



Public Health
England

Protecting and improving the nation's health

The Burden of Disease in England compared with 22 peer countries

A report for NHS England

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.

Public Health England, Wellington House, 133-155 Waterloo Road, London SE1 8UG
Tel: 020 7654 8000 www.gov.uk/phe Twitter: @PHE_uk
Facebook: www.facebook.com/PublicHealthEngland

Prepared by: **Dr Jürgen C Schmidt**, Principal Epidemiologist, Public Health Data Science, Public Health England; **Sebastian Fox**, Principal Data Scientist, Public Health Data Science, Public Health England; **Andrew Hughes**, Principle Analyst, Public Health England; **Alex Betts**, Data Scientist, Public Health England; **Dr Julian Flowers**, Head of Public Health Data Science, Public Health England; **Professor John Newton**, Director of Health Improvement, Public Health England; **Sonya Clark**, Programme Manager, Public Health England

All data:

Global Burden of Disease Study 2017 (GBD 2017) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2018. Available from <http://vizhub.healthdata.org/gbd-compare/> For terms and conditions of use, please visit <http://www.healthdata.org/about/terms-and-conditions>



© Crown copyright 2020

You may re-use this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence v3.0. To view this licence, visit [OGL](#). Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

Published January 2020

PHE publications

gateway number: GW-971

PHE supports the UN

Sustainable Development Goals



Contents

About Public Health England	2
Contents	3
Executive summary	4
Introduction	6
Methods	8
Results	9
Discussion	30
References	32

Glossary

YLL	Years of Life Lost
YLD	Years Lived with Disability
DALY	Disability Adjusted Life Years
GBD	Global Burden of Disease
IHME	Institute of Health Metrics
PHE	Public Health England
NCD	Non-communicable diseases
HAQ	Healthcare Access and Quality Index
WHO	World Health Organisation
SDI	Socio Demographic Index
SEV	Summary Exposure Value
HAQ	Healthcare Access and Quality Index
CHD	Coronary Heart Disease
COPD	Chronic Obstructive Pulmonary Disease

Executive summary

Background

This paper summarises and synthesises data from the Global Burden of Disease (GBD) 2016 programme for England compared with 22 countries (UK, EU and non-EU).

The paper aims to answer 3 questions:

- 1) What is the current relative position of England in relation to major disease burdens and international peers?
- 2) For which diseases and or risk factors is England improving or not improving?
- 3) For which diseases and risks is England improving at a faster or slower rate than peers compared in the paper?

The analysis was developed around 8 themes.

- 1) Premature mortality as measured by Years of Life Lost (YLL),
- 2) Morbidity as measured by Years Lived with Disability (YLD),
- 3) Trend analysis for major conditions,
- 4) Disease frequency as measured by disease incidence and prevalence,
- 5) Summary levels of population exposure to key risk factors,
- 6) Healthcare access and quality (HAQ) – a summary comparative measure of health system performance,
- 7) Comparison of trends with peer countries,
- 8) Limited analysis of projections of life expectancy and YLL for selected diseases.

Methods

The Global Burden of Disease (GBD) methodology is a comprehensive comparative assessment framework of health and determinants of health designed to assist planning interventions and allocating resources that might address health conditions and risk factors. GBD metrics are based on a standardised analytical approach for estimating life expectancy, years of life lost due to premature mortality (YLLs), years lived with disability (YLDs), disability-adjusted life-years (DALYs), and risk factors. Full details can be found in the methods section and in the Technical Appendix.

Results

England's health has improved over the last 30 years. However, over the last 10 years improvements in mortality rates have slowed.

England outperforms other UK countries in most areas of disease burden with lower rates of mortality and morbidity, and equivalent or faster rates of improvement. Internationally England outperforms the USA, but lags behind Scandinavian countries, the Netherlands and Spain.

The phenomenon of slowing improvement in mortality is not unique to England and has been seen in most of the countries England is routinely compared with. It is largely due to a slowing in the rate of improvement in cardiovascular disease mortality, and to some extent cancer.

The rankings of the burden of disease due to mortality and morbidity have remained stable over the last decade and ischaemic heart disease, lung cancer, stroke and COPD remain the commonest causes of death.

Deaths from Dementia, pancreatic and colon cancer have increased in absolute terms and now constitute a higher proportion of all deaths.

Major causes of morbidity have remained stable in England, the top 4 being back and neck pain, skin diseases, migraine and auditory and visual impairment. This pattern is similar for the comparator countries. Depression and anxiety remain major sources of morbidity.

Overall there is less variation in between-country GBD estimates of morbidity reflecting in part the relative immaturity of data collection on the incidence, prevalence and impact of diseases. There have been notable improvements in mean exposure levels to smoking, high cholesterol and high systolic blood pressure. However, England is in the top quartile (i.e. highest level of exposure) to particulate air pollution, high cholesterol, diet low in whole grains and low levels of physical activity. Alcohol consumption is relatively low compared to peers but has been increasing along with low physical activity rates and high BMI.

There remain significant opportunities for the prevention of both cardiovascular disease and cancer through both primary prevention, early detection, public health action, and secondary prevention - clinical care (especially primary care) to reduce the burden of risk factors and maximise the uptake of known effective care.

Introduction

The Global Burden of Disease (GBD) project, as developed and maintained by the Institute for Health Metrics and Evaluation (IHME), aims to produce the best possible comparable estimates of ill health and injury around the world¹.

Metrics produced using the GBD methodology are the only standardised source for internationally comprehensive and comparable estimates of risk factors and outcomes, and health sector performance².

Previous studies have reported GBD 2010 estimates for the UK³ and GBD 2013 estimates for 9 English regions split by deprivation quintile GBD estimates of burden of disease have been used extensively at the national level⁴; for example, by Public Health England in its strategic plan,⁵ in its Health Profile for England report⁶, and by Public Health Wales in its report of Health and its Determinants in Wales⁷.

The first influential paper applying the GBD methodology for England was published in 2015, highlighting how over the recent decades life expectancy had increased and outcomes had substantially improved in England, however the gap in health inequalities was unchanged, and morbidity had increased, notably in multiple conditions. The article concluded, “we live longer, but with more long-term illness.” A subsequent paper concluded that “improvements in mortality have slowed in the UK and other countries over a timescale that could imply a link with political, economic, and service factors in the UK.”⁸ PHE have been responsible for producing the England Burden of Disease Study since 2014.

The National Institute for Health Research has used GBD data to assess the balance of their funded research portfolio⁹. GBD has also been used at a more granular level by bodies with an interest in addressing high burden conditions, such as mental health and musculoskeletal diseases¹⁰, and by local Directors of Public Health.

In June 2018 The Prime Minister announced an extra £20bn annually for NHS in England by 2023¹¹. This was accompanied by the development of a new 10-year plan for the NHS was to be developed to improve the quality of patient care and health outcomes¹², The NHS Long Term Plan was published in early 2019. The intent of the additional £20billion budget was to prevent 150,000 heart attacks, strokes and dementia cases, and to provide better access to mental health services for adults and children.

The data provided in this study was made available to the NHS when drafting their plan. These data apply GBD methods to identify the areas where England appears to be falling behind other countries. This study provides modelled health intelligence to aid future health service spending plans.

This analysis gives:

- an overview of trajectories for major conditions and risk factors in England compared to peer countries applying the Global Burden of Disease (GBD) methodology
- A review of major contributors in terms of diseases, conditions and risk factors for both mortality and morbidity
- information of value to a wide array of policy and decision makers across the public sector

Methods

GBD metrics are based on a standardised analytical approach for estimating life expectancy, years of life lost due to premature mortality (YLLs), years lived with disability (YLDs), disability-adjusted life-years (DALYs), and risk factors. Data used for this article are based on the 2016 GBD study. Computation of individual metrics has been detailed elsewhere, including their use for the analysis of the Burden of Disease in England^{13,14,15}.

This study focuses on comparing the epidemiological developments in England with 22 'comparator' countries. In addition, it uses newly developed metrics and methodologies for forecasting and health systems performance.

We extracted data from the GBD 2016 study¹⁶ to compare mortality, causes of death, years of life lost (YLLs), years lived with a disability (YLDs), and disability-adjusted life-years (DALYs) in England, the UK, and 18 other countries (the first 15 EU members [apart from the UK] and Australia, Canada, Norway, and the USA [EU15+]). Data were available for 306 causes and 2,337 sequelae^{17a}, and 79 risks or risk clusters.

We added analysis using newly developed methodologies in forecasting and estimating health sector performance. GBD-based forecasting is based on work by the Centre for Health Trends and Forecasts¹⁸. Health sector performance is measured using the Health Access and Quality Index (HAQ Index), a new metric developed by IHME^{19,20}. It estimates optimal performance comparing observed and expected mortality rates for conditions amenable to medical care, based on a country's Sociodemographic Index (SDI)²¹. The Forecasting and HAQ methods allow the same international comparison as applies to other GBD metrics, identifying commonalities in trends and causes of variation of outcomes.

All results presented are based on publicly available GBD England data²².

The section 'Methods' in the separate Technical Appendix document provides more detail.

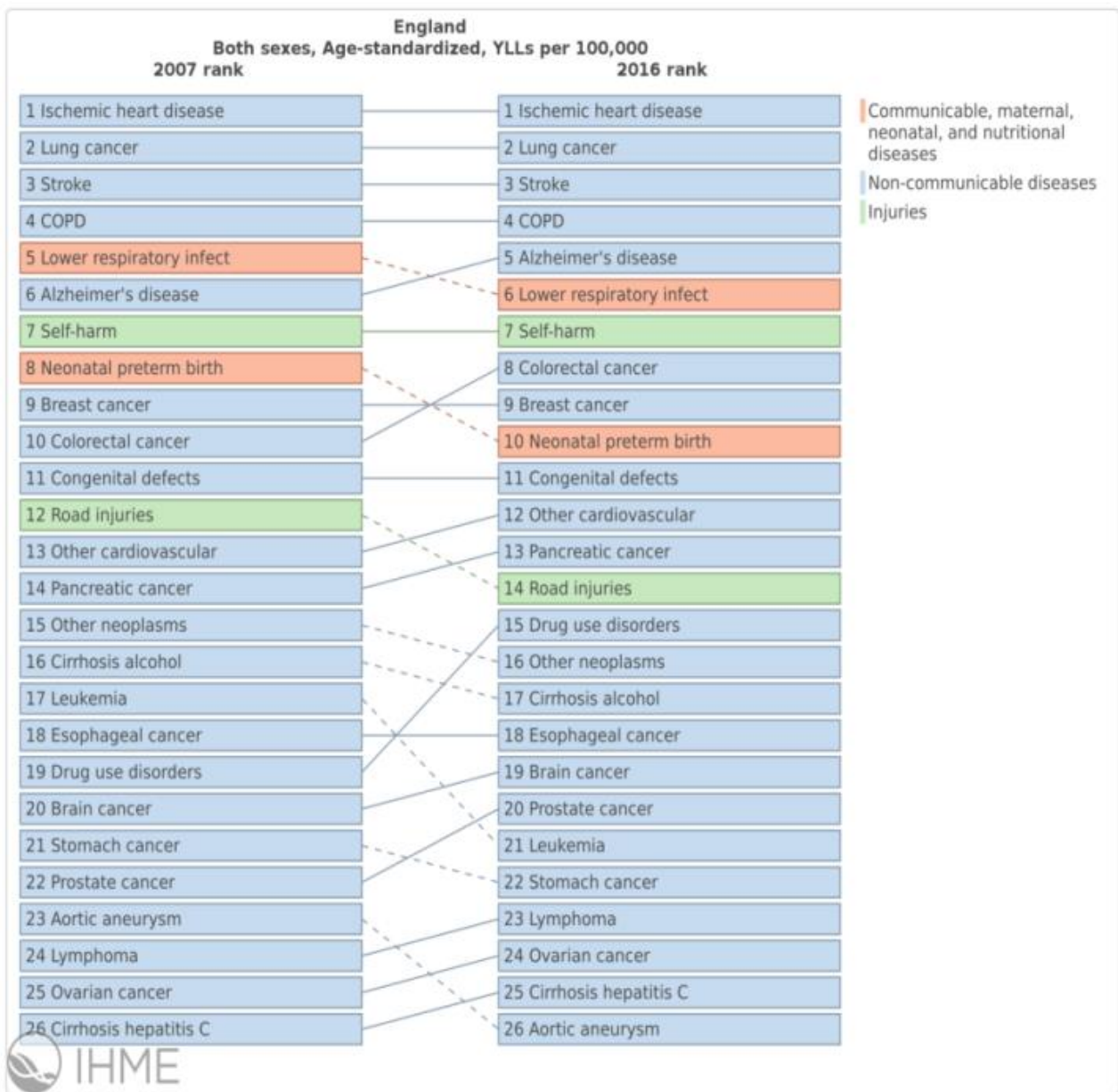
^a **Sequelae** - conditions which are the consequence of a previous disease or injury.

