Public Health England

Protecting and improving the nation's health

From Fingertips to RAP: getting statistics into public health policy and practice

Sian Evans and Stephen Yeung
Local Knowledge and Intelligence Service

PHE East of England 2019

Acknowledgements and a disclaimer

Thanks to Julian Flowers and Sebastian Fox, PHE Public Health Data Science who both contributed to this presentation.

This presentation will give some insight into PHE's work on population health intelligence but should in no way be viewed as a comprehensive overview of the work of the organisation in this area.

Overview

- Introduction to Public Health England (PHE)
- Overview of some of the Health Intelligence division activities in promoting health improvement through the better use of information
- Case study example
- Ways that you can get involved

Public Health England

Established in 2013 as the executive public health agency for the Department of Health and Social Care

Role is to protect and improve the nation's health and wellbeing, and reduce health inequalities.

Delivered through world-class science, advocacy, partnerships, knowledge and intelligence, and the delivery of specialist public health services.

Public Health England

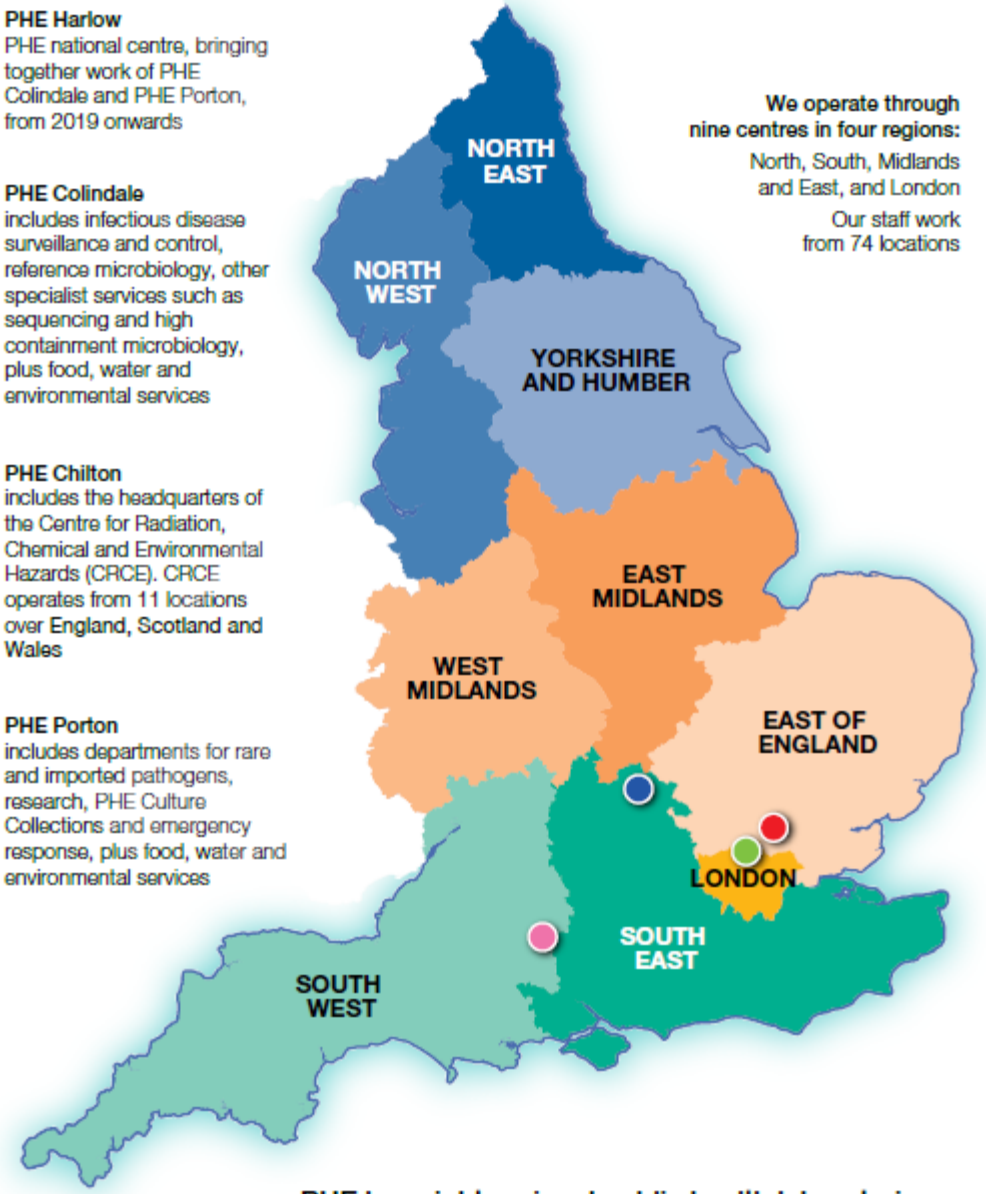
National and local focus

PHE Harlow
PHE national centre, bringing together work of PHE Colindale and PHE Porton, from 2019 onwards

PHE Colindale
includes infectious disease surveillance and control, reference microbiology, other specialist services such as sequencing and high containment microbiology, plus food, water and environmental services

PHE Chilton
includes the headquarters of the Centre for Radiation, Chemical and Environmental Hazards (CRCE). CRCE operates from 11 locations over England, Scotland and Wales

