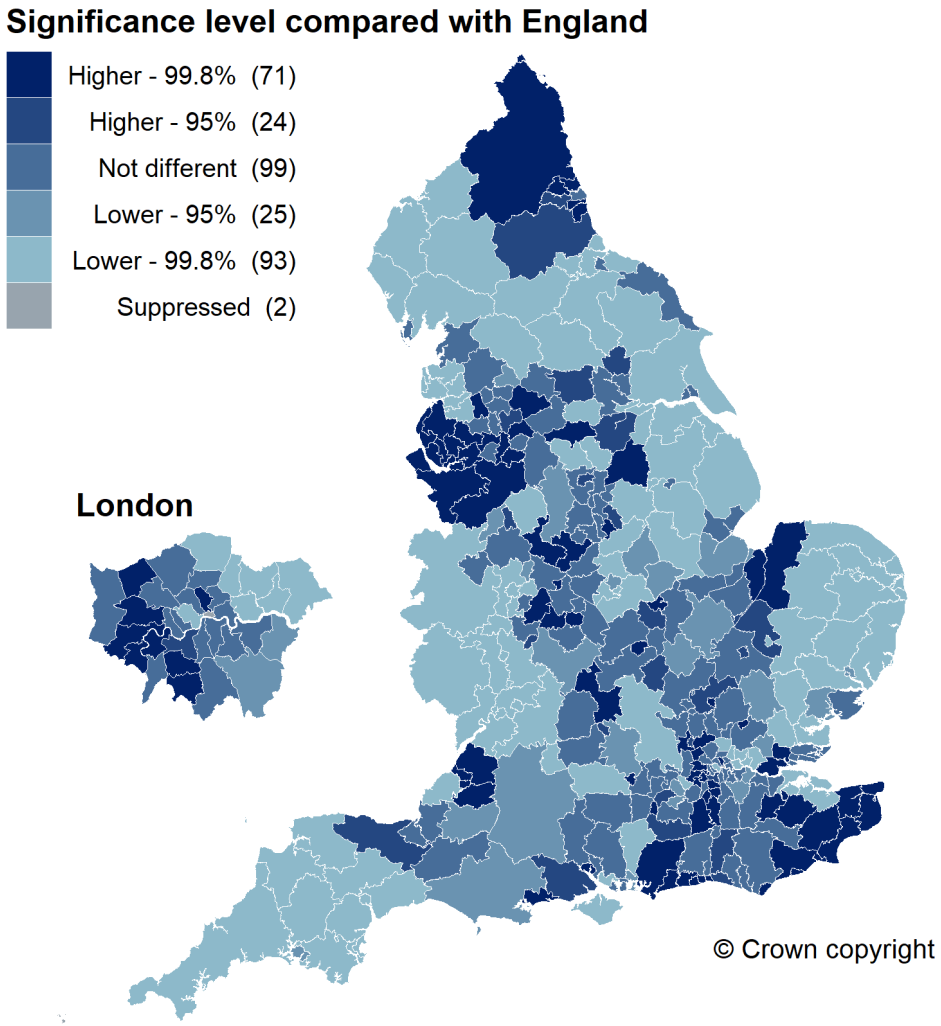
The relationship between falls and visual impairment is well established. Identifying patients with visual impairment and eye diseases who are at risk of falls, and developing appropriate interventions to mitigate these risks, is essential in mitigating the social and economic impact of falls. Similarly, for patients who have fallen, checking their vision is an important part of a comprehensive health examination. This is increasingly important in older adults where many causes of visual impairment are reversible. Older adults who take part in regular physical activity experience less falls when wearing single vision glasses than less active groups wearing single vision glasses.[10,11] Wearers of bifocals and progressive addition lens were twice as likely to fall and are at higher risk of 'edge of step' accidents compared to single vision lens wearers.[10]

[6] Haymes SA, Leblanc RP, Nicolela MT and others (2007) Risk of falls and motor vehicle collisions in glaucoma Invest Ophthalmol Vis Sci. 2007; 48:1149–1155 [Accessed 11 May 2021]
[7] Vision Loss Expert Group of the Global Burden of Disease Study (2020) Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study The Lancet Global health, 9 (2021), pp. e144-e160 [Accessed 24 Jun 2021]
[8] Harwood RH, Foss AJ, Osborn F and others (2005) Falls and health status in elderly women following first eye cataract surgery: a randomised controlled trial Br J Ophthalmol. 2005;89:53–59 [Accessed 11 May 2021]
[9] Hodge W, Horsley T, Albiani D and others (2007) The consequences of waiting for cataract surgery: A systematic review CMAJ. 2007;176:1285–1290 [Accessed 11 May 2021]
[10] College of optometrists (2020) Vision and falls - The importance of vision in preventing falls [Accessed 22 Jun 2021]
[11] Haran MJ, Cameron ID, Ivers RQ and others (2010) Effect on falls of providing single lens distance vision glasses to multifocal glasses wearers: VISIBLE randomised controlled trial. BMJ. 2010 May 25;340:c2265. [Accessed 22 Jun 2021]

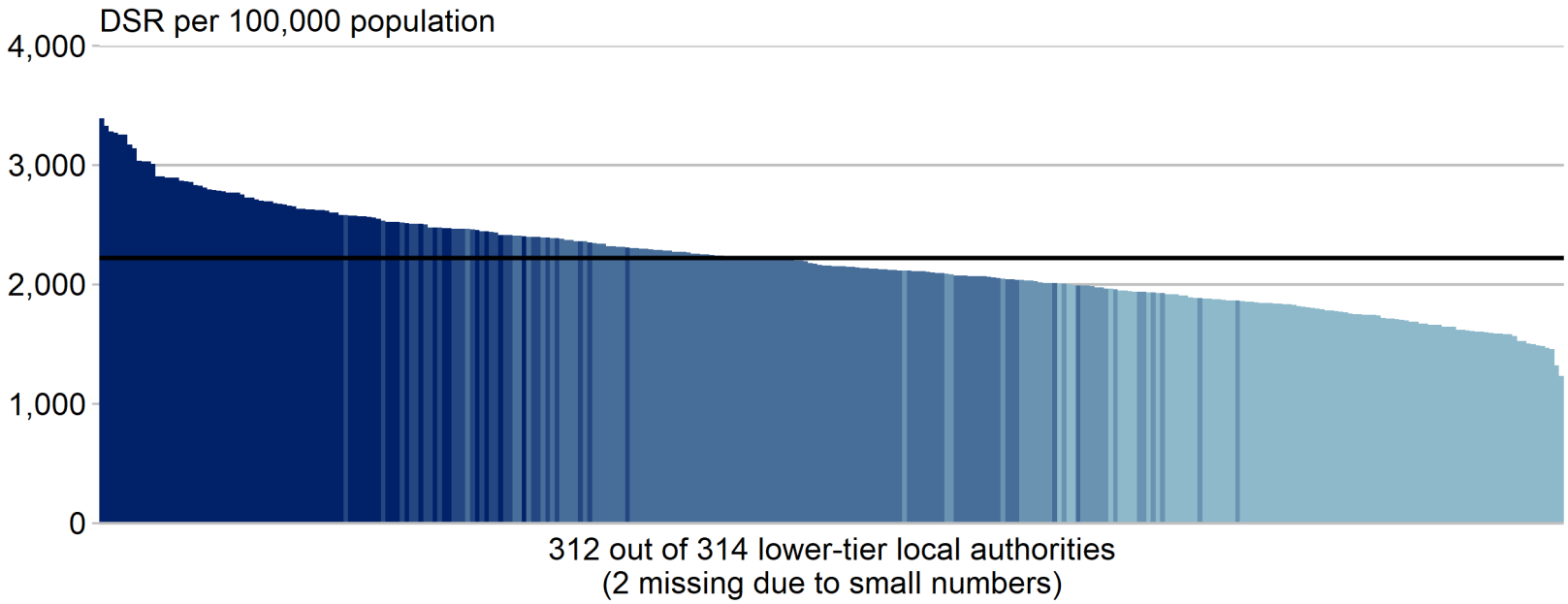
Map 10: Variation in rate of emergency admissions to hospital due to falls in people aged 65 years and over by lower-tier local authority (2019/20)

Directly standardised rate per 100,000 population
Optimum Value: Low

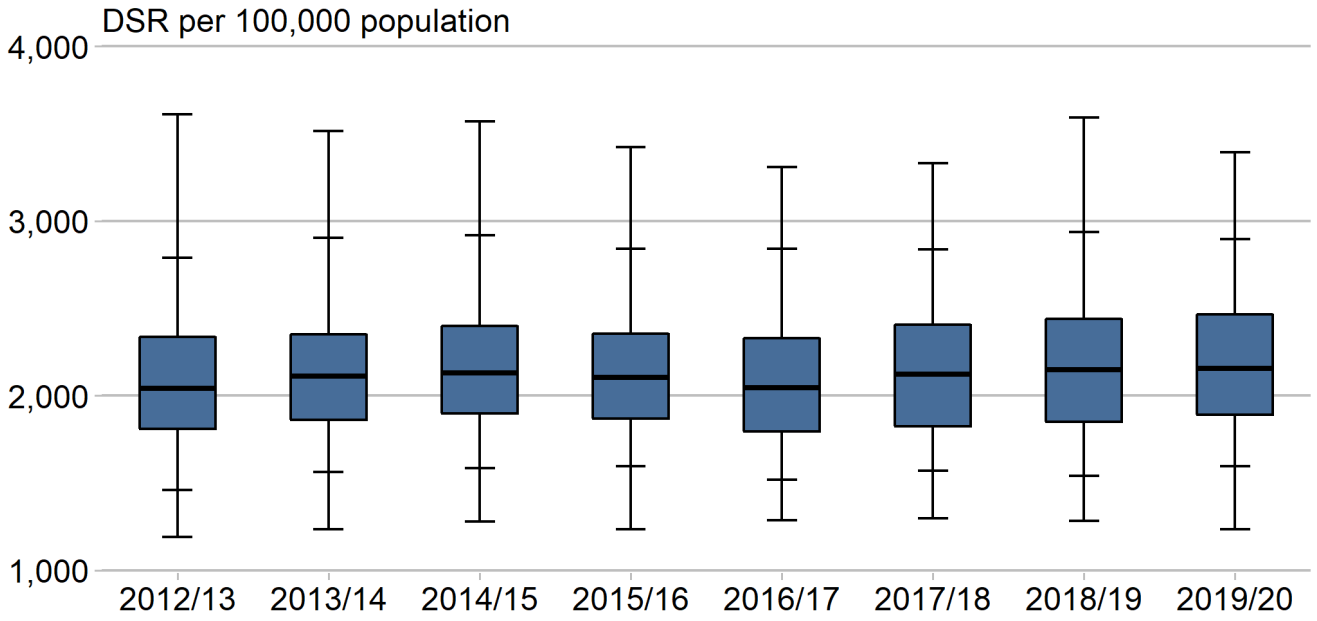




Column chart: Variation in rate of emergency admissions to hospital due to falls in people aged 65 years and over by lower-tier local authority (2019/20)



Box plot time series: Variation in rate of emergency admissions to hospital due to falls in people aged 65 years and over by lower-tier local authority (2012/13 to 2019/20)



Year	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	2,420	2,282	2,289	2,186	2,022	2,031	2,307	2,159	No significant change
75th-25th percentile	526	490	501	487	534	582	587	577	WIDENING Significant
95th-5th percentile	1,332	1,343	1,332	1,247	1,323	1,266	1,397	1,297	No significant change
Median	2,042	2,113	2,129	2,106	2,045	2,122	2,150	2,156	No significant change

Magnitude of Variation

Map 10: Variation in rate of emergency admissions to hospital due to falls in people aged 65 years and over by lower-tier local authority

The maps and column chart display the latest period (2019/20), during which lower-tier local authority values ranged from 1,235 per 100,000 population to 3,394 per 100,000 population, which is a 2.7-fold difference between lower-tier local authorities.

The England value for 2019/20 was 2,222 per 100,000 population.

The box plot shows the distribution of lower-tier local authority values for the period 2012/13 to 2019/20.

The 75th to 25th percentile gap widened significantly.

Low vision is an important contributory factor to increased falls risk but it is only one part of a multifactorial problem. Variation in the rate of emergency admissions to hospital due to falls is associated with the age of the local population, socioeconomic factors and access to healthcare services.

Options for action

Preventing falls requires a multifactorial approach. National Institute for Health and Care Excellence (NICE) clinical guidance [CG161] recommends multifactorial risk assessments including a comprehensive falls history with an assessment of risk factors, comorbidities and occupational hazards alongside medical examination and medication review.[1]

Given the multifactorial nature of falls in older adults, there are multiple targeted programmes aimed at tackling the variety of risk factors predisposing individuals to increased rates of falls.[12] In terms of return on investment, exercise and home hazard assessments are cost-effective measures for prevention.[13] Identifying factors that contribute to increased falls risk are essential for improving targeted schemes within a local authority.

Additionally, identifying patients that are at a higher risk of falls is essential to ensure all patients have access to available treatments. People registered as blind or partially sighted are known to their local authority social services. They represent a readily identifiable group of people at higher risk who could be prioritised for interventions.

[12] Public Health England (2017) Falls and fractures: consensus statement and resources pack [Accessed 22 Jun 2021]
[13] Public Health England (2018) Falls prevention: cost-effective commissioning [Accessed 22 Jun 2021]

Further details can be found in the Blind and partially sighted registrations section. To identify people who may be living with frailty, NICE recommends the use of a validated electronic Frailty Index (eFI) tool.[14] However, whilst the uptake of such tools in primary care is high and referrals are being made for high-risk individuals to strength and balance training programmes, uptake or adherence to these programmes are low.[14,15] A lack of awareness of the links between falls and insufficient exercise, poor strength or balance may be a factor for low observance.[16] Programmes that are done in group settings or as one to one sessions can help with engagement except where the patient has multiple sensory impairments.[17] Work must be undertaken to understand the reasons for low uptake and remove potential barriers for such interventions.

NICE has produced comprehensive guidelines in the prevention and management of falls. Some of the key components include:

- identification of people at risk
- multifactorial falls risk assessment and interventions
- multifactorial interventions:
    - referral for strength and balance training programmes
    - home hazard assessment and intervention
    - vision assessment and referral
    - medication review
- detecting and managing osteoporosis and fracture risk
- optimal support after a fragility fracture to prevent recurrent falls

Vision assessment and referral is a component of a successful multifactorial falls prevention programme. The Royal College of Physicians published the National Audit of Inpatient Falls which revealed that less than 50% of inpatients receive a vision assessment.[18,19] There is little evidence available about the proportion of vision assessments as part of the fall prevention programme in community settings. Increasing awareness and access to free NHS eye health checks,[20] including the option of using mobile sight tests, for early identification of visual problems may also help to prevent rates of falls in older adults.

[14] National Institute for Health and Care Excellence (2018) NICEimpact falls and fragility fractures [Accessed 22 Jun 2021]
[15] Waterman H, Ballinger C, Brundle C and others (2016) A feasibility study to prevent falls in older people who are sight impaired: the VIP2UK randomised controlled trial. Trials. 2016 Sep 26;17(1):464 [Accessed 23 Jun 2021] [Accessed 23 Jun 2021]
[16] Brundle C, Waterman HA, Ballinger C and others (2015) The causes of falls: views of older people with visual impairment. Health Expect. 2015 Dec;18(6):2021-31. [Accessed 23 Jun 2021]
[17] Adams N, Skelton DA, Howel D and others (2018) Feasibility of trial procedures for a randomised controlled trial of a community based group exercise intervention for falls prevention for visually impaired older people: the VIOLET study. BMC Geriatr. 2018 Dec 12;18(1):307 [Accessed 23 Jun 2021]
[18] Royal college of Physicians (2000) National Audit of Inpatient Falls (NAIF) [Accessed 23 Jun 2021]
[19] Royal college of Physicians (2017) Bedside vision check for falls prevention: assessment tool [Accessed 23 Jun 2021]
[20] NHS (2021) Free NHS eye tests and optical vouchers [Accessed 23 Jun 2021]

Resources

College of Optometrists (2021) Vision and falls [Accessed 23 Jun 2021]

College of Optometrists (2021) Eye care - a guide to looking after your eyes - Falls prevention [Accessed 23 Jun 2021]

National Institute for Health and Care Excellence (2013) Falls in older people: assessing risk and prevention (NICE clinical guideline [CG161]) [Accessed 11 May 2021]

National Institute for Health and Care Excellence (2018) Measuring the use of NICE guidance: NICEimpact falls and fragility fractures [Accessed 11 May 2021]

National Institute for Health and Care Excellence (2015) Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes (NICE guideline [NG5]) [Accessed 11 May 2021]

National Institute for Health and Care Excellence (2017) Preventing falls in older people (NICE interactive flowchart) [Accessed 11 May 2021]

National Institute for Health Research (NIHR) Applied Research Collaboration East Midlands (2019) Falls Management Exercise (FaME) Implementation Toolkit [Accessed 11 May 2021]

NHS Health Education England in partnership with the Royal College of Physicians (2021) Preventing falls in hospitals (Interactive e-learning resource) [Accessed 12 Aug 2021]

NHS England (2017) NHS RightCare Pathways: Falls and Fragility Fractures Pathway [Accessed 11 May 2021]

Public Health England (2017) Falls and fractures: consensus statement and resources pack [Accessed 22 Jul 2021]

Diabetes

Context

Diabetic retinopathy (DR) is a common complication of diabetes mellitus and a significant cause of visual loss on a global scale. The prevalence of diabetes mellitus (diagnosed and undiagnosed) is increasing worldwide with estimates for England for 2020 standing at 4.2 million people aged 16 and over living with the condition.[1]

Diabetes is a progressive disease that leads to a range of microvascular and macrovascular complications. DR is a microvascular complication that arises due to damage to the blood vessels supplying the retina. It was until recently the leading cause of visual loss in working adults,[2,3] making it a significant public health concern. Almost all patients with type 1 diabetes, and 60% of people with type 2 diabetes, have some degree of retinopathy 20 years after diagnosis.[4]

A range of demographic risk factors have been identified for the development and progression of diabetes and DR.[5] In the UK, South Asian and African Caribbean communities are approximately two times more likely to develop diabetes mellitus than white British populations.[6, 7, 8] Poor socioeconomic status has also been shown to be associated with diabetic retinopathy.[9]

A national screening programme was introduced in England in 2003[10] in order to prevent, delay and better manage DR. Further details about the screening programme, including clinical grading and the management of patients can be found in the Diabetic eye screening section.

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[1] Public Health England (2015) Diabetes prevalence model - Diabetes prevalence estimates for CCGs by GP registered populations [Accessed 13 Jun 2021]

[2] Mathur R, Bhaskaran K, Edwards E and others (2017) Population trends in the 10-year incidence and prevalence of diabetic retinopathy in the UK: a cohort study in the Clinical Practice Research Datalink 2004–2014. BMJ Open 2017;7:e014444 [Accessed 22 Jul 2021]

[3] Rahman F, Zekite A, Bunce C and others (2020) Recent trends in vision impairment certifications in England and Wales. Eye 34, 1271–1278 [Accessed 13 Jun 2021]

[4] Diabetes UK (2010) Diabetes in the UK 2010: Key statistics on diabetes 2010

[5] Gupta R, Misra A (2016) Epidemiology of microvascular complications of diabetes in South Asians and comparison with other ethnicities J Diabetes 2016;**8**:470–82 [Accessed 13 Jun 2021]

[6] Bhopal RS (2013) A four-stage model explaining the higher risk of type 2 diabetes mellitus in South Asians compared with European populations Diabet Med 2013;**30**:35–42 [Accessed 13 Jun 2021]

[7] Davis TME (2008) Ethnic diversity in type 2 diabetes Diabet Med2008;**25**(Suppl 2):52–6 [Accessed 13 Jun 2021]

[8] Pham TM, Carpenter JR, Morris TP and others (2019) Ethnic Differences in the Prevalence of Type 2 Diabetes Diagnoses in the UK: Cross-Sectional Analysis of the Health Improvement Network Primary Care Database. Clin Epidemiol. 2019;11:1081-1088 [Accessed 16 Jun 2021]

[9] Low L, Law JP, Hodson J and others (2015) Impact of socioeconomic deprivation on the development of diabetic retinopathy: a population-based, cross-sectional and longitudinal study over 12 years BMJ Open 2015;5:e007290 [Accessed 22 Jul 2021]

[10] Scanlon PH (2017) The English National Screening Programme for diabetic retinopathy 2003-2016. Acta Diabetol. 2017;54(6):515-525 [Accessed 16 Jan 2021]

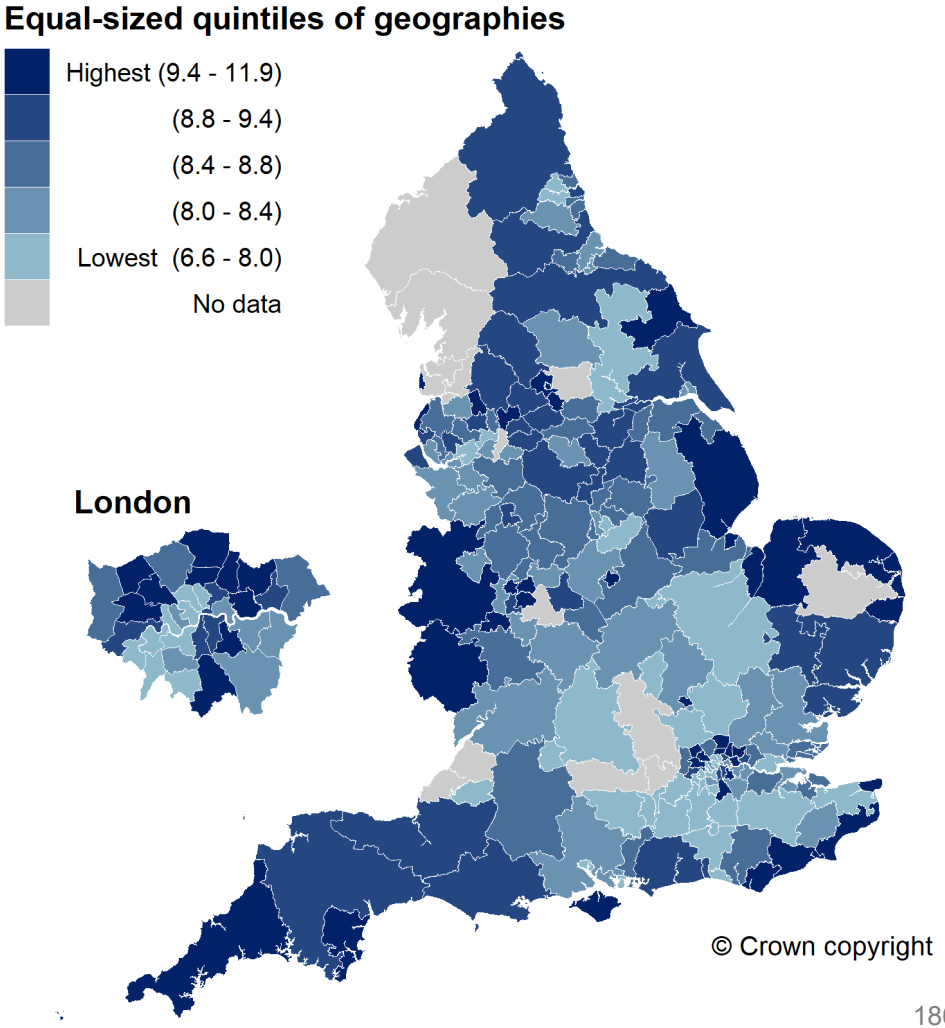
Despite improvements in screening for diabetic retinopathy and advancements in treatment options (such as anti-VEGF for diabetic macular oedema), DR continues to bear a considerable public health burden. Visual impairment from DR can result in reduced physical, emotional and social well-being[11] and has a significant impact on health-related quality of life.

Establishing a more complete understanding of the disease burden in the diverse UK population will help to improve future interventions in service planning, preventative and therapeutic care.

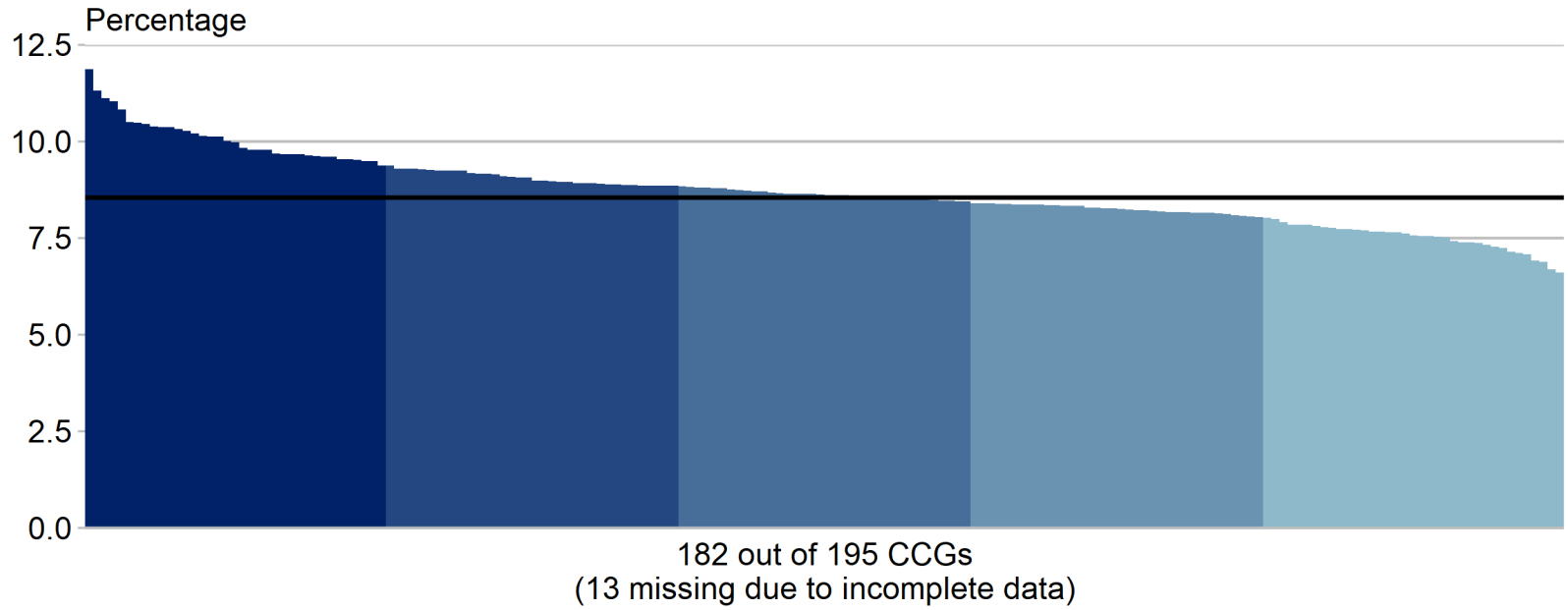
[11] Fenwick EK, Pesudovs K, Rees G, and others (2011) The impact of diabetic retinopathy: understanding the patient's perspective Br J Ophthalmol. 2011 Jun;95(6):774-82 [Accessed 16 Jun 2021]

Map 11: Variation in percentage of people aged 16 years and over who have diabetes (estimated prevalence - undiagnosed and diagnosed) by clinical commissioning group (2017)

Optimum value: Low



Column chart: Variation in percentage of people aged 16 years and over who have diabetes (estimated prevalence - undiagnosed and diagnosed) by CCG (2017)



Magnitude of Variation

Map 11: Variation in percentage of people aged 16 years and over who have diabetes (estimated prevalence - undiagnosed and diagnosed) by clinical commissioning group

The map displays the latest period (2017), during which clinical commissioning group (CCG) values ranged from 6.6% to 11.9%, which is a 1.8-fold difference between CCGs.

The England value for 2017 was 8.5%.

The differences between CCGs may be influenced by many factors such as age structure, ethnicity, obesity and socioeconomic status.

Excess weight and diet are also important factors that influence the prevalence of diabetes across England. Numerous areas in the highest quintiles for percentage of people classified as overweight and obese are also in the highest quintiles for diabetes prevalence.

Additionally, access to healthcare may be a key factor that influences both early diagnosis and effective management of diabetes to prevent adverse outcomes.

Options for action

The key to reducing the prevalence of diabetes and importantly the associated adverse outcomes lies in early prevention, education and awareness.

Raising awareness of the risk factors for diabetes will help to promote routine health checks and lifestyle changes. Identifying people at risk in order to prevent or delay diabetes by encouraging changes to their diet and lifestyle is the focus of the NHS Diabetes Prevention Programme. The programme helps to introduce lifestyle interventions at a pre-diabetic stage and reduce the risk of developing type 2 diabetes.

Referral routes into the diabetes prevention programme vary according to local case finding pathways. Three primary mechanisms for referral are: the NHS Health Check Programme; those who have already been identified as having an appropriately elevated risk level (HbA1c or FPG) in the past and who have been included on a register of patients with high HbA1c or FPG; and those who are identified with nondiabetic hyperglycaemia (NDH) as part of routine clinical care.[12]

[12] Public Health England (2018) Health matters: preventing Type 2 Diabetes [Accessed 22 Jul 2021]

Education on the impacts of diabetes will help to encourage adherence to national screening programmes that are in place. Alongside personalised care planning, education can also empower patients to self-manage their diabetes more effectively and take a more proactive role in their care.

Additionally, recognising at-risk groups such as ethnic minority groups and developing culturally appropriate programmes is paramount. Certain ethnic minorities such as South Asian, African Caribbean or black African are 2 to 4 times more likely to develop type 2 diabetes.[13] NICE has specific guidance that recognises this increased risk and extends the usual recommendation of conducting a diabetic risk assessment in anyone over the age of 40 to people aged 25 to 39 in high risk minority ethnic groups. NICE guidance also promotes a healthy diet and physical activity and has recommendations on how to tailor services for minority ethnic communities and other at-risk groups.

Importantly, ensuring NICE guidance is followed at all tiers of healthcare will help to prevent the onset of complications such as diabetic retinopathy.

Resources

For further information about diabetic eye screening please refer to the Diabetic eye screening chapter of this publication.

Diabetes UK (2021) Resources to improve care [Accessed 18 Jun 2021]

National Institute for Health and Care Excellence (2018) NICEimpact: diabetes [Accessed 18 Jun 2021]

National Institute for Health and Care Excellence (2011) Type 2 diabetes prevention: population and community-level interventions (Public health guidance [PH35]) [Accessed 18 Jun 2021]

National Institute for Health and Care Excellence (2012) Type 2 diabetes: prevention in people at high risk Last updated: 15 September 2019 (Public health guidance [PH38]) [Accessed 18 Jun 2021]

National Institute for Health and Care Excellence (2018) Promoting health and preventing premature mortality in black, Asian and other minority ethnic groups (Quality standards [QS167]) [Accessed 18 Jun 2021]

[13] Cultural intelligence Hub (2020) A handbook for communicating with black and south Asian communities about Type 2 diabetes [Accessed 21 Jul 2021]

NHS Diabetes Prevention Programme (2021) [Accessed 18 Jun 2021]

NHS Health Check (2021) [Accessed 22 Jul 2021]

Public Health England Diabetes [Accessed 21 Jul 2021]

Public Health England Health matters: preventing Type 2 Diabetes [Accessed 21 Jul 2021]

Excess Weight

Context

Obesity is a significant public health concern with increasing prevalence in the UK. The majority of adults in England were overweight or obese in 2018 (63%) with 28% classified as being obese.[1] The World Health Organization (WHO) define obesity as a body mass index (BMI) of over 30. A BMI of 25 to 29.9 is classified as overweight.[2] Additionally, waist size can be used as a measure of obesity. A waist size greater than 94cm in men and greater than 80cm in women poses a higher risk of developing obesity related health problems.[3]

The medical consequences of obesity are well documented. It is associated with numerous comorbidities, most commonly:

- coronary heart disease
- type 2 diabetes mellitus
- hypertension
- stroke
- obstructive sleep apnoea
- certain cancers
- non-alcoholic fatty liver disease

Though less documented, obesity also has numerous consequences related to ocular health and vision. In particular, obesity has been shown to be associated with cataracts, age related macular degeneration (AMD), diabetic retinopathy and glaucoma.[4]

Obesity is associated with development of cataracts. A systematic review and meta-analysis of longitudinal studies showed that both obesity and being overweight were associated with an increased risk of different types of cataract.[5] The relationship between obesity and cataracts may be due to mutual mechanisms such as increased oxidative stress and systemic inflammation, or co-existing risk factors such as diabetes.