Results

Premature mortality as measured by Years of Life Lost (YLL)

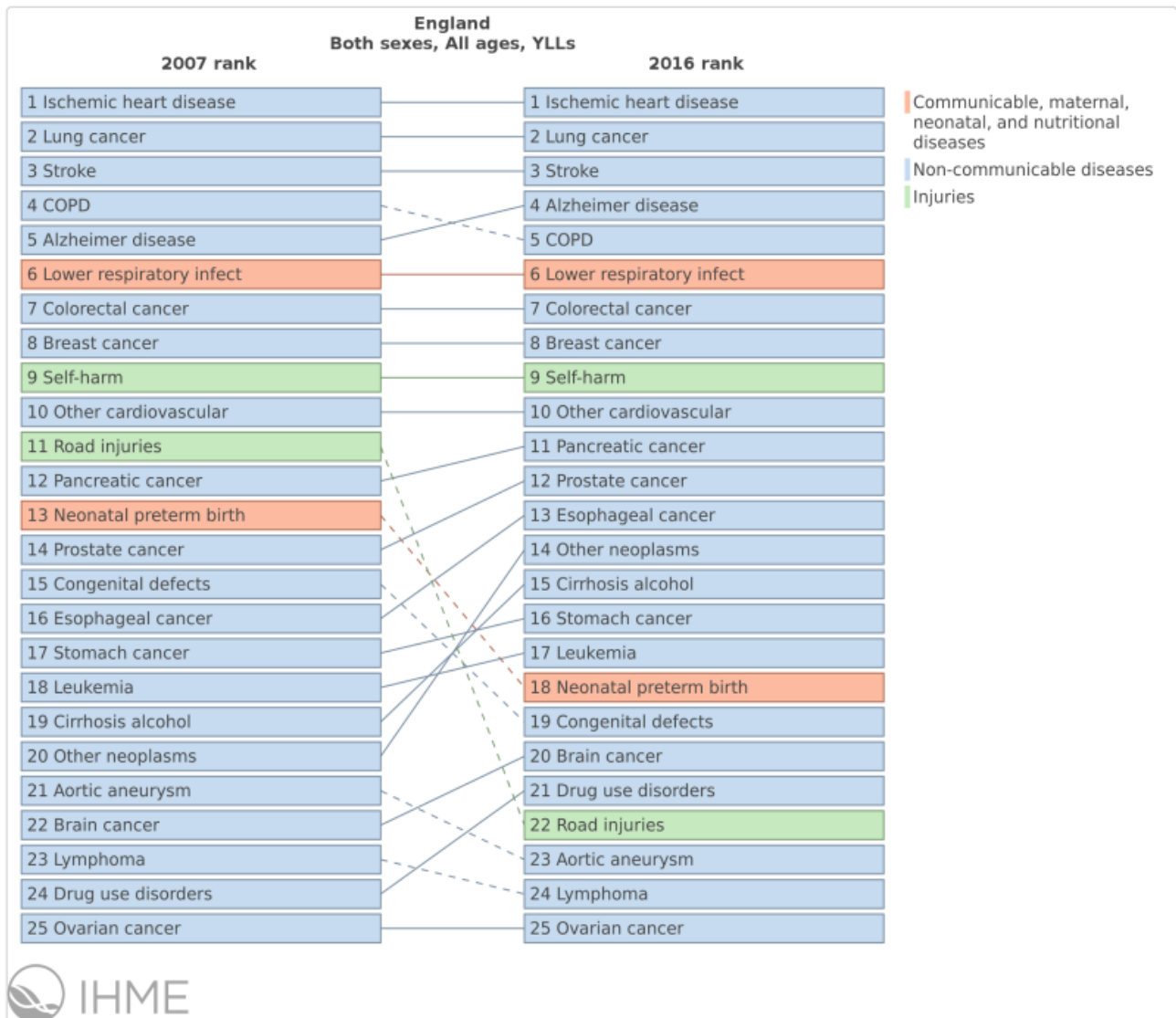
Figure 1 below shows how individual conditions have been ranked according to their age-standardised rate^b between 2007 and 2016 for mortality and morbidity. Figure 2 shows the absolute burden. Ranks are similar.

Figure 1: Causes of mortality in England ranked by YLL, age-standardised and all ages



^b Age Standardised rate - is a weighted average of the **age-specific rates** per 100,000 persons, where the weights are the proportions of persons in the corresponding **age** groups

Figure 2: Causes of mortality in England ranked by YLL, all ages



The ‘top 4’ diseases have remained static over time. Alzheimer’s disease, colorectal and pancreatic cancer, and drug use disorders have increased their rank.

There are some areas where the rank and burden has decreased such as the reduction in road injuries.

Cardiovascular disease, cancer, non-communicable respiratory disease and injury dominate the mortality ranking.

International comparison, mortality

It is now clear that the rate of improvement in mortality has slowed down in the last 10 years manifesting in a lack of improvement in life expectancy. This is not unique to the UK and has been seen in many comparator countries – Finland is a notable exception. This can be decomposed by cause as shown in Figure 3 which confirms:

- the reduction in year on year change in YLLs since around 2010
- the proportion of YLL improvement due to cardiovascular disease and cancer
- the reduction in the contribution of cardiovascular disease to YLL reduction

The slow-down in mortality improvement is largely due to reduced improvements in cardiovascular disease mortality.

Figure 3: YLL improvement over time decomposed by cause for England

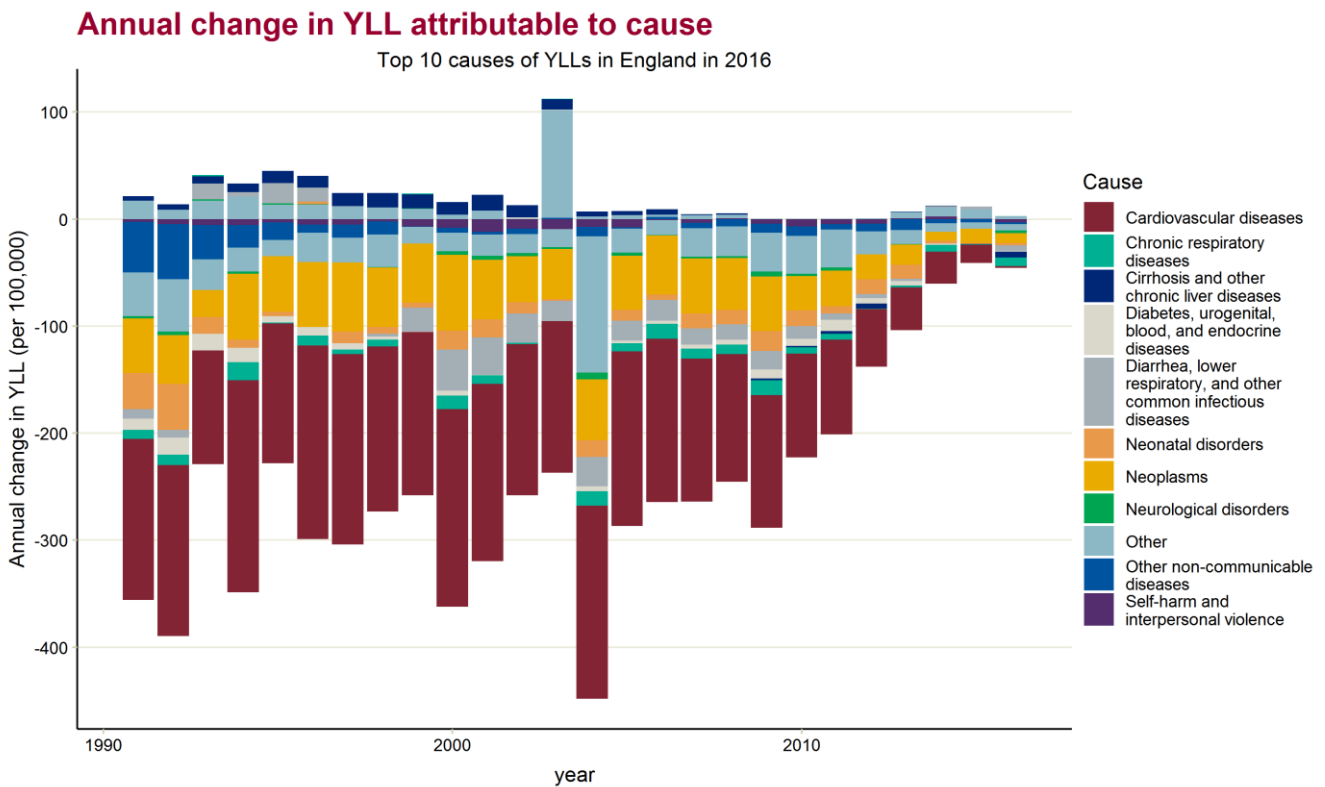


Figure 4: YLL improvement over time decomposed by cause for England compared to peers