PHE Porton
includes departments for rare and imported pathogens, research, PHE Culture Collections and emergency response, plus food, water and environmental services



We operate through nine centres in four regions:
North, South, Midlands and East, and London

Our staff work from 74 locations

PHE has eight regional public health laboratories based in large NHS hospitals

PHE's role: population health intelligence

Goal is to provide definitive, high quality, accessible population health intelligence data, tools and products to inform public health decisions on a day to day basis

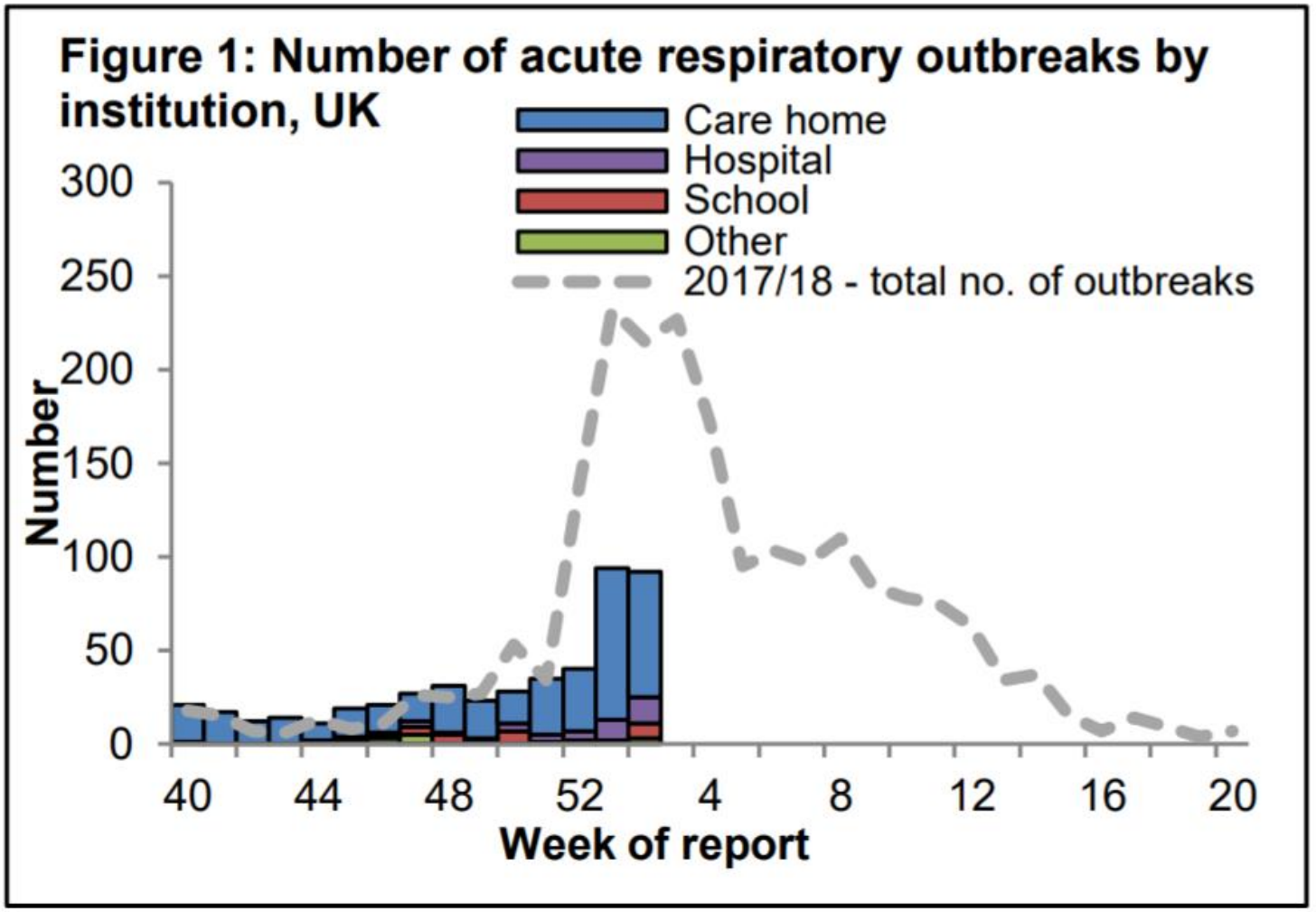
- PHE led data collection
- Routine surveillance
- Data analysis to inform national and local policy
- Data visualisation to support data use by different users
- Improving access to population health data
- Training and workforce development in population health intelligence