There is an established association between obesity and raised intraocular pressure, a strong risk factor for glaucoma. However, few studies have looked at the association with glaucomatous optic neuropathy.

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1 NHS Digital (2020) Statistics on Obesity, Physical Activity and Diet, England, 2020 Part 3: Adult overweight and obesity [Accessed 10 Jun 2021]
2 World Health Organization Health topics: Obesity [Accessed 10 Jun 2021]
3 NHS (2019) Conditions: Obesity [Accessed 10 Jun 2021]
4 Cheung N, Wong TY (2007) Obesity and eye diseases Surv Ophthalmol. 2007 Mar-Apr;52(2):180-95 [Accessed 24 Jun 2021]
5 Pan CW, Lin Y (2014) Overweight, obesity, and age-related cataract: a meta-analysis Optom Vis Sci. 2014 May;91(5):478-83 [Accessed 10 Jun 2021]

There is literature supporting the association between obesity and AMD.[4] Obesity promotes a pro-inflammatory state with increased oxidative stress. Alongside modulation in lipoprotein profiles, these changes are thought to indirectly relate to the pathophysiology behind AMD.[6]

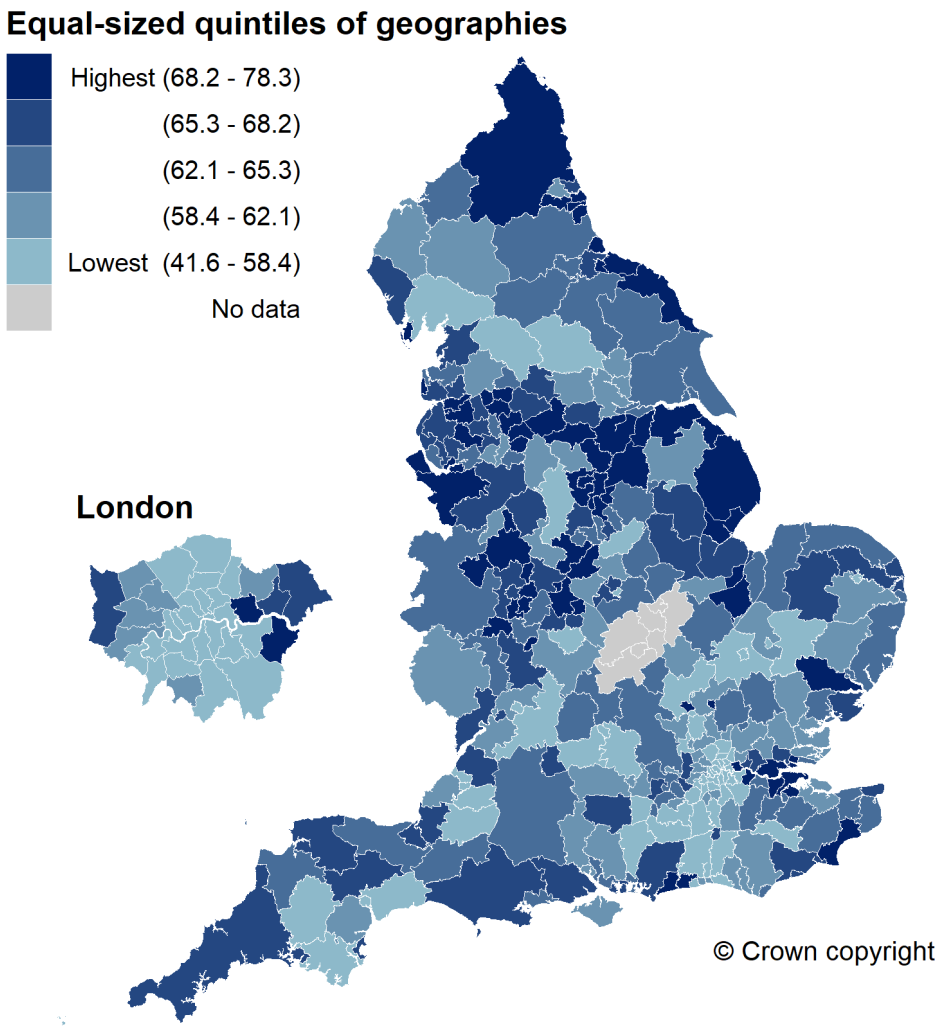
Obesity is a known cause of obstructive sleep apnoea, which has been linked to papilledema[7] and floppy eyelid syndrome.[8] Additionally, obese individuals have a 4-fold increased risk of retinal vein occlusion.[9]

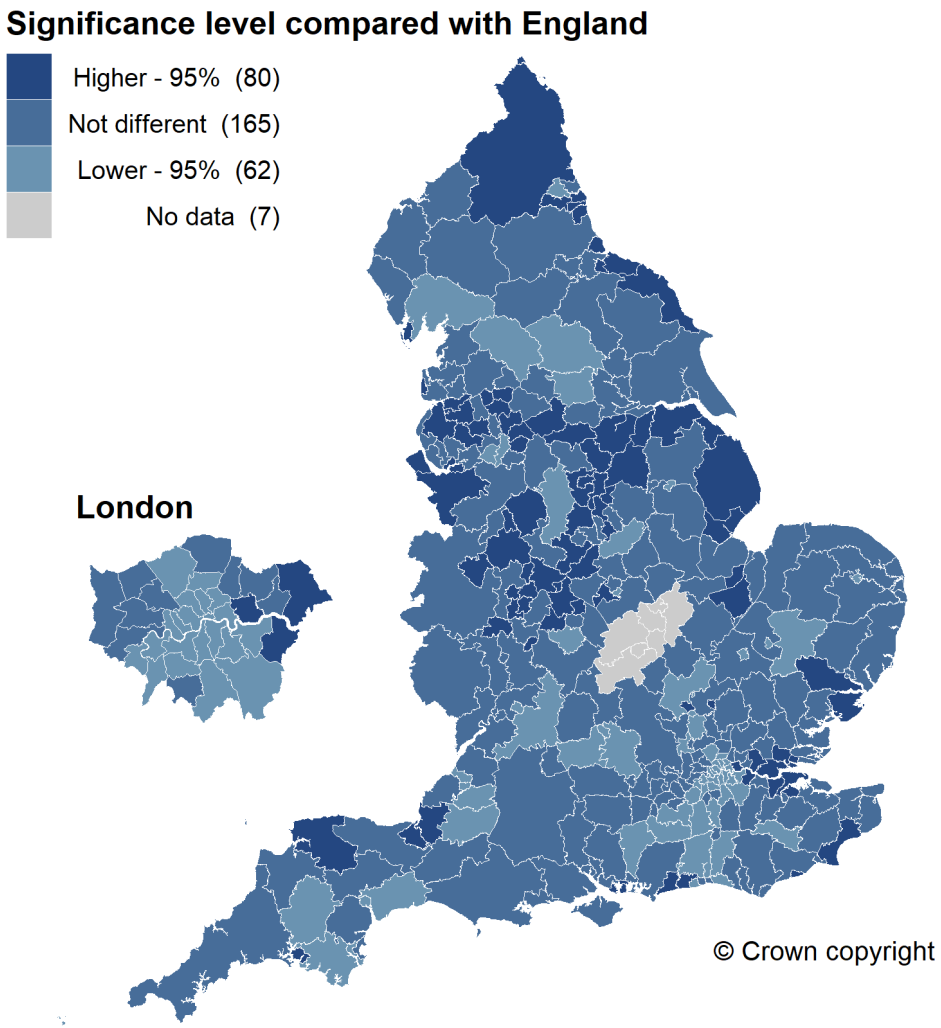
The cost of obesity related morbidity to the NHS in the UK was estimated to be £6.1 billion in 2014/15.[10] The rising financial cost, alongside the vast health burden to individuals, makes obesity an important public health challenge. Importantly, obesity is reversible and preventable, and therefore a priority area for intervention to prevent adverse general and eye health outcomes.

[6] Johnson E (2005) Obesity, Lutein Metabolism, and Age-Related Macular Degeneration: a Web of Connections Nutrition Reviews. 2005 Feb;63(1):9-15 [Accessed 10 Jun 2021]
[7] Purvin VA, Kawasaki A, Yee RD (2000) Papilledema and obstructive sleep apnea syndrome Arch Ophthalmol. 2000 Dec;118(2):1626–1630 [Accessed 10 Jun 2021]
[8] McNab AA (2005) The eye and sleep Clin Experiment Ophthalmol. 2005 Apr;33(2):117–125 [Accessed 10 Jun 2021]
[9] Wong TY, Larsen EK, Klein R and others Cardiovascular risk factors for retinal vein occlusion and arteriolar emboli: the Atherosclerosis Risk in Communities & Cardiovascular Health studies Ophthalmology. 2005 Apr;112(4):540–547 [Accessed 10 Jun 2021]
[10] Scarborough P, Bhatnagar P, Wickramasinghe KK and others (2011) The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006-07 NHS costs J Public Health (Oxf). 2011 Dec;33(4):527-35 [Accessed 24 Jun 2021]

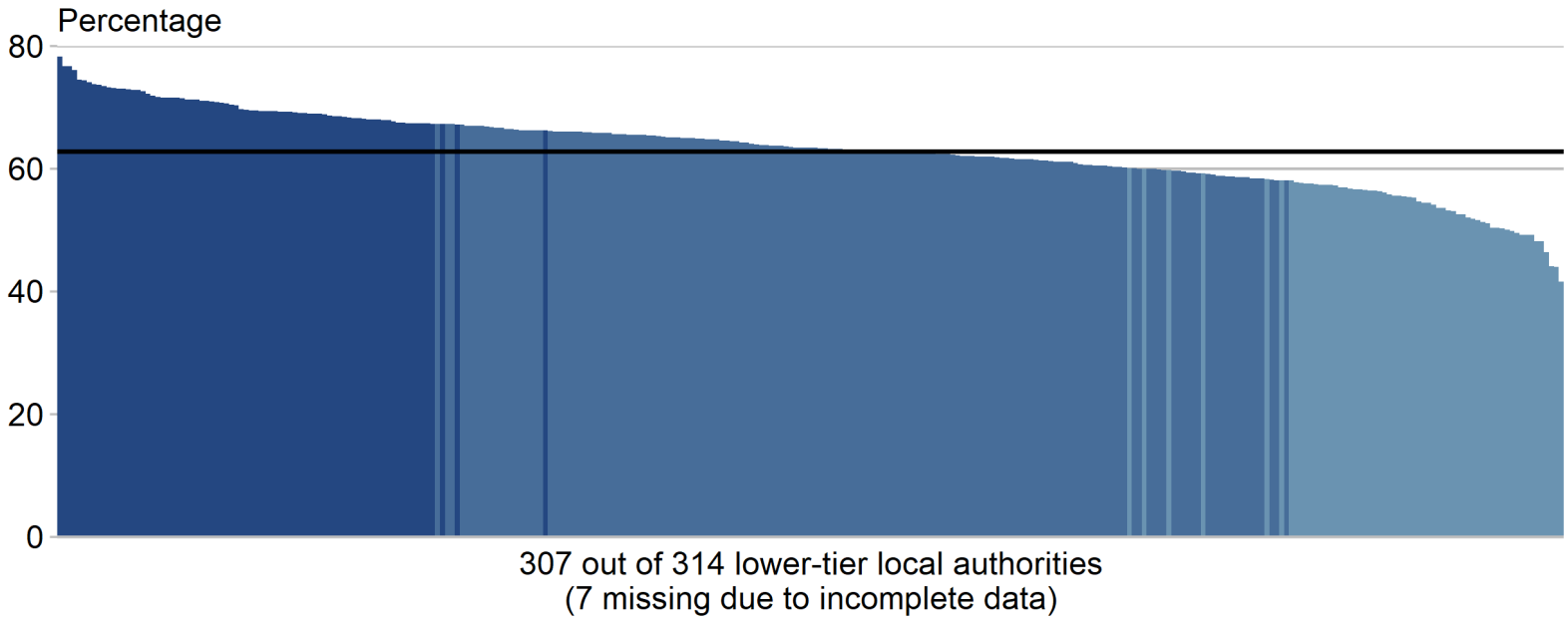
Map 12: Variation in percentage of people aged 18 years and over classified as overweight or obese (body mass index greater than or equal to 25 kg/m2) by lower-tier local authority (2019/20)

Optimum value: Low

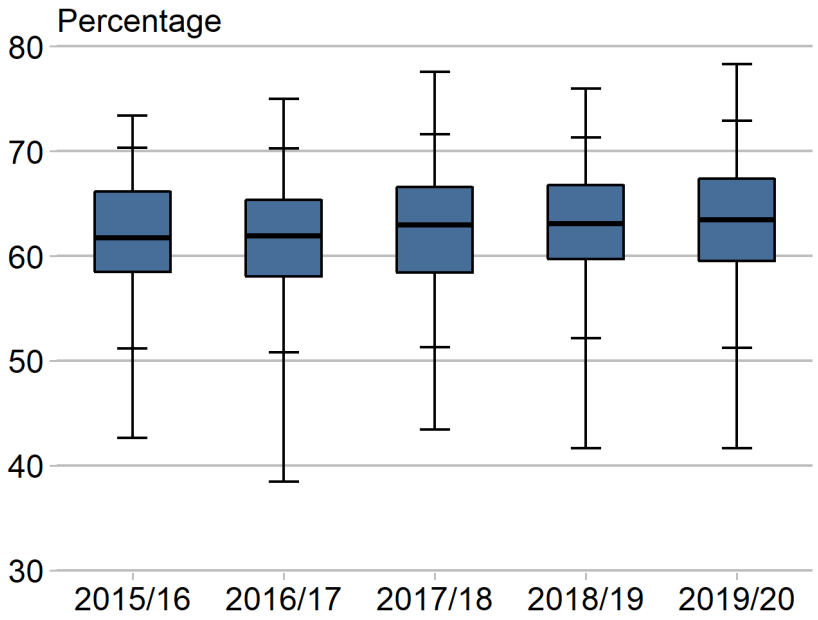




Column chart: Variation in percentage of people aged 18 years and over classified as overweight or obese (body mass index greater than or equal to 25 kg/m2) by lower-tier local authority (2019/20)



Box plot time series: Variation in percentage of people aged 18 years and over classified as overweight or obese (body mass index greater than or equal to 25 kg/m2) by lower-tier local authority (2015/16 to 2019/20)



Year	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	30.7	36.5	34.1	34.3	36.6	No significant change
75th-25th percentile	7.7	7.3	8.2	7.0	7.9	No significant change
95th-5th percentile	19.1	19.5	20.3	19.2	21.7	No significant change
Median	61.7	61.9	62.9	63.1	63.5	INCREASING Significant

Magnitude of Variation

Map 12: Variation in percentage of people aged 18 years and over classified as overweight or obese (body mass index greater than or equal to 25 kg/m2) by lower-tier local authority

The maps and column chart display the latest period (2019/20), during which lower-tier local authority values ranged from 41.6% to 78.3%, which is a 1.9-fold difference between lower-tier local authorities.

The England value for 2019/20 was 62.8%.

The box plot shows the distribution of lower-tier local authority values for the period 2015/16 to 2019/20.

The median increased significantly from 61.7% in 2015/16 to 63.5% in 2019/20.

It is important to recognise that the prevalence of obesity is high in all local authorities, with the lowest category in Map 12 (equal-sized quintiles of geographies) denoting 41.6% to 58.4% prevalence. Additionally, there have been no significant improvements in recent years nationally, as shown in the box plot.

Obesity is strongly linked to wider determinants of health. In particular, socioeconomic status and the environment where people live strongly influences their risk of obesity.[11] People's diets and exercise (which often comes at a cost) and access to services are also influenced by their environment. Obesity increases with age and some ethnic minority groups such as Black ethnic groups have a higher prevalence of obesity than other ethnic groups.[12]

Area deprivation is a risk factor for both obesity and eye diseases. It is associated with poorer access to open spaces which limits options for physical activity and further exacerbates risk.

Options for action

It is important to work with local authorities in order to address wider determinants of health that impact the prevalence of obesity. A better understanding of local drivers of obesity through community engagement will enable tailored plans of action. A range of resources and programmes have been developed to support local areas to promote a healthier weight in their communities including:

[11] Government Office for Science (2007) Reducing obesity: environmental factors Tackling obesities: future choices: obesogenic environments - evidence review [Accessed 22 Jul 2021]
[12] UK Government (2021) Overweight adults [Accessed 22 Jul 2021]

- a whole systems approach to obesity: a guide to support local approaches to promoting a healthy weight[13]
- promoting healthy weight in children, young people and families: resource to support local authorities[14]
- the Childhood Obesity Trailblazer programme which is testing local levers to tackle childhood obesity at a local level[15]

Education at an early stage about the possible dangers of obesity and how to lead a healthy lifestyle is of particular importance and has to be conducted sensitively. On a national level, government measures include measures around advertising, promotions (volume and location), labelling (out of home calorie labelling, alcohol calorie labelling),[16] and structural and other levers to impact obesity across the life course such as:

- the soft drinks industry levy
- working with businesses across all sectors of the food industry (retailers, manufacturers and the eating out/takeaway delivery sector) to reduce the sugar and calorie content of everyday foods and supporting innovation to help make food and drink products healthier
- promoting a healthy balanced diet through communication channels including; PHE social marketing campaigns (Change4Life,[17] Better Health[18]), PHE's healthier catering guidance[19] and dietary advice via the NHS.uk website[20]
- increasing weight management services for adults and children delivered through the NHS and local authorities
- providing support with the cost of healthy food for those in most need
- encouraging physical activity at school and helping schools to identify gaps in the existing opportunities for children to be active

Resources

Department of Health and Social Care (2020) Tackling obesity: empowering adults and children to live healthier lives [Accessed 22 Jul 2021]

[13] Public Health England (2019) Whole systems approach to obesity Whole systems approach to obesity: a guide to support local approaches to promoting a healthy weight [Accessed 22 Jul 2021]
[14] Public Health England (2018) Promoting healthy weight in children, young people and families Promoting healthy weight in children, young people and families: resource to support local authorities [Accessed 22 Jul 2021]
[15] Local Government Association Childhood Obesity Trailblazer Programme [Accessed 24 Jun 2021]
[16] Department of Health and Social Care (2020) Tackling obesity: empowering adults and children to live healthier lives [Accessed 22 Jul 2021]
[17] NHS Change4life [Accessed 06 Jul 2021]
[18] NHS Better Health [Accessed 06 Jul 2021]
[19] Public Health England (2017) Healthier and more sustainable catering [Accessed 22 Jul 2021]
[20] NHS Eat well [Accessed 06 Jul 2021]

National Institute for Health and Care Excellence (2015) Preventing excess weight gain (NICE guideline [NG7]) [Accessed 22 Jul 2021]

National Institute for Health and Care Excellence (2014) Obesity: identification, assessment and management (Clinical guideline [CG189]) [Accessed 22 Jul 2021]

National Institute for Health and Care Excellence Obesity: working with local communities overview (NICE pathway) [Accessed 22 Jul 2021]

National Institute for Health and Care Excellence Obesity overview (NICE pathway) [Accessed 22 Jul 2021]

National Institute for Health and Care Excellence Lifestyle weight management services for overweight or obese adults overview (NICE pathway) [Accessed 22 Jul 2021]

National Institute of Diabetes and Digestive and Kidney Diseases Understanding Adult Overweight & Obesity Treatment for Overweight & Obesity [Accessed 22 Jul 2021]

Royal College of Physicians (2015) Action on obesity: Comprehensive care for all [Accessed 22 Jul 2021]

Public Health England (2017) Weight management: guidance for commissioners and providers [Accessed 22 Jul 2021]

Public Health England (2017) Adult weight management: short conversations with patients [Accessed 22 Jul 2021]

Public Health England (2019) Adult obesity: applying All Our Health [Accessed 22 Jul 2021]

Public Health England (2020) Sugar reduction: progress report, 2015 to 2019 [Accessed 22 Jul 2021]

UK Government (2017) Childhood obesity: a plan for action [Accessed 22 Jul 2021]

Physical Activity

Context

Physical activity is a strong predictor of overall health and wellbeing. Lower levels of physical activity have been shown to be related to several eye conditions, including glaucoma, age related macular degeneration (AMD) and diabetic retinopathy (DR).

The relationship between lower levels of physical activity and eye disease is bidirectional. Visual impairment can significantly impact patient mobility and thus physical activity levels. Research has shown that visual impairment (corrected visual acuity worse than 20/40) was associated with a nearly 50% reduction in the time spent in moderate to vigorous physical activity states.[1] Whilst vision loss can significantly impair physical activity, increased levels of physical activity may protect against vision loss. Therefore, maintaining a healthy level of physical activity in individuals with visual impairment is especially important.

Glaucoma

Glaucoma can lead to significant visual field loss, affecting mobility, balance and increased risk of falling. An accelerometery study of glaucoma patients compared to people without glaucoma suggested that severity of visual field loss in glaucoma is associated with fewer daily steps and 21% less time spent in moderate to vigorous physical activity.[2] Laboratory studies also indicate a neuroprotective mechanism related to higher levels of physical activity[3] that could affect the development of glaucoma. Therefore, physical activity may have a role in preventing progression of glaucoma. Glaucoma field loss can deter patients from physical activity, thereby exacerbating potential worsening of disease.

Age related macular degeneration

AMD is a leading cause of irreversible blindness.[4] Not only does AMD limit physical activity but physical activity may also be protective against the progression of AMD. Physical inactivity has been associated with the development of macular drusen, a

[1] Willis JR, Vitale SE, Agrawal Y and others (2013) Visual impairment, uncorrected refractive error, and objectively measured balance in the United States JAMA Ophthalmol. 2013;131:1049–56 [Accessed 10 Jun 2021]
[2] Ramulu PY, Maul E, Hochberg C and others (2012) Real-world assessment of physical activity in glaucoma using an accelerometer Ophthalmology. 2012 Jun;119(6):1159-66 [Accessed 10 Jun 2021]
[3] Loprinzi PD, Herod SM, Cardinal BJ and others (2013) Physical activity and the brain: a review of this dynamic, bi-directional relationship Brain Res. 2013 Nov;1539:95–104 [Accessed 10 Jun 2021]
[4] Khandhadia S,Cherry J, Lotery AJ (2012) Age-Related Macular Degeneration. In: Ahmad SI (eds) Neurodegenerative Diseases. Advances in Experimental Medicine and Biology, vol 724. Springer, New York, NY. https://doi.org/10.1007/978-1-4614-0653-2_2 [Accessed 23 Jul 2021]

precursor for AMD.[5] Additionally, multiple longitudinal studies have shown greater physical activity levels decreases the risk of progression of AMD.[6,7]

Diabetic retinopathy

Physical activity is a well established modifiable risk factor for type 2 diabetes.[8] However, the relationship between physical activity and vision loss from DR is less well studied. Chronic inflammatory processes and glucose induced endothelial dysfunction underlie the development and progression of DR. Physical activity has been associated with improved vascular endothelial function[9] and is therefore thought to play a protective role in developing advanced DR. This has been supported by clinical studies objectively comparing physical activity levels to progression of DR.[10, 11, 12]

[5] Munch IC, Linneberg A, Larsen M (2013) Precursors of age-related macular degeneration: associations with physical activity, obesity, and serum lipids in the inter99 eye study Investigative Ophthalmology & Visual Science. 2013 Jun;54:3932-3940 [Accessed 10 Jun 2021]

[6] Knudtson MD, Klein R, Klein BE (2006) Physical activity and the 15-year cumulative incidence of age-related macular degeneration: the Beaver Dam Eye Study Br J Ophthalmol 2006 Dec;90(12):1461–1463 [Accessed 10 Jun 2021]

[7] Seddon JM, Cote J, Davis N and others (2003) Progression of age-related macular degeneration: association with body mass index, waist circumference, and waist-hip ratio Arch Ophthalmol 2003 Jun;121(6):785–792 [Accessed 10 Jun 2021]

[8] Department of Health and Social Care (2019) Physical activity guidelines: UK Chief Medical Officers' report [Accessed 22 Jun 2021]

[9] Di Francescomarino S, Sciartilli A, Di Valerio V and others (2009) The effect of physical exercise on endothelial function Sports Med. 2009;39(10):797–812 [Accessed 10 Jun 2021]

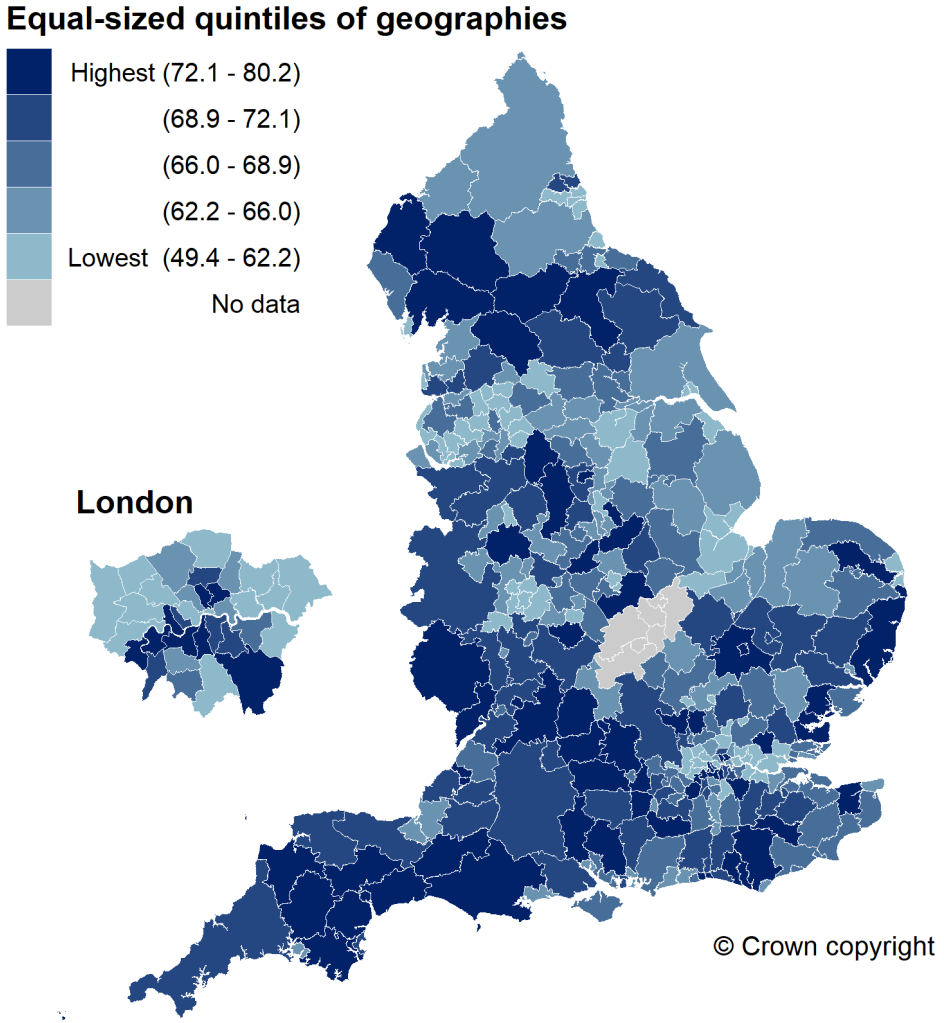
[10] Anuradha S, Dunstan DW, Healy GN and others (2011) Physical activity, television viewing time, and retinal vascular caliber Med Sci Sports Exerc. 2011 Feb;43(2):280–286 [Accessed 10 Jun 2021]

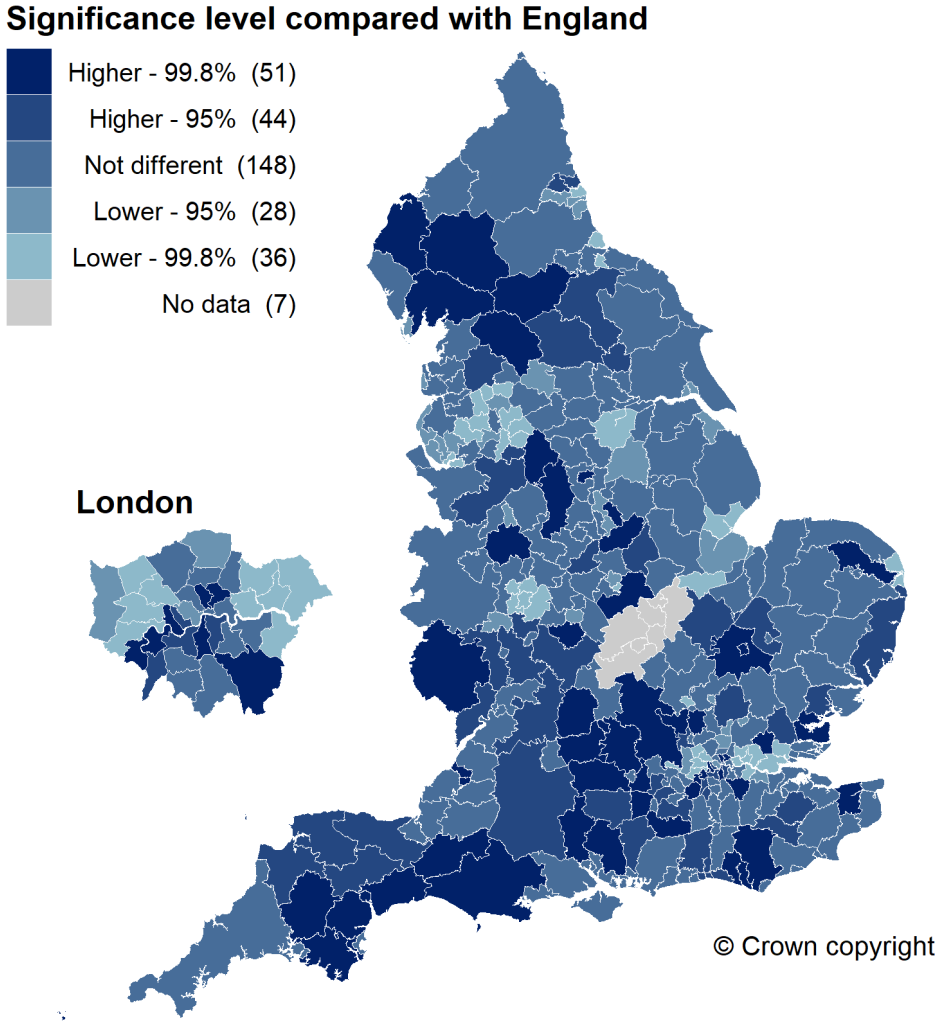
[11] Tikellis G, Anuradha S, Klein R and others (2010) Association between physical activity and retinal microvascular signs: the Atherosclerosis Risk in Communities (ARIC) Study Microcirculation. 2010 Jul;17(5):381–393 [Accessed 10 Jun 2021]