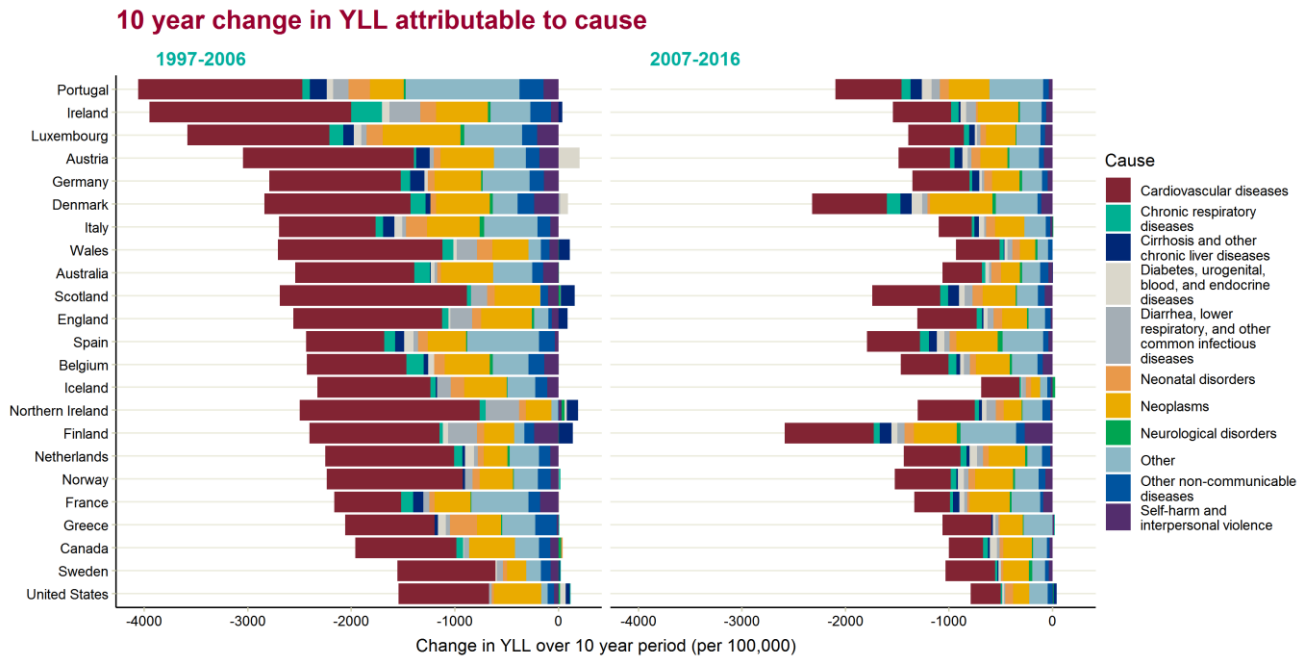


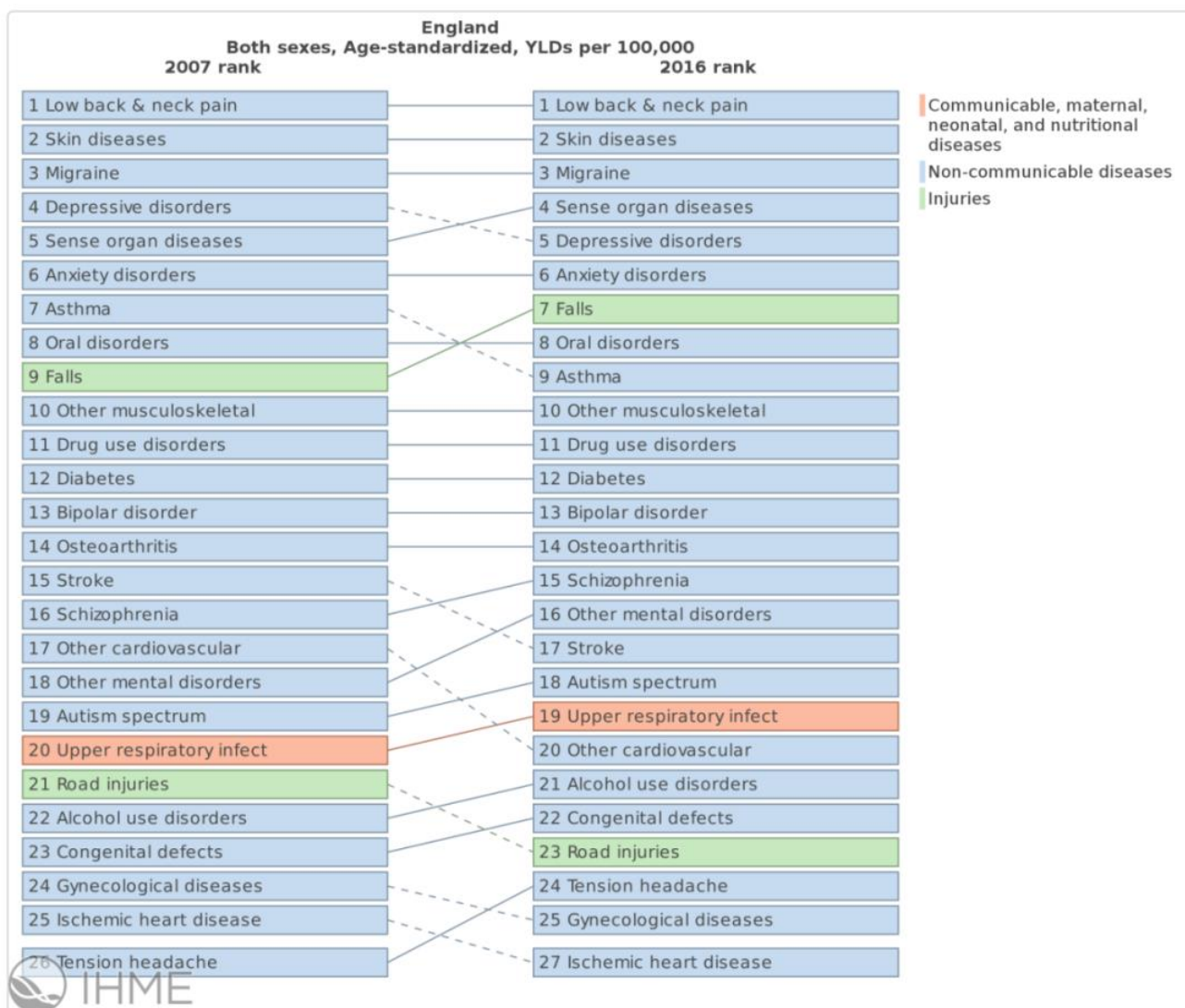
Figure 4 shows near universal slowdown in the rate of reduction of YLLs except for Finland and Denmark. England is similar to peers and ‘better’ than Iceland and the USA. Much of the change has occurred in cardiovascular disease and to a lesser extent, cancer.

Morbidity as measured by Years lived with Disability (YLD)

Musculoskeletal disease, mental disorders, asthma, diabetes and injury dominate morbidity rankings. Figure 5 shows that the ‘top 3’ causes of morbidity or YLD, are back and neck pain, skin disease and migraine the rankings of which have remained static over time. Sense organ disease (auditory and visual impairment) and falls have increased their rank. The rankings for absolute burden are identical. Morbidity caused by Asthma and stroke has fallen.

Morbidity rankings are less reliable than mortality rankings due data availability and quality. The interpretation of the rankings needs care. For example, high ranked conditions like back pain are frequent, create considerable demand on healthcare, and have economic impact through lost working time, whereas conditions like migraine are also very frequent but are largely amenable to self-care and to some extent primary care.

Figure 5: Causes of morbidity in England ranked by YLD per 100,000 age-standardised



International comparison, mortality and morbidity

The current ranking of conditions between and within countries for mortality and morbidity are summarised in heatmaps (Figures 6 and 7). Columns are ordered by England rankings for YLL and YLD.

Within England the highest YLL is for ischaemic heart disease (it ranks #1) and the lowest among the top 25 is motor vehicle accidents.

Compared to our peer group we rank higher for lower respiratory tract infections, neonatal mortality, oesophageal cancer and aortic aneurysm.