PHE data catalogue of primary data collections

- Health protection incident/case management and outbreak control
- Vaccination and immunisation services
- Chemical, radiological and biological source and exposure monitoring
- Communicable and non-communicable disease surveillance
- Population disease screening programme management & quality assurance
- Microbiological and other specialist laboratory testing and reporting services
- Disease registration
- Patient- and population-level health and social care service monitoring and evaluation
- Environmental, socio-economic, behavioural, and genetic health risk factor monitoring
- Health improvement service marketing and the provision of information, sign-posting and interventions

Source: Public Health England: approach to surveillance
https://www.gov.uk/government/publications/public-health-england-approach-to-surveillance/public-health-england-approach-to-surveillance#appendix-phe-data-catalogue-of-primary-data-collections

Some examples: National weekly flu report



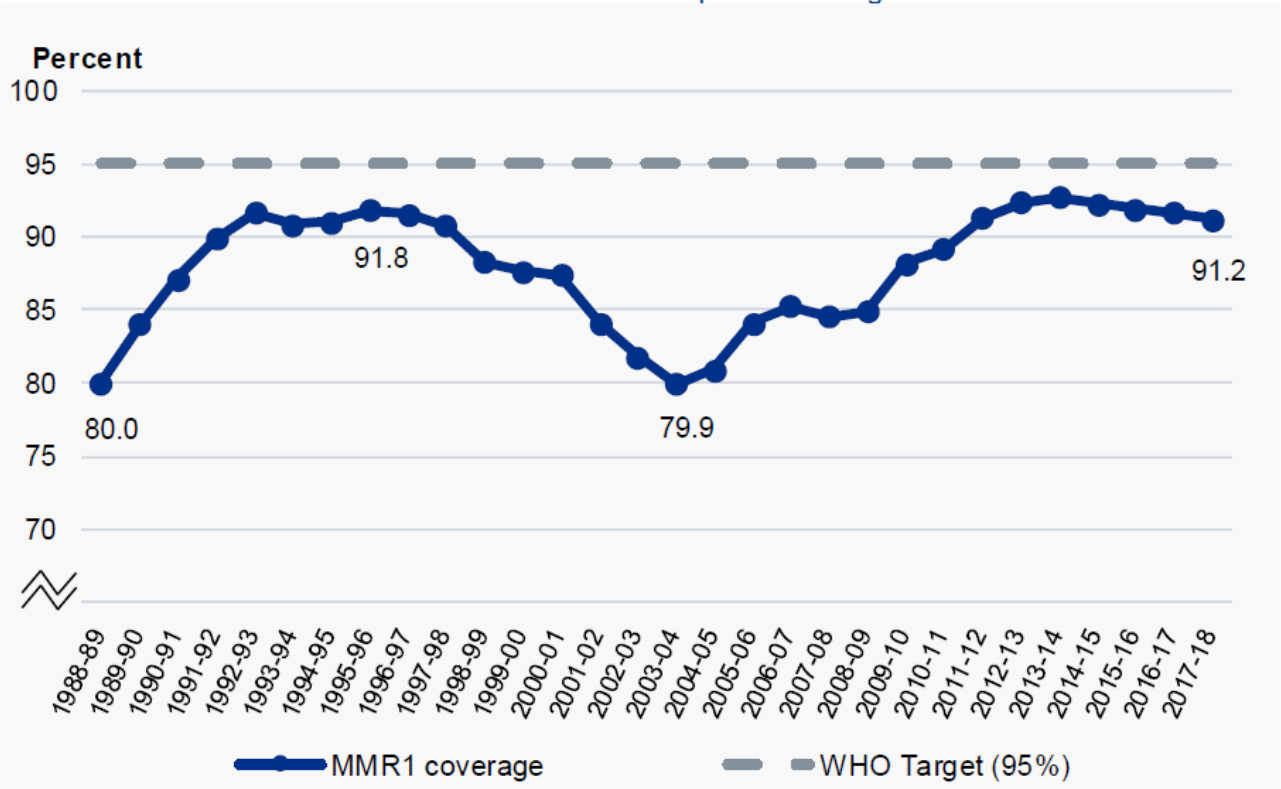
Source: PHE National weekly flu report 2018-19 season. 17 January 2019
https://www.gov.uk/government/statistics/weekly-national-flu-reports-2018-to-2019-season

Vaccination uptake: MMR

Figure 6: MMR1 coverage at 24 months[7]