[12] Loprinzi PD, Joyner C (2016) Accelerometer-determined physical activity and mortality in a national prospective cohort study: considerations by visual acuity Prev Med. 2016 Jun;87:18–21 [Accessed 10 Jun 2021]

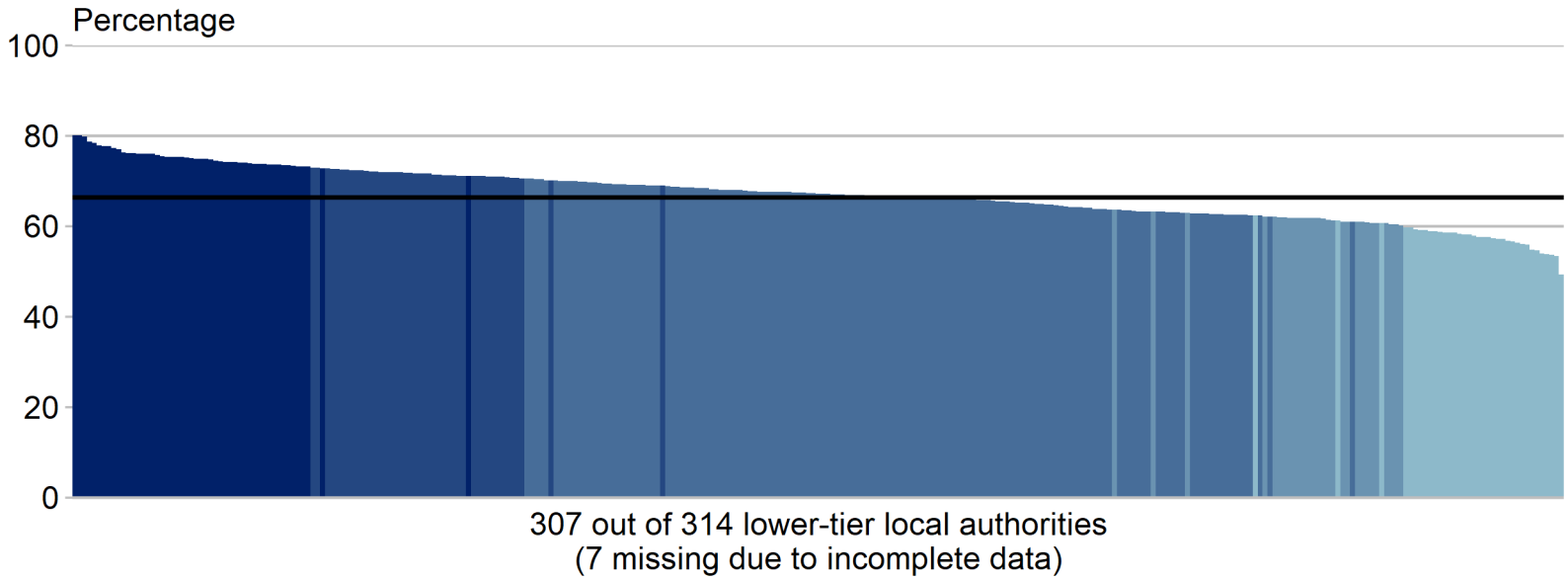
Map 13: Variation in percentage of people aged 19 years and over that meet CMO recommendations for physical activity (150+ moderate intensity equivalent minutes per week) by lower-tier local authority (2019/20)

Optimum value: High

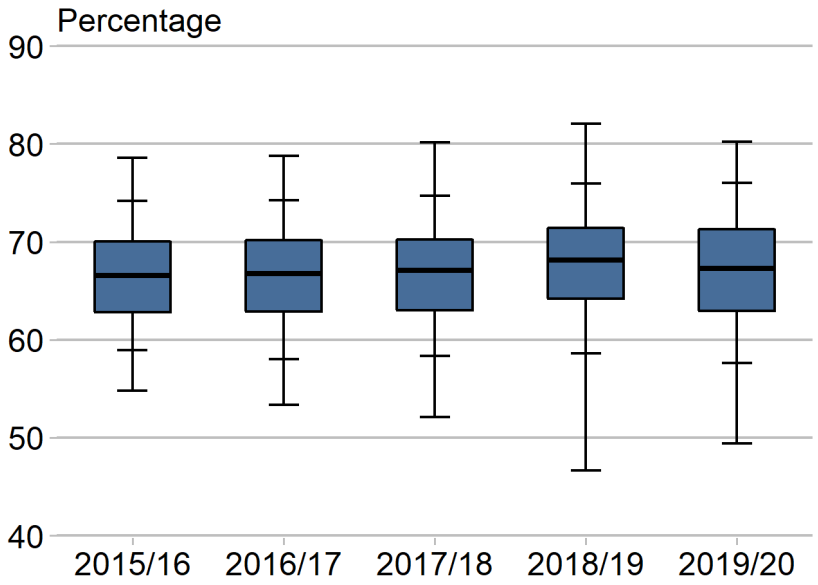




Column chart: Variation in percentage of people aged 19 years and over that meet CMO recommendations for physical activity (150+ moderate intensity equivalent minutes per week) by lower-tier local authority (2019/20)



Box plot time series: Variation in percentage of people aged 19 years and over that meet CMO recommendations for physical activity (150+ moderate intensity equivalent minutes per week) by lower-tier local authority (2015/16 to 2019/20)



Year	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	23.8	25.4	28.1	35.4	30.8	No significant change
75th-25th percentile	7.2	7.3	7.3	7.2	8.4	No significant change
95th-5th percentile	15.3	16.2	16.4	17.3	18.4	WIDENING Significant
Median	66.6	66.7	67.1	68.2	67.3	No significant change

Magnitude of Variation

Map 13: Variation in percentage of people aged 19 years and over that meet CMO recommendations for physical activity (150+ moderate intensity equivalent minutes per week) by lower-tier local authority

The maps and column chart display the latest period (2019/20), during which lower-tier local authority values ranged from 49.4% to 80.2%, which is a 1.6-fold difference between lower-tier local authorities.

The England value for 2019/20 was 66.4%.

The box plot shows the distribution of lower-tier local authority values for the period 2015/16 to 2019/20.

The 95th to 5th percentile gap widened significantly.

Neighbourhood design that promotes access to open spaces enables physical activity such as walking, cycling and running for leisure and travel. Access to open spaces varies, particularly for those living in deprived areas, influencing the prevalence of physical activity for some population groups.[13]

Age is markedly associated with levels of physical activity through its association with the prevalence of multiple health conditions and physical condition. Older adults are at a greater risk of falls, often resulting in avoidance of physical activity.

Other important factors that influence variations in recommended levels of physical activity include disability, ethnicity, health condition and culture.[14]

Options for action

Identifying areas and population groups with lower levels of physical activity is imperative for population level and targeted action. Ensuring there is widespread access to quality open spaces and approaches to support everyone to get more active and maintain activity levels is essential in order to enable recommended physical activity levels to be adhered to.

[13] Allen J and Balfour R (2014) Natural Solutions to Tackling Health Inequalities Institute of Health Equity [Accessed 22 Jul 2021]

[14] Public Health England (2014) Everybody active, every day: framework for physical activity Everybody active, every day: an evidence-based approach to physical activity [Accessed 23 Jun 2021]

A whole school approach, including education about the importance of physical activity is encouraged in school age children, partly through timetabled physical education.[15] Education and encouragement for adults can be given from employers who can promote and incorporate physical activity into workplace routines where possible.

Adopting a place based whole systems approach to physical activity, which includes creating an active environment, can help connect and align physical activity with other important local issues, such as air quality and other environmental issues.[14,16]

NICE guidance recommends that local authorities have a physical activity champion at a senior level in order to develop and implement local strategies, policies and plans for improving physical activity levels.[17]

Furthermore, targeted programmes for older adults must continue to be developed and endorsed. The value of activities that improve strength, balance and flexibility in older adults cannot be overstated; these components help to reduce the risk of falls, risk of social isolation, risk of mental and physical health morbidities; all are notable concerns in older adults.

People with eye diseases and disability are at increased risk of lower levels of physical activity due to the impact from poor visual function and associations with area deprivation. Lower levels of physical activity can further exacerbate their risk of eye disease progression as well as adversely impacting their general physical and mental health.

The Chief Medical Officer's Physical Activity Guidelines[8] advised the following for older adults (65 years and over):

- older adults should participate in daily physical activity to gain health benefits, including mental health, wellbeing and social functioning
- even light activity brings some health benefits compared to being sedentary
- older adults should maintain or improve their function by undertaking activities aimed at improving or maintaining muscle strength, balance and flexibility at least two days a week
- older adults should aim to accumulate at least 150 minutes of moderate intensity aerobic activity

[15] Public Health England (2020) What works in schools and colleges to increase physical activity What works in schools and colleges to increase physical activity? [Accessed 23 Jun 2021]
[16] Public Health England (2019) Health matters: whole systems approach to obesity [Accessed 22 Jun 2021]
[17] National Institute for Health and Care Excellence (2019) Physical activity: encouraging activity on the community (NICE quality standard [QS183]) [Accessed 09 Jun 2021]

Resources

British Blind Sport The National Disability Sport Organisation for people living with sight loss. Guidance and resources to support blind and partially sighted people get active and play sport [Accessed 20 Jul 2021]

British Blind Sport (2016) A Guide To Visually Impaired Friendly Sport [Accessed 20 Jul 2021]

Department of Health and Social Care (2019) Physical activity guidelines: UK Chief Medical Officers' report [Accessed 22 Jun 2021]

National Institute for Health and Care Excellence (2019) Physical activity: encouraging activity on the community (NICE quality standard [QS183]) [Accessed 09 Jun 2021]

National Institute for Health and Care Excellence (2013) Physical activity: brief advice for adults in primary care (NICE public health guideline [PH44]) [Accessed 09 Jun 2021]

National Institute for Health and Care Excellence (2014) Physical activity: exercise referral schemes (NICE public health guideline [PH54]) [Accessed 09 Jun 2021]

National Institute for Health and Care Excellence (2009) Physical activity for children and young people (NICE public health guideline [PH17]) [Accessed 09 Jun 2021]

National Institute for Health and Care Excellence (2008) Physical activity in the workplace (NICE public health guideline [PH13]) [Accessed 09 Jun 2021]

National Institute for Health and Care Excellence (2012) Physical activity: walking and cycling (NICE public health guideline [PH41]) [Accessed 09 Jun 2021]

NHS Digital (2017) Health Survey for England, 2016 [Accessed 09 Jun 2021]

Public Health England (2014) Everybody active, every day: framework for physical activity [Accessed 09 Jun 2021]

Public Health England Health matters: physical activity – prevention and management of long-term conditions [Accessed 20 July 2021]

Public Health England (2019) Health matters: whole systems approach to obesity [Accessed 22 Jul 2021]

Public Health England Physical Activity [Accessed 23 Jun 2021]

Public Health England (2015) Physical activity: applying All Our Health [Accessed 09 Jun 2021]

Public Health England (2017) Spatial planning for health: evidence review Spatial planning for health: an evidence resource for planning and designing healthier places [Accessed 22 Jul 2021]

Sport England Active lives [Accessed 22 Jun 2021]

Sport England Moving Healthcare Professionals [Accessed 22 Jun 2021]

Smoking

Context

Tobacco smoking is the leading preventable cause of morbidity and premature mortality in the UK.[1] The health consequences of smoking are numerous and are estimated to cost the NHS approximately £2.6 billion a year.[2]

As well as lung cancer, COPD and cardiovascular disease, smoking causes diseases across the full spectrum of major organ systems and crosses almost all areas of medicine.[3] Tobacco smoke contains toxic substances that when inhaled are distributed to the rest of the body; these chemicals cause damage through mechanisms including DNA damage, inflammation and oxidative stress.[4]

Many chronic ocular conditions have been linked to smoking, including:

- age related macular degeneration (AMD)
- cataracts
- diabetic retinopathy (DR)
- retinal ischaemia
- anterior ischaemic optic neuropathy
- thyroid eye disease (TED)/ Grave's ophthalmopathy
- alcohol amblyopia

AMD is a common cause of severe visual impairment that is irreversible and often difficult to treat. Tobacco smokers have a 2 to 4 fold increase in risk for AMD when compared to individuals that have never smoked.[5] A systematic review estimates the relative risk of AMD in smokers is 1.86 (95% CI 1.27 to 2.73).[6] Stopping or avoiding smoking is therefore an essential part of managing this condition. A couple of laboratory

[1] NHS Digital Statistics on Smoking, England - 2019 [Accessed 12 May 2021]
[2] Public Health England (2017) Cost of smoking to the NHS in England: 2015 [Accessed 12 May 2021]
[3] Royal College of Physicians (2018) Hiding in plain sight: Treating tobacco dependency in the NHS [Accessed 12 May 2021]
[4] Centers for Disease Control and Prevention (US); National Center for Chronic Disease Prevention and Health Promotion (US); Office on Smoking and Health (US) (2010) How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease: A Report of the Surgeon General [Accessed 26 Jul 2021]
[5] Smith W, Assink J, Klein R and others (2001) Risk factors for age-related macular degeneration: Pooled findings from three continents Ophthalmology 108(4):697–704 [Accessed 12 May 2021]
[6] Chakravarthy U, Wong TY, Fletcher A and others (2010) Clinical risk factors for age-related macular degeneration: a systematic review and meta-analysis BMC Ophthalmol 10:31 [Accessed 12 May 2021]

studies have demonstrated that nicotine can stimulate angiogenesis, a pathogenic pathway associated with wet AMD.[7, 8, 9]

Cataracts are the main cause of reversible blindness worldwide. There is a well-established association between smoking and cataract formation. A systematic review of cohort studies estimates an odds ratio of 1.47 (95% CI 1.36 to 1.59) for the onset of cataracts among current smokers and 1.19 (95% CI 1.01 to1.41) in former smokers.[10] Importantly, smoking cessation results in a decreased risk of cataract formation.[11,12]

DR is also a leading cause of visual impairment linked to smoking. Smoking is a significant risk factor for developing DR in both type 1 and type 2 diabetics.[13,14] There is also a higher prevalence of smokers in more deprived areas, where multiple risk factors converge to potentially amplify risks of blindness from DR.

Grave's ophthalmopathy, an autoimmune inflammatory eye disorder also known as TED, is also linked to tobacco smoke, with cohort studies showing that people who smoke have over twice the risk of developing TED.[15]

Maternal smoking is a source of significant health inequality and it is associated with a number of ocular defects in unborn children including: astigmatism, anophthalmia, microphthalmia, strabismus and optic nerve hypoplasia.[16,17] Data from booking appointments show mothers in the most deprived decile to be almost 6 times more likely

[7] Lee J and Cooke JP (2012) Nicotine and Pathological Angiogenesis Life Sci 91(21-22):1058-64 [Accessed 28 Jul 2021]
[8] Suner IJ, Espinosa-Heidmann DE, Marin-Castano ME and others (2004) Nicotine increases size and severity of experimental choroidal neovascularization Invest Ophthalmol Vis Sci 45(1):311-7 [Accessed 28 Jul 2021]
[9] Pons M and Marin-Castano ME (2011) Nicotine Increases the VEGF/PEDF Ratio in Retinal Pigment Epithelium: A Possible Mechanism for CNV in Passive Smokers with AMD. Invest Ophthalmol Vis Sci 52(6): 3842–3853 [Accessed 28 Jul 2021]
[10] Ye J, He J, Wang C and others (2012) Smoking and Risk of Age-Related Cataract: A Meta-Analysis Invest Ophthalmol Vis Sci 53:3885–95 [Accessed 12 May 2021]
[11] Lindblad BE, Hakansson N and Wolk A (2014) Smoking Cessation and the Risk of Cataract: A Prospective Cohort Study of Cataract Extraction Among Men JAMA Ophthalmol 132(3):253-257 [Accessed 02 Jun 2021]
[12] Lindblad BE, Hakansson N, Svensson H and others (2005) Intensity of Smoking and Smoking Cessation in Relation to Risk of Cataract Extraction: A Prospective Study of Women Am J Epidemiol 162:73–9 [Accessed 02 Jun 2021]
[13]Hammes HP, Kerner W, Hofer S and others (2011) Diabetic retinopathy in type 1 diabetes-a contemporary analysis of 8,784 patients Diabetologia 54(8):1977-1984 [Accessed 02 Jun 2021]
[14] Zhong ZL, Han M and Chen S (2011) Risk factors associated with retinal neovascularization of diabetic retinopathy in type 2 diabetes mellitus International Journal of Ophthalmology 4(2):182-185 [Accessed 12 May 2021]
[15] Thornton J, Kelly S, Harrison R and others (2007) Cigarette smoking and thyroid eye disease: a systematic review Eye 21:1135–1145 [Accessed 12 May 2021]
[16] Hackshaw A, Rodeck C and Boniface S (2011) Maternal smoking in pregnancy and birth defects: a systematic review based on 173 687 malformed cases and 11.7 million controls Human reproduction update 17(5):589-604 [Accessed 12 May 2021]
[17] Pueyo V, Güerri N, Oros D and others (2011) Effects of smoking during pregnancy on the optic nerve neurodevelopment Early human development 87(5):331-4 [Accessed 12 May 2021]

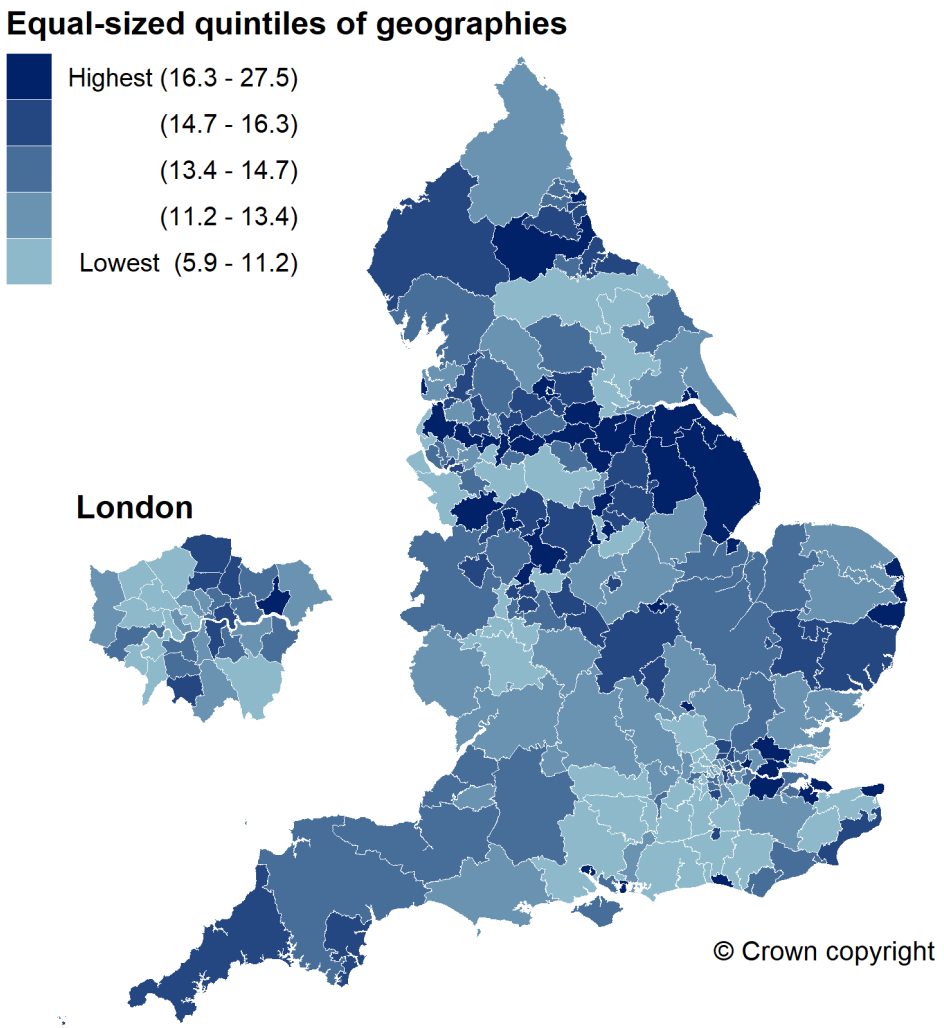
to actively smoke than those in the least deprived decile (24.7% compared to 4.1%).[18] This further exacerbates eye health inequalities.

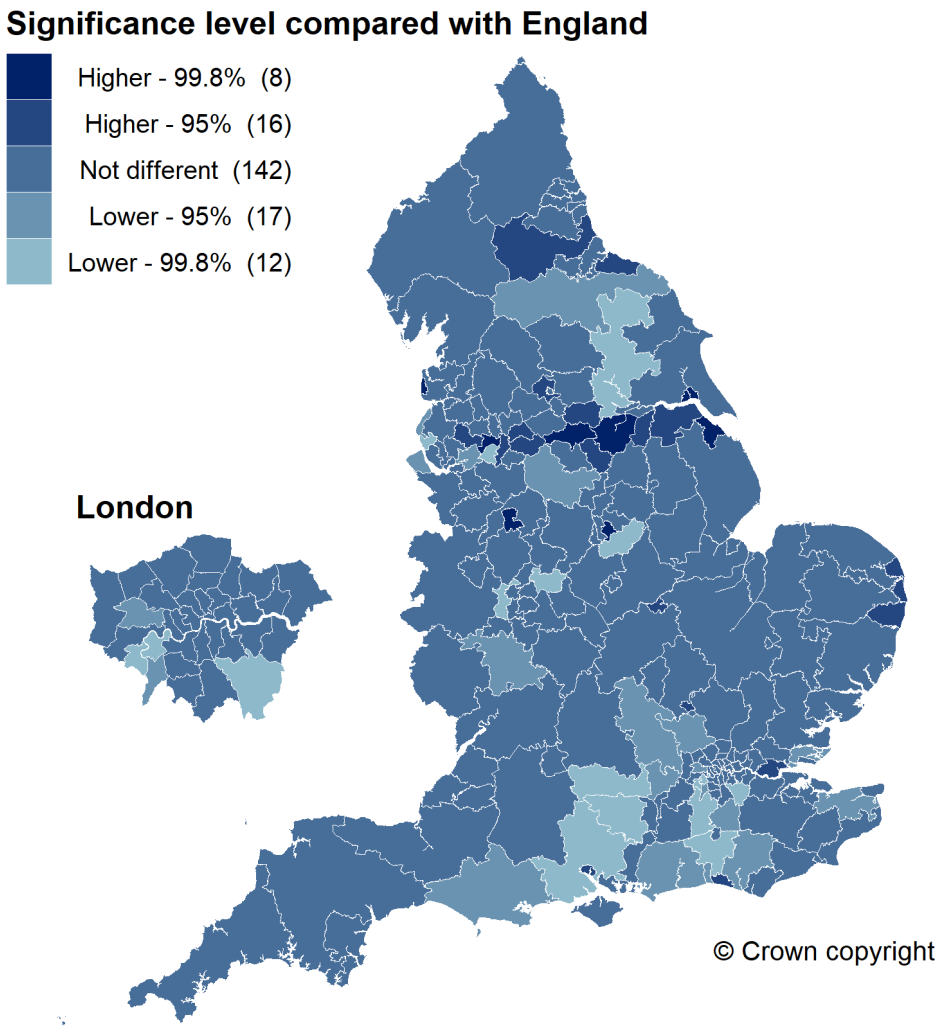
Smoking is the leading avoidable cause of death, disability and social inequalities in health within the UK. As such, the Royal College of Physicians state that smoking prevention and cessation should therefore be the highest priority in medicine.[3]

[18] Public Health England (2019) Health of women before and during pregnancy: health behaviours, risk factors and inequalities [Accessed 12 May 2021]

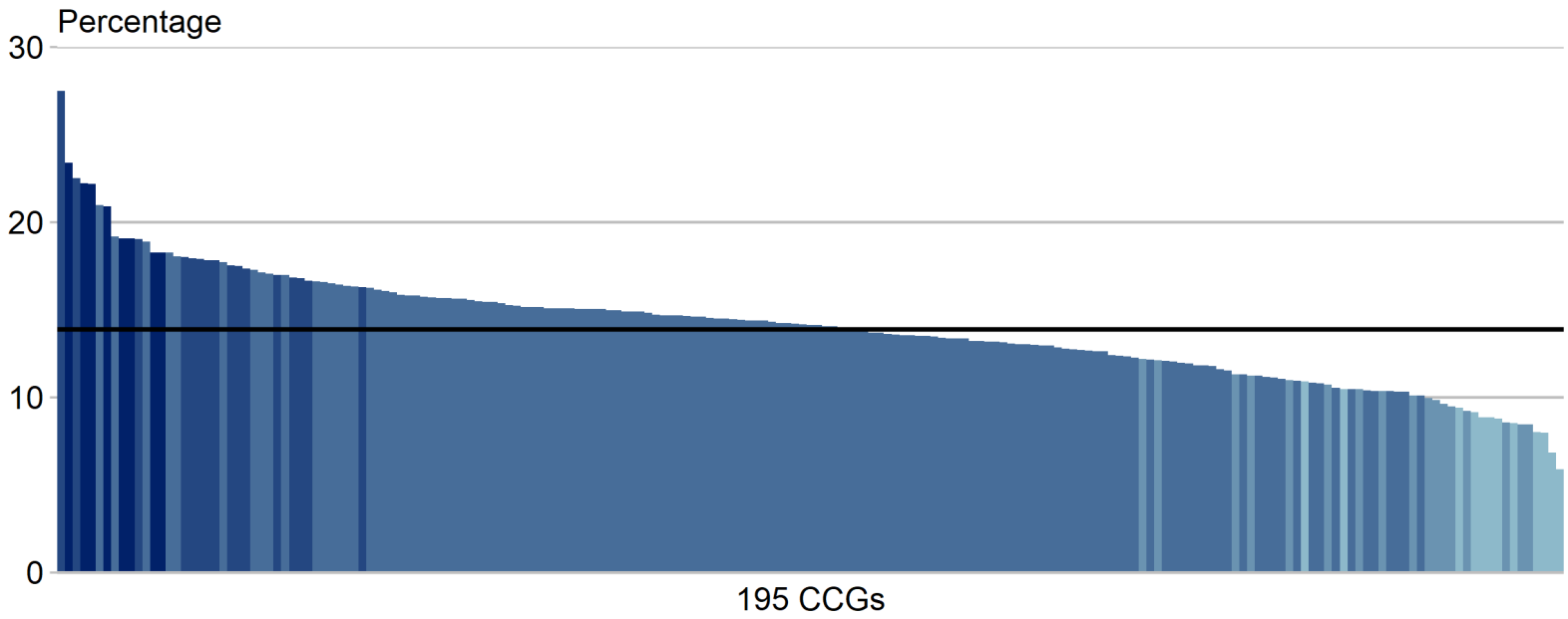
Map 14a: Variation in percentage of people aged 18 years and over self-reporting as smokers by clinical commissioning group (2019)

Optimum value: Low

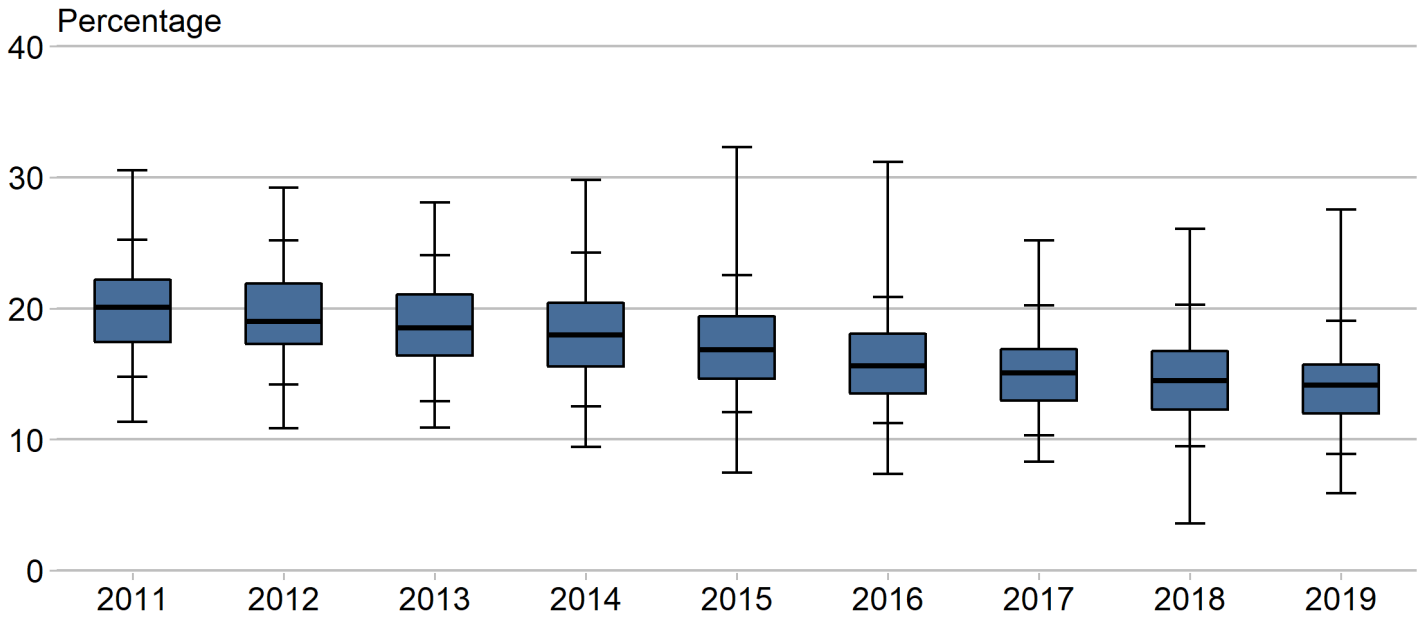




Column chart: Variation in percentage of people aged 18 years and over self-reporting as smokers by CCG (2019)