Figure 6: Heatmap 2016 age-standardised YLLs by country

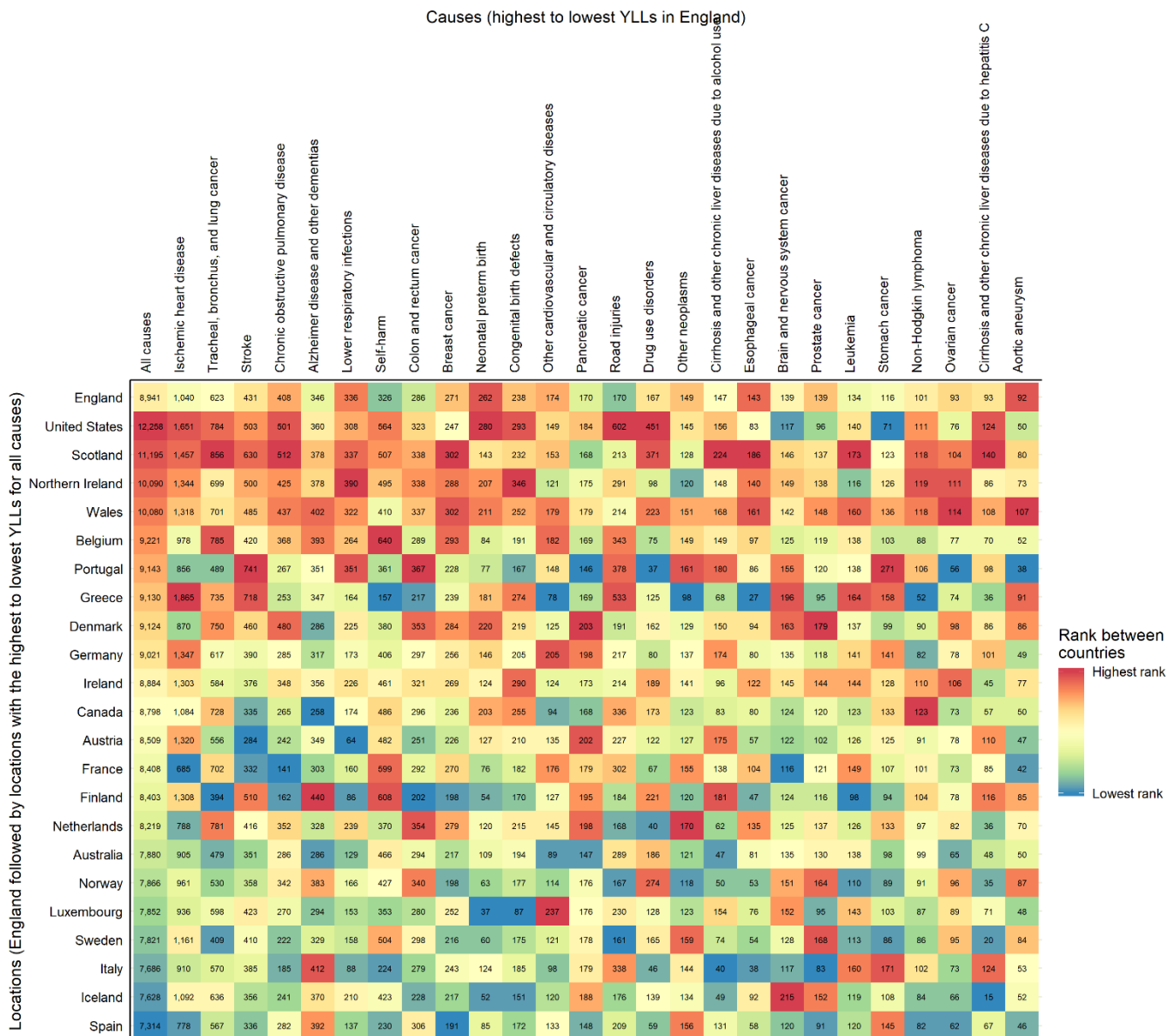
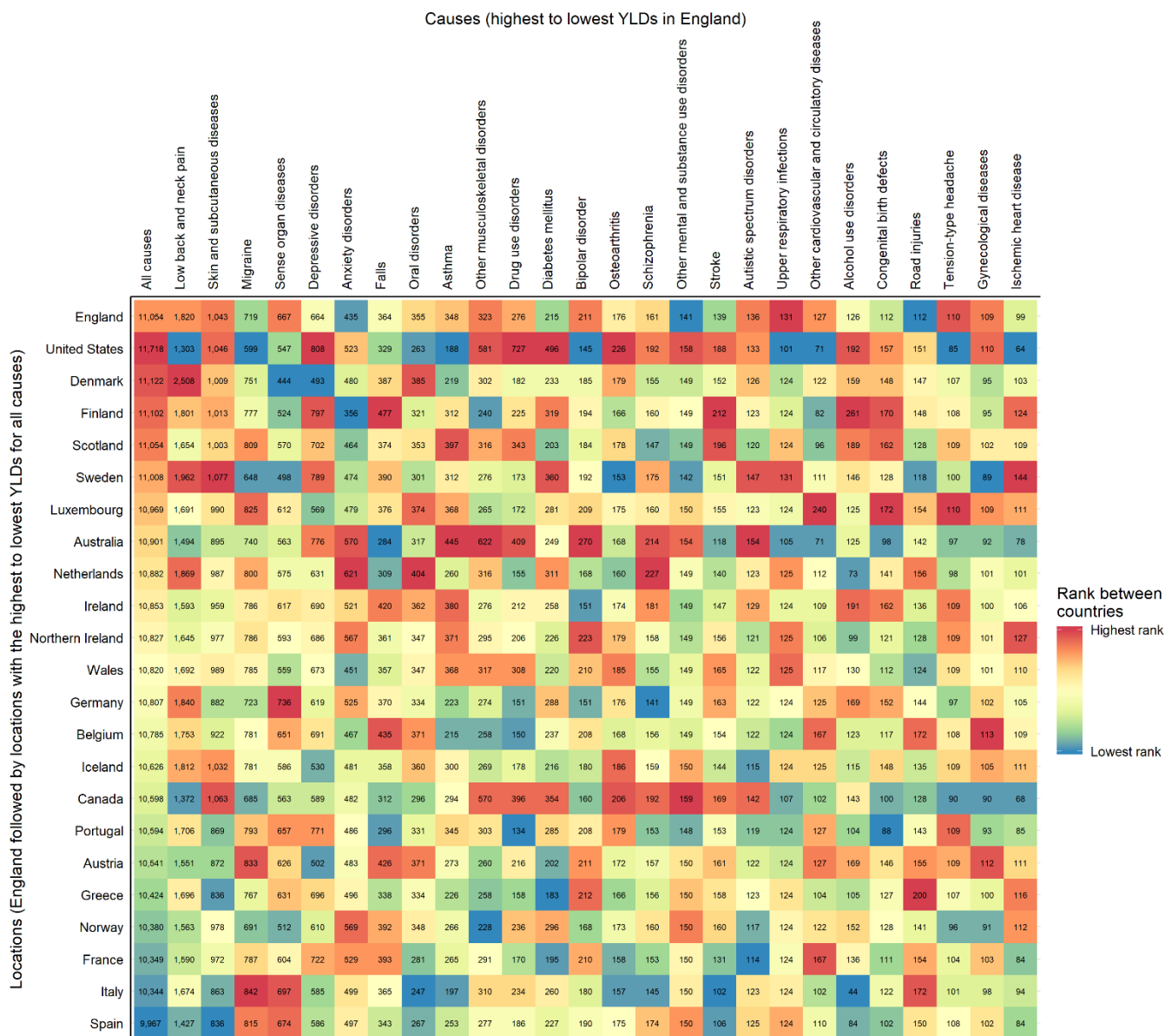


Figure 7: Heatmap 2016 age-standardised YLDs by country



Trends in mortality and morbidity

Figures 8 and 9 show trends over time in major causes of mortality and respiratory morbidity, represented as box plots showing England values compared to the median, lower quartile and upper quartile of values for all comparator countries. The Technical Appendix provides more detail.

Figure 8: Trend in premature mortality

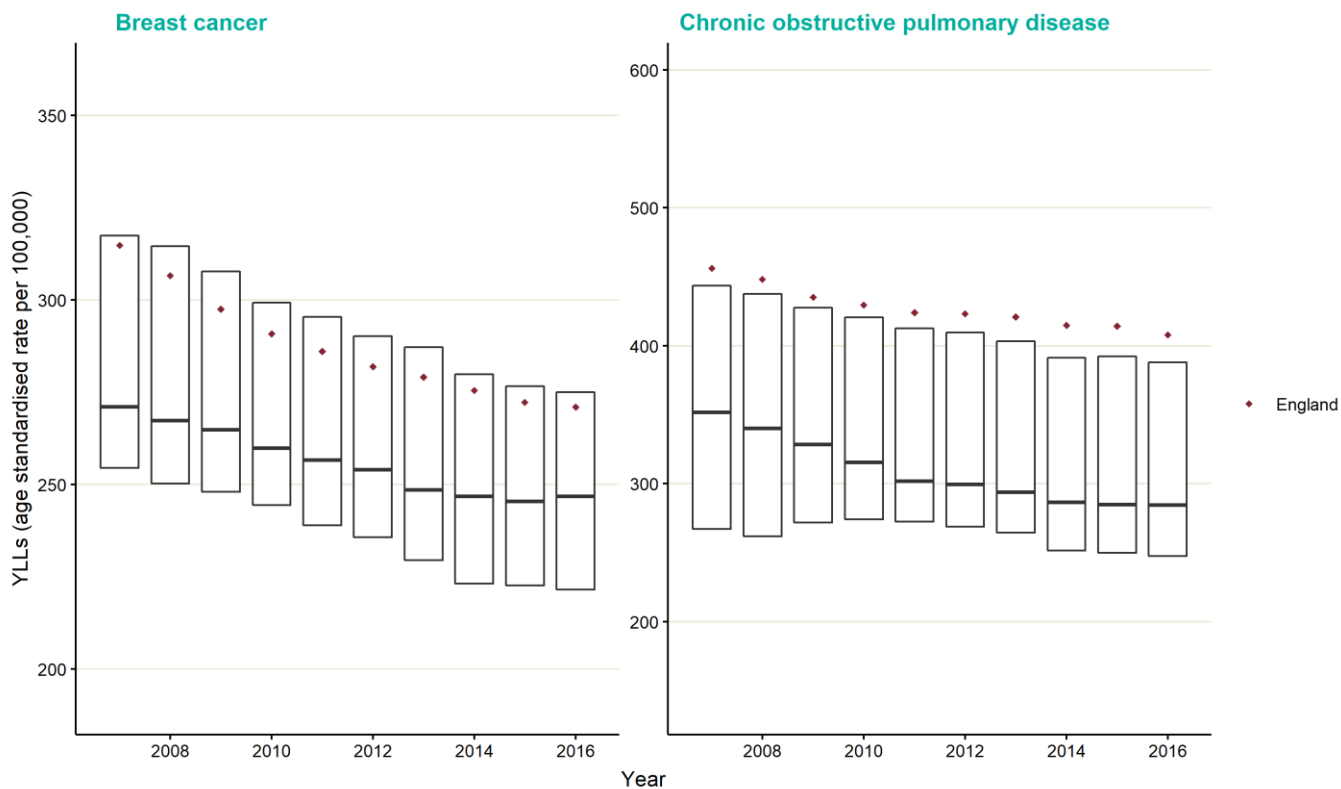
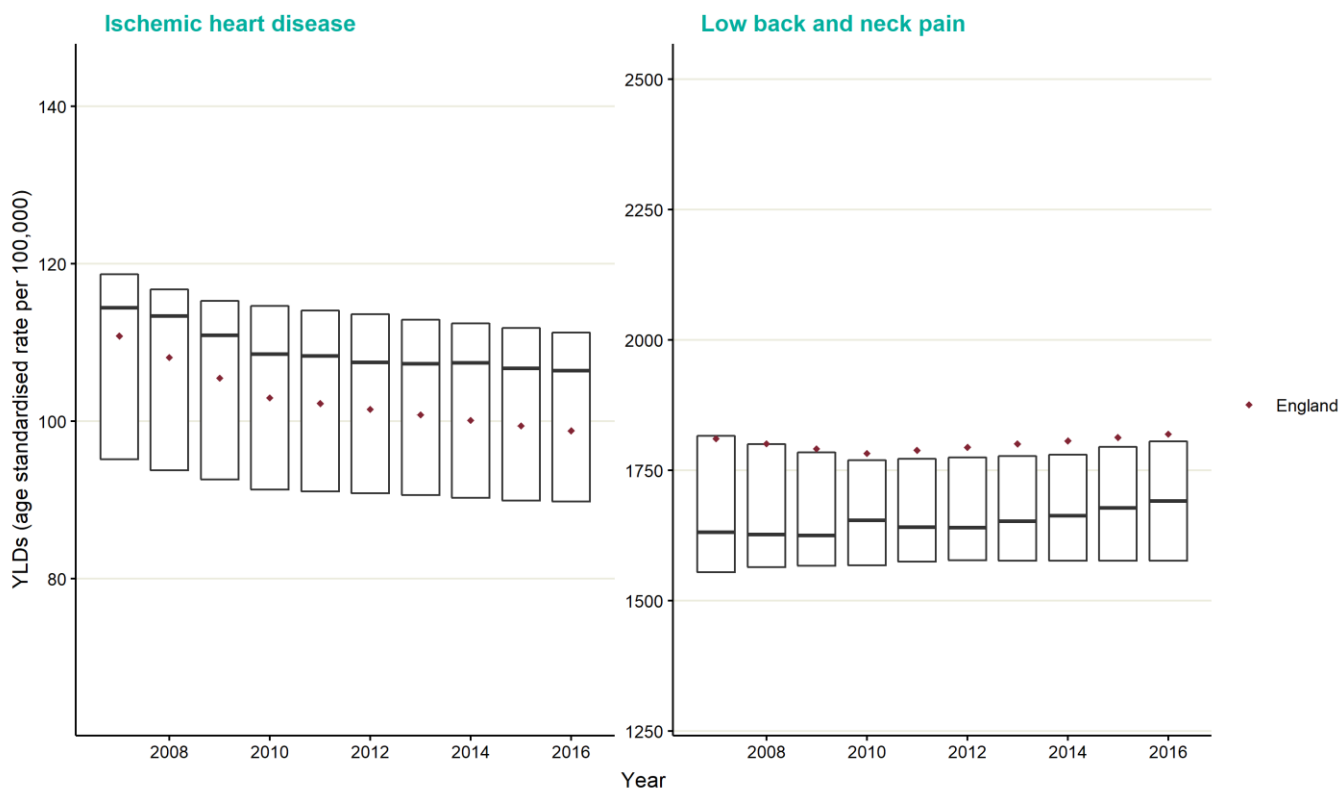


Figure 9: Trend in morbidity



Disease frequency: incidence and prevalence

GBD calculates estimates of disease incidence (new cases per unit time) and prevalence (existing cases per unit time) for all conditions, by age, sex and location. It uses a combination of literature reviews, local data and statistical models to create these.