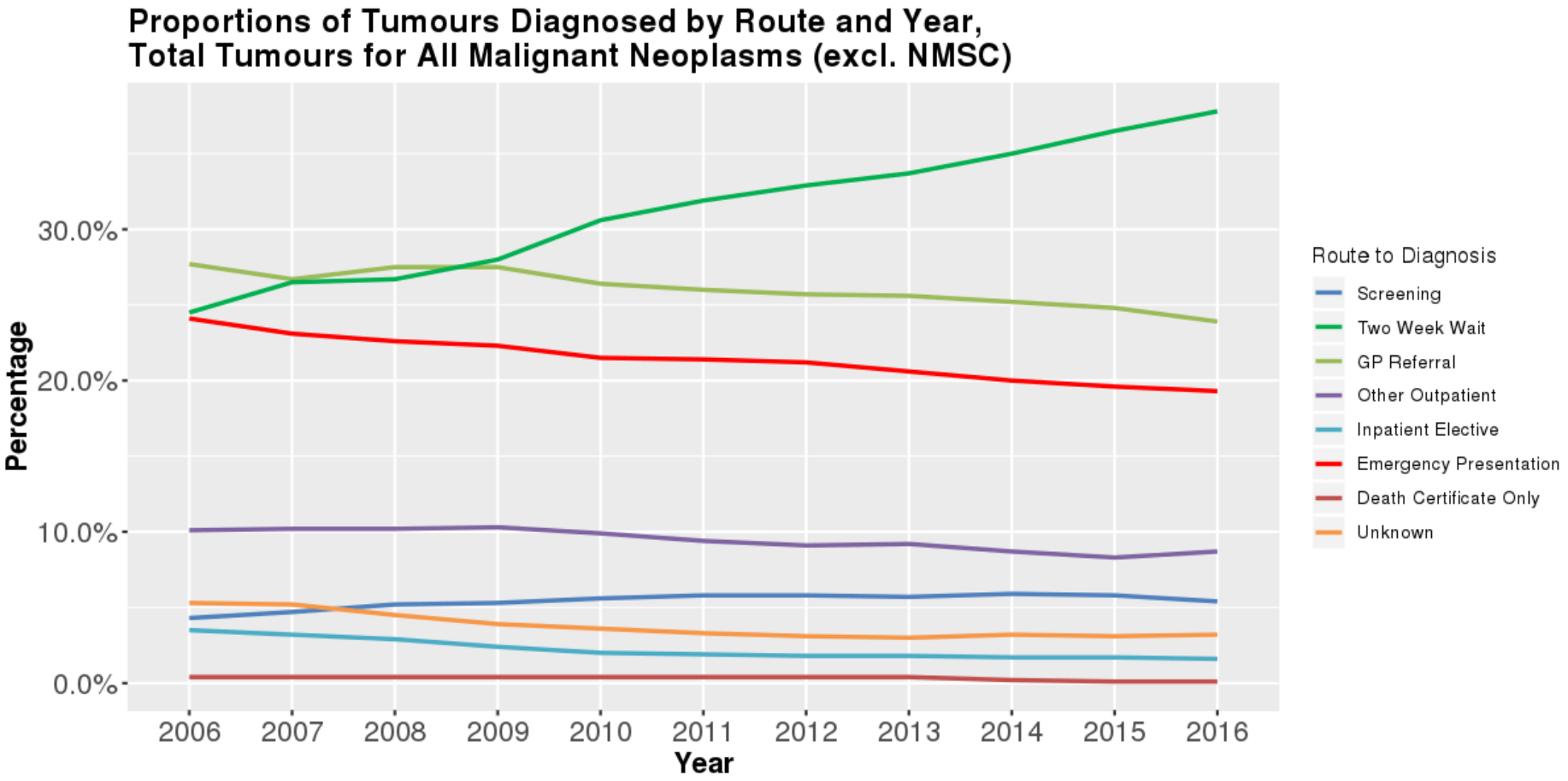
England 1988-89 to 2017-18

NB: The MMR vaccine was introduced in 1988 when it replaced the single measles vaccine



Source: COVER - PHE, NHS Digital. See Tables 2 and 7 in the Data Tables.

Source: Childhood vaccination coverage statistics 17/18. NHS Digital
https://files.digital.nhs.uk/55/D9C4C2/child-vacc-stat-eng-2017-18-report.pdf



Source: PHE Cancer Stats Routes to diagnosis
https://data.healthdatainsight.org.uk/apps/routes_to_diagnosis/routes_subbreakdowns/

Simulacrum: artificial patient-like cancer data to support researchers

- Imitates some of the data held securely by PHE National Cancer and Analysis Service.
- Data in the Simulacrum is entirely artificial, no data about real patients, so users can never identify a real person
- Data on 1,322,100 synthetic patients and 1,402,817 synthetic tumours
- Free to use and allows anyone who wants to use record-level cancer data to do so, safe in the knowledge that while the data feels like the real thing, there is no danger of breaching patient confidentiality.
- The data model – the shape of the data – the same as the real one so that it can be used to write and test queries that would run on the real data.

Accessing PHE data

PHE Official Statistics
https://www.gov.uk/government/organisations/public-health-england/about/statistics

PHE Data and Analysis tools
https://www.gov.uk/guidance/phe-data-and-analysis-tools

Access NDR data via the Office of Data Release:
https://www.gov.uk/government/publications/accessing-public-health-england-data/about-the-phe-odr-and-accessing-data

Guidance

PHE data and analysis tools

Data and analysis tools from across Public Health England (previously known as the 'Data and knowledge gateway').