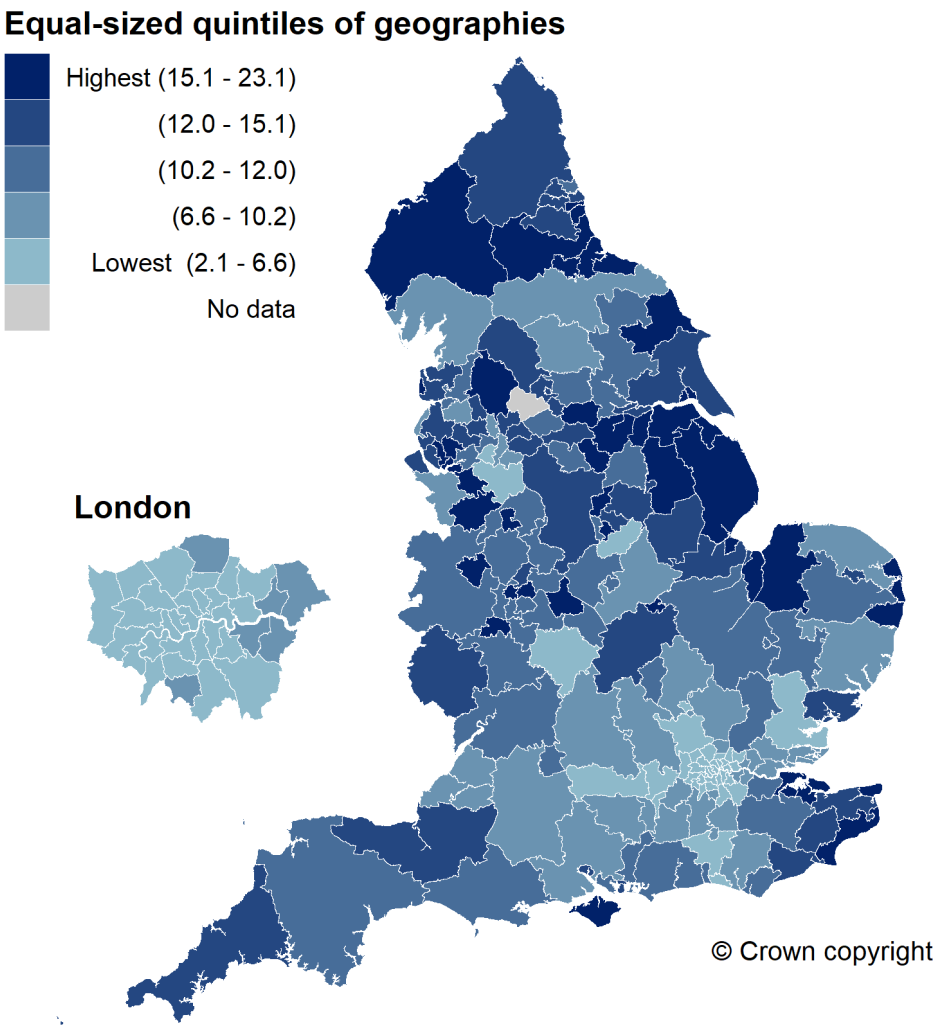
Box plot time series: Variation in percentage of people aged 18 years and over self-reporting as smokers by CCG (2011 to 2019)

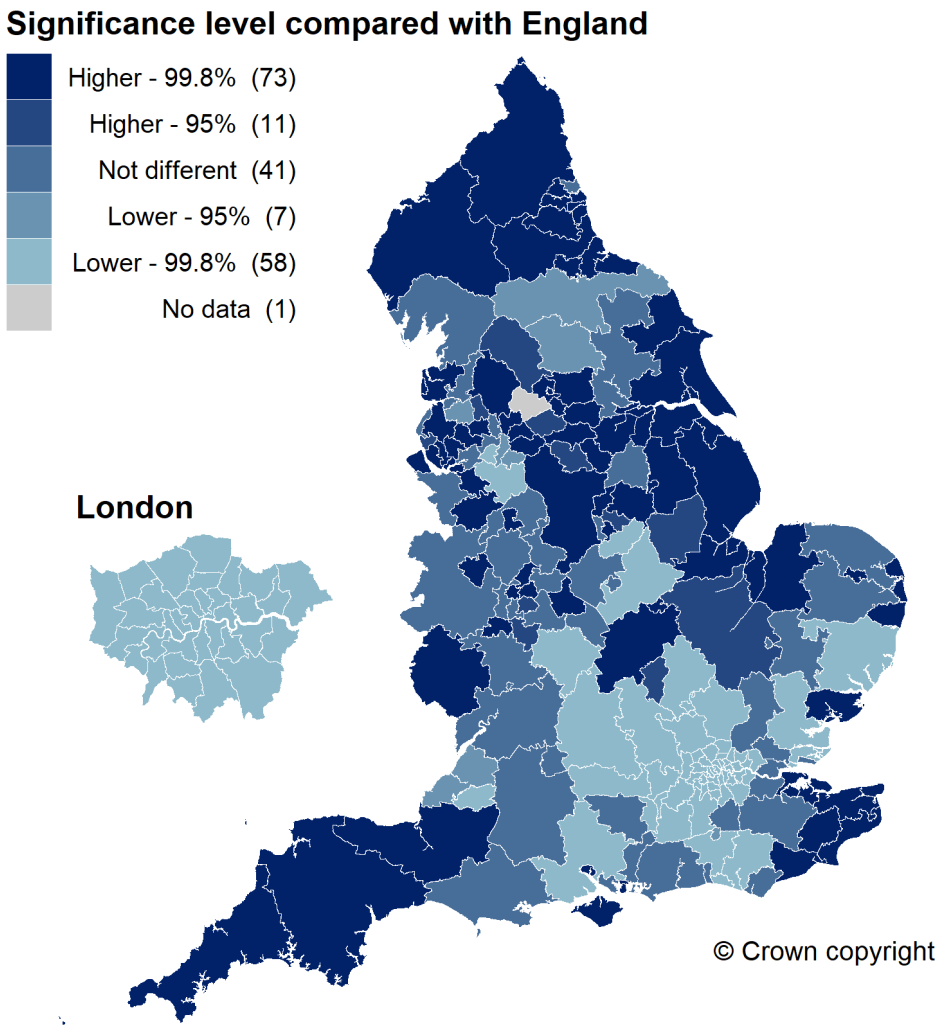


Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Max-Min (Range)	19.2	18.4	17.2	20.4	24.8	23.8	16.9	22.5	21.6	No significant change
75th-25th percentile	4.8	4.6	4.6	4.9	4.7	4.6	3.9	4.5	3.7	NARROWING Significant
95th-5th percentile	10.4	11.0	11.1	11.7	10.5	9.7	9.9	10.8	10.2	No significant change
Median	20.1	19.0	18.5	17.9	16.9	15.6	15.1	14.5	14.1	DECREASING Significant

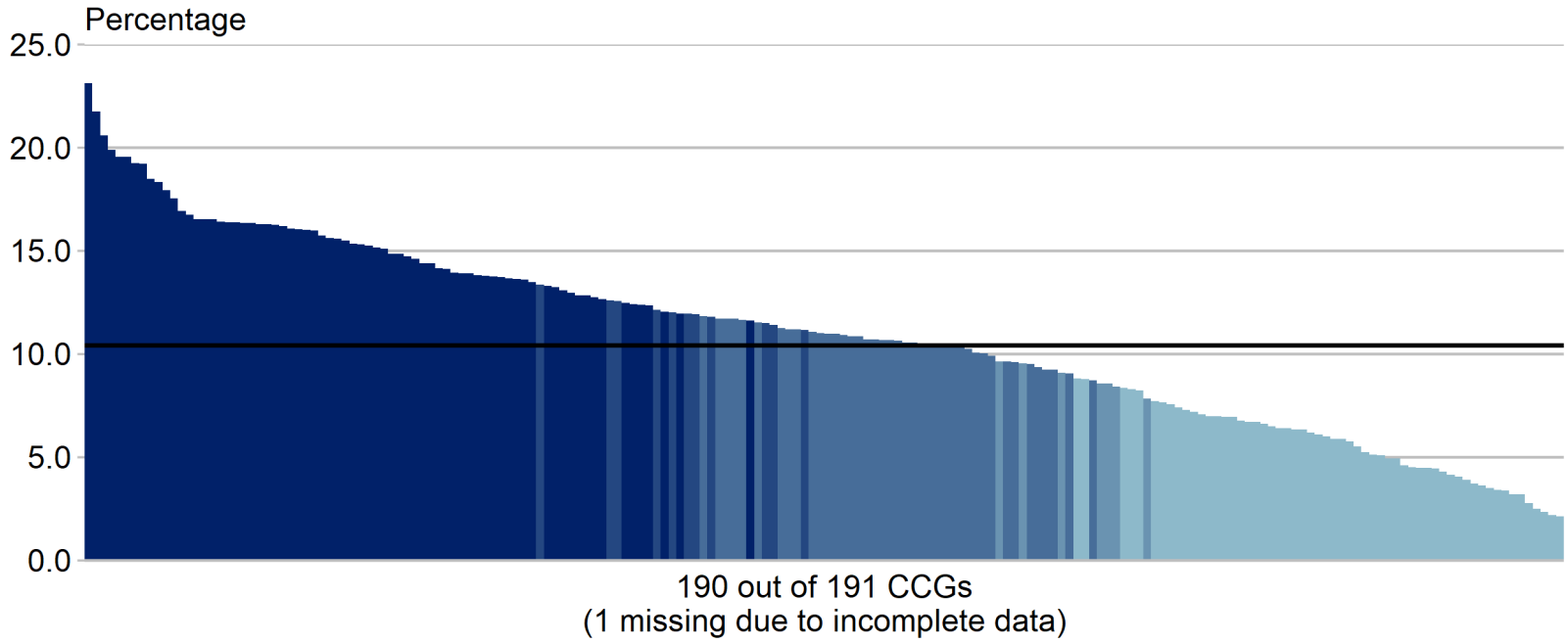
Map 14b: Variation in percentage of women who are known to smoke at time of delivery by clinical commissioning group (2019/20)

Optimum value: Low

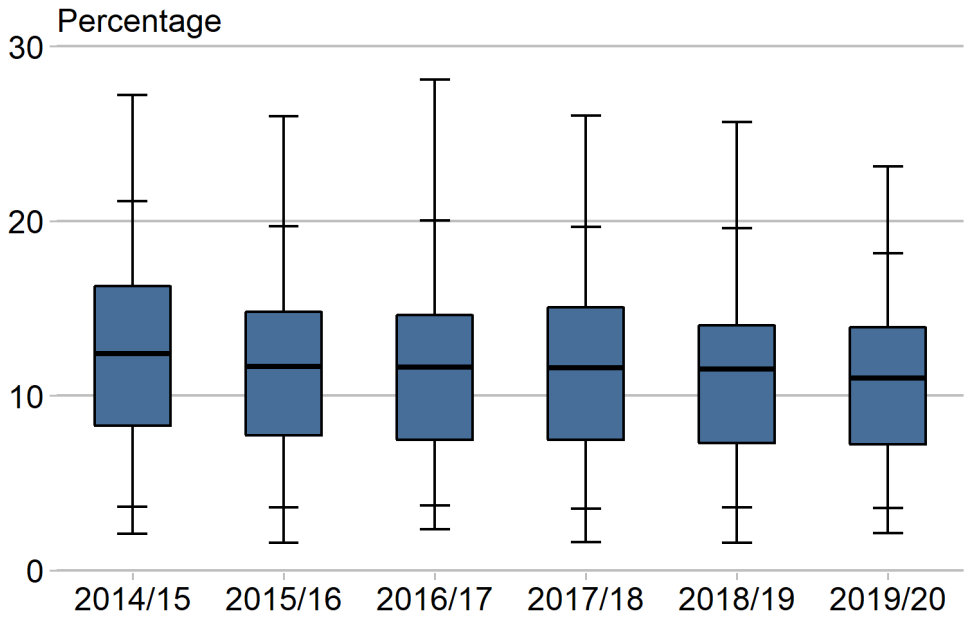




Column chart: Variation in percentage of women who are known to smoke at time of delivery by CCG (2019/20)



Box plot time series: Variation in percentage of women who are known to smoke at time of delivery by CCG (2014/15 to 2019/20)



Year	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	25.1	24.4	25.8	24.4	24.1	21.0	No significant change
75th-25th percentile	8.0	7.1	7.1	7.6	6.7	6.7	No significant change
95th-5th percentile	17.5	16.1	16.3	16.1	16.0	14.6	NARROWING Significant
Median	12.4	11.7	11.6	11.6	11.5	11.0	DECREASING Significant

Magnitude of Variation

Map 14a: Variation in percentage of people aged 18 years and over self-reporting as smokers by clinical commissioning group

The maps and column chart display the latest period (2019), during which clinical commissioning group (CCG) values ranged from 5.9% to 27.5%, which is a 4.7-fold difference between CCGs.

The England value for 2019 was 13.9%.

The box plot shows the distribution of CCG values for the period 2011 to 2019.

The 75th to 25th percentile gap narrowed significantly.

The median decreased significantly from 20.1% in 2011 to 14.1% in 2019.

Map 14b: Variation in percentage of women who are known to smoke at time of delivery by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 2.1% to 23.1%, which is a 10.8-fold difference between CCGs.

The England value for 2019/20 was 10.4%.

The box plot shows the distribution of CCG values for the period 2014/15 to 2019/20.

The 95th to 5th percentile gap narrowed significantly.

The median decreased significantly from 12.4% in 2014/15 to 11.0% in 2019/20.

Smoking prevalence in England has declined year on year since 2011 and is now at a record low. However, it is clear that inequalities still exist with a vast 10.8-fold difference in prevalence between CCGs for women who are known to smoke at time of delivery and a large 4.7-fold difference for adults self-reporting as smokers

Health inequalities vastly influence the prevalence of smoking across England. Key factors include socioeconomic status, education attainment, ethnicity and mental health. Given the extensive adverse health outcomes associated with smoking, this variation renders further differences in morbidity and mortality rates across England. In turn, smoking is the most significant driver of health inequalities.

Smoking is much more common in low socioeconomic groups. It is also harder to tackle in such groups due to the societal and cultural affiliation; the activity is passed through generations and reinforced by role models who may smoke. Access to tobacco is also increased in such environments, triggering young people to become regular life long smokers.

Whilst inter CCG variation in smoking is inextricably linked to health inequalities and socioeconomic deprivation, variations within CCGs also exist due to higher rates amongst people with mental health conditions and lesbian, gay, bisexual and trans (LGBT) people.

Options for action

To reduce this variation across England and within local communities, there is a need to identify those communities at greatest risk and curate measures that target and positively impact these higher prevalence groups.

Education and early intervention are crucial for engendering a smoke free generation. Training professionals on smoking cessation is particularly important for the successful treatment of tobacco dependence.

Extensive evidence exists on smoking cessation. In conjunction with cessation advice, behavioural support, pharmacotherapies and the use of nicotine replacement are all effective, especially in combination.

The challenge is therefore not due to a lack of effective management options, but in encouraging access by smokers and promoting these services.

There is extensive NICE guidance on smoking cessation which covers the following recommendations:

- identify and prioritise groups at high risk of tobacco related harm
- campaigns to promote awareness of local stop smoking services
- engage with people who smoke
    - opportunistic interviewing and advise in a way that is sensitive to their preferences and needs
    - encourage people being referred for elective surgery to stop smoking before their operation

- ensure the following evidence-based interventions are available for adult smokers:
    - behavioural support
    - bupropion
    - nicotine replacement therapy

    - varenicline
- set targets for stop smoking services
    - treating at least 5% of the local population who smoke each year
    - achieving a successful quit rate of at least 35% at 4 weeks (confirmed by carbon monoxide monitoring of exhaled breath)

- education for persons not ready to quit smoking
    - ensure they understand stopping smoking reduces the risk of smoking-related illnesses
    - encouraging adopting a harm reduction approach[19]

Resources

Department of Health and Social Care (2018) Tobacco control plan: delivery plan 2017 to 2022 [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2013) Smoking: acute, maternity and mental health services (NICE Public health guideline [PH48]) [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2013) Smoking: harm reduction (NICE Public health guideline [PH45]) [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2010) Smoking prevention in schools (NICE Public health guideline [PH23]) [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2008, updated 2014) Smoking: preventing uptake in children and young people (Public health guidance [PH14] [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2010) Smoking: stopping in pregnancy and after childbirth (NICE Public health guideline [PH26]) [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2007) Smoking: workplace interventions (NICE Public health guideline (PH5]) [Accessed 12 May 2021]

National Institute for Health and Care Excellence (2018) Stop smoking interventions and services (NICE guideline [NG92]) [Accessed 12 May 2021]

[19] National Institute for Health and Care Excellence (2013) Smoking: harm reduction (NICE Public health guideline [PH45]) [Accessed 12 May 2021]

Preterm Birth

Context

Preterm is defined by the World Health Organization (WHO) as babies born alive before 37 weeks' gestation.[1] Preterm is further subcategorised into moderately preterm (32 to 37 weeks' gestation), very preterm (28 to 32 weeks' gestation) and extremely preterm (before 28 weeks).[1] Worldwide around 10% of babies are born prematurely and premature birth is the leading cause of death in those under the age of 5.[1,2] In England and Wales approximately 1.3% of infants per year are born very or extremely preterm.[3] Children born prematurely may face lifelong problems such as physical or learning disability, hearing problems[4] and visual abnormalities.[5]

In the UK, the commonest cause of reduced vision in children is amblyopia secondary to refractive error or strabismus.[6] These are all conditions that disproportionately affect premature children[7], who are particularly susceptible to visual and ophthalmic problems, as the development of normal visual function depends on the perfectly coordinated timing and interaction of extremely complex processes.[8] Around 3% of children born prematurely experience visual impairment of which one-third were blind.[9] This blindness is frequently due to either retinopathy of prematurity (ROP), cerebral visual impairment or optic nerve disorders.[10,11] ROP is of particular interest as the resultant blindness is avoidable if identified and treated early.[12]

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[1] World Health Organization (2018) WHO: Preterm birth fact sheets [Accessed 23 Nov 2020]
[2] Lawn JE, Kinney MV, Belizan JM, and others (2013) Born too soon: accelerating actions for prevention and care of 15 million newborns born too soon Reprod Health 2013;10 Suppl 1:S6 [Accessed 23 Nov 2020]
[3] Office for National Statistics (7 December 2020) Provisional births in England and Wales: 2020 [Accessed 22 Jun 2021]
[4] Wroblewska-Seniuk K, Greczka G, Dabrowski P and others (2017) Hearing impairment in premature newborns-Analysis based on the national hearing screening database in Poland PloS one 12(9), e0184359 [Accessed 20 Jul 2021]
[5] Pétursdóttir D, Holmström G, and Larsson E (2020) Visual function is reduced in young adults formerly born prematurely: a population-based study Br J Ophthalmol 104(4), 541–546 [Accessed 20 Jul 2021]
[6] Williams C, Northstone K, Howard M, and others (2008) Prevalence and risk factors for common vision problems in children: data from the ALSPAC study Br J Ophthalmol 2008 Jul; 92(7):959–64 [Accessed 23 Nov 2020]
[7] Birch EE, O'Connor AR (2001) Preterm birth and visual development Semin Neonatol 2001 Dec;6(6):487–97 [Accessed 23 Nov 2020]
[8] Pueyo V, González I, Altemir I and others (2015) Microstructural changes in the retina related to prematurity Am J Ophthalmol Apr;159(4):797–802 [Accessed 23 Nov 2020]
[9] Holmström GE, Källen K, Hellström A and others (2014) Ophthalmologic outcome at 30 months' corrected age of a prospective Swedish cohort of children born before 27 weeks of gestation: the extremely preterm infants in Sweden study JAMA Ophthalmol 2014 Feb;132(2):182–9 [Accessed 23 Nov 2020]
[10] Solebo AL, Rahi J (2014) Epidemiology, aetiology and management of visual impairment in children Arch Dis Child 2014 Apr 1 [cited 2014 Sep 9];99(4):375–9 [Accessed 23 Nov 2020]
[11] Kong L, Fry M, Al-Samarraie M and others (2012) An update on progress and the changing epidemiology of causes of childhood blindness worldwide J AAPOS 2012 Dec [cited 2014 Sep 9];16(6):501–7 [Accessed 23 Nov 2020]
[12] Gilbert C, Muhit M (2008) Twenty years of childhood blindness: what have we learnt? Community eye Heal 2008 Sep;21(67):46–7 [Accessed 23 Nov 2020]

ROP is a potentially sight impairing proliferative retinal vascular disease affecting low birthweight neonates and those born before 32 weeks. An international classification exists based on the principle that disease severity relates to the amount of retinal vascular tissue involved and how posterior the disease location.[13,14] Early treatment is key to short and long-term visual outcomes.[15] Current good practice should ensure the availability of timely assessment and management of preterm babies as recommended by the Royal College of Ophthalmologists.[16] Around 14% of infants screened require treatment through dense peripheral retinal ablation, the aim of which is to prevent progression and reversing the growth of abnormal vessels. Originally cryotherapy was used, but current UK guidelines are based on use of laser therapy. Those born earliest are most affected[17] and around 10% of children treated require repeat treatments.[18] In recent years anti-vascular endothelial growth factor (anti-VEGF) have been approved for use in ROP treatment, however the safety and efficacy of mono-therapy or a combination of anti-VEGF and laser treatment remains uncertain particularly in terms of disease recurrence and potential extra-ocular side effects due to systemic absorption.[19]

Table 15.1 illustrates that failure to meet ROP screening timescales in over 10% of cases occurred in 11% of neonatal intensive care units, 12% of local neonatal units and 17% of special care units. Table 15.2 presents the number of eligible babies meeting the 2008 ROP screening criteria by type of unit. Neonatal intensive care units (NICU) experience the highest numbers of eligible babies closely followed by local neonatal units (LNU).

[13] International Committee for the Classification of Retinopathy of Prematurity (2005) The International Classification of Retinopathy of Prematurity revisited Arch Ophthalmol (Chicago, Ill 1960) 2005 Jul;123(7):991–9 [Accessed 23 Nov 2020]
[14] Committee for the Classification of Retinopathy of Prematurity (1984) An international classification of retinopathy of prematurity Arch Ophthalmol (Chicago, Ill 1960)1984 Aug;102(8):1130–4 [Accessed 23 Nov 2020]
[15] Good WV (2004) Early Treatment for Retinopathy of Prematurity Cooperative Group (2004) Final results of the Early Treatment for Retinopathy of Prematurity (ETROP) randomized trial Trans Am Ophthalmol Soc 2004;102:233–48; discussion 248-50 [Accessed 23 Nov 2020]
[16] Royal College of Ophthalmologists & Royal College of Paediatrics and Child Health (2008) Guideline for the Screening and treatment of retinopathy of Prematurity [Accessed 23 Nov 2020]
[17] Tavassoli S, Wach R, Haynes R and others (2019) Estimate of incidence of ROP requiring treatment in extreme preterms and impact on service-7 year review in tertiary unit Eye (Lond) 2019;33(5):845–9 [Accessed 23 Nov 2020]
[18] Adams GG, Bunce C, Xing W and others (2018) Retinopathy of prematurity in the United Kingdom: retreatment rates, visual and structural 1-year outcomes Eye (Lond) 2018;32(11):1752–9 [Accessed 23 Nov 2020]
[19] Sankar MJ, Sankar J, Chandra P (2018) Anti-vascular endothelial growth factor (VEGF) drugs for treatment of retinopathy of prematurity Cochrane database Syst Rev 2018;1:CD009734 [Accessed 23 Nov 2020]

Table 15.1: Number of Neonatal / Special Care Baby units by percentage band 2019[20]

Type of unit		100%	90.0% to 99.9%	50.0% to 89.9%	Total units
NICU	Neonatal Intensive Care Unit	9	30	5	**44**
LNU	Local Neonatal Unit	31	36	9	**76**
SCU	Special Care Unit	20	9	6	**35**
All units		**60**	**75**	**20**	**155**

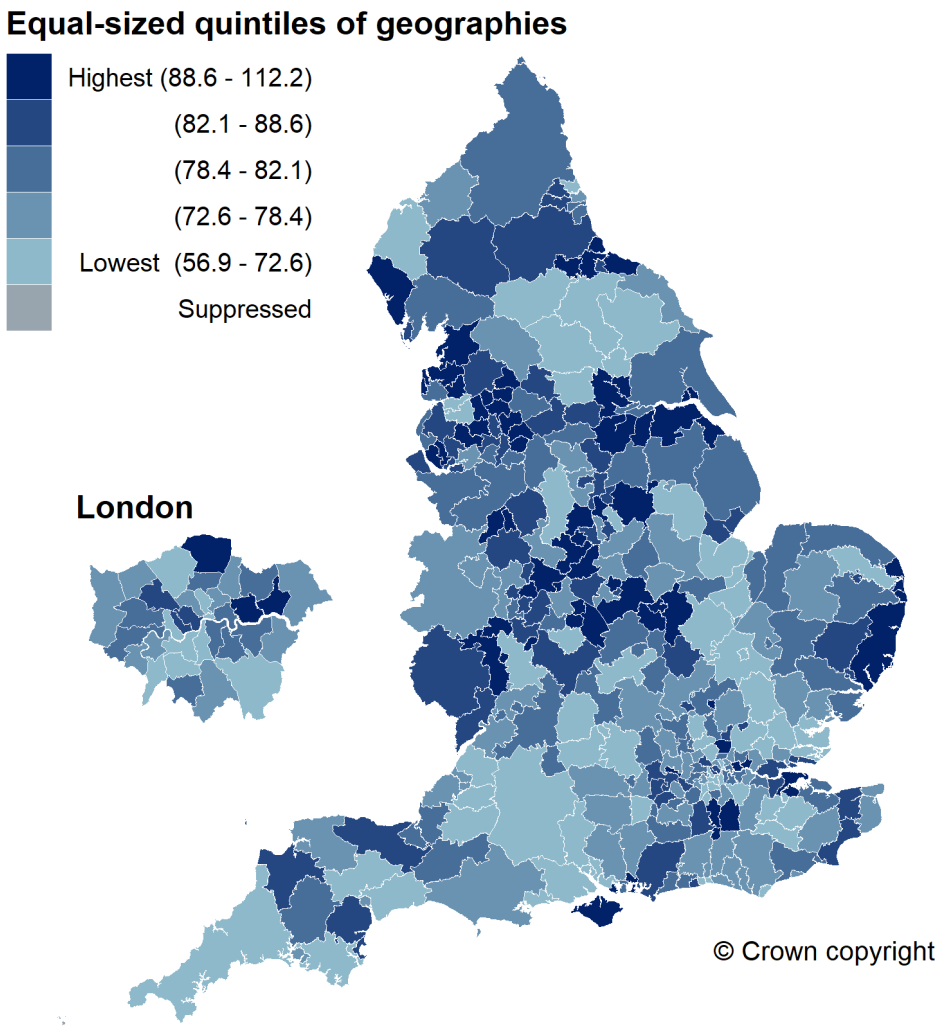
Table 15.2: Number of eligible babies by type of Neonatal / Special care baby unit 2019[20]

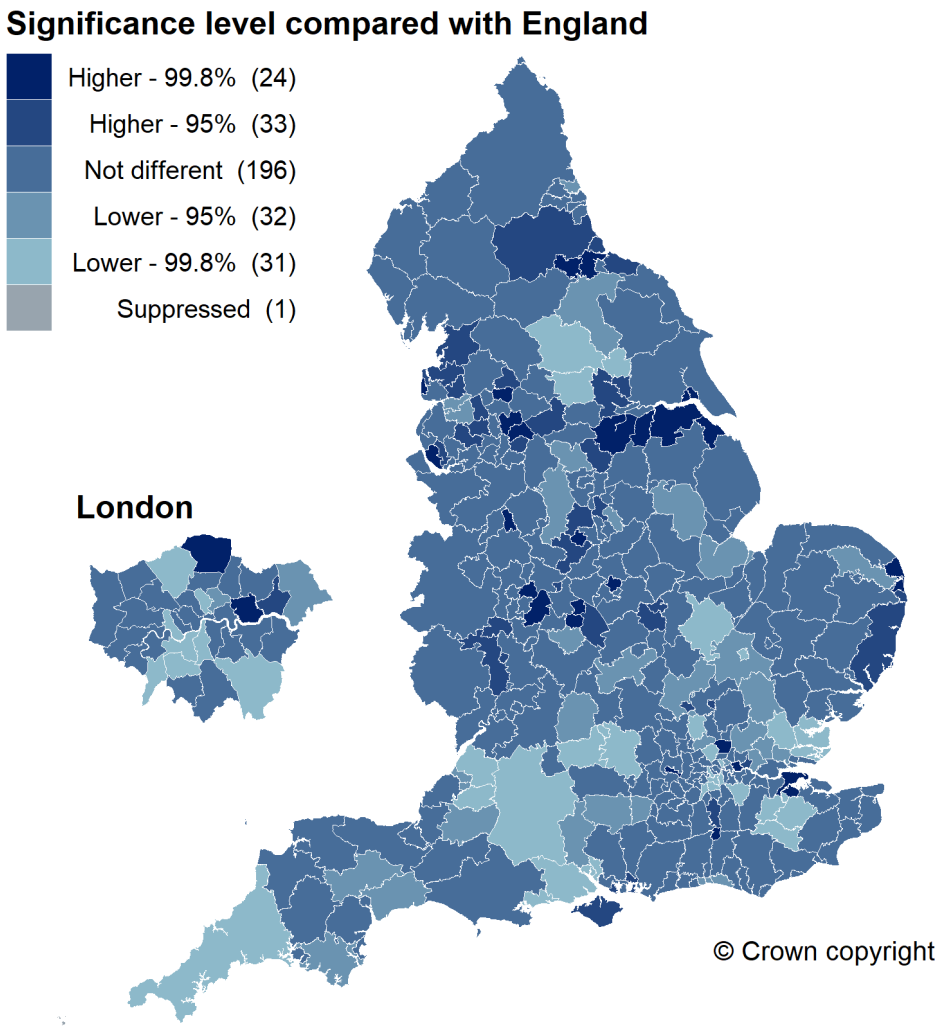
Type of unit		Number of eligible babies
NICU	Neonatal Intensive Care Unit	3,734
LNU	Local Neonatal Unit	3,078
SCU	Special Care Unit	639
All units		**7,451**

[20] Healthcare Quality Improvement Partnership (HQIP) Royal College of Paediatrics and Child Health (RCPCH) National Neonatal Audit Programme (NNAP) online [Accessed 09 Aug 2021]

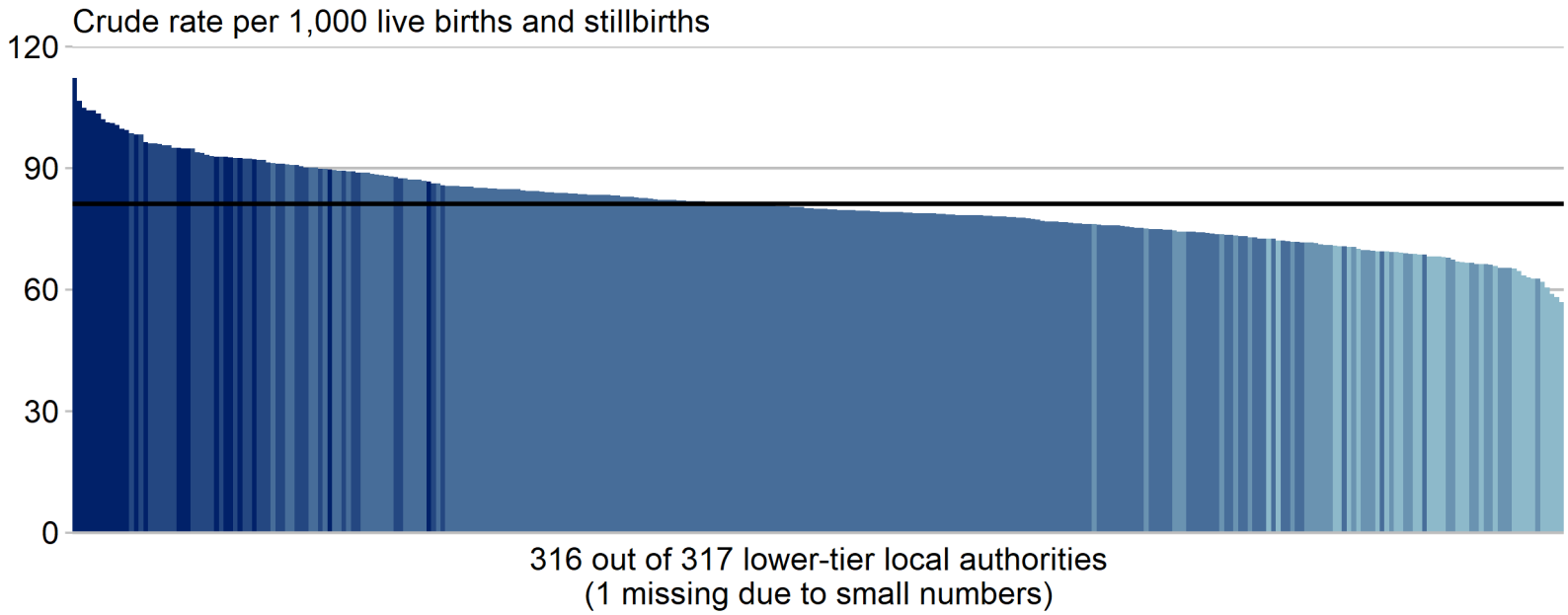
Map 15a: Variation in rate of premature live births (less than 37 weeks gestation) and all stillbirths by lower-tier local authority (2016-18)