These figures are often difficult to obtain and although there are differences between GBD and data from familiar sources like QOF or cancer registration they tend to lie within the uncertainty intervals of the GBD estimates. These are shown in Figures 10 and 11.

The paper also presents estimated absolute numbers of incident and prevalent cases and looks at the change between 2007 and 2016. These are summarised in Table 1 in the appendix. To summarise:

- GBD estimates about 3m people in England with ischaemic heart disease and stroke in 2016 (QOF is very similar), and 400,000 new cases a year
- GBD estimates around 14 million people suffered with musculoskeletal disease in 2016 with 8 million new cases per year
- GBD estimates around 2.6 million people with COPD – this far exceeds the QOF estimate of 1.1 million, likely due to under-detection and differences in case-definition
- the absolute number of both incident and prevalent cases of most conditions has increased since 2007

The Technical Appendix provides more detail.

International comparison, incidence and prevalence

Figures 10 and 11 show incidence and prevalence rates for England compared to peer countries. England has higher disease frequency than peers for cardiovascular, neurological, chronic respiratory and musculoskeletal disease, and is lower than peers for individual common cancers.

Cardiovascular diseases incidence and prevalence in England are in the highest quartile of rates for peer countries. This is largely due to a much higher incidence and prevalence of ischaemic heart disease (IHD), despite a faster rate of improvement than our comparators. In contrast, stroke prevalence is in the lowest quartile and has seen a faster improvement, both in incident cases and prevalence compared to most peers. Although breast cancer and colorectal cancer have slowed rate of improvement, both are close to or within the best quartile. Generally, all cancers follow an upward trend in line with peers.

Musculoskeletal disease, driven by low back and neck pain are in the worst quartile. Detailed narrative descriptions for comparative rates of change are provided in the Technical Appendix.

Figure 10: Trends in incidence

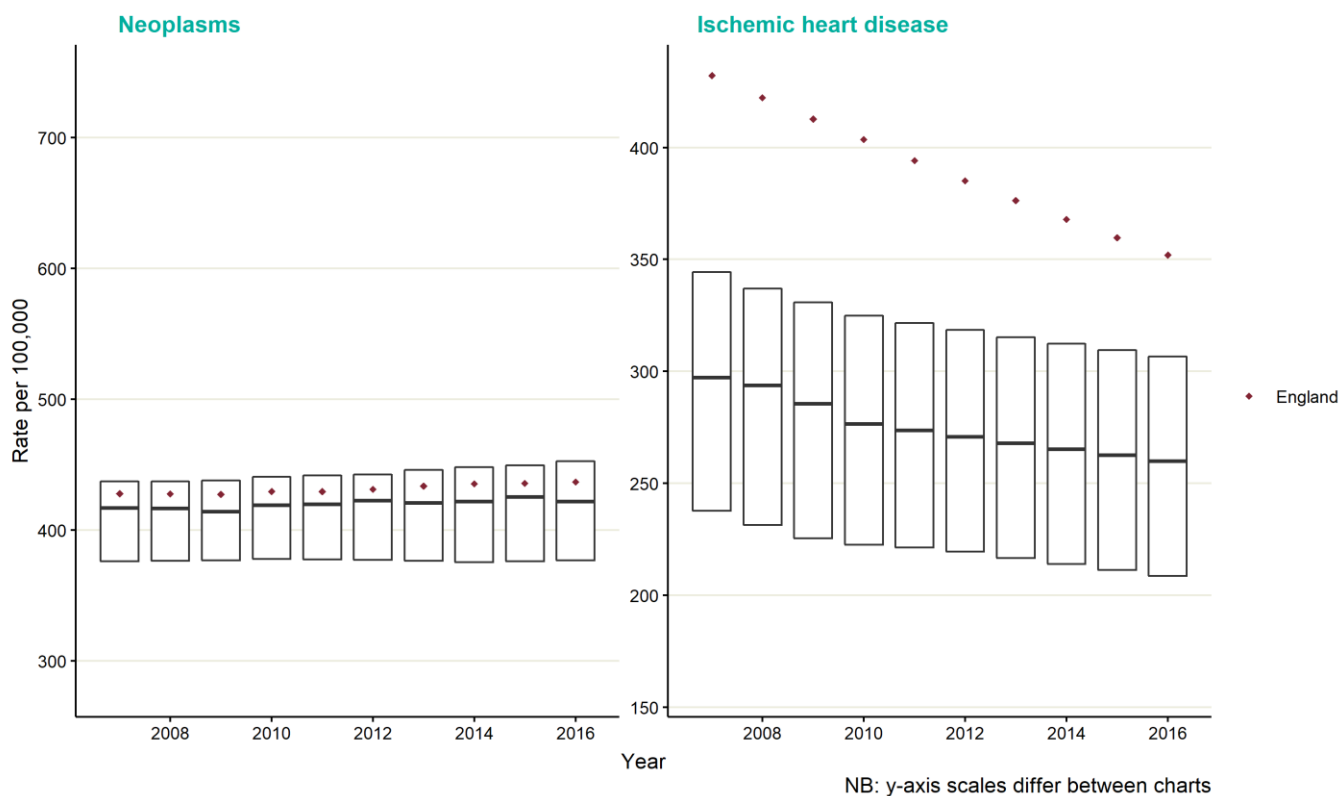
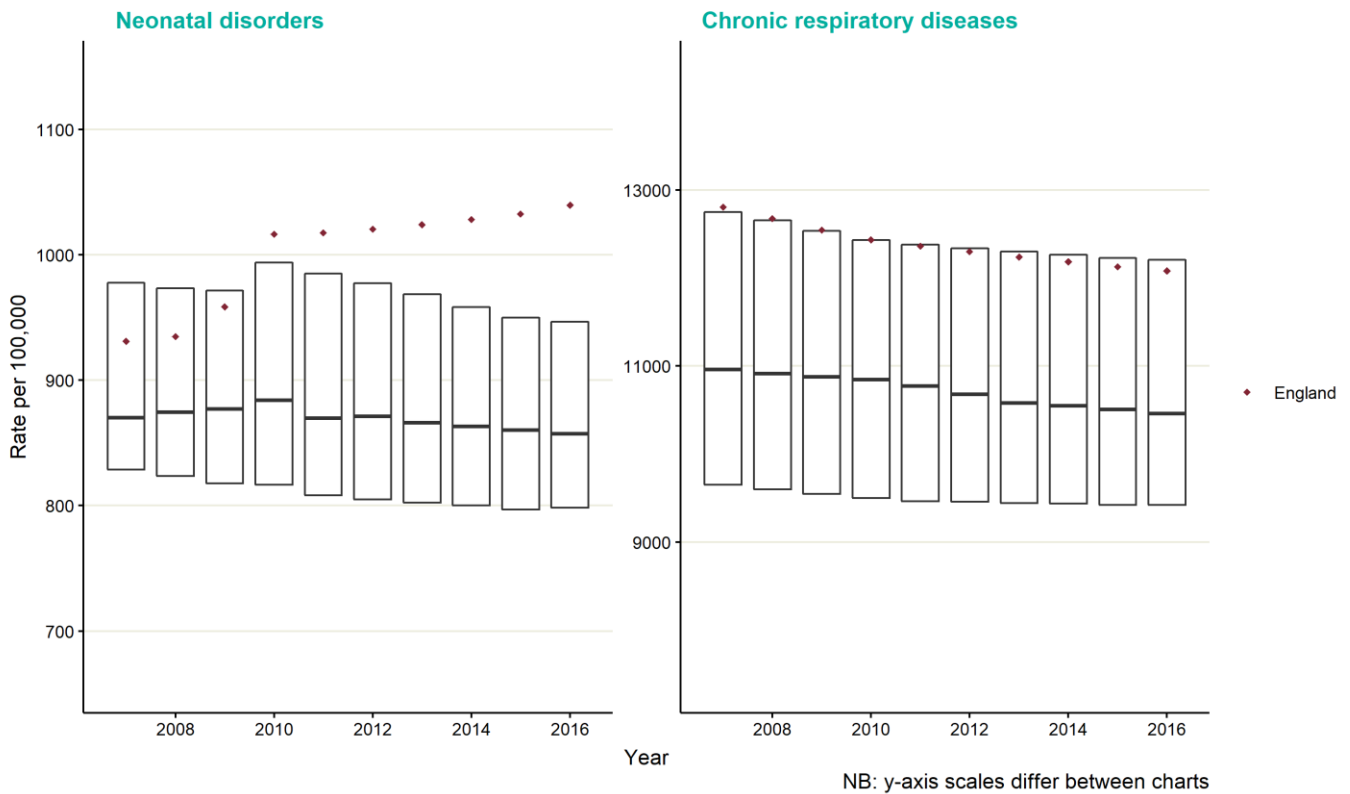