Published 1 April 2013
Last updated 24 July 2018 — see all updates
From: **Public Health England**

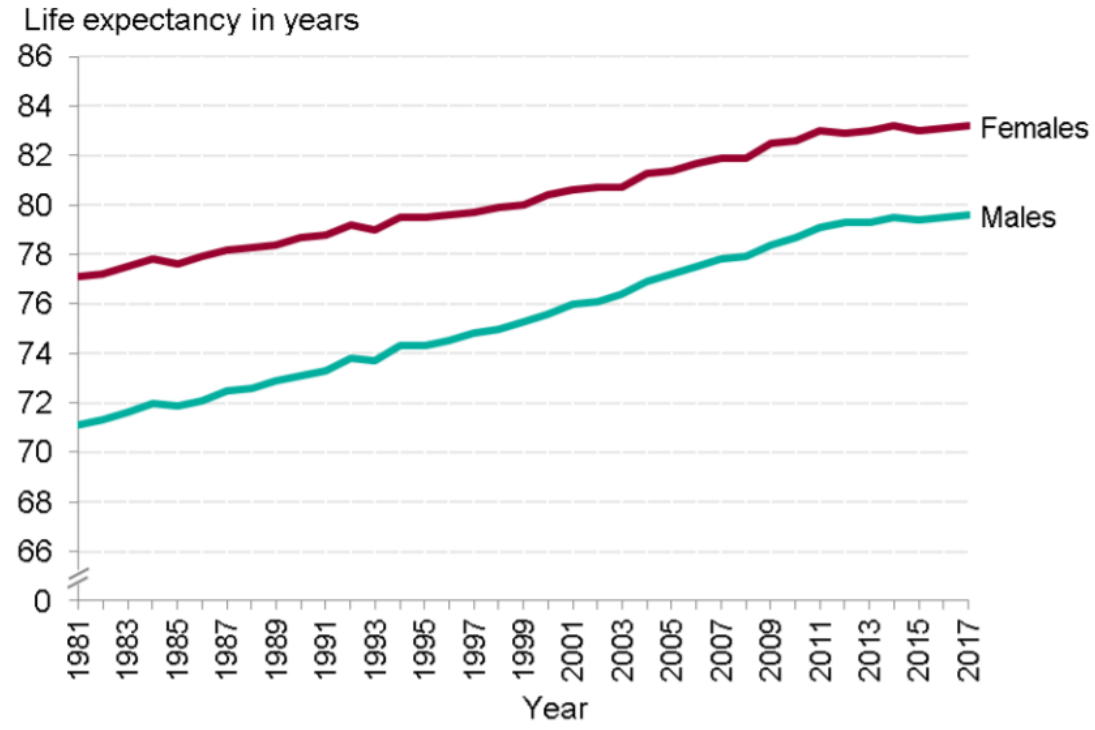
Contents

— About this resource
— A to Z list
— Cancer
— Cardiovascular disease
— Child and maternal health
— Comparison, practice and performance
— Dementia
— Drugs, alcohol and tobacco
— End of life care
— General health profiles
— Health economics and return on investment
— Health impact assessment
— Health inequalities
— Health protection
— Injuries and violence
— Learning disabilities
— Mental health
— Neurological conditions
— Obesity, diet and physical activity
— Older people's health and wellbeing
— Oral health
— Screening
— Sexual health
— Wider determinants of health
— Contact us