Crude rate per 1,000 live births and stillbirths
Optimum value: Low

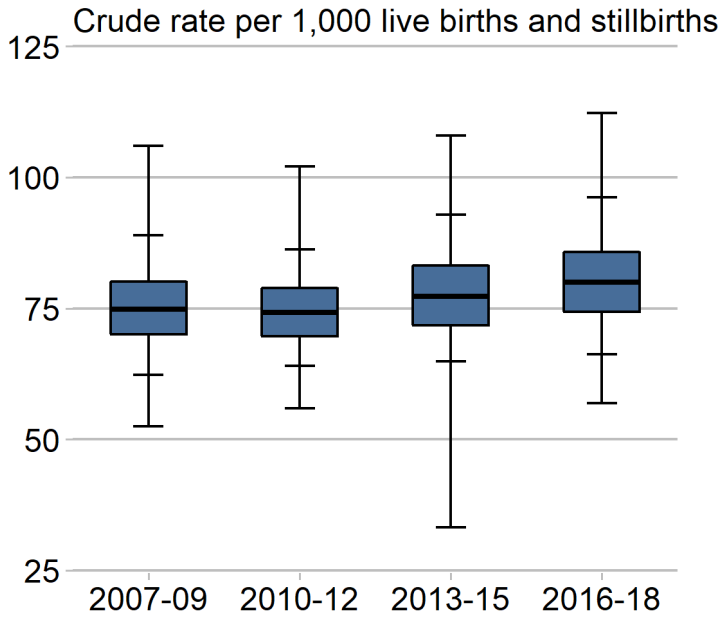




Column chart: Variation in rate of premature live births (less than 37 weeks gestation) and all stillbirths by lower-tier local authority (2016-18)



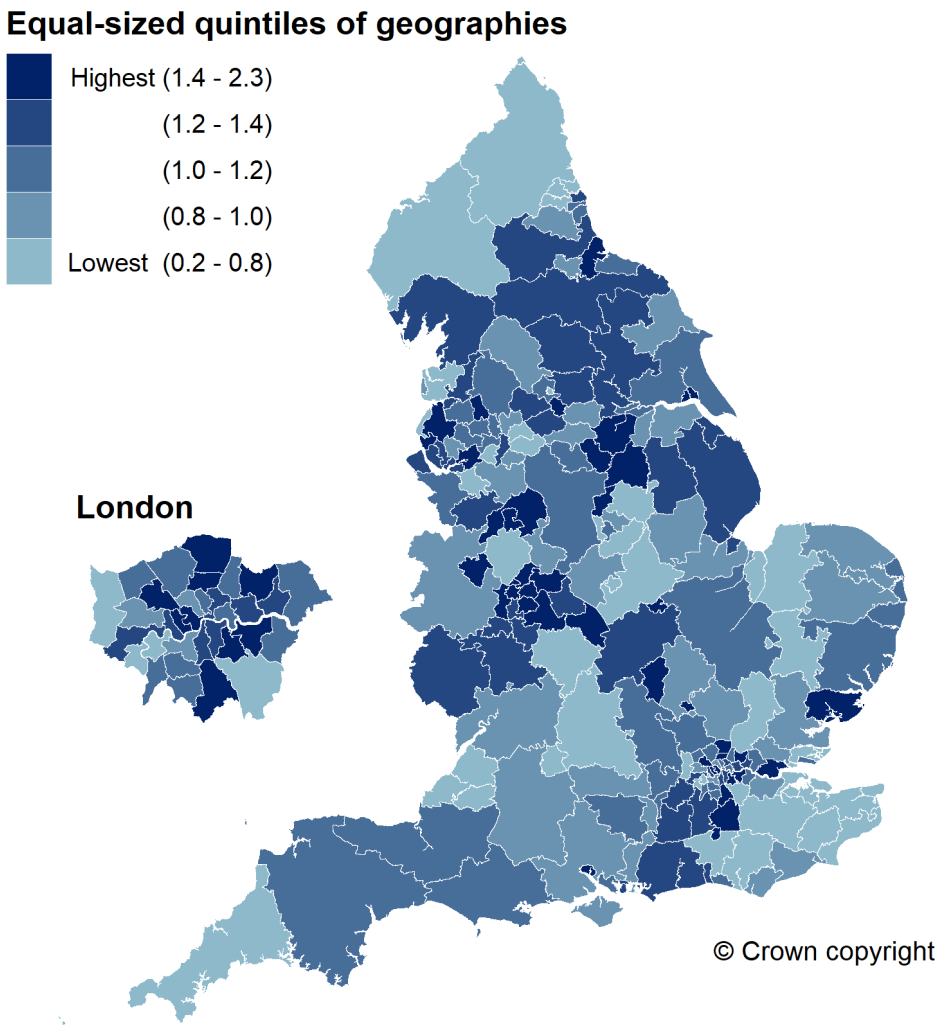
Box plot time series: Variation in rate of premature live births (less than 37 weeks gestation) and all stillbirths by lower-tier local authority (2007-09 to 2016-18)

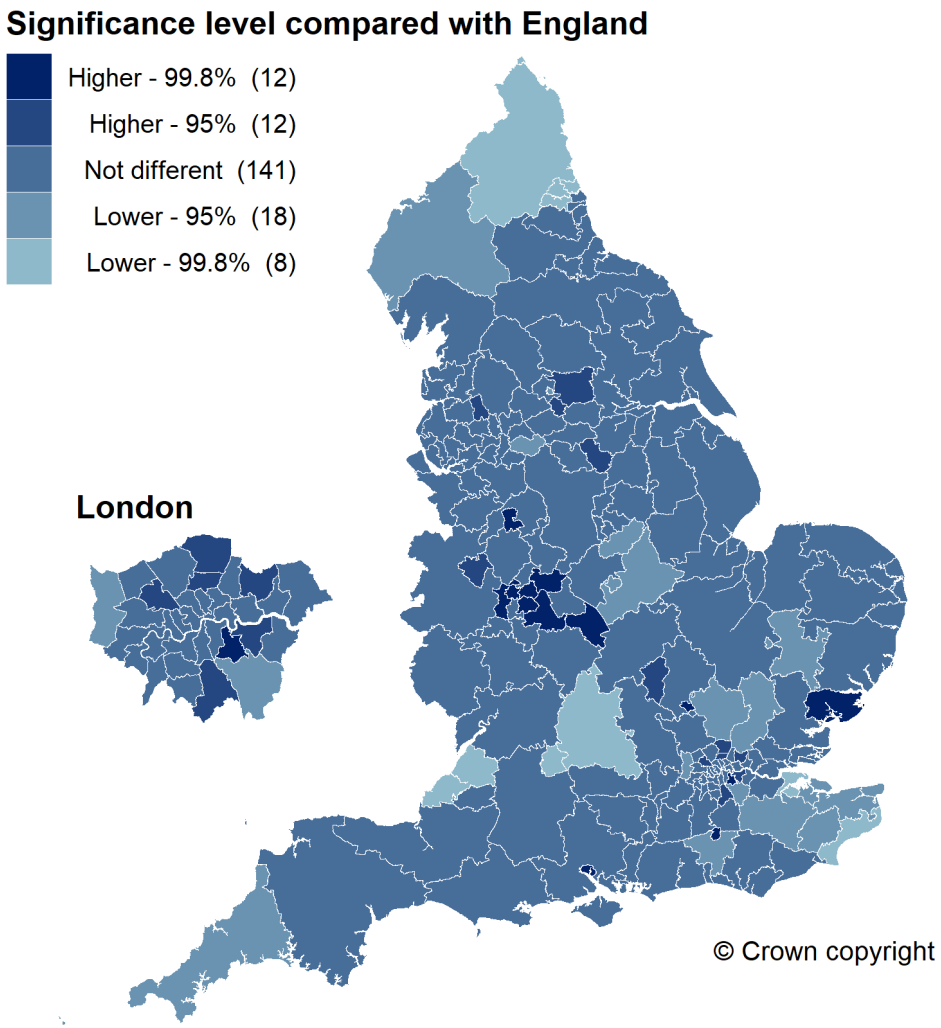


Year	2007-09	2010-12	2013-15	2016-18	
Max-Min (Range)	53.5	46.1	74.7	55.4	No significant change
75th-25th percentile	10.0	9.1	11.4	11.4	No significant change
95th-5th percentile	26.6	22.3	28.0	29.9	No significant change
Median	74.8	74.2	77.3	80.0	No significant change

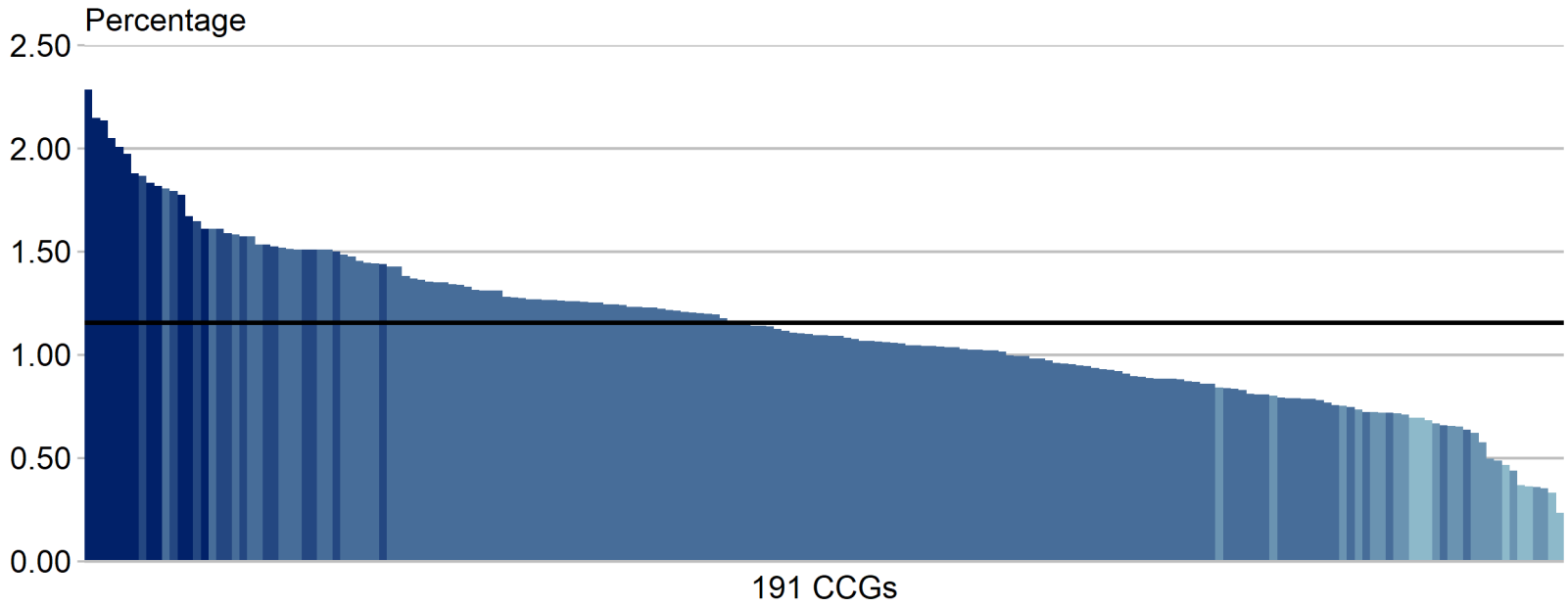
Map 15b: Variation in percentage of all births (live and stillbirths) with very low weight (under 1,500g) by clinical commissioning group (2018)

Optimum value: Low

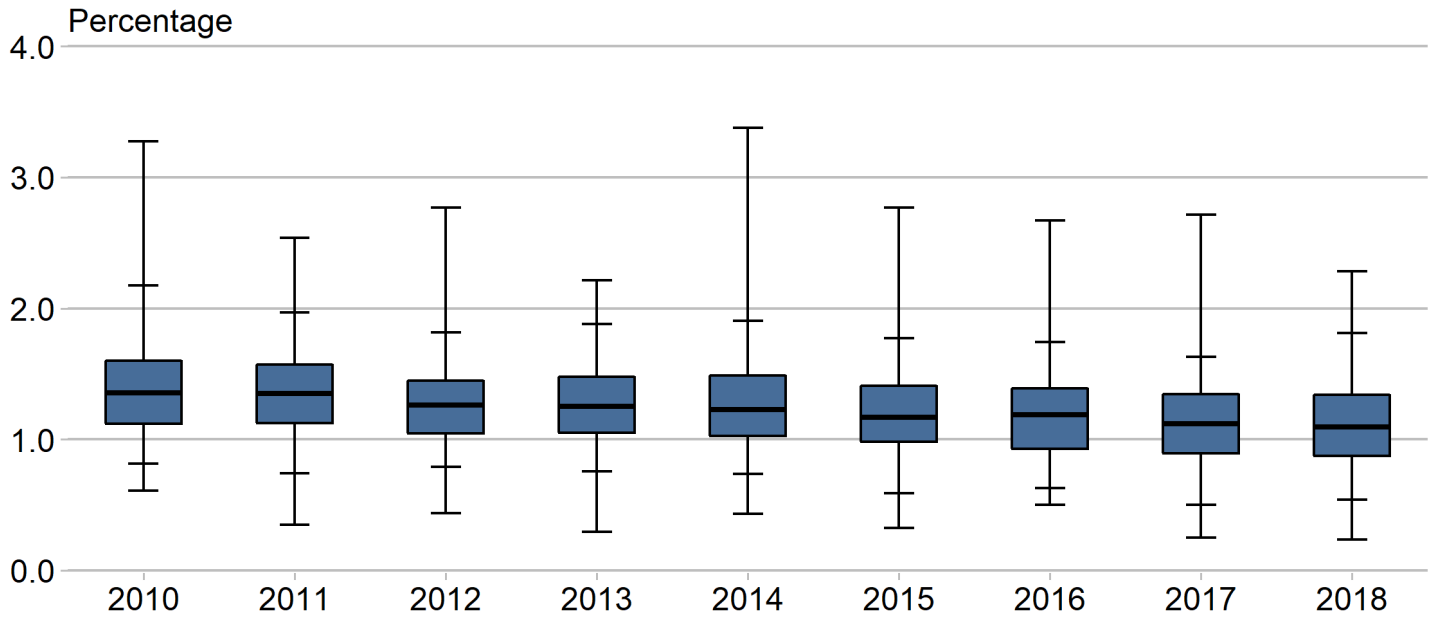




Column chart: Variation in percentage of all births (live and stillbirths) with very low weight (under 1,500g) by CCG (2018)



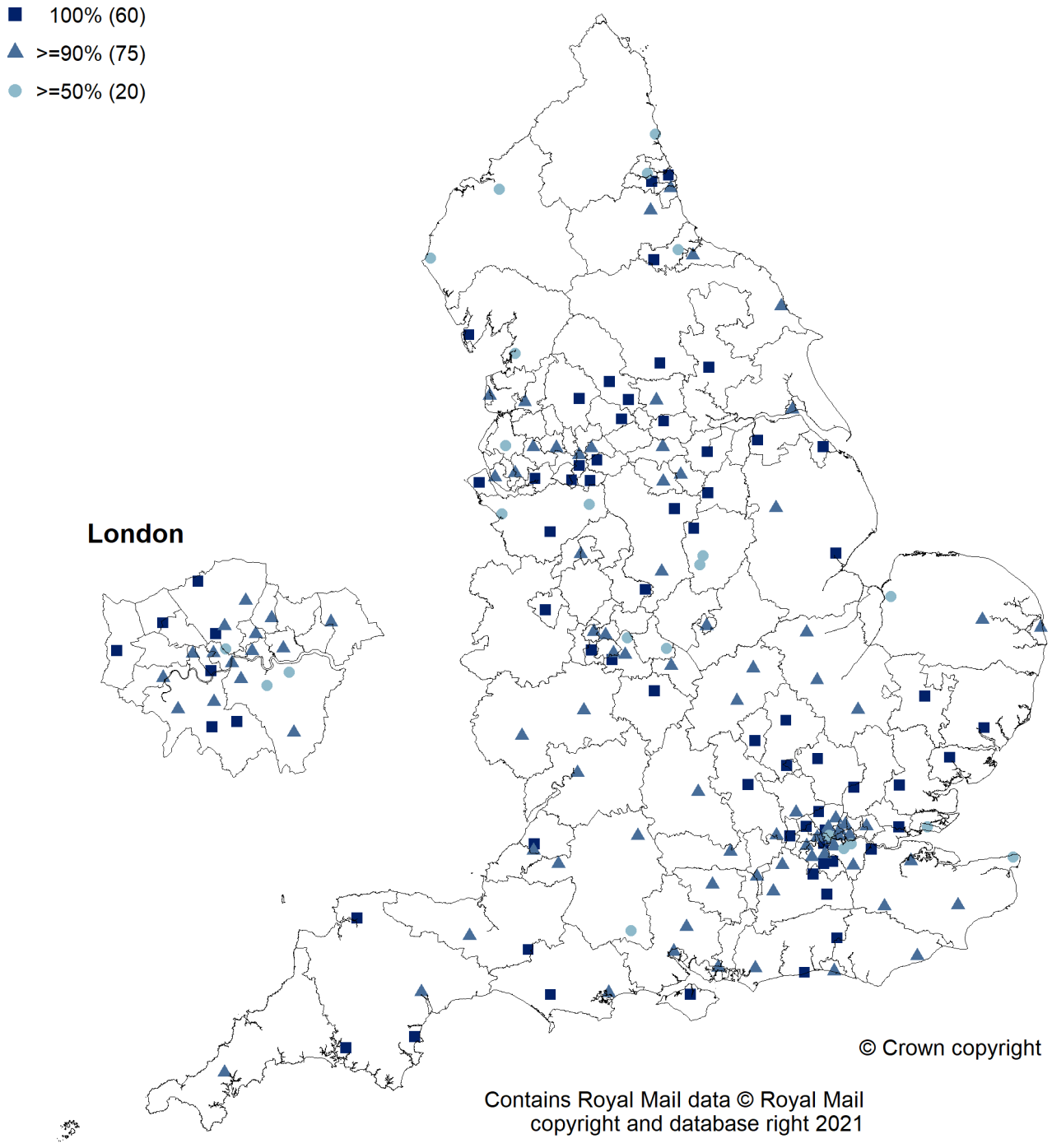
Box plot time series: Variation in percentage of all births (live and stillbirths) with very low weight (under 1,500g) by CCG (2010 to 2018)



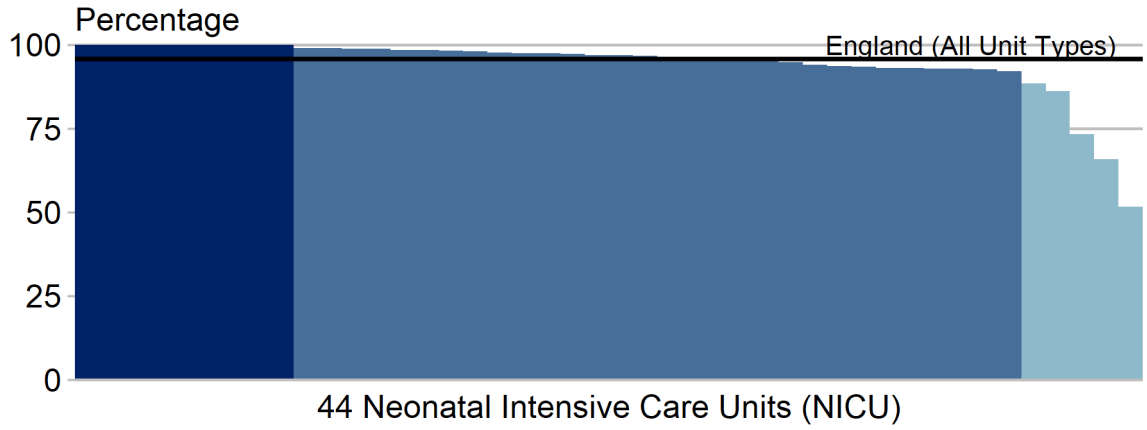
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Max-Min (Range)	2.7	2.2	2.3	1.9	2.9	2.4	2.2	2.5	2.0	No significant change
75th-25th percentile	0.5	0.4	0.4	0.4	0.5	0.4	0.5	0.4	0.5	No significant change
95th-5th percentile	1.4	1.2	1.0	1.1	1.2	1.2	1.1	1.1	1.3	No significant change
Median	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.1	DECREASING Significant

Map 15c: Variation in percentage of eligible babies screened on-time for retinopathy of prematurity (ROP) by hospital unit (2019)

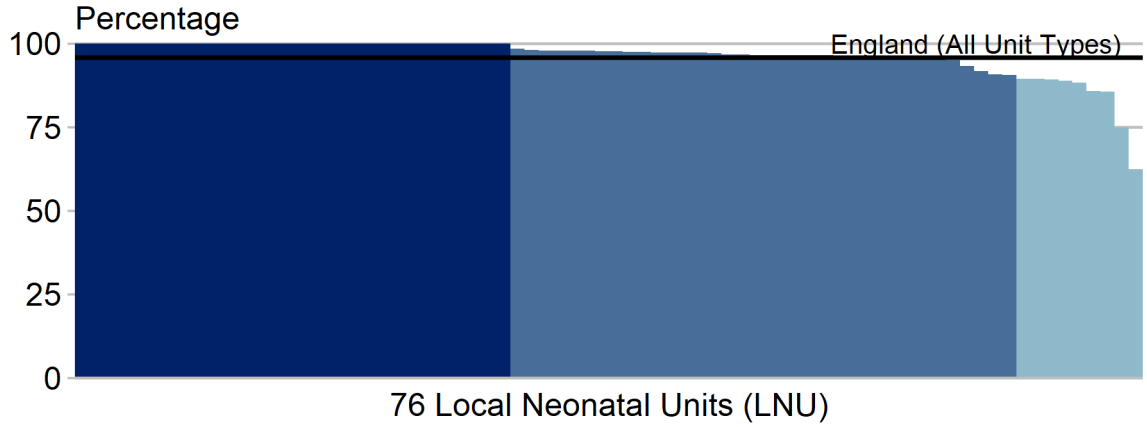
Optimum value: High



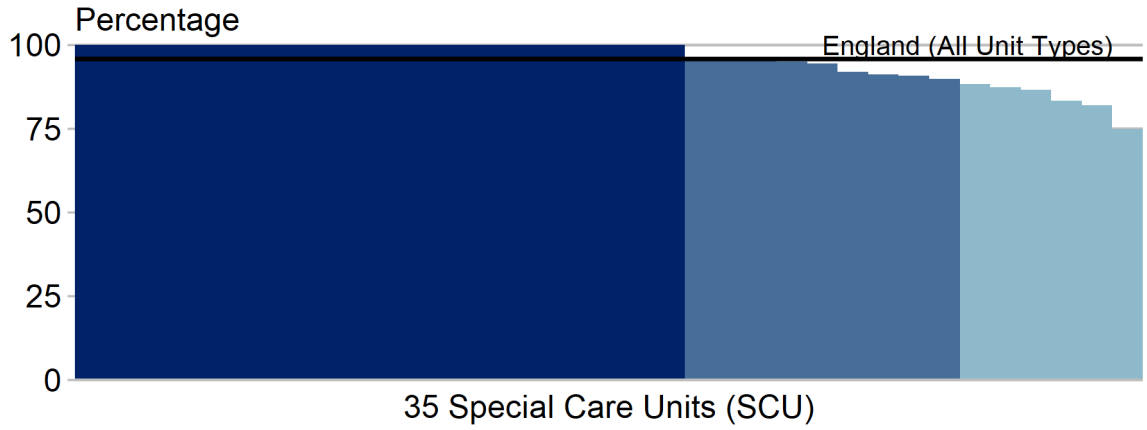
Column chart: Variation in percentage of eligible babies screened on-time for retinopathy of prematurity (ROP) by hospital unit (2019) - NICU



Column chart: Variation in percentage of eligible babies screened on-time for retinopathy of prematurity (ROP) by hospital unit (2019) - LNU



Column chart: Variation in percentage of eligible babies screened on-time for retinopathy of prematurity (ROP) by hospital unit (2019) - SCU



Magnitude of Variation

Map Eye15a: Variation in rate of premature live births (less than 37 weeks gestation) and all stillbirths by lower-tier local authority

The maps and column chart display the latest period (2016-18), during which lower-tier local authority values ranged from 56.9 per 1,000 live births and stillbirths to 112.2 per 1,000 live births and stillbirths, which is a 2.0-fold difference between lower-tier local authorities.

The England value for 2016-18 was 81.2 per 1,000 live births and stillbirths.

The box plot shows the distribution of lower-tier local authority values for the period 2007-09 to 2016-18.

According to these data rates of premature birth before 37 weeks have remained relatively steady between 2007-09 and 2016-18. Differences between local areas of up to double the rate of preterm birth may be due to many factors, such as antenatal care, the prevalence of local risk factors for premature delivery such as cigarette smoking[21] and transfer of expectant mothers to tertiary centres prior to preterm delivery. Without further breakdown by gestational age at birth it is not possible to determine whether the distribution of extremely preterm and moderately preterm deliveries has changed, or whether it is extremely preterm or moderate preterm births that account for the national variation.

As children born on or after 32 weeks will rarely require ROP screening it is difficult to ascertain whether or not there has been a rise in requirement for ROP screening or whether this is required to a greater extent in those locations with higher rates of preterm birth less than 37 weeks.

Map 15b: Variation in percentage of all births (live and stillbirths) with very low weight (under 1,500g) by clinical commissioning group

The maps and column chart display the latest period (2018), during which clinical commissioning group (CCG) values ranged from 0.2% to 2.3%, which is a 9.7-fold difference between CCGs.

The England value for 2018 was 1.2%.

The box plot shows the distribution of CCG values for the period 2010 to 2018.

[21] Chiriboga CA (2003) Fetal Alcohol and Drug Effects The Neurologist: Nov 2003 volume 9 Issue 6 p 267-279 [Accessed 04 May 2021]

The median decreased significantly from 1.4% in 2010 to 1.1% in 2018.

According to these data rates of infants born at very low birth weight have decreased slightly between 2010 and 2018. National variation is vast with the most affected areas experiencing almost ten-fold the rate of low birth weight deliveries experienced by the least affected locations. As with premature birth, reasons for variation may include differences in antenatal care, the prevalence of local risk factors for low birth weight, and transfer of high-risk expectant mothers to tertiary centres prior to delivery.

Map 15c: Variation in percentage of eligible babies screened on-time for retinopathy of prematurity (ROP) by hospital unit

The maps and column chart display the latest period (2019), during which hospital unit values ranged from 51.8% to 100%, which is a 1.9-fold difference between hospitals.

The England value for 2019 was 95.8%, and the median was 97.7%.

The three charts show the variation across different types of care unit.

The NICU values ranged from 51.8% to 100%, which is a 1.9-fold difference. The median was 97.0%.

The LNU values ranged from 62.5% to 100%, which is a 1.6-fold difference. The median was 97.8%.

The SCU values ranged from 75.0% to 100%, which is a 1.3-fold difference. The median was 100%.

There is clear guidance on the practice of ROP screening in premature or low birth weight infants. However, there is a concerning amount of variation between centres. The high median rates of timely screening indicate that while many centres are achieving around 100% timely screening of eligible infants others are dramatic outliers, with some only meeting the criteria in half of babies. There are both large and small units achieving 100% compliance. Where screening is delayed this may involve babies who are healthy enough to be discharged home prior to starting screening, or may relate to the availability of ophthalmic staff, particularly in smaller units. Movement between units due to a ‘step down’ in care requirements may also play a part. The degree of delay is not clear from the data and these findings require further exploration.

ROP screening is a highly skilled procedure usually performed by an experienced paediatric ophthalmologist. In serious cases delayed diagnosis and treatment may result in blindness. It is unclear from these data whether those who are not screened within the recommended timeframe are higher or lower risk for severe ROP, for example the

highest risk babies are usually those born earliest, or at the lowest birth weights. One potential explanation for delays in screening or failure to screen eligible infants is failure to coordinate care, for example when babies are transferred back to local services, or when babies are undergoing surgery or investigations that mean they are away from the ward when the ophthalmic teams visit. Healthier babies may be discharged home prior to ophthalmic screening and then may be missed by outpatient services. A second possibility is that hospitals with very few premature deliveries, or those located in rural areas may not have local access to ophthalmic services and so rely on ophthalmic visits which may be sporadic. If extremely premature birth is unusual, awareness of the ROP guidance may be limited. In some cases a single ophthalmologist is responsible for all screening within a region and so sickness or holiday may result in gaps in service delivery.

Options for action

Support is needed for areas where the paediatric ophthalmic service is sparse or understaffed. These data further support previous proposals to discuss whether there is a role for technicians or nursing staff in obtaining images for telemedicine review.[22] A review of current practice in areas where screening and treatment are timely and where parent satisfaction is high would be helpful in guiding such a project.

Service planning would also be aided by coordinated, detailed, freely available electronic data relating to premature births and ROP screening and treatment.

Resources

Bliss for babies born premature or sick [Accessed 23 Nov 2020]

Royal College of Ophthalmologists & Royal College of Paediatrics and Child Health (2008) Guideline for the Screening and Treatment of Retinopathy of Prematurity [Accessed 23 Nov 2020]

UK National Screening Committee (2019) The UK NSC recommendation on Vision defects screening in children [Accessed 23 Nov 2020]

[22] Campbell JP, Mathenge C, Cherwek H and others (2021) Artificial Intelligence to Reduce Ocular Health Disparities: Moving From Concept to Implementation Translational Vision Science & Technology 2021 Mar;10(3):19

Learning disabilities

Context

There are estimated to be 1.2 million people in England with a learning disability.[1] Adults with learning disabilities are 10 times more likely to have serious sight problems than other adults, and children are 28 times more likely.[2] Six in 10 people with learning disabilities need spectacles and often need support to feel comfortable to wear them.[3] They can benefit from spectacles, surgery, low vision aids and certificate of vision impairment (CVI) to support their activities of daily living. The 2013 Confidential Inquiry into premature deaths of people with learning disabilities (CIPOLD) report documented that 50% of adults with a learning disability who died prematurely had a vision problem.[4]

Vision impairment is an even greater problem in those with profound and multiple learning disabilities. They may not know they have a sight problem and may not be able to communicate this to people who care for them such as supporters, carers and teachers. It has been recommended that individuals in this group should be considered visually impaired unless proven otherwise.[5] Good eye care helps people to live healthier, more active and independent lives. With the right support, sight tests can be done for people with any level of disability.