Figure 11: Trends in prevalence



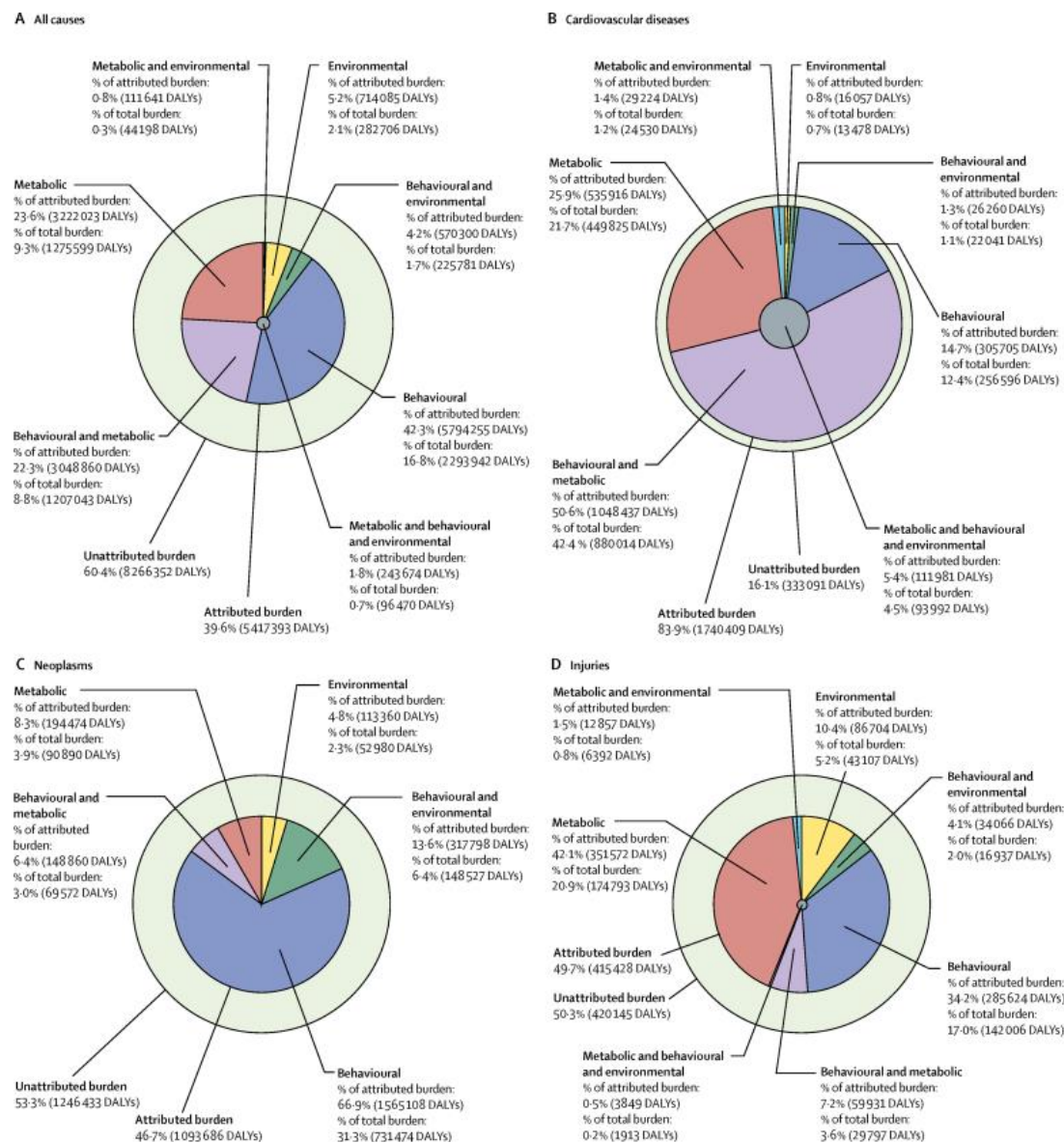
Risk factors

Just under 40% of the total burden of disease is thought to be attributable to 84 known risk factors included in the GBD analysis. In practice there are a few risk-factors that each account for about 2% or more of attributable risk in DALYs²³. Smoking, high blood pressure and high BMI together account for 25% of the burden of disease in England. Main risk factors in England are:

- behavioural risks: tobacco, alcohol, drugs, diet low in fruits, diet low in vegetables, diet low in whole grains
- metabolic risk: high body mass index, high systolic blood pressure, high plasma fasting glucose
- environmental risks: exposure to particulate air pollution

The relationship between risk factors and diseases is summarised in Figure 12. Each pie chart shows the proportion of DALYs that can be attributed to behavioural, environmental, metabolic factors or a combination of these. The green background pie represents the total burden. For example, in cardiovascular diseases, 84% of DALYs (over 1.7 million DALYs) can be attributed to known risk factors, whereas in the case of cancer only about half of the disease burden (46.7%, or over 1 million) can be attributed.

Figure 12: Attributable risk patterns for all causes, CVD, neoplasm and injury



Source: John N Newton et al., Changes in health in England, with analysis by English regions and areas of deprivation, 1990–2013

GBD does not provide estimates of risk factor prevalence for countries. Instead it calculates a summary measure known as the Summary Exposure Value (SEV) which is defined as a:

“... measure of a population’s exposure to a risk factor that takes into account the extent of exposure by risk level and the severity of that risk’s contribution to disease burden. SEV takes the value zero when no excess risk for a population exists and the value one when the population is at the highest level of risk; we report SEV on a scale from 0% to 100% to emphasize that it is risk-weighted prevalence”²⁴.

The SEV is therefore a measure of risk-adjusted prevalence of risk factor exposure - it may not be directly comparable to directly measured prevalence in countries but facilitates comparison of exposures over time and between locations.

International comparison, risk factors

The trend in risk-specific SEVs for major risk factors is shown in Figure 13 with England (red diamonds) compared to comparator countries.

In summary, there are some notable trends in risk factor exposure in England:

- declines in air pollution, smoking, cholesterol and hypertension
- increases in exposure to low physical activity, high BMI and drug use
- little change in dietary exposures

In comparison with other countries England is:

- at the 75th centile of exposure risk to air pollution amongst peer countries (Sweden lowest)
- 60% have diet low in fruit and 45% have diet low in vegetables (Luxembourg and Greece best at 25%). England is at the 75th centile for low fruit consumption compared to peers, and at the 30th centile for diet low in vegetables.
- in the top 50% of countries with high BMI (Austria lowest at 11.9%, and the USA is highest at 25%).
- in the top 25% of countries for high cholesterol and low physical activity.
- by contrast England’s smoking and alcohol exposures are in the lowest quartile for Europe and peer countries.
- of particular note is the decline in systolic blood pressure through the 2000s from being in the highest quartile through the 1990s to being in bottom quartile since 2010 when improvement stopped. Systolic blood pressure SEV in 2016 is lowest in the USA at 22.3%.

Figure 13 presents selected risk factors. More details are available in the Technical Appendix.

Figure 13: Trends in risk factor exposure



NB: y-axis scales differ between charts

Healthcare Access and Quality Index (HAQ)

The Healthcare Access and Quality Index (HAQ) is a measure of amenable mortality based on GBD mortality rates. Amenable mortality refers to deaths in a defined set of conditions which are thought to be avoidable by optimal access to and quality of

medical care. It has been used as a comparative measure of healthcare and health system performance for several years.

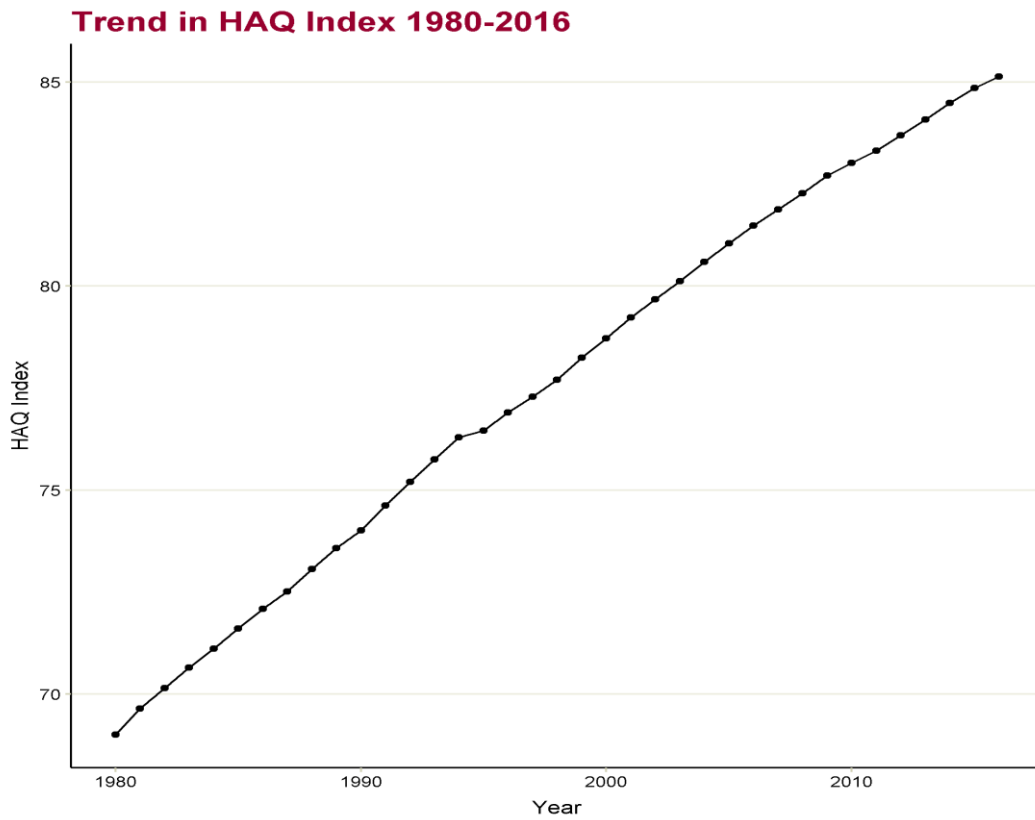
The definition of amenable mortality has been modified over time, but the standard list was developed by Nolte and McKee some years ago²⁵. The GBD version enhances amenable mortality in several ways adjusting for risk and age. More detail is available in the Technical Appendix, where the conditions contributing to the HAQ Index are shown.

The HAQ summarises amenable mortality (premature deaths theoretically avoidable by access to and receipt of high quality medical care) into an index which takes values from 0-100 where 100 is best achievable performance.

Interpreting the index is not straightforward but if there are no deaths in a locality from any of the contributory conditions, then it will get an index of 100. No country currently has an index of 100. The inference is that the higher the value of the index the more likely it is that people are able to access high quality effective care. The HAQ can be deconstructed into 32 underlying causes of death for which there are time series data for each comparator country. A similar analytical approach to that outlined above can help to identify potential areas for improvement in England.

Figure 14 shows that the HAQ index for England has increased from roughly 70 in 1980 to an average of 85 in 2016. There is variation between local authorities which has increased slightly but the relative rank of local authorities has been consistent over time.