Wide range of health intelligence to inform national and local policy

Example: Trend in life expectancy in England 1981 to 2017

Figure 2B: trends in life expectancy at birth, by sex, England, 1981 up to 2017

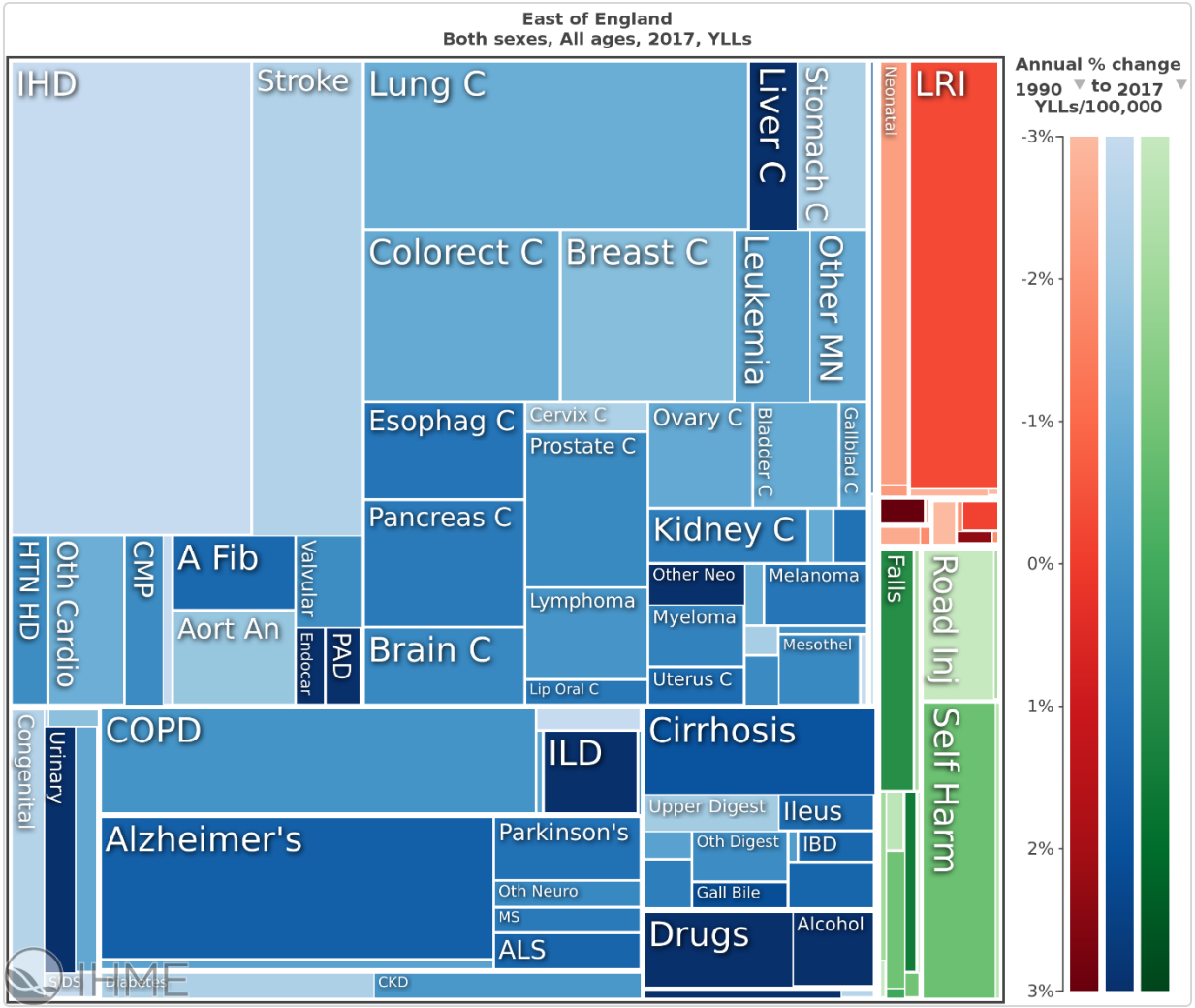


Source: PHE analysis of ONS mortality data, 1971-2016 and 2017

- Improvements in life expectancy have slowed
- Inequality in life expectancy has widened
- Slow downs also seen in other countries
- No single explanatory factor