A person with learning disabilities has a significantly reduced ability to understand new or complex information and to learn new skills, and a reduced capacity to cope independently. Many people with learning disability have more than one diagnosis, and in some cases the cause is not known. The major causes of learning disability in the UK are:

- preterm birth
- cerebral palsy
- Down's syndrome
- fragile-X syndrome
- genetic disorders
- metabolic disorders[6]

[1] MENCAP How common is learning disability? [Accessed 09 Jul 21]
[2] Public Health England (2020) Eye care and people with learning disabilities: making reasonable adjustments [Accessed 14 Jun 2021]
[3] Emerson E, Robertson J (2011) Estimated prevalence of visual impairment among people with learning disabilities in the UK Royal National Institute of Blind People (RNIB) and SeeAbility Learning Disabilities Observatory [Accessed 25 Jun 2021]
[4] University of Bristol (2013) Confidential Inquiry into premature deaths of people with learning disabilities (CIPOLD) Full final report [Accessed 16 Jul 2021]
[5] van Splunder J, Stilma J, Bernsen R and others (2006) Prevalence of visual impairment in adults with intellectual disabilities in the Netherlands: cross-sectional study Eye Sep;20(9):1004-10 [Accessed 16 Jul 2021]
[6] Royal College of Ophthalmologists (2015) Eye care services for adults with learning disabilities [Accessed 08 Jul 2021]

Vision Impairment comprises ocular visual impairment: abnormal function of the eye; and cerebral visual impairment: dysfunction of the complex processing pathways in the brain which interprets the image received by the eye. Patients with cerebral visual impairment may have normal visual acuity but a spectrum of dysfunction relating to visual search, visual attention, visual guided movement and/or visual recognition (places, faces, objects). The reported rates of cerebral visual impairment in prematurity, cerebral palsy[7] and Down's syndrome are between 20 and 50%.[8]

The sight problems that people with learning disabilities experience can include:

- refractive error
- cataract
- visual processing problems or cerebral visual impairment
- eye movement disorders including squint and nystagmus
- keratoconus
- optic nerve anomalies

The prevalence of autism spectrum disorder (ASD) is reported as around 1% of the UK population. Although not a cause of learning disability, around half of people with ASD also have a learning disability.[1] People with ASD are not included in the presented indicators unless they have a learning disability.

The recent British Childhood Visual Impairment Study 2 (BCVIS)[9] published findings indicating that almost half of all visual impairment in children is due to cerebral visual impairment. Seventy-two per cent of children with visual impairment have non-ocular morbidity most commonly associated with developmental delay. It has been demonstrated that documentation of vision impairment is omitted within a child's education, health and care plan (EHCP) for many children with complex needs and the impact of visual dysfunction on the child's ability to access education is overlooked.[10]

Recognising visual impairment in people with learning disabilities can be difficult as there may be impaired communication abilities present. Some behaviours have been associated with sight loss in people with learning disabilities, these include:

- anxiety in unfamiliar situations
- unwillingness to venture out of their immediate environment
- hesitancy on steps, at pavement edges or in poorly lit areas
- depression

[7] National Institute for Health and Care Excellence (2019) Cerebral palsy: What are the complications and comorbidities? [Accessed 16 Jul 2021]
[8] Wilton G J, Woodhouse R, Vinueala-navarro V and others (2021) Behavioural features of cerebral visual impairment are common in children with Down's syndrome Frontiers in Human Neuroscience 2021 Jun;15: 673342 [Accessed 16 Jul 2021]
[9] Teoh LJ, Solebo AL, Rahi JS (2021) Visual impairment, severe visual impairment, and blindness in children in Britain (BCVIS2): a national observational study Lancet Child Adolesc Health. 2021 Mar;5(3):190-200 [Accessed 16 Jul 2021]
[10] Donaldson LA, Karas M, O'Brien D and others (2019) Findings from an opt-in eye examination service in English special schools. Is vision screening effective for this population? PLoS ONE 14(3): e0212733 [Accessed 16 Jul 2021]

- anger or frustration
- eye poking or rubbing
- reduction in social or domestic skills in participation
- loss of interest in family, friends, TV or social activities
- undue alarm at unfamiliar noises or when approached
- self injurious behaviour[11]

Vision screening is recommended for children at age 4 to 5 years and takes place in mainstream schools in most regions. However, not all healthcare regions fund the programme outside mainstream schools. A framework for provision of eye care in special schools, to address this healthcare inequality, was therefore proposed in 2016.[12] While acknowledging that some areas may have a vision screening programme at school entry[13] the framework does not recommend screening as a tool for the special school population. Instead, the framework recommends that children in special schools should follow a pathway which includes a prescribed list of vision tests (outlined in section 6.4 and in the flowchart in appendix D of the framework).[12] This pathway is now being rolled out in special schools.[13,14]

Children with more severe or profound and multiple learning disabilities are more likely to attend a special school than their counterparts with mild or moderate learning disabilities.[15] A study in Bradford showed that a third of children in special schools who had never attended the relevant eye clinics would be considered visually impaired under the World Health Organisation (WHO) classification of visual impairment.[16] Moreover a further study has found that most children in special schools would fail the standard vision screen test.[10]

There is also evidence that significant barriers also exist for adults. Studies have shown only 50% of adults with a learning disability who attended a sight test reported having previously had a sight test within the 2 year recommended period for adults of working

[11] Cooper SA, Smiley E, Allan LM and others (2009) Adults with intellectual disabilities: prevalence, incidence and remission of self-injurious behaviour, and related factors J Intellect Disabil Res. 2009 Mar;53(3):200-216 [Accessed 16 Jul 2021]
[12] SeeAbility in association with the Association of British Dispensing Opticians, the British and Irish Orthoptic Society, the College of Optometrists, the Local Optical Committee Support Unit (LOCSU) and the Royal College of Ophthalmologists (2016) Framework for provision of eye care in special schools in England [Accessed 18 Jun 2021]
[13] Public Health England (2019) Child vision screening: Service specification [Accessed 21 Jul 2021]
[14] SeeAbility NHS England's Special School Eye Care Service [Accessed 16 Jun 2021]
[15] Public Health England (2020) People with learning disabilities in England Chapter 1: education and children's social care [Accessed 11 Jun 2021]
[16] Pilling RF, Outhwaite L (2017) Are all children with visual impairment known to the eye clinic? Br J Ophthalmol. 2017 Apr;101(4):472-474 [Accessed 16 Jul 2021]

age.[17,18] This is strikingly low as the GP annual learning disabilities health check includes a prompt to review whether patients have had a sight test.

Barriers can include:

- assumptions - that it is not possible to have a sight test for someone who does not speak or read
- awareness - that people with learning disabilities are more likely to have vision problems, and less likely to be able to communicate a problem
- overshadowing - that changes in behaviour or a reduction in function may be due to vision rather than the person's learning disability
- misguided kindness - that a carer believes it would be too difficult for the patient, or cause them distress to have an eye test

It is a statutory requirement under the Equality Act 2010[19] and the NHS and Social Care Act 2008[20] that public sector agencies make reasonable adjustments to their practice, so these patients are not disadvantaged in both access and outcomes for treatment. Additionally, all organisations that provide NHS or adult social care must follow the NHS England Accessible Information Standard.[21]

For healthcare professionals, there is a paucity of data on outcomes of interventions for adults with learning disabilities and eye problems, leading to difficulties in decision making and establishing best interests. There is little data collected on access to eye care by people with learning disabilities, which also hampers understanding of the eye health outcomes they experience at a local or national level. The impact of deteriorating and restoring vision in patients on their caring needs and quality of life is under researched and a likely contributory factor in the cautious approach taken during surgical decision making.

Access to screening services, including diabetic eye screening programme, has been shown to be reduced for adults with learning disability, although they are at higher risk of developing sight threatening complications.[22]

Improvements in neonatal and paediatric care over the past 2 decades has resulted in longer life expectancies for children born with neurological, developmental and

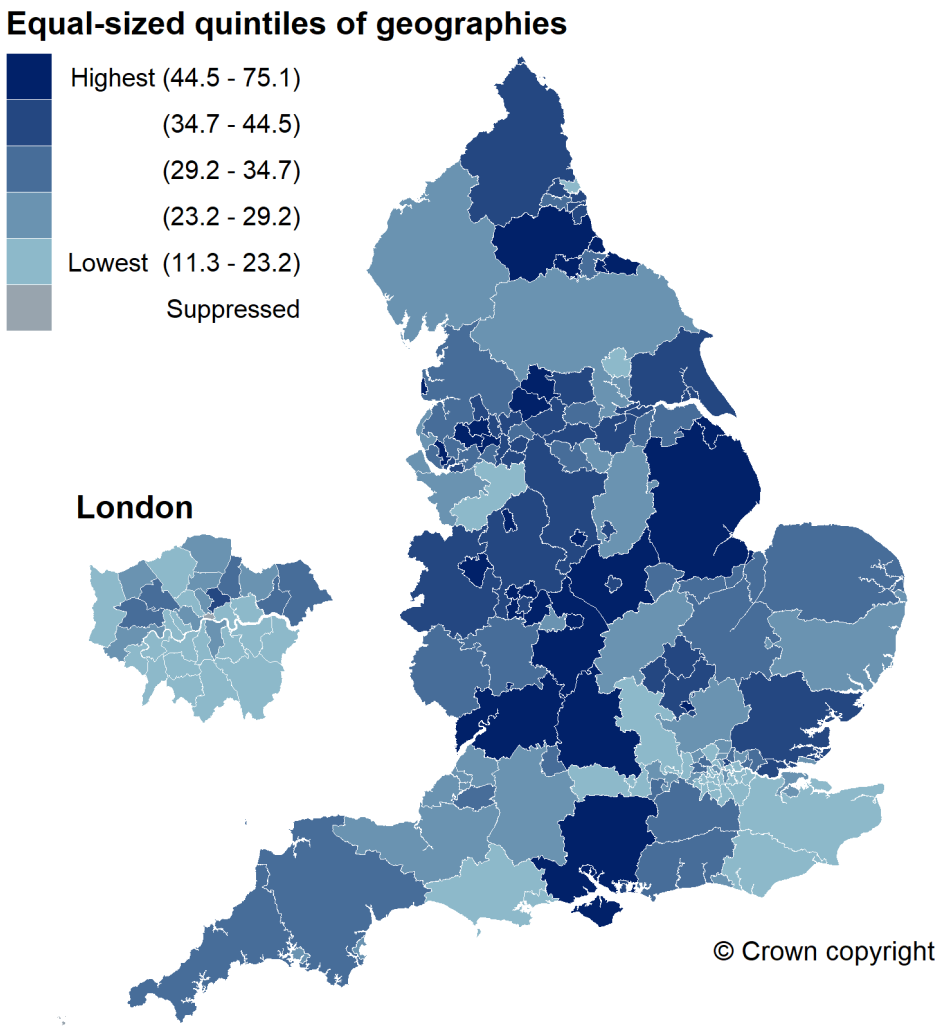
[17] SeeAbility (2015) Pilot of the LOCSU Community Eye Care Pathway for Adults and Young People with Learning Disabilities in the Tri-Borough area of Kensington and Chelsea, Hammersmith and Fulham and Westminster [Accessed 16 Jul 2021]
[18] Wessex Voices (2020) Improving Eye Care in Wessex [Accessed 16 Jul 2021]
[19] UK Government (2010) Equality Act 2010 [Accessed 16 Jun 2021]
[20] UK Government (2008) Health and Social Care Act 2008 [Accessed 16 Jul 2021]
[21] NHS England Accessible Information Standard [Accessed 16 Jun 2021]
[22] Pilling RF (2014) Screening for diabetic retinopathy in adults with learning disability: current uptake and adjustments to facilitate equality of access British Journal of Learning Disabilities 2014 Feb;43(1):62-65 [Accessed 16 Jul 2021]

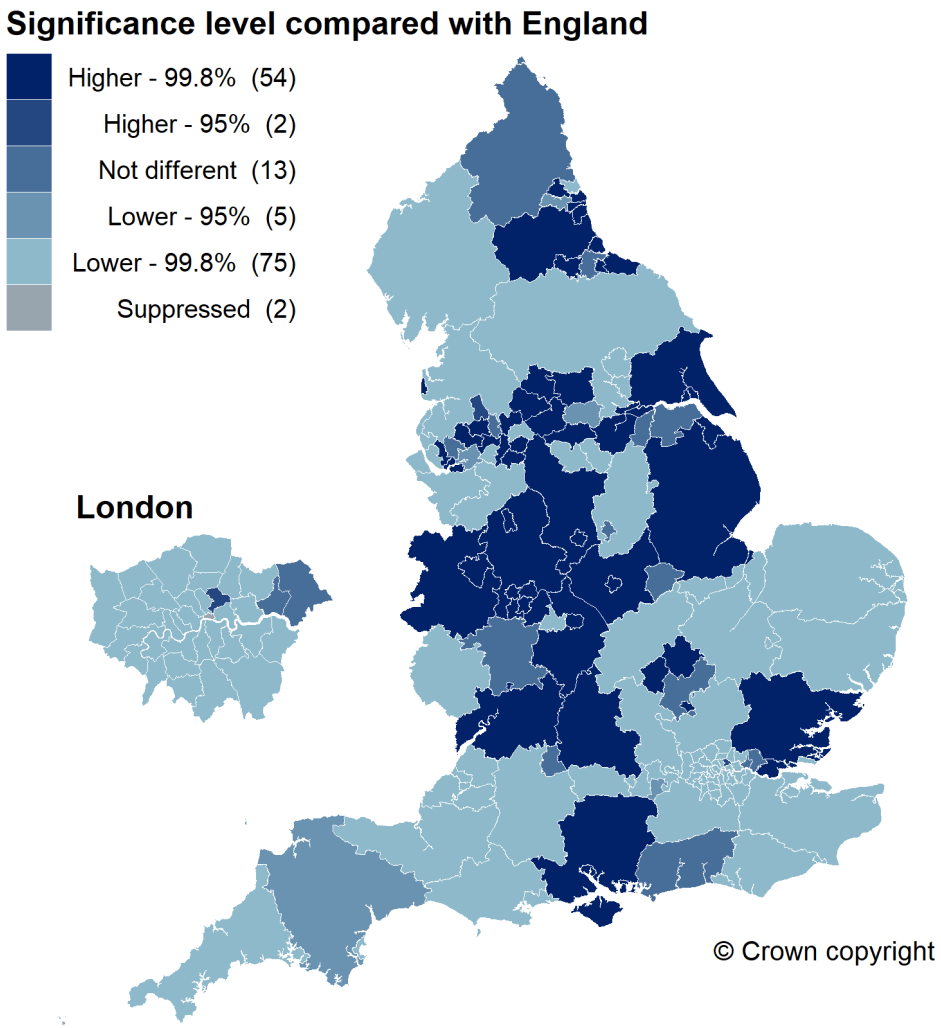
chromosomal abnormalities.[23] This is expected to lead to an increase in adults with learning disability presenting with glaucoma, cataract and macular degeneration. Without improving access to community and secondary care, a commensurate increase in preventable sight loss will occur.

[23] University of Bristol (2020) The Learning Disabilities Mortality Review (LeDeR) Programme Annual Report 2020 [Accessed 16 Jul 2021]

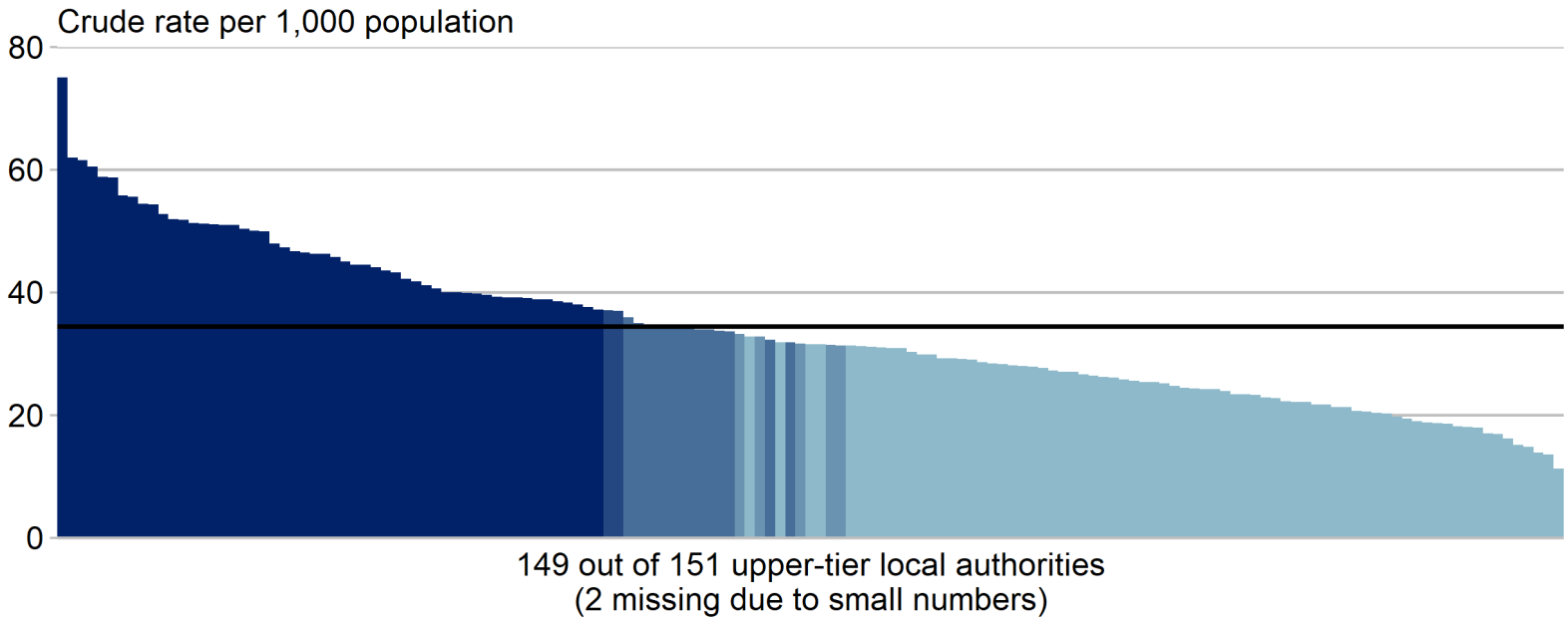
Map 16a: Variation in rate of children with learning difficulties known to schools by upper-tier local authority (2020)

Crude rate per 1,000 population
Optimum value: Requires local interpretation

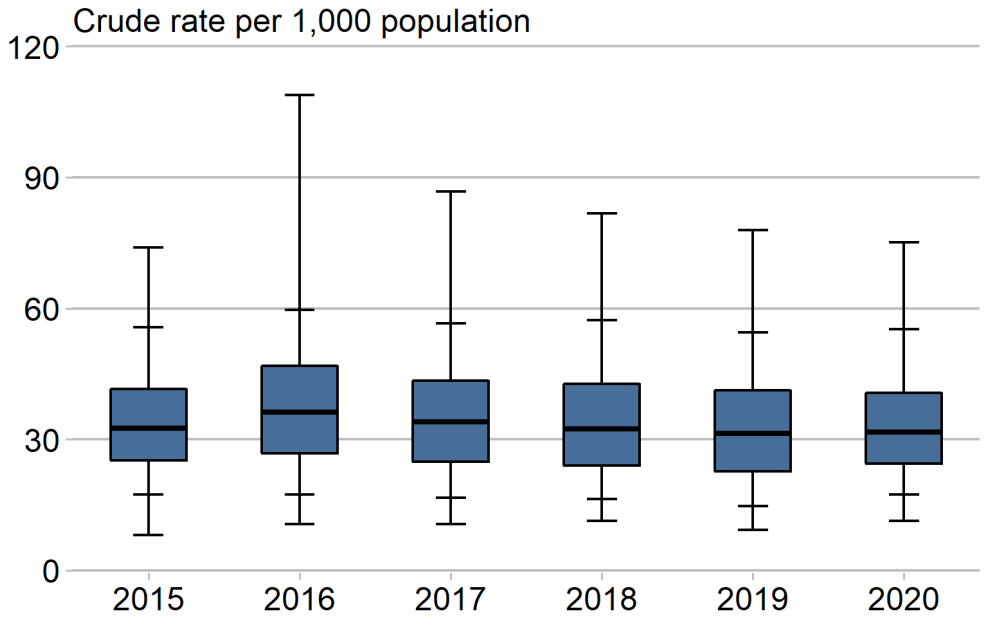




Column chart: Variation in rate of children with learning difficulties known to schools by upper-tier local authority (2020)



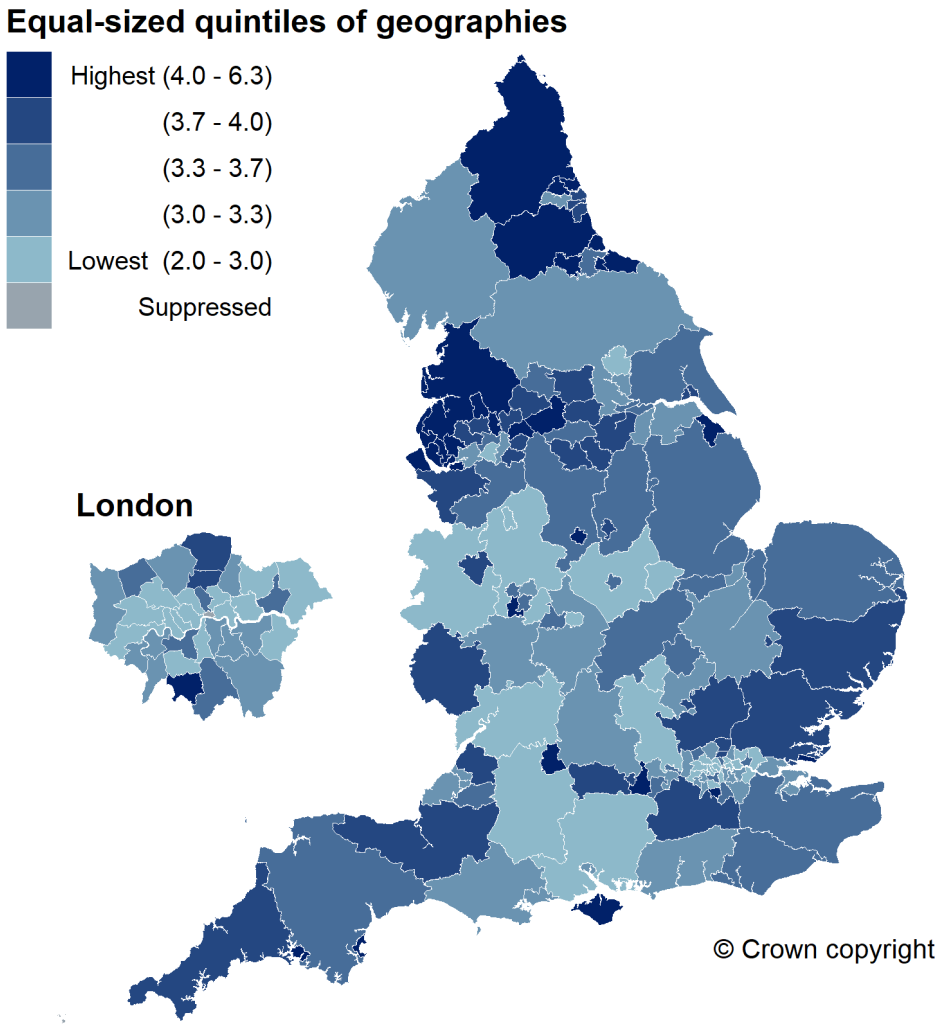
Box plot time series: Variation in rate of children with learning difficulties known to schools by upper-tier local authority (2015 to 2020)

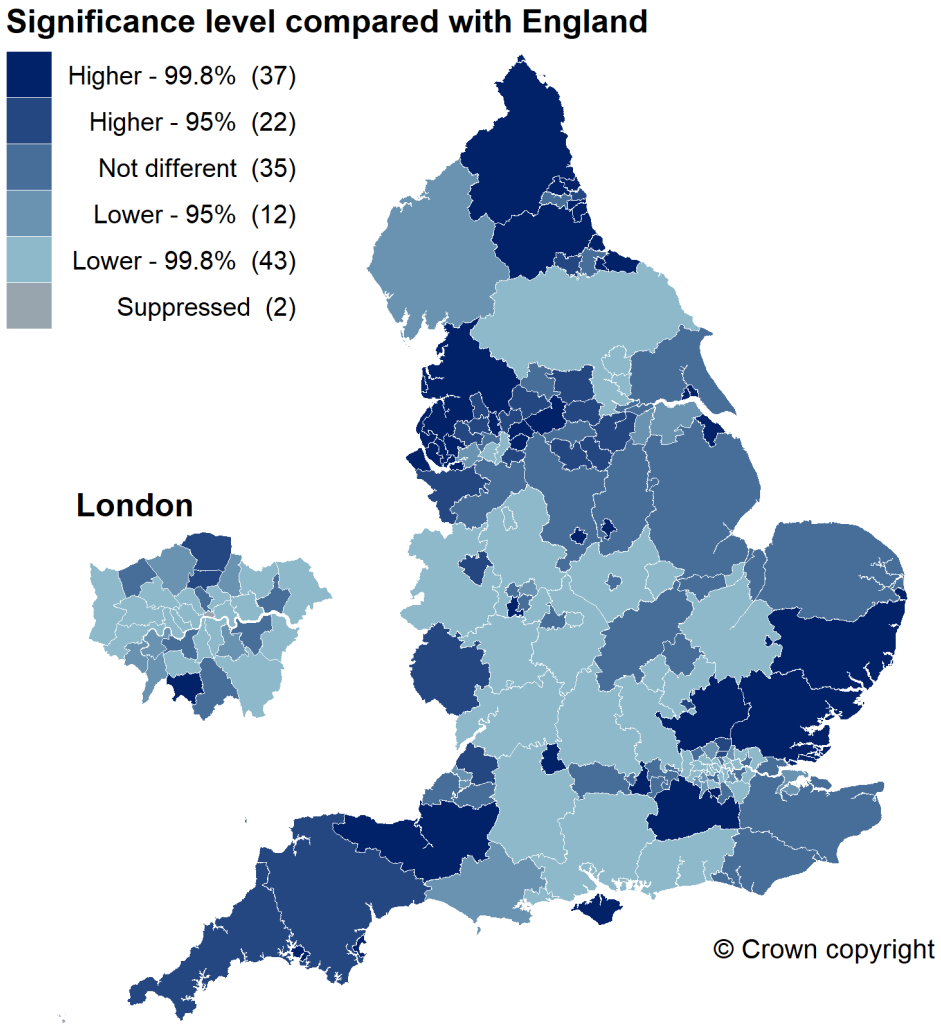


Year	2015	2016	2017	2018	2019	2020	
Max-Min (Range)	65.9	98.2	76.2	70.4	68.6	63.7	No significant change
75th-25th percentile	16.3	20.1	18.5	18.7	18.5	16.2	No significant change
95th-5th percentile	38.3	42.2	40.0	40.9	39.8	37.7	No significant change
Median	32.5	36.2	34.0	32.3	31.4	31.6	No significant change

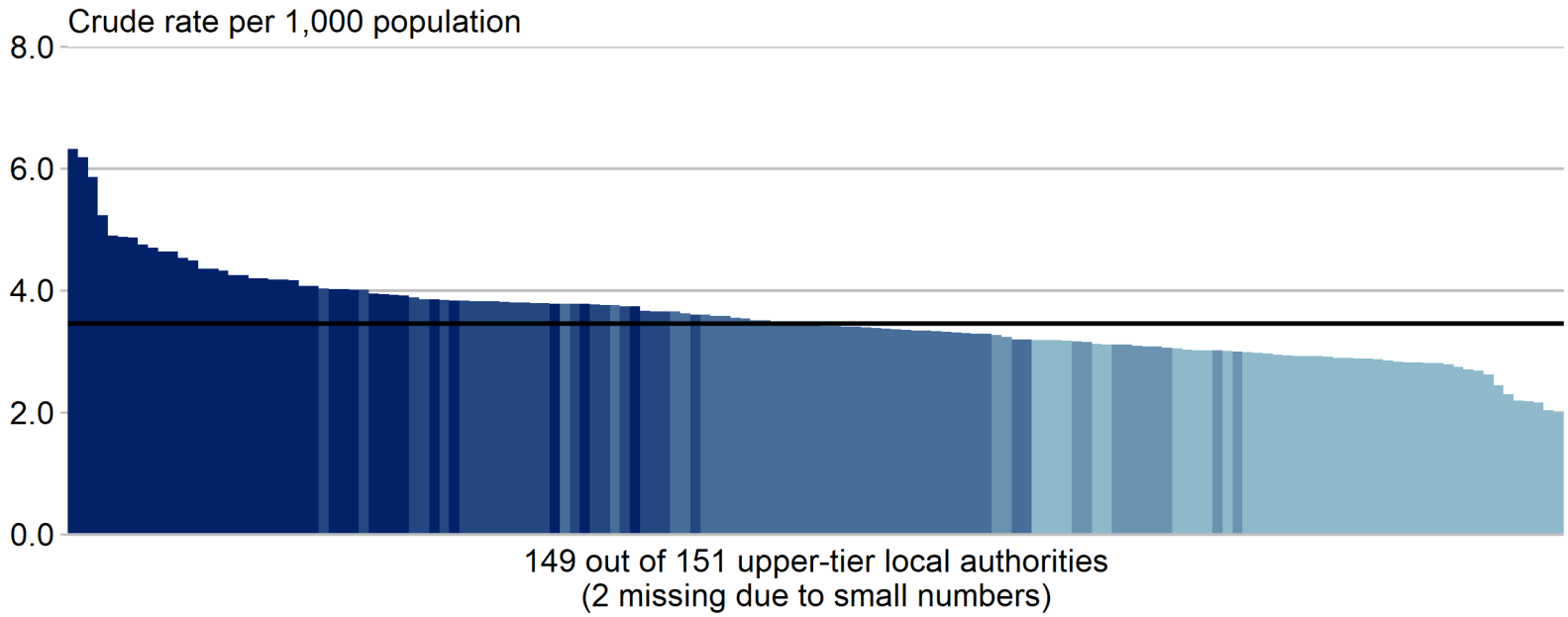
Map 16b: Variation in rate of people aged 18 years and over with a learning disability getting long-term support from local authorities by upper-tier local authority (2019/20)

Crude rate per 1,000 population
Optimum value: Requires local interpretation

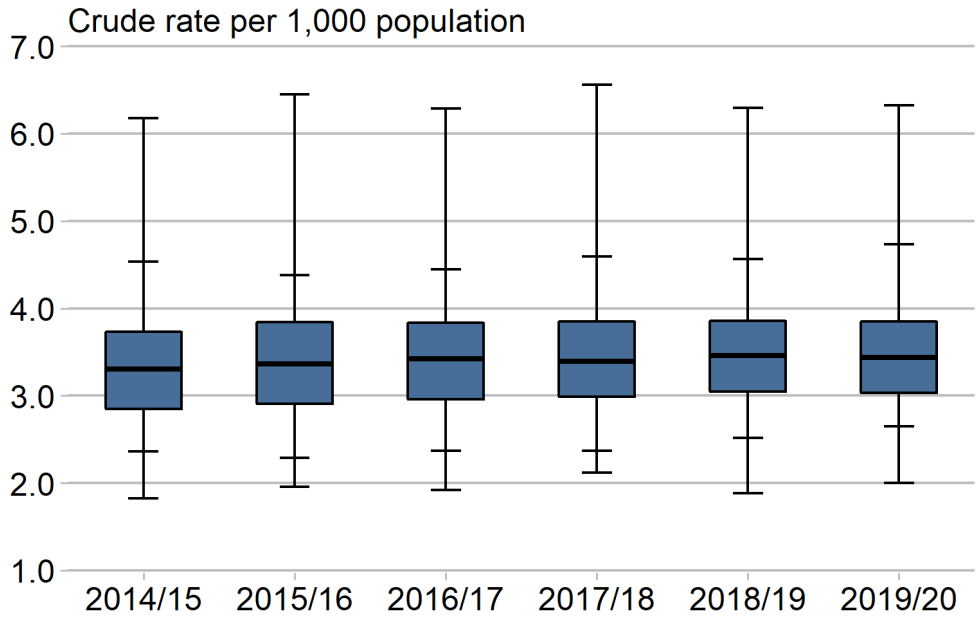




Column chart: Variation in rate of people aged 18 years and over with a learning disability getting long-term support from local authorities by upper-tier local authority (2019/20)



Box plot time series: Variation in rate of people aged 18 years and over with a learning disability getting long-term support from local authorities by upper-tier local authority (2014/15 to 2019/20)



Year	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
Max-Min (Range)	4.4	4.5	4.4	4.4	4.4	4.3	No significant change
75th-25th percentile	0.9	0.9	0.9	0.9	0.8	0.8	NARROWING Significant
95th-5th percentile	2.2	2.1	2.1	2.2	2.0	2.1	No significant change
Median	3.3	3.4	3.4	3.4	3.5	3.4	INCREASING Significant

Magnitude of Variation

Map 16a: Variation in rate of children with learning difficulties known to schools by upper-tier local authority

The maps and column chart display the latest period (2020), during which upper-tier local authority values ranged from 11.3 per 1,000 population to 75.1 per 1,000 population, which is a 6.6-fold difference between upper-tier local authorities.