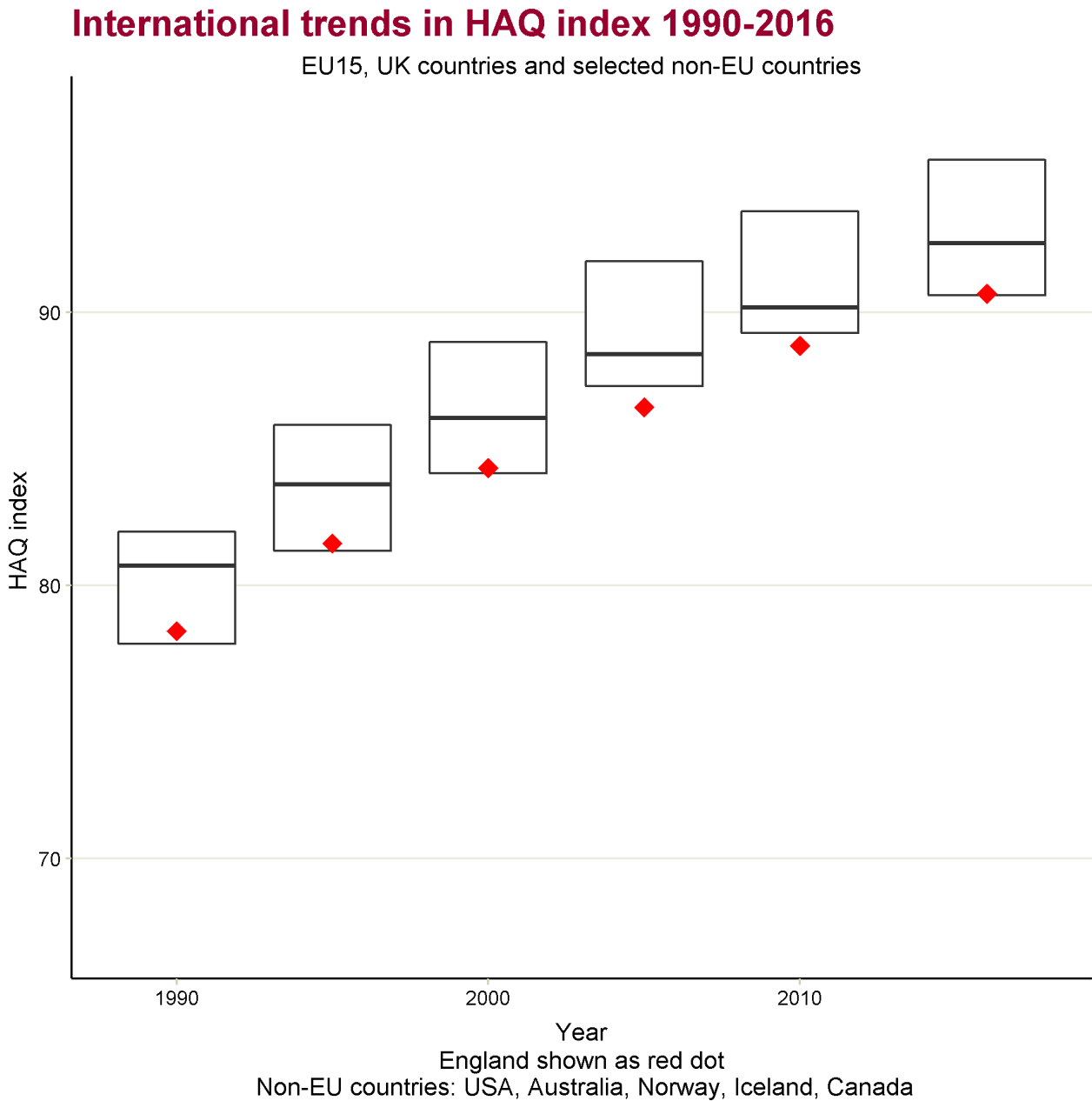
Figure 14: Trend in HAQ for England



International comparison, HAQ

Most EU and peer countries have a higher HAQ score than England in 2016²⁶. Amongst our peer group, Iceland, Norway and the Netherlands have the highest HAQ scores. Our score is higher than Greece, Scotland, Wales, Portugal and the United States. Our relative position has remained consistently in the lowest 25% of our peer group (Figure 15).

Figure 15: Trend in HAQ for England versus peer group



The Technical Appendix presents more detail for individual causes, comparing England with peer countries.

Variation in YLL trends, international comparison

The mortality and morbidity data from the GBD 2016 study were each analysed as age standardised rates in separate general linear models (Analysis of covariance - ANCOVA) for each of 20 level 3 causes (selected as they were each ranked as a top 10 cause of mortality or morbidity in England).

The data from England were analysed alongside comparator countries such as other UK countries, European countries and the USA. The ANCOVA method assessed whether there was a significant difference in the mean of each measure (YLL or YLD) and the mean rate of change in the level of each measure over time.

Figure 16 shows the pattern of the slope (change over time), allowing understanding of whether England's performance (slowing down in most cases), is significantly different from that of comparable countries.

Figure 17 compares the average rate over the last 10 years or so between countries, to allow placing the England value into context.

These examples show:

- the dramatic improvement in male cardiovascular mortality in Finnish men compared to England.
- the dramatic improvement in mortality in breast cancer in Danish women compared to England.

The Technical Appendix presents more detail for individual causes, comparing England with peer countries.

Figure 16: Trends in age-standardised YLL rates, England vs comparator countries

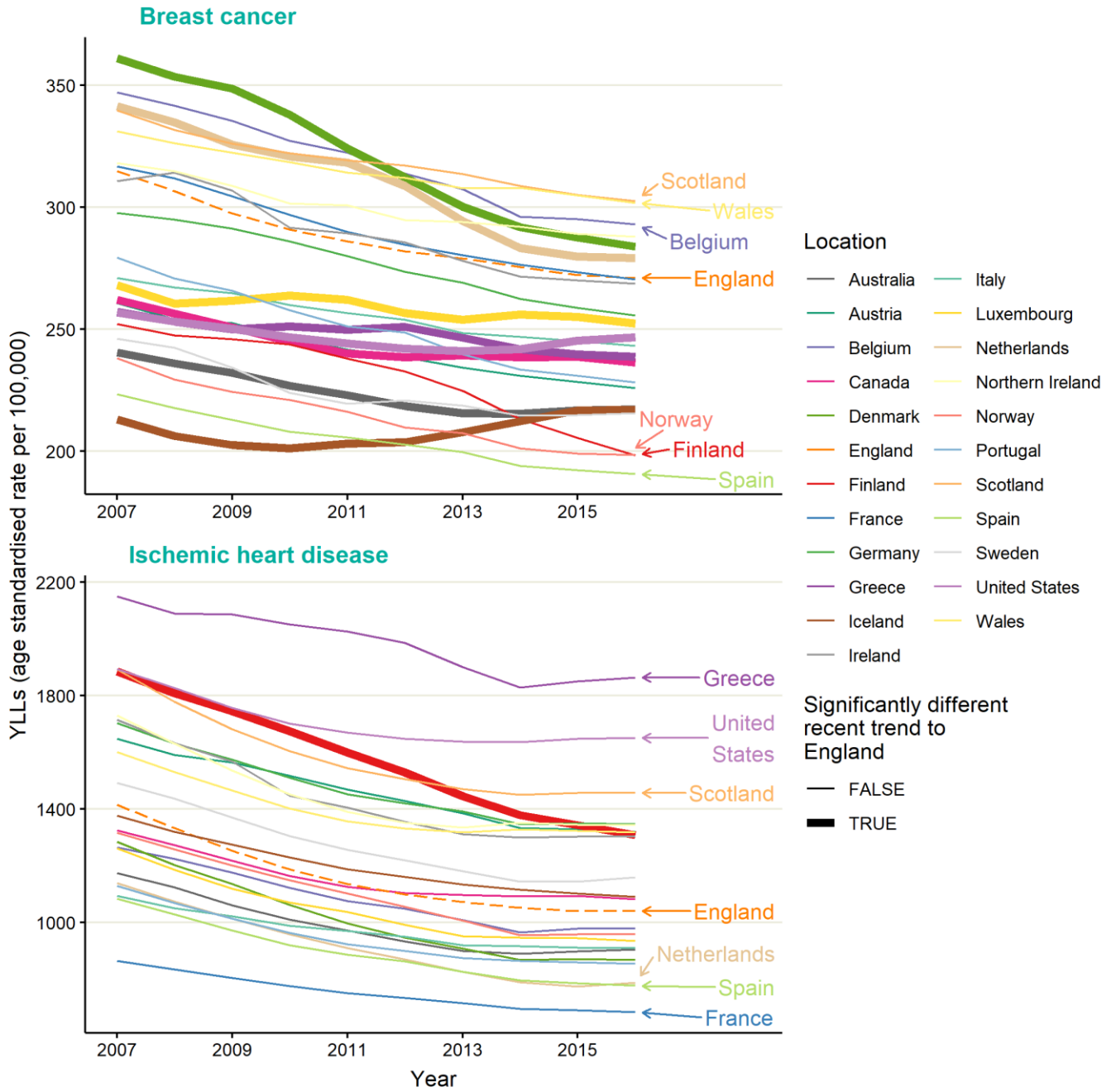
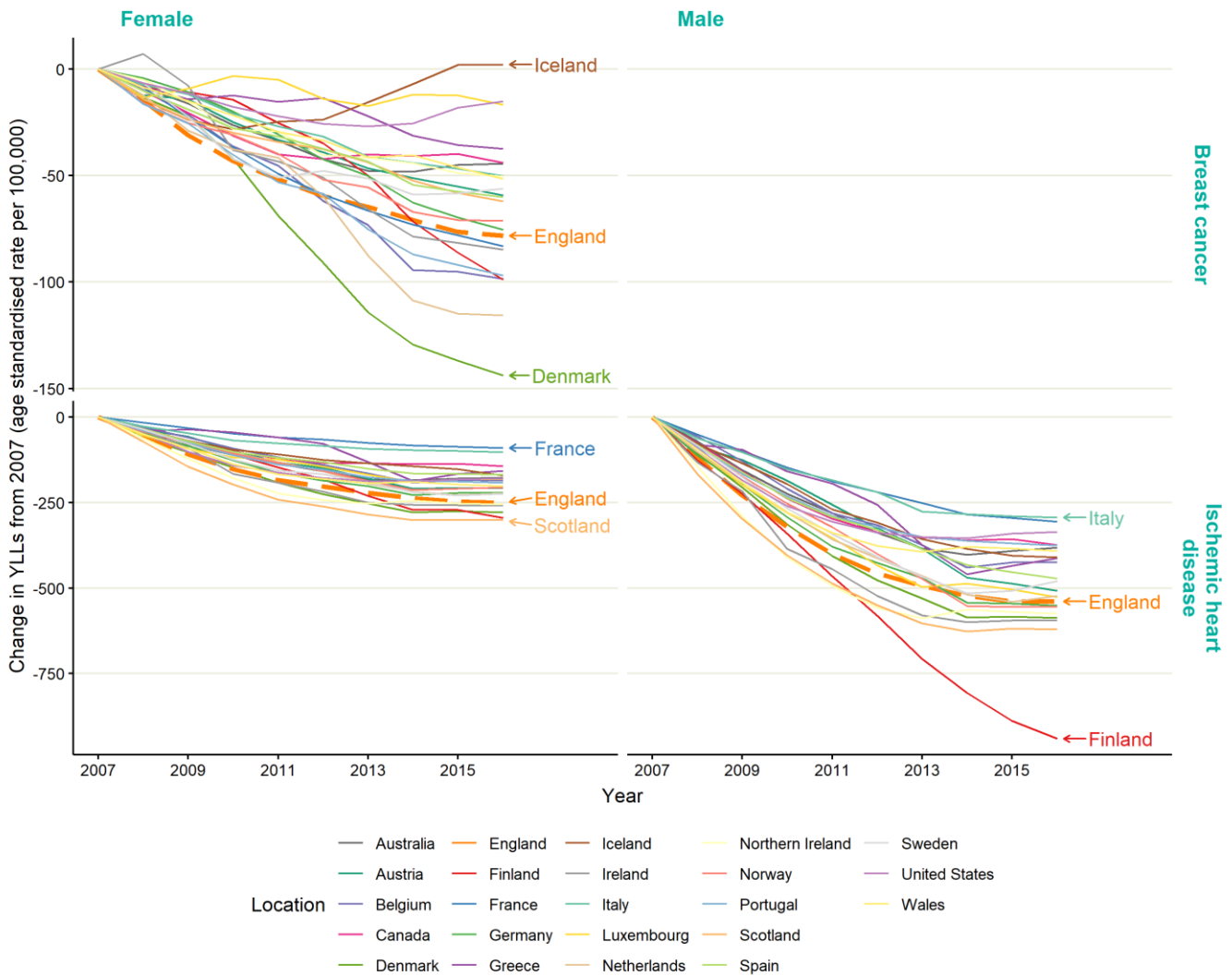