The England value for 2020 was 34.4 per 1,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2015 to 2020.

There is extensive geographical variation in the rate of children with learning disabilities who are known to schools. This could suggest that there is variation in the rate of children with learning disabilities in different upper-tier local authorities, which could be due to socioeconomic and demographic factors. It could also suggest variation in the abilities of local authorities to assess pupils' needs or identify when a learning disability is present. Differences in funding allocated to services within and between geographical areas may be both a cause and effect of this variation.

Map 16b: Variation in rate of people aged 18 years and over with a learning disability getting long-term support from local authorities by upper-tier local authority

The maps and column chart display the latest period (2019/20), during which upper-tier local authority values ranged from 2.0 per 1,000 population to 6.3 per 1,000 population, which is a 3.2-fold difference between upper-tier local authorities.

The England value for 2019/20 was 3.5 per 1,000 population.

The box plot shows the distribution of upper-tier local authority values for the period 2014/15 to 2019/20.

The 75th to 25th percentile gap narrowed significantly.

The median increased significantly from 3.3 per 1,000 population in 2014/15 to 3.4 per 1,000 population in 2019/20.

There is substantial geographical variation in the rate of people aged 18 years and over with a learning disability receiving long-term support from local authorities. This variation

is seen in both the type of social care provided and expenditure.[24] The uneven distribution of social care provision stems from the fact that funding is not centrally controlled. Faced with competing demands for their limited resources, local authorities can make very different decisions about how they spend on social care provision.[25] It may also represent cultural differences in approach to family carers. There can also be substantial variation in numbers of people with learning disabilities accessing a GP learning disability annual health check[26] despite GPs being incentivised to provide targeted checks.

Options for action

Assessing if people with learning disability have a vision problem can be undertaken as a functional visual assessment, rather than using a standard chart. A functional visual assessment is useful in determining how the patient uses their vision day to day and establishes if there has been a change in visual function to support the diagnosis of onset of ocular pathology. Functional tools have been developed to assess adults with learning disability prior to cataract surgery,[27] and another example can be found on the SeeAbility website.[28] Employing the skills of an orthoptist, using forced choice preferential looking techniques or picture/letter matching tests, can also be useful. Other measures such as contrast sensitivity or the Bradford Visual Function Box[29] can be used to demonstrate reduction in visual function.

The current system of registration/certification for vision impairment refers clinicians to a visual acuity or visual field threshold. As many patients with learning disability are unable to participate in formal testing, some clinicians feel unable to certify a patient and this presents a barrier to accessing services. Changes in the form to allow functional visual impairment regardless of visual acuity, would be more inclusive.

A critical step to increasing awareness is the specific inclusion of eye conditions relating to children with special needs and adults with learning disability within professional curricula. Good professional practice guidance exists for ophthalmologists and

[24] Public Health England (2020) People with learning disabilities in England Chapter 5: adult social care [Accessed 16 Jul 2021]
[25] NHS Digital (2020) Adult Social Care Activity and Finance Report Adult Social Care Activity and Finance Report, England - 2019-20 [Accessed 11 Jun 2021]
[26] Public Health England (2020) People with learning disabilities in England Chapter 7: health checks [Accessed 16 Jul 2021]
[27] Rostron E, Rawse C and Pilling R (2018) Validation of VSLD questionnaire in patients with learning disabilities undergoing cataract surgery Eye 2018;32:833–834 [Accessed 20 Jul 2021]
[28] SeeAbility Functional Vision Assessment (FVA) [Accessed 16 Jul 2021]
[29] Pilling RF, Outhwaite L and Bruce A (2016) Assessing visual function in children with complex disabilities: the Bradford visual function box Br J Ophthalmol. 2016 Aug;100(8):1118-21 [Accessed 20 Jul 2021]

optometrists.[30,31] Case studies and examples of reasonable adjustments to facilitate access to eye care have been published by Public Health England in 2020.[2] **Error! Hyperlink reference not valid.**A national scheme of mandatory training in learning disabilities across health and social care is planned for introduction in the future.[32]

Public Health information campaigns using peer to peer led community champions with learning disabilities, promoting accessible information and understanding of different aspects of eye care to this high risk group has also been recommended.[18]

Ophthalmologists should be proactive in identifying people with learning disability prior to clinic attendance so that preparation can be offered to the patient and the carer. Appendix B of the Eye Care for Adults with Learning Disabilities guidance from the Royal College of Ophthalmologists[31] includes a list of reasonable adjustments which could be considered for accessing the eye clinic. Appendix D[31] includes reasonable adjustments to facilitate successful diabetic retinopathy screening. Easy Read leaflets are available to help the patient prepare for an eye test so they might be better able to anticipate what will happen.[33] The Royal National Institute of Blind People (RNIB) have published advice on how to communicate with a person,[34] and how to manage the environment to improve services. They have also devised a list of questions which can be addressed to the patient or carer.[35] These reasonable adjustments are also applicable for people with ASD, especially where a learning disability is also present.

SeeAbility have an eye surgery support plan which can be used by hospital and community support teams to help plan surgery.[36] Initiatives such as Books Beyond Words[37] developed by and with people with learning disability can also support patients and carers in their decision making and preparation for eye surgery.

Ophthalmologists should be aware that people with learning disability may have a written health record that sets out how they prefer to be treated. It should be ensured that where possible, people with a learning disability are enabled to consent for themselves, as per the 2005 Mental Capacity Act.[38] People with a learning disability are vulnerable patients and should be exempt from Trust did not attend policies.

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[30] Royal College of Ophthalmologists (2015) Ophthalmic Services Guidance: Eye Care for Adults with Learning Disabilities [Accessed 16 Jul 2021]
[31] Royal College of Ophthalmologists (2015) Examining patients with learning disabilities [Accessed 16 Jul 2021]
[32] NHS Health Education England The Oliver McGowan Mandatory Training in Learning Disability and Autism [Accessed 16 Jul 2021]
[33] SeeAbility Having an eye test (easy read) [Accessed 16 Jul 2021]
[34] Royal National Institute of Blind People (RNIB) Learning disabilities [Accessed 16 Jul 2021]
[35] Royal National Institute of Blind People (RNIB) Learning Disability and Sight Loss [Accessed 16 Jul 2021]
[36] SeeAbility Eye Surgery Support Plan [Accessed 16 Jul 2021]
[37] Beyond Words Looking after my eyes Books [Accessed 16 Jul 2021]
[38] UK Government (2005) Mental Capacity Act 2005 [Accessed 16 Jun 2021]

The adoption of a learning disabilities eye care pathway, both pre appointment as well as during and after a sight test appointment, is recommended in areas where there are none commissioned. Improved funding to support longer appointment times can be allocated for the test and accessible information and support can be provided, for example to get support in wearing spectacles and have the results of the sight test explained in an easy read format.

The GP annual health check for people with learning disabilities[39] provides a further opportunity for patients to be prompted and encouraged to go for a regular sight test. Evidence that this leads to more patients accessing eye tests however is lacking.

Public Health England's service specification for the child vision screening programme[13] does not recommend screening for special schools, instead they recommend more comprehensive and regular eye care. A vision screen is not a full eye examination and does not pick up all eye conditions and so a full eye examination is recommended for children with learning disabilities. See the framework for proposed special schools service.[10]

It will require collaboration with secondary eye care to ensure children are offered hospital eye care, particularly for formal diagnosis with cerebral visual impairment and sight impairment certification where appropriate. NHS England is introducing a programme of eye care for special schools across England from 2021.[14] This programme will reach over 120,000 children and will address a range of unmet needs. Research in special schools in Northern Ireland has evidenced improvements in educational attainment when there is an in school eye care service.[40]

The Down's syndrome Society[41] have established a simple and robust surveillance protocol to ensure children are assessed at key stages of childhood to proactively detect vision problems. Similar approaches in those with prematurity, cerebral palsy and other common causes of ocular and cerebral visual impairment would promote prompt diagnosis and access to support in children who would otherwise be unable to express visual dysfunction.

Improvements in data collection for example in the diabetic eye screening programme, NHS sight test data, and in hospital eye care records, would allow more understanding of access and outcomes for these patients. Changes to NHS information technology infrastructure are being piloted and will allow for a digital flag to be provided for these patients so health professionals and services are alerted to the reasonable adjustments

[39] NHS Annual health checks Learning disabilities [Accessed 16 Jun 2021]
[40] Black SA, McConnell EL, McKerr L and others (2019) In-school eyecare in special education settings has measurable benefits for children's vision and behaviour PLoS ONE. 2019 Aug;14(8): e0220480 [Accessed 16 Jul 2021]
[41] Down's Syndrome Association Eyes [Accessed 16 Jun 2021]

patients with learning disabilities need.[42] The certificate of vision impairment has a mandatory field for clinicians to record the patient's cognitive status which will lead to improvements in data collection for prevalence of sight impairment and different sight impairing conditions in this population.[43]

Resources

Beyond Words Looking after my eyes Books [Accessed 16 Jul 2021]

Department of Health and Social Care (2018) Registering vision impairment as a disability Certificate of Vision Impairment (CVI) form and Referral of Vision Impairment (RVI) letter template for consultant ophthalmologists and hospital eye clinic staff [Accessed 16 Jul 2021]

Down's Syndrome Association Eyes [Accessed 16 Jun 2021]

General Medical Council Learning disabilities [Accessed 18 Jun 2021]

Improving Health and Lives: Learning Disabilities Observatory, Supported by the Department of Health (2014) The Estimated Prevalence of Visual Impairment among People with Learning Disabilities in the UK [Accessed 18 Jun 2021]

Local Optical Committee Support Unit (2020) Service pathway: Enhanced eye care for people with learning disabilities [Accessed 18 Jun 2021]

Pilling RF, Donaldson L, Karas M and others (2020) Referral thresholds for an integrated learning disability eye care pathway: a consensus approach Eye 2021 [Accessed 16 Jul 2021]

Pilling RF, Outhwaite L and Bruce A (2016) Assessing visual function in children with complex disabilities: the Bradford visual function box Br J Ophthalmol. 2016 Aug;100(8):1118-21 [Accessed 20 Jul 2021]

Public Health England (2020) Diabetic eye screening: easy read guide [Accessed 16 Jul 2021]

Public Health England (2020) Eye care and people with learning disabilities: making reasonable adjustments [Accessed 14 Jun 2021]

[42] NHS Digital Reasonable Adjustment Flag [Accessed 09 Aug 2021]
[43] Department of Health and Social Care (2018) Registering vision impairment as a disability Certificate of Vision Impairment (CVI) form and Referral of Vision Impairment (RVI) letter template for consultant ophthalmologists and hospital eye clinic staff [Accessed 16 Jul 2021]

Public Health England Learning Disability Profiles [Accessed 16 Jul 2021]

NHS Digital (2020) Adult Social Care Activity and Finance Report Adult Social Care Activity and Finance Report, England - 2019-20 [Accessed 11 Jun 2021]

NHS Health Education England The Oliver McGowan Mandatory Training in Learning Disability and Autism [Accessed 16 Jul 2021]

Rostron E, Rawse C and Pilling R (2018) Validation of VSLD questionnaire in patients with learning disabilities undergoing cataract surgery Eye 2018;32:833–834 [Accessed 20 Jul 2021]

Royal College of Ophthalmologists (2015) Examining patients with learning disabilities [Accessed 16 Jul 2021]

Royal College of Ophthalmologists (2015) Ophthalmic Services Guidance: Eye Care for Adults with Learning Disabilities [Accessed 16 Jul 2021]

Royal National Institute of Blind People (RNIB) Learning disabilities [Accessed 16 Jul 2021]

Royal National Institute of Blind People (RNIB) Learning Disability and Sight Loss [Accessed 16 Jul 2021]

Royal National Institute of Blind People (RNIB) Healthy Eyes Helping adults with learning disabilities to recognise the signs of sight loss [Accessed 16 Jul 2021]

SeeAbility in association with the Association of British Dispensing Opticians, the British and Irish Orthoptic Society, the College of Optometrists, the Local Optical Committee Support Unit (LOCSU) and the Royal College of Ophthalmologists (2016) Framework for provision of eye care in special schools in England [Accessed 18 Jun 2021]

SeeAbility Eye care factsheets [Accessed 18 Jun 2021]

SeeAbility Eye care champions [Accessed 25 Jun 2021]

SeeAbility Eye Surgery Support Plan [Accessed 16 Jul 2021]

SeeAbility Having an eye test (easy read) [Accessed 16 Jul 2021]

SeeAbility NHS England's Special School Eye Care Service [Accessed 16 Jun 2021]

Glossary of terms

This Glossary is provided to help develop a shared or common language. If there is a clear, short or memorable definition from the literature, the source has been given. Where definitions in the literature do not meet any of these criteria, the PHE Atlas Team have composed and provided a definition. Where definitions have been adapted from the published literature, they are presented with the source acknowledged.

Access to healthcare

Facilitating access is concerned with helping people to access appropriate healthcare resources to preserve or improve their health. Access is a complex concept and there are at least 4 aspects:

- Availability/adequacy of supply
- Acceptability (influenced by the health literacy of the population)
- Relevance and effectiveness
- Barriers to utilisation

Source adapted from: Gulliford M, Figueroa-Munoz J, Morgan M and others (2002) What does 'access to healthcare' mean? J Health Serv Res Policy 7(3):186-8 [Accessed 08 August 2019]

Admitted episode of care

Each admitted patient record is for a continuous period of care (episode) administered within a particular consultant specialty at a single hospital provider. Therefore, if a patient is transferred to another consultant or to a different provider during a spell of treatment (the total time a patient is in hospital, from admission to discharge) a new record is generated. This means that not all stays in hospital will be represented by a single HES record; this is why there are more finished consultant episodes than finished admission episodes.

Source: NHS Digital (2019) Users, uses and access to Hospital Episode Statistics Download the guide for analysis of Hospital Episode Statistics [Accessed 29 Jul 2021]

Aflibercept

Aflibercept is a medication used to treat wet AMD and metastatic colorectal cancer.

Source: National Institute for Health and Care Excellence (NICE) Aflibercept [Accessed 29 Jul 2021]

Age related macular degeneration

Age related macular degeneration (AMD) causes changes to the macula, which leads to problems with central vision. Central vision is the vision used when looking straight at something, for example when reading, looking at photos or watching television. Central vision can become distorted or blurry, and over time, a blank patch may appear in the centre of your vision. AMD doesn't affect your peripheral (side) vision, so it doesn't lead to total loss of sight.

Source: RNIB Age-related macular degeneration (AMD) [Accessed 29 Jul 2021]

Amblyopia

Also referred to as ‘lazy eye’. A failure of development of the part of the brain which processes vision, which can arise if the eye in question is misaligned with the dominant eye, or is significantly out of focus or is prevented from seeing clearly (for example by a cataract) during the first seven years or so of life when the visual system is still developing. It is usually reversible during this time by treating its cause and patching the other eye but becomes irreversible once the visual system is mature.
Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

Anti-VEGF drugs

Substances which block the action of Vascular Endothelial Growth Factor. They are effective in the treatment of choroidal neovascularisation.
Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

Appropriate

A procedure is termed appropriate if its benefits sufficiently outweigh its risks to make it worth performing.
Source: Kahan J, Bernstein S, Leape L and others (1994) Measuring the necessity of medical procedures Medical Care 1994;32:352-365 [Accessed 08 August 2019]

Astigmatism

A difference in the focal point of the eye in one meridian from another (for example between the horizontal and vertical planes). It can usually be corrected with a cylindrical (toric) lens.
Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

Audit

See also Clinical audit

Average

See Mean or Median

Box and whisker plot

See Introduction to the data section

Brolucizumab

Brolucizumab is a monoclonal antibody that inhibits vascular endothelial growth factor A (VEGF-A), thereby suppressing endothelial cell proliferation and inhibiting the growth of new vessels and decreasing vascular permeability. Brolucizumab is used to treat wet AMD.
Source: National Institute for Health and Care Excellence (NICE) Brolucizumab [Accessed 29 Jul 2021]

Burden of disease

The burden of disease is a measurement of the gap between a population's current health and the optimal state where all people attain full life expectancy without suffering major ill health.

Source: World Health Organization Health Promotion Glossary: new terms [Modified definition (WHO, 2000)] [Accessed 18 January 2019]

Care pathway

"... the expected course of events in the care of a patient with a particular condition, within a set timescale".

Source: Kitchiner D, Davidson D and Bundred P (1996) Integrated Care Pathways: effective tools for continuous evaluation of clinical practice J Eval Clin Pract 2(1):65-9 [Accessed 08 August 2019]

Cataract

A cataract is a clouding of the lens inside your eye.

Source: RNIB Cataracts [Accessed 29 Jul 2021]

Certificate of vision impairment

A certificate of vision impairment (CVI) formally certifies someone as visually impaired, and also acts as a referral for a social care assessment if the individual is not yet known to social services. Its secondary purpose is to record data to be used for research into the underlying causes and the effects of visual impairment.

Source: The Royal College of Ophthalmologists (RCOph) Certificate of vision impairment [Accessed 29 Jul 2021]

Clinical audit

See also Audit

Clinical audit is a way to find out if healthcare is being provided in line with standards and allows care providers and patients know where their service is doing well, and where there could be improvements. The aim is to allow quality improvement to take place where it will be most helpful and will improve outcomes for patients. Clinical audits can look at care nationwide (national clinical audits) and local clinical audits can also be performed locally in trusts, hospitals or GP practices anywhere healthcare is provided.

Source: NHS England Clinical audit [Accessed 08 August 2019]

Clinical guidelines

Systematically developed statements to assist practitioner and patient decisions about appropriate healthcare for specific circumstances.

Source: Timmermans S and Berg M (2003) The Gold Standard. The challenge of evidence-based medicine and standardization in health care. Temple University Press, Philadelphia

Commissioner

"…to be the advocate for patients and communities - securing a range of appropriate high quality health care services for people in need [and] to be the custodian of tax payers' money - this brings a requirement to secure best value in the use of resources".

Source: House of Commons Health Committee (2010) Commissioning Fourth Report of Session 2009-10. Volume 1 [Accessed 08 August 2019]

Commissioning

Commissioning in the NHS is the process of ensuring that the health and care services provided effectively meet the needs of the population. It is a complex process with responsibilities ranging from assessing population needs, prioritising health outcomes, procuring products and services, and managing service providers.
Source: Department of Health (2010) Commissioning [Archived content] [Accessed 19 January 2019]

Confidence intervals

Confidence intervals give the range within which the true size of a treatment effect (which is never precisely known) lies, with a given degree of certainty (usually 95% or 99.8%).
Source: Evans I, Thornton H, Chalmers I and others (2011) Testing Treatments. Better Research for Better Healthcare. Pinter & Martin Ltd. 2nd Edition

Costs

Cost is not solely financial. Cost may be measured as the time used, the carbon produced, or the benefit that would be obtained if the resources were used for another group of patients (for example the opportunity cost).

Deprivation

See also English Indices of Deprivation 2019
Deprivation covers a broad range of issues and refers to unmet needs caused by a lack of resources of all kinds, not just financial.
Source: Ministry of Housing, Communities & Local Government (2019) English Indices of Deprivation 2019 [Accessed 29 June 2021]

Diabetes

Diabetes is a serious condition where your blood glucose level is too high. It can happen when your body doesn't produce enough insulin or the insulin it produces isn't effective. Or, when your body can't produce any insulin at all.
Source: Diabetes UK What is diabetes [Accessed 06 Aug 2021]

Diabetic macular oedema

Diabetic macular oedema (DMO) is the most common cause of sight loss in people with diabetes. Oedema means fluid retention. When leaky vessels cause fluid to build up in the macula, at the centre of the retina, it is known as diabetic macular oedema. It is a complication of diabetic retinopathy and results in a condition very similar to wet AMD.
Source: Macular Society Diabetic macular oedema [Accessed 29 Jul 2021]

Diabetic retinopathy

Diabetic retinopathy is a complication of diabetes, caused by high blood sugar levels damaging the back of the eye (retina). It can cause blindness if left undiagnosed and untreated.
Source: NHS Health A to Z [Accessed 06 Aug 2021]

Directly age-standardised rate

Directly age-standardised rates express an indicator in terms of the overall rate that would occur in a standard population age-structure if it experienced the age-specific rates of the observed population.

Source: Public Health England APHO Technical Briefing 3 – Commonly used public health statistics and their confidence Intervals [Accessed 18 January 2019]

Efficiency

See also Productivity

Efficiency can be defined as maximising well-being at the least cost to society.

Source: Mitton C, Donaldson C (2004) Priority setting toolkit: A guide to the use of economics in healthcare decision making. BMJ Publishing Group, London

Endophthalmitis

Infection which involves the internal structures of the eye. It usually poses a serious threat to the visual function of the eye.

Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

English Indices of Deprivation 2019

See also Deprivation

This is an overall measure of multiple deprivation experienced by people living in an area and is calculated for every lower layer super output area (LSOA), or neighbourhood, in England. The English Indices of Deprivation 2019 are based on 39 separate indicators, organised across 7 distinct domains of deprivation which are combined, using appropriate weights, to calculate the Index of Multiple Deprivation 2019 (IMD 2019).

Source: Ministry of Housing, Communities and Local Government (2019) English Indices of Deprivation 2019 [Accessed 29 June 2021]

Equity

See also Inequalities in health

Equity in health can be defined as the absence of systematic disparities in health (or in the major social determinants of health) between social groups who have different levels of underlying social advantage/disadvantage.

Source: Braveman P, Gruskin S (2003) Defining equity in health J Epidemiol Community Health 2003; 57: 254-258 [Accessed 29 Jul 2021]

Evidence

Evidence is generally considered to be information from clinical experience that has met some established test of validity, and the appropriate standard is determined according to the requirements of the intervention and clinical circumstance. Processes that involve the development and use of evidence should be accessible and transparent to all stakeholders.

Source: Olsen L, Goolsby W and McGinnis J (2009) Roundtable on Evidence-Based Medicine Leadership Commitments to Improve Value in Health Care: Finding Common Ground: Workshop Summary The National Academies, Washington [Accessed 18 January 2019]

Gestational diabetes

Gestational diabetes is high blood sugar (glucose) that develops during pregnancy and usually disappears after giving birth.

Source: NHS Health A to Z [Accessed 06 Aug 2021

Glaucoma

A condition usually characterised by raised pressure in the eye which causes damage to the optic nerve resulting in defects in the field of vision. It is treated by reducing the pressure in the eye.

Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Source: Preamble to the Constitution of WHO as adopted by the International Health Conference, New York, 19 June – 22 July 1946; signed on 22 July 1946 by the representatives of 61 States and entered into force on 7 April 1948.

Health needs

Health needs are those that can benefit from health care or from wider social and environmental changes.

Source: Wright J, Williams R and Wilkinson JR (1998) Development and importance of health needs assessment BMJ (Clinical research ed.). 1998 Apr;316(7140):1310–1313 [Accessed 29 Jul 2021]

Inequalities in health

See also Equity

Inequalities in health are objectively measured differences in health status, healthcare access and health outcomes between different population groups.

Input, Output and Outcome

Input is a term used by economists to define the resources used, such as the number of hospital beds, to produce the output, such as the number of patients admitted per bed per year. The economists' terminology is different from the language utilised in quality assurance, in which the terms structure, process and outcome are used. Input equates to structure and process, that is the number of beds and the number of admissions per bed, respectively. However, the outcome is distinct from the output. Outcome includes some measure of the effect the process has had on the patients, for example, the number of patients who were discharged to their own home.

Integrated care

Clinical integration, where care by professionals and providers to patients is integrated into a single or coherent process within and/or across professions such as through use of shared guidelines and protocols.

Source: Kodner D and Spreeuwenberg C (2002) Integrated care: meaning, logic, applications and implications – a discussion paper Int J Integr Care 2:1-6 [Accessed 08 August 2019]

International statistical classification of diseases and related health problems (ICD)

ICD is the foundation for the identification of health trends and statistics globally, and the international standard for reporting diseases and health conditions. ICD defines the universe of diseases, disorders, injuries and other related health conditions, listed in a comprehensive, hierarchical fashion.
Source: World Health Organization Classifications [Accessed 29 June 2021]
This atlas has been prepared using International Classification of Diseases (ICD10)
Source: NHS Data Model and Dictionary ICD10 code [Accessed 29 Jul 2021

Interquartile range (IQR)

See also Range
See Introduction to the Data section

Life-expectancy

Life-expectancy at a specific age is the average number of additional years a person of that age could expect to live if current mortality levels observed for ages above that age were to continue for the rest of that person's life.
Source: UNESCO Glossary Demographic Terms and Concepts 2018 [Accessed 29 June 2021]

Mean (average)

The mean is the sum of values divided by the number of values.

Median (average)

A value or quantity lying at the midpoint of a frequency distribution of observed values or quantities, such that there is an equal probability of falling above or below it.

Myopia

Short-sightedness, requiring a concave lens to focus the vision.
Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

Needs assessment

The purpose of needs assessment in healthcare is to gather the information required to bring about change beneficial to the health of the population. It is generally, but not universally, accepted that this takes place within the context of finite resources. 'Health gain' can therefore be achieved by reallocating resources as a result of identifying four factors:

- non-recipients of beneficial interventions (that is, unmet need)
- recipients of ineffective health care (and releasing the resources for unmet need)
- recipients of inefficient health care (and releasing the resources for unmet need)
- recipients of inappropriate health care (for whom the outcomes could be approved)

Source: Stevens A and Gillam S (1998) Needs assessment: from theory to practice BMJ 316:1448 [Accessed 08 August 2019]

OPCS4

OPCS-4 is used to classify interventions and surgical procedures
Source: NHS Digital Clinical classifications [Accessed 29 Jul 2021]

Ocular surface squamous neoplasia

Ocular surface tumours refer mainly to three types of malignant or premalignant neoplasias arising from the conjunctiva and the cornea, that is ocular surface squamous neoplasia (OSSN), ocular surface melanocytic tumours and lymphoid tumours of the conjunctiva.
Source: Varde MA and Biswas J (2009) Ocular surface tumors Oman journal of ophthalmology 2009;2(1):1–2 [Accessed 29 Jul 2021]

Ophthalmologist

An ophthalmologist is a medically trained doctor who commonly acts as both physician and surgeon. (S)he examines, diagnoses and treats diseases and injuries in and around the eye.
Source: The Royal College of Ophthalmologists (RCOph) What is an Ophthalmologist? [Accessed 29 Jul 2021]

Optical coherence tomography

Optical coherence tomography (OCT) uses a catheter emitting near-infrared light to produce high-resolution images of blood vessel walls. It may be used to assess stenotic lesions in the coronary arteries and to image the result of stent deployment during percutaneous coronary interventions.
Source: National Institute for Health and Care Excellence (NICE) Optical coherence tomography to guide percutaneous coronary intervention [Accessed 29 Jul 2021]

Outcome

See Input, Output and Outcome

Output

See Input, Output and Outcome

Population healthcare

The aim of population healthcare is to maximise value and equity by focusing not on institutions, specialties or technologies, but on populations defined by a common symptom, condition or characteristic, such as breathlessness, arthritis or multiple morbidity.

Posterior vitreous detachment

Posterior vitreous detachment (PVD) is a condition where your vitreous comes away from the retina at the back of your eye. This detachment is caused by changes in the vitreous gel.
Source: The Royal College of Ophthalmologists (RCOph) Posterior vitreous detachment [Accessed 06 Aug 2021]

Prevalence

Prevalence refers to the total number of individuals in a population who have a disease or health condition at a specific period of time, usually expressed as a percentage of the population.

Productivity

See also Efficiency

Productivity is the relationship between inputs and outputs, such as the number of operations per theatre per year; efficiency is the relationship between outcomes and inputs, such as the number of successful operations per theatre per year.

Public health

"…the art and science of preventing disease, prolonging life and promoting health through the organized efforts of society".

Source: Acheson (1988) Public Health in England. Report of the Committee of Inquiry into the future development of the public health function, HMSO, London

Quality

Quality is the degree to which a service meets pre-set standards of goodness.

Source: Donabedian A. Personal communication, cited in: Davies C (2018) Understanding Harm (& Value) If We Build It… A blog for systems thinking, leadership and collaborative healthcare management [Accessed 08 August 2019]

Quality of life

"… individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of their environment".

Source: World Health Organization. Division of Mental Health and Prevention of Substance Abuse (1997) WHOQOL: Measuring Quality of Life [Accessed 08 August 2019]

Quality outcomes framework

The Quality and Outcomes Framework (QOF) is a voluntary annual reward and incentive programme for all GP surgeries in England, detailing practice achievement results.

Source: NHS Digital Quality and Outcome Framework (QOF) [Accessed 06 Aug 2021]

Quintile

See Introduction to the data section.

Range

See also Interquartile range and Variance

The range is the difference between the highest and lowest value in the sample. The range provides a crude measure of the spread of the data.

Ranibizumab

Ranibizumab is an antiangiogenic drug that is a genetically engineered monoclonal antibody administered by injection into the eye especially to treat age-related macular degeneration and diabetic retinopathy

Source: National Institute for Health and Care Excellence (NICE) Ranibizumab [Accessed 29 Jul 2021]

Retinal detachment

A detached retina is when the thin layer at the back of your eye (retina) becomes loose.

Source: NHS Health A to Z [Accessed 29 Jul 2021]

Retinal vein occlusion

Retinal vein occlusion is a common cause of sudden, painless reduction or loss of vision in older people (it is uncommon in people under the age of 60). It occurs when an artery presses on and blocks one of the veins in the retina (the thin lining at the back of the eye that allows us to see).

Source: Guy's and St Thomas' NHS Foundation Trust Retinal vessel occlusion [Accessed 06 Aug 2021]

Safety

Patient safety can, at its simplest, be defined as: The avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of healthcare. … the reduction of harm should be the primary aim of patient safety, not the elimination of error.

Source: Vincent C (2006) Patient Safety. Churchill Livingstone

Snellen test

Visual acuity is measured using the Snellen scale. A Snellen test usually consists of a number of rows of letters which get smaller as you read down the chart.

Source: RNIB The criteria for certification [Accessed 06 Aug 2021]

Standard deviation

See also Variance

The standard deviation is a measure of spread and is the square root of the variance.

Standards

A minimum level of acceptable performance or results or excellent levels of performance or the range of acceptable performance or results.

Source: Committee on Quality of Health Care in America, Institute of Medicine (2000) To Err is Human. Building a Safer Health System Editors: Kohn L, Corrigan J, Donaldson M National Academy Press, Washington

Uveitis

Uveitis is inflammation involving the pigmented layers of the eye (the iris, ciliary body and choroid).

Source: The Royal College of Ophthalmologists (RCOph) Glossary of Medical Terms [Accessed 29 Jul 2021]

Value

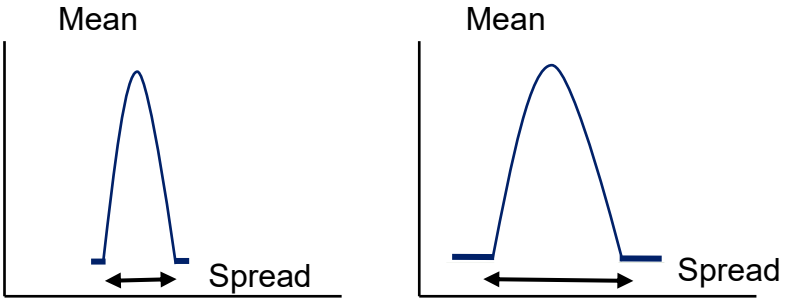
"… value is expressed as what we gain relative to what we give up – the benefit relative to the cost".

Source: Institute of Medicine of the National Academies (2008) Learning Healthcare System Concepts v. 2008 Annual Report The Roundtable on Evidence-Based Medicine, Institute of Medicine

Variance

See also Standard deviation and Range

The variance is another measure of spread, which describes how far the values in the sample lie away from the mean value. It is the average of the squared differences from the mean and is a better measure of spread than the range.



This figure illustrates how 2 populations may have the same mean value, but different degrees of variation or spread: the graph on the right shows greater variation than that on the right.

Variation

Everything we observe or measure varies. Some of this is random variation. Some variation in healthcare is desirable, even essential, since each patient and population is different and should be cared for uniquely. New and better treatments and improvements in care processes result in variation during the early phases of their introduction.

Source Adapted from: Neuhauser D, Provost L, Bergman B (2011) The meaning of variation to healthcare managers, clinical and health-services researchers, and individual patients BMJ Qual Saf 20(Suppl 1):i36-i40 doi: 10.1136/bmjqs.2010.046334

Visual acuity

Your central vision, the vision you use to see detail

Source: RNIB The criteria for certification [Accessed 29 Jul 2021]

Visual field

How much you can see around the edge of your vision, while looking straight ahead

Source: RNIB The criteria for certification [Accessed 29 Jul 2021]

Introduction to the data and methods

Data sources

The data for the indicators in the Atlas of variation in risk factors and healthcare for vision, has been provided by a range of organisations, including The Office for National Statistics (ONS), NHS Digital, NHS Screening programmes and Moorfields Eye Hospital with a variety of datasets:

- NHS Digital Hospital Episode Statistics (HES)
- ONS mid-year population estimates
- NHS Digital GP Practice list sizes
- ONS Annual births
- NHS Digital Registered Blind and Partially Sighted People
- NHS Diabetic Eye Screening (DES) programme
- Moorfields Eye Hospital New Certifications of Visual Impairment
- RCPCH National Neonatal Audit Programme
- MHCLG Index of Multiple Deprivation 2019
- Sport England Active Lives Survey

An Atlas data sheet with all indicator values, including quintiles and significance bandings and a metadata document which includes methodology, data extraction coding schemes and data sources for each indicator is available at the Atlas of variation home page.

The data analysis, maps, column charts and box plots were produced using Microsoft Excel for Office 365, R version 4.0.3 and RStudio Version 1.4.110.

Denominators

Indicators have been calculated using a variety of population denominators including resident populations at CCG, lower-tier local authority, upper-tier local authority and cancer alliance level. The vision HES based indicators are based on clinical commissioning group (CCG) of responsibility and GP practice list sizes as provided by NHS Digital are used as the denominators.

Statistical methods and presentation in this Atlas

For each indicator the atlas presents two maps, one where the shading is based on statistical significance (difference from the England value) and one where the shading is based on quintiles (where the number of areas in each banding is the same). For some indicators, maps have been categorised by other methods, such as national thresholds.

The latest time period is also presented as a column chart. Where time series data is available box and whisker plots are used to show trends in the level and spread of local area values across England.

Statistical comparators

In the statistical significance map and column charts, the England value is used as the statistical benchmark. It is important to note that this does not imply that the England rate is the optimal or aspirational level for that indicator but gives a sense of the performance of organisations compared with the national value. For some indicators national thresholds or targets are used for comparisons.

Maps

For each indicator, the data for the latest time period is presented as thematic maps. London is shown as an enlarged page inset on selected maps to show detail that might otherwise be lost. The maps assign each geographical area to a single category although variation will also exist within each area.

When two maps are presented, they will show different approaches to categorising data, often a quintile map alongside a statistical significance map, while showing a similar picture there will be differences between them. When comparing the maps, there will be examples where on the quintile map an area will have the darkest shading indicating it has one of the highest values, but on the significance map it may have a lighter shade denoting that it is not statistically significant and vice versa.

At a local level, organisations will need to consider whether having a higher or lower value is important even if statistically they are not different to the England value. The same is true where an area is statistically significantly different to the England value, but the actual value is within the mid-range. Local decision makers will then need to decide whether this warrants further investigation.

Statistical significance maps

For each indicator, individual areas are allocated to one of five groups (see Table B1) based on comparing its confidence interval with the England value to indicate how statistically significantly different their value is from the England value (shown as the horizontal black line across the column charts). The significance maps are colour classified according to these groups.

The map legend shows the significance level for each of the 5 shades compared with the England value for that indicator. The two darkest shades indicate that an indicator value is significantly higher than the England value at the 99.8% and 95% significance

levels. The 2 lightest shades indicate that an indicator value is significantly lower than the England value at the 99.8% and 95% significance levels. Mid-shaded areas are those with an indicator value that is not significantly different to the England value. Where data is unavailable or excluded for an area/organisation, the corresponding map area/symbol is shaded light grey. Data that is suppressed due to small numbers is shaded dark grey.

Table B1: Five shade quintile and significance bands used in the maps and column chart

Shade	Quintile	Significance Band
	Highest 20%	Significantly higher than England at the 99.8% level
		Significantly higher than England at the 95% level
		Not significantly different from England
		Significantly lower than England at the 95% level
	Lowest 20%	Significantly lower than England at the 99.8% level

Quintile maps

The quintile maps split the geographical areas into 5 equal groups with 20% of areas in each group. Where the number of areas are not exactly divisible by 5 (for example 191 CCGs), the classifications do not include exactly the same number of areas. The method used to create the classification was to rank in order the areas from highest to lowest values, then divide the ranks into 5 equal groups using a percentile calculation in Excel.

The legend for the quintile map may have overlapping boundaries between quintile groupings, this is because we have rounded the legends, whereas quintile groupings have been calculated based on the unrounded number.

A disadvantage to grouping data in quintiles is that it does not take into account the distribution of data and quintiles can be created with very different ranges between the highest and lowest values. This should be taken into consideration when comparing areas in different categories within indicators.

The classification is shaded from dark blue (highest value) to light blue (lowest value) on the quintile maps (See Table B1).

Other map presentations

Some maps within the Atlas are presented using different methods, examples of this are:

- diabetic eye screening Map 5a is shown by CCG performance against the national performance thresholds
- diabetic eye screening Maps 5b and 5c show DESP areas presented on the maps by dots for the GP practices within each DESP area
- retinopathy of prematurity map 15c shows hospital units assessed against the screening criteria

Column charts

The local area indicator values and the England value are presented in the column chart accompanying the maps. Where a statistical significance map is presented the column chart will usually show the same colour bands as the significance map. Where there is only 1 map presented the column chart will show the same colour bands as the map.

Interpretation of the column charts

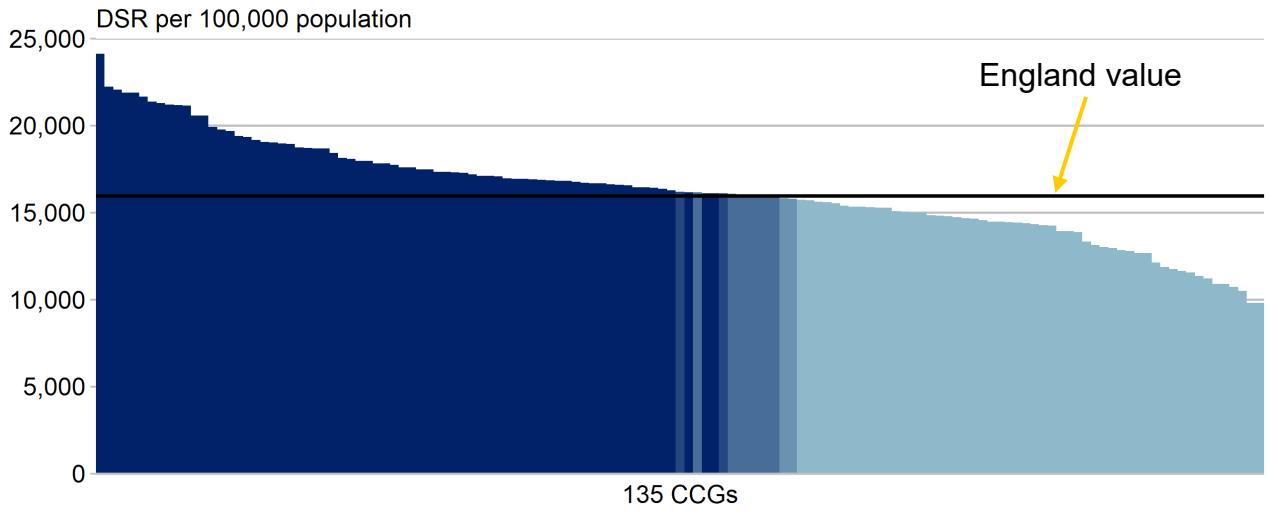
For each indicator, the data presented in the column charts is for the most recent time period.

The height of each bar in the chart shows the indicator value for each geography– the columns are ordered from the highest value on the left to the lowest value on the right. Where a statistical significance map is presented the colour shading used in the column chart is the same (Figure B1). The shading of each column indicates the degree of statistical significance of each indicator value in terms of its difference from the England value (the black horizontal line across the chart). If the quintile map has been used for the column chart the shading will match that of the quintile map.

Conventional column charts display the confidence interval bar for each area to allow the reader to compare against the England value represented by a horizontal line. The 5 shades replace the use of displayed confidence intervals on column charts.

Figure B1 is an example presented in this Atlas. It shows that differently shaded columns are mixed on the chart, rather than same-shaded columns appearing in adjacent blocks. This is because being statistically significantly different from the England value depends not only on the size of the indicator value, but also on statistical confidence. This may be influenced by the size of the population for which the indicator value is shown, as smaller populations tend to have wider confidence intervals.

Figure B1: Example column chart to show statistical significance compared to the England value



Statistical significance interpretation

The significance band does not indicate whether a high or low value represents good or bad performance, simply whether the indicator value is significantly higher or lower than the England value, and the degree of statistical confidence that the difference is not due to random variation.

Indicator values that are not significantly different from the England value (mid-shade) are said to display ‘random’ variation alone. Indicator values that are higher or lower than the England value at the 95% significance level are deemed statistically significantly different. However, as so many indicator values are being simultaneously tested against the England value, the likelihood of finding indicator values that are significantly different from the England value is raised by chance alone. For this reason a more stringent 99.8% significance level is also applied.

There is much greater certainty that indicator values found to be different from the England value at the 99.8% significance level (the lightest and the darkest shades) are due to a systematic non-random variation that requires investigation. In these localities it is likely that the process or system of generating these values is markedly different from that in other localities.

If many indicator values are significantly different from the national value at the 99.8% level this could be the result of small confidence intervals which can result from a large sample size. Alternatively, this may be due to what is known as overdispersion, characterised by many localities having indicator values at the extremities of the distribution, and fewer indicator values around the central value of the distribution.

Overdispersion typically occurs when there are factors influencing the values that have not been accounted (or adjusted) for in the method of calculating the statistic, such as demographic risk factors, casemix or localised service configuration, which is particularly relevant to specialised services. It is important to consider whether all known warranted factors have been adjusted for when assessing whether the observed variation is unwarranted.

Box and whisker plots

For each indicator, where sequential data over a number of time periods is available, this is presented visually in a time series of box and whisker plots that shows the median and spread of local area values across England at consecutive time points. Importantly, the tables accompanying the box and whisker plots show whether there has been any statistically significant change in the median, or in the degree of variation over time. It should be noted that the central value on the box plot is the median for the reported data, not the indicator value for England.

Interpretation of the box and whisker plots

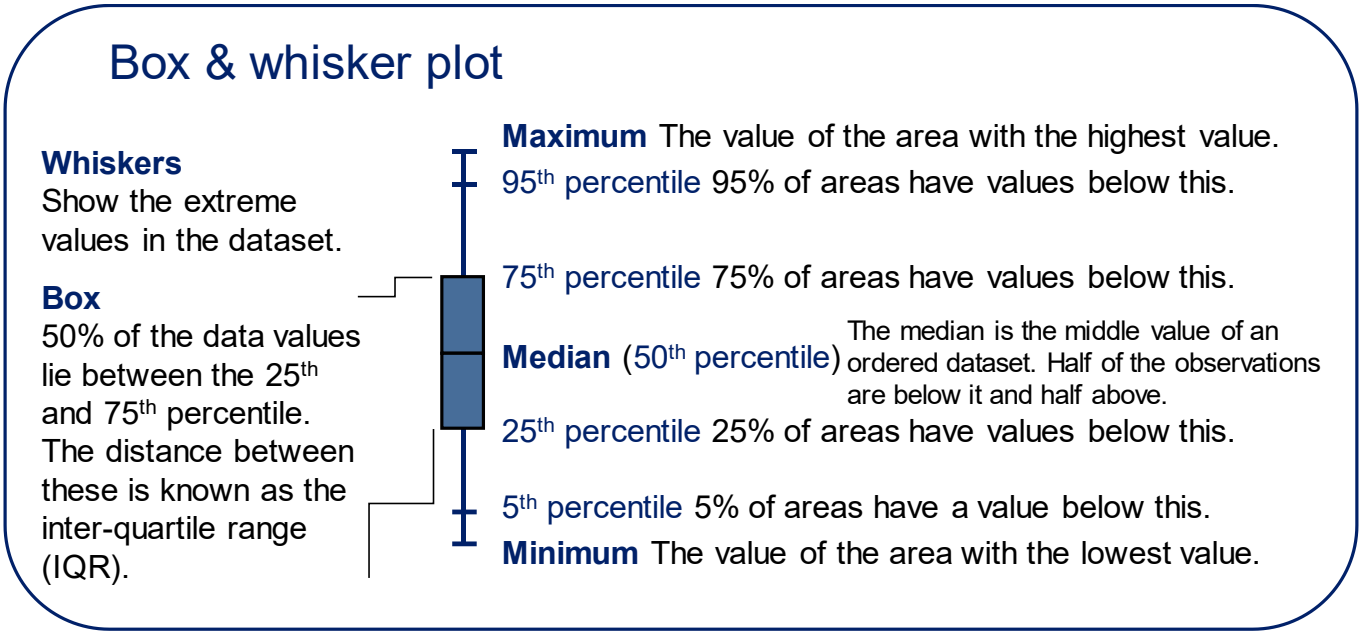
The purpose of the box and whisker plot is to give an impression of the level and spread, or distribution, of the data points (Figure B2). The box and whisker plots use a methodology which is unrelated to the method determining the significance map and column chart shading, they do not represent statistical significance. The box and whisker plot shows how variable the indicator is across all the geographical areas. A single box and whisker plot is displayed for each time period so that comparisons can be made through time of the level and spread of values.

The ‘box’ runs from the upper quartile (75th percentile data point) to the lower quartile (25th percentile) and represents the middle 50% of data points. The height of the box between is known as the interquartile range (IQR) and is calculated as upper quartile value minus the lower quartile value.

Inside the box is a horizontal line, which shows where the median lies. The median is the middle point of the dataset. Half of the data points are above and half of the data points are below it. The median is different from the value of the indicator for England, the more skewed the distribution of data the greater the difference between the median and the England value.

The ‘whiskers’ extend out from either end of the box and show the highest and lowest values within the dataset. The 95th percentile and the 5th percentile are also represented by tick marks on the ‘whiskers’.

Figure B2: Example box and whisker plot



A box and whisker plot enables the user to obtain information about the shape or spread of the data points and whether the data points have a symmetric or skewed distribution. A dataset with a normal distribution is symmetric (non-skewed) around the mean (average), the mean and the median are equal, and each half of the distribution is a mirror-image of the other half. In a distribution that is skewed there is a lack of symmetry between the upper and lower halves of the dataset, the median and the 'box' is not centrally located between the maximum and minimum.

Box and whisker plot summary statistics table

Presented below the box and whisker plot is a table of statistics summarising the trend in the absolute degree of variation and the median:

Max–min (range): The difference between the highest and lowest value, the full range of the data. However, extreme outliers can heavily influence this statistic and consequently mislead about the extent of variability across the dataset. It may be more helpful to use the 95th to 5th percentile (see below)

95th–5th percentile: This shows the range of the data between the 95th and the 5th percentile of the dataset; if there are extreme outliers this statistic may give a better impression of variation across the majority of data values because the highest and lowest 5% of values have been discounted

75th–25th percentile: These percentiles are the upper and lower limits of the middle 50% of data values and indicates the spread of the data for the middle 50% of values. Also known as the interquartile range (IQR). It is related to the median (see below): if the IQR is small it indicates that the central 50% of data values are close to the median; if the

IQR is large it indicates that the data is spread out from the median and there is more dispersion in the middle 50% of values in the dataset

Median: The middle value identified by arranging the values in ascending order from the smallest to the highest. If there is an even number of values the median will be the average of the 2 central data points. It is not the mean or average

The final column of the table is a summary of whether each of these statistics is narrowing or widening (or median is increasing/decreasing) and whether the trend is statistically significant at the 95% level. The statistical significance was determined using a 2-tailed t-test on the slope of a linear regression line fitted to the values in the table over time, where the null hypothesis is that the slope equals zero. The significance test is only performed for indicators with three or more time periods. This regression line and the detailed results of the t-test are not presented in this Atlas.

Standardisation

Differences in the number of events, for example incidence of disease, can be strongly related to the age structure of that population. To identify variation that is beyond that related to age structure, a technique called standardisation is used. This enables the level of testing to be compared between populations with different age structures producing a more level playing field.

For instance, if we compare 2 population groups, A and B, and population A has a higher rate of deaths when compared with population B we could conclude that population A has worse mortality outcomes in comparison with population B. However, if population A has a much higher proportion of older people in it we would expect population A to have a higher mortality rate when compared with population B because mortality rates are linked to increasing age. Therefore, it would be misleading to infer that people in population A are dying at a faster rate than people in population B.

There are 2 main methods of calculating age-standardised rates:

- direct standardisation
- indirect standardisation

Only direct standardisation has been used within this Atlas and so only this method is discussed here. Directly age-standardised rates adjust for the differences in age distribution in a population and are usually expressed, for example, as a number of infections per 100,000 population. To calculate a directly age-standardised rate the observed number of cases from the local population (for example CCG) in each age-band (usually 5 year age bands) is divided by the local population for that age-band and then multiplied by a standard population (in this case the European Standard

Population) in the same age-band. These calculations are then summed across the relevant age-bands and usually expressed as a weighted rate per 100,000 population. This method of direct standardisation has been used for Maps 1a, 1b, 1c, 1d, 2a, 2b, 3a, 3b, 3c, 4, 6 and 10.

Confidence intervals

Confidence intervals are used to represent the level of uncertainty of an area value. Statistical uncertainties usually arise because the indicators are based on a random sample or subset from the population of interest or over a defined time period, both of which may not be representative of the whole population. A smaller confidence interval indicates that the value is more reliable, and a larger confidence interval indicates that the value is less reliable. Confidence intervals were used to determine the shading in the significance maps and the column charts based on significance.

The two main methods of calculating confidence intervals in this Atlas are:

- the Wilson score method for proportions[1,2]
- the Dobson and Byar's methods for rates[2,3]

[1] Wilson EB (2012) Probable Inference, the Law of Succession, and Statistical Inference J AM Stat Assoc 1927; 22: 209-212 [Accessed 10 Aug 2021]

[2] PH Technical Guidance APHO Technical Briefing 3 – Commonly used public health statistics and their confidence intervals [Accessed 23 Jun 2021]

[3] Breslow NE, Day NE. (1987) Statistical methods in cancer research, volume II: The design and analysis of cohort studies. Lyon: International Agency for Research on Cancer, World Health Organization; 1987: 69

Organisational and team biographies

The Atlas of variation in risk factors and healthcare for vision in England has been prepared in partnership with RightCare:

RightCare

Since 2019, the RightCare Programme has been integrated into the Improvement Directorate of NHS England and NHS Improvement. The data and delivery methodology continues to be a significant tool for System Planning and Delivery.

The delivery methodology is based around three simple principles to improve population health:
Diagnose the issues and identify the opportunities with data, evidence and intelligence
Develop solutions, guidance and innovation
Deliver improvements for patients, populations and systems.

RightCare's offer is aimed at systems and starts with a review of indicative data to identify opportunities to reduce unwarranted variation and improve population health. RightCare has a regionally devolved delivery mechanism and supplies systems with tools and products to identify improvements using evidence-based best practice, developed with our national partners, at the moment that local clinicians are considering what good looks like in that area of their system.

The following PHE teams have been involved in the production of the Atlas of variation in risk factors and healthcare for vision in England:

Healthcare Public Health

Healthcare Public Health (HCPH) is one of the three public health domains, working closely with health improvement and health protection. The National Healthcare public health works to improve health at a population level, by maximising the benefits of healthcare on population health to prevent diseases and improve health related outcomes aiming to enable people to live longer healthier lives, PHE's HCPH function provides strategic leadership to the NHS and healthcare providers, supporting the development and delivery of a sustainable integrated health and care system. Coordination across national, regional and local health and care systems helps address health inequalities and optimise population health outcomes via prevention, evidence-based care planning, health related policy and prioritisation.

Health Improvement

The Health Improvement (HI) directorate aligns health surveillance, data, evidence and research capability with our policy advice expertise. The continued application of evidence into practice is vital to inform and influence public health across national and local government and the NHS.

The Health Improvement directorate is currently made up of the following teams:

- alcohol, drugs, tobacco and gambling
- diet, obesity and physical activity
- public mental health
- screening and quality assurance
- health intelligence
- national disease registration
- research, translation and innovation
- priorities and programmes

National Cancer Registration and Analysis Service

National Cancer Registration and Analysis Service (NCRAS), part of PHE, is the population-based cancer registry for England. It collects, quality assures and analyses data on all people living in England who are diagnosed with malignant and pre-malignant neoplasms, with national coverage since 1971. The primary role of NCRAS is to provide near-real time, cost effective, comprehensive data collection and quality assurance over the entire cancer care pathway. www.ndrs.nhs.uk email NCRASenquiries@phe.gov.uk

Screening team

The PHE Screening team provides support and advice to the NHS led national screening programmes. These programmes identify apparently healthy people who may be at increased risk of a disease or condition, enabling earlier treatment and informed decisions.

The following external organisations have been involved in the Atlas of variation in risk factors and healthcare for vision in England:

Addenbrooke's Hospital

The Vitreoretinal Service at Addenbrooke's Hospital Cambridge was established in 1967 and offers a 7 days a week, 365 days a year service for the emergency management of all aspects of retinal and vitreous disorders. The Vitreoretinal Service is also involved in research investigating the causes of retinal detachment including molecular genetic and familial risk factors and has a particular interest in both prevention and retinal detachment repair.

Bedfordshire Hospitals NHS Foundation Trust

Bedfordshire Hospitals NHS Foundation Trust was formed on 1 April 2020 following the merger of Bedford Hospital and the Luton and Dunstable University Hospital. By combining the two trusts we have been able to ensure the clinical sustainability of both sites and ensure that key services such as A&E, Obstetrics led Maternity and Paediatrics can remain at both Hospital sites.

Both hospitals deliver a full range of acute hospital services to a population of around 700,000. The integrated Trust employs a combined workforce of approximately 8,000 staff, the largest NHS employer in Bedfordshire. The hospitals are supported by an army of 500 volunteers whose invaluable work helps the delivery of services.

Bradford Teaching Hospitals NHS Foundation Trust

Bradford Teaching Hospitals NHS Foundation Trust is responsible for providing hospital services for the people of Bradford and communities across Yorkshire. We serve a core population of around 500,000 people and provide specialist services for some 1.1 million.

Bristol Medical School

The Bristol Medical School is a leading centre for research and teaching in Population and Translational Health Sciences. The Bristol Medical School is highly collaborative and multi-disciplinary, with staff from a wide range of academic disciplines and clinical specialties. The medical school is the largest and one of the most diverse schools in the University of Bristol, with over 670 academic and research members of staff and over 280 postgraduate doctoral research students. The school community is highly committed to a diverse and equal, collegial and respectful working environment where we can recruit, develop and retain the best academic and professional services staff and provide them with a challenging, high-performing and supportive environment. The school is committed to delivering a positive working environment for all staff, it holds a Silver Athena SWAN Award in recognition of the ongoing commitment to promote equality, diversity and inclusion within the school. This has now been followed by the formation of a Medical Anti-Racism Taskforce to improve the experiences of BAME students and staff, and to challenge all forms of individual and institutional racism at our school.

Britain and Eire Association of Vitreo Retinal Surgeons (BEAVRS)

BEAVRS is the Britain and Eire Association of Vitreo Retinal Surgeons. We are an informal organisation that brings together all retinal surgeons in the British Isles. Our remit includes promoting best practice in vitreoretinal surgery, through disseminating and sharing advances, and by providing a national audit tool, the BEAVRS database. In addition we provide opportunities in training and research, and advise the Royal College of Ophthalmologists on vitreoretinal surgery issues.

Clinical Council for Eye Health Commissioning

The Clinical Council for Eye Health Commissioning (CCEHC) is an independent advisory body providing evidence-based national clinical leadership, advice and guidance to policy makers in health, social care and public health, and those commissioning and providing eye health services in England. It is recognised as such through a Memorandum of Understanding with NHS England. The CCEHC's recommendations are provided in the best interest of patients, on the best evidence available and independent of any professional or commercial interests.

College of Optometrists

The College of Optometrists is the professional body for optometry. It qualifies the profession and delivers the guidance and training to ensure optometrists provide the best possible care. We promote excellence through the College's affixes, by building the evidence base for optometry, and raising awareness of the profession with the public, commissioners, and health care professionals.

International Centre for Evidence on Disability (ICED) (LSHTM)

ICED provides evidence to improve the health and wellbeing of people with disabilities globally. We develop tools, techniques and evidence on disability, leading to scalable interventions that can improve people's lives across the world.

Moorfields Eye Hospital NHS Foundation Trust

Moorfields Eye Hospital NHS Foundation Trust is one of the leading providers of eye health services in the UK and a world class centre of excellence for ophthalmic research and education. Our main focus is the treatment and care of NHS patients with a wide range of eye problems, from common complaints to rare conditions that require treatment not available elsewhere in the UK. Our unique patient case-mix and the number of people we treat mean that our clinicians have expertise in discrete ophthalmic sub-specialties.

We treat people in 32 locations in and around London, the South East and Bedford, enabling us to provide expert treatment closer to patients' homes. We also operate commercial divisions that provide care to private patients in both London and the Middle East.

With our academic partners at the UCL Institute of Ophthalmology, Moorfields is recognised as a leading centre of excellence in eye and vision research. Together we form one of the largest ophthalmic research sites in the world, with the largest patient population in Europe or the USA. We publish more scientific papers than any other eye and vision research site and have an extensive joint research portfolio.

NHS Digital

NHS Digital is the national digital, data and technology delivery partner for the NHS and social care system. We create powerful tools and services that support NHS staff at work, help people get the best care, and use the nation's health data to drive research and improve services.

NHS England and NHS Improvement

NHS England and NHS Improvement have worked together as a single organisation since 1 April 2019, to help improve care for patients and provide leadership and support to the wider NHS.

Office for National Statistics

The Office for National Statistics (ONS) is the executive office of the UK Statistics Authority (UKSA). Led by the National Statistician, it is the UK's National Statistical Institute and largest producer of official statistics. The ONS produces data, statistics and analysis on a range of key economic, social and demographic topics. Key services include measuring changes in the value and composition of the UK economy, estimating the size, geographical distribution and characteristics of the population (including information from the census), and providing indicators of other social and economic topics of national interest.

Royal College of Ophthalmologists

The Royal College of Ophthalmologists (RCOphth) is the only professional body for eye doctors, who are medically qualified and have undergone or are undergoing specialist training in the prevention, treatment and management of eye disease, including surgery. Ophthalmologists are at the forefront of eye health services because of their extensive training and experience.

As an independent membership organisation, we pride ourselves on providing impartial and clinically based evidence, putting patient care and safety at the heart of everything we do and we collaborate with a wide range of organisations to influence national eye health policy and benefits patients and the profession of ophthalmology.

We are not a regulatory body, but we work collaboratively with government, health departments, charities and eye health organisations to develop recommendations and support improvements in the co-ordination and management of hospital eye care services both nationally and regionally. www.rcophth.ac.uk

Royal National Institute of Blind People

We are the Royal National Institute of Blind People (RNIB). Every six minutes, someone in the UK begins to lose their sight. RNIB is taking a stand against exclusion, inequality and isolation to create a world without barriers where people with sight loss can lead full lives. A different world where society values blind and partially sighted people not for the disabilities they've overcome, but for the people they are. RNIB. See differently. Call the RNIB Helpline on 0303 123 9999 or visit www.rnib.org.uk to find out more.

SeeAbility

SeeAbility provides specialist support to enable people with learning disabilities, autism, and sight loss to achieve their ambitions and participate fully in society. For more information on the work of SeeAbility please go to: https://www.seeability.org/

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About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-leading science, research, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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