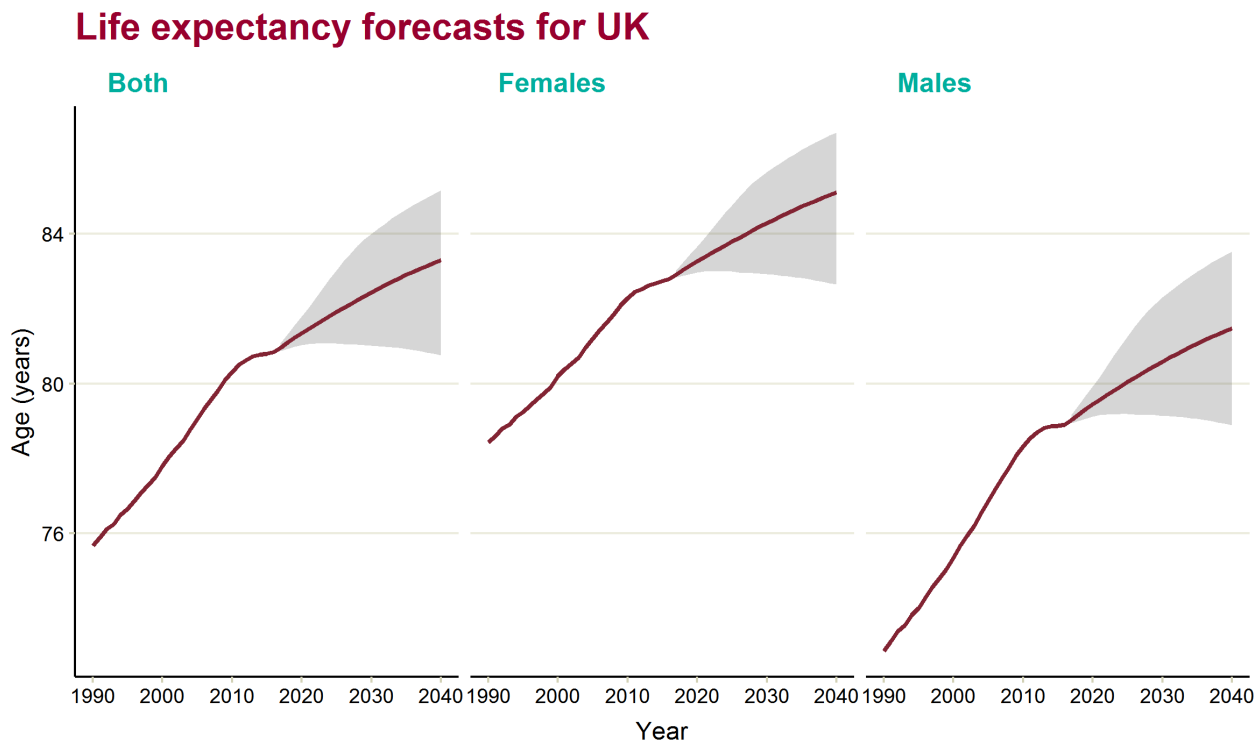
Figure 17: Age-standardised YLL rate changes, by gender, England vs comparator countries



Life expectancy projections UK

GBD is producing forecasts for life expectancy and numbers of deaths to 2040 (life expectancy, YLLs and deaths by cause and age to 2040 under 3 scenarios – 15th centile, reference (baseline) and 85th centile). Life expectancy is forecast to increase albeit at a lower rate than in previous years. In the “worst case” scenario, life expectancy could continue the recent trend and level off or fall. The best estimate is an increase in overall life expectancy of 3 years by 2040 which is less than that required to achieve the increase in healthy life expectancy of 5 years set out in the industrial strategy²⁷. Figure 18 shows the forecasts for life expectancy at birth for England by sex with 15th (lower bound of grey area) and 85th centile (upper bound of grey area) scenarios.

Figure 18: Forecast for life expectancy at birth for England



Discussion

The analysis confirms that over the last decade improvements in mortality rates have slowed down, as has life expectancy improvement. The same trend occurs in other comparator countries, with some notable exceptions. Data shows that most of this deterioration is attributable to decreased rates of improvement in cardiovascular disease mortality, and to a lesser extent in cancer.

The ranking of mortality and morbidity causes has remained stable over the period in examination. England continues to outperform other UK countries, but has average to lower quality of outcomes when compared to other European countries. Common risk factors are declining but overall exposure is still high. Generally, England outperforms the USA, but lags behind Scandinavian countries, the Netherlands and Spain. While the slowing down of improvements in life expectancy and mortality are a phenomenon shared with other comparable countries, it is worthwhile considering the experience of outliers like Finland or Portugal to understand the impact of public health prevention strategies.

Our study provides additional evidence to the debate over morbidity expansion vs compression, showing that the former is occurring in most if not all the countries compared.

England has made considerable improvements in health over the last 30 years. In the last decade however, improvements in mortality rates have slowed in England. This phenomenon is not unique to England and has been seen in other comparator countries – Finland is an exception. This slow-down is largely attributable to reduction in the rates of improvement in cardiovascular disease mortality and to some extent cancer (Figs 2 and 3).

The findings are consistent with those reported in the Health Profile for England and are the subject of a mortality review commissioned by the DHSC.

Deaths from Dementia, pancreatic and colon cancer have increased in absolute terms and now constitute a higher proportion of all deaths. This pattern is similar across the comparator countries, however in 2016 England had about 50% higher YLL rates for ischaemic heart disease than France or Spain; 60% higher rates for lung cancer than Finland or Sweden; 50% higher rates of YLL for stroke than Austria; and more than double the YLL rates for COPD than Finland or France.

The rankings of the burden of disease due to mortality and morbidity have remained stable over the last decade with ischaemic heart disease, lung cancer, stroke and COPD remaining as the commonest causes of death. Dementia is ranking higher in

terms of priority. There has been a shift to morbidity as the population ages and the burden of chronic disease increases with back and neck pain, depression and anxiety, skin disease and sense organ disease remaining major sources of morbidity likely to consume healthcare resources. Morbidity due to falls has increased (Figure 5).

Major causes of morbidity have remained stable in England, the top 4 being back and neck pain, skin diseases, migraine and auditory and visual impairment. This pattern is similar for the comparator countries. Depression and anxiety remain major sources of morbidity. Morbidity due to falls has increased (see Fig 5).

Morbidity due to back and neck pain is second only to Denmark but rates in all countries are relatively similar; morbidity due to asthma is almost double that of the USA. Overall there is less variation in between-country GBD estimates of morbidity reflecting in part the relative immaturity of data collection on the incidence, prevalence and impact of diseases. There have been notable improvements in mean exposure levels to smoking, high cholesterol and high systolic blood pressure.

There have been notable improvements in mean exposure levels to smoking, high cholesterol and high systolic blood pressure.

For premature deaths amenable to healthcare, England is improving but remains in the bottom quartile of peer countries. Amongst conditions amenable to healthcare England performs relatively poorly for breast, cervical and colorectal cancer and epilepsy. Consistent with other reports and the Health Profile for England there remain significant opportunities for the prevention of both cardiovascular disease and cancer through both primary prevention, early detection, public health action, and secondary prevention - clinical care (especially primary care) to reduce the burden of risk factors and maximise the uptake of known effective care.

This should include:

- redoubling efforts to lower population blood pressure through tackling diet and obesity, salt and alcohol consumption and promoting physical activity, as well as optimising the detection and management of people with hypertension
- continuing to lower the prevalence of smoking
- highlight the importance of air pollution and its links to Asthma and other respiratory conditions

References

¹ <http://www.healthdata.org>

² Christopher J L Murray et al., GBD 2010: a multi-investigator collaboration for global comparative descriptive epidemiology; *www.thelancet.com* Vol 380 December 15/22/29, 2012

³ Christopher J L Murray et al., UK health performance: findings of the Global Burden of Disease Study 2010, *www.thelancet.com* Vol 381 March 23, 2013

⁴ John N Newton et al., Changes in health in England, with analysis by English regions and areas of deprivation, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013; September 15, 2015 [http://dx.doi.org/10.1016/S0140-6736\(15\)00195-6](http://dx.doi.org/10.1016/S0140-6736(15)00195-6)

⁵

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/516985/PHE_Strategic_plan_2016.pdf

⁶ <https://www.gov.uk/government/publications/health-profile-for-england-2018>

⁷ <http://www.publichealthwalesobservatory.wales.nhs.uk/healthanddeterminants>

⁸ Nicholas Steel et al., Changes in health in the countries of the UK and 150 English Local Authority areas 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016; *Lancet* 2018; 392: 1647–61 Published Online October 24, 2018 <http://dx.doi.org/10.1016/>

⁹ Chinnery et al., National Institute for Health Research (NIHR) Health Technology Assessment (HTA) Programme research funding and UK burden of disease; *Trials* (2018) 19:87 <https://doi.org/10.1186/s13063-018-2489-7>

¹⁰ <http://arma.uk.net/wp-content/uploads/2015/09/GBD-press-release-ARMA-1509151.pdf>

¹¹ Nick Triggle. NHS funding; Theresa May unveils £20bn boost. BBC. 17 June 2018. <https://www.bbc.co.uk/news/health-44495598> [accessed 17/05/2019]

¹² NHS Long Term Plan. <https://www.longtermplan.nhs.uk> [accessed 17/05/2019]

¹³ Nicholas Steel et al., Changes in health in the countries of the UK and 150 English Local Authority areas 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016; *Lancet* 2018; 392: 1647–61 Published Online October 24, 2018 http://dx.doi.org/10.1016

¹⁴ Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016; *Lancet* 2017; 390: 1211–59

¹⁵ Supplement to: GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; 390: 1211–59.

¹⁶ <http://ghdx.healthdata.org/gbd-2016>

¹⁷ <http://www.healthdata.org/>

¹⁸ <http://www.healthdata.org/chtf>

¹⁹ GBD 2015 Healthcare Access and Quality Collaborators. Healthcare Access and Quality Index based on mortality from causes amenable to personal healthcare in 195 countries and territories, 1990–2015: a novel analysis from the Global Burden of Disease 2015 study. *The Lancet*. 2017 May 18.

²⁰ <http://www.healthdata.org/results/country-profiles/haq>

²¹ <http://ghdx.healthdata.org/record/ihme-data/gbd-2015-socio-demographic-index-sdi-1980%E2%80%932015>

²² <https://vizhub.healthdata.org/gbd-compare/>

²³ Risk factors overlap in accounting for attributable burden of disease, so they cannot be accurately added together

²⁴ http://www.healthdata.org/sites/default/files/files/Data_viz/GBD_2017_Tools_Overview.pdf

²⁵ Nolte E, McKee M. Measuring the health of nations: analysis of mortality amenable to health care. *BMJ*. 2003;327(7424):1129

²⁶ GBD 2016 Healthcare Access and Quality Collaborators, Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from the Global Burden of Disease Study 2016. *Lancet*. 2018;391(10136):2236-71

²⁷ Industrial Strategy: building a Britain fit for the future. November 2017. Gov.uk

<https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>