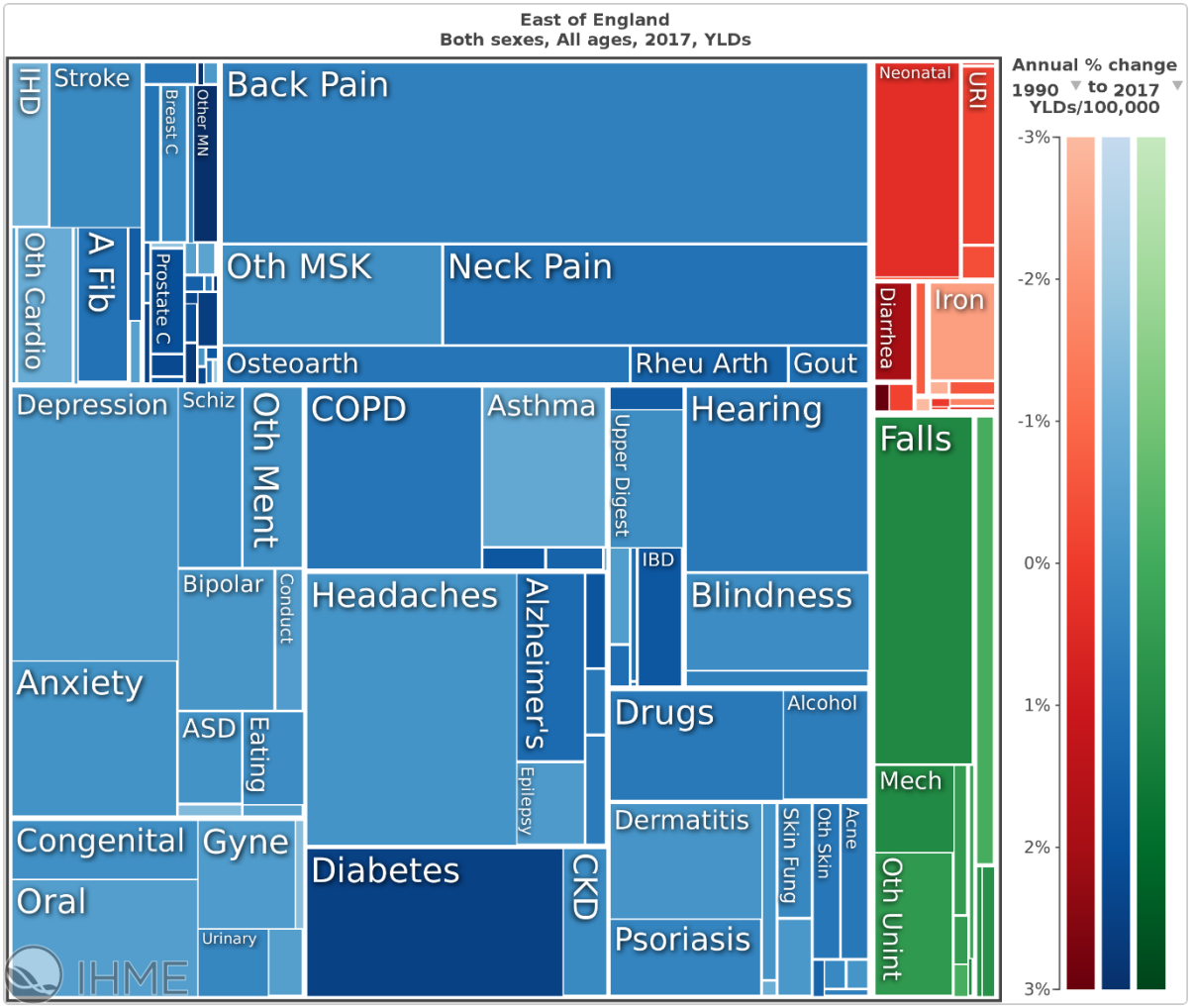
Source: Recent trends in mortality in England: review and data packs PHE 2018
https://www.gov.uk/government/publications/recent-trends-in-mortality-in-england-review-and-data-packs

Causes of Years of life lost, East of England 2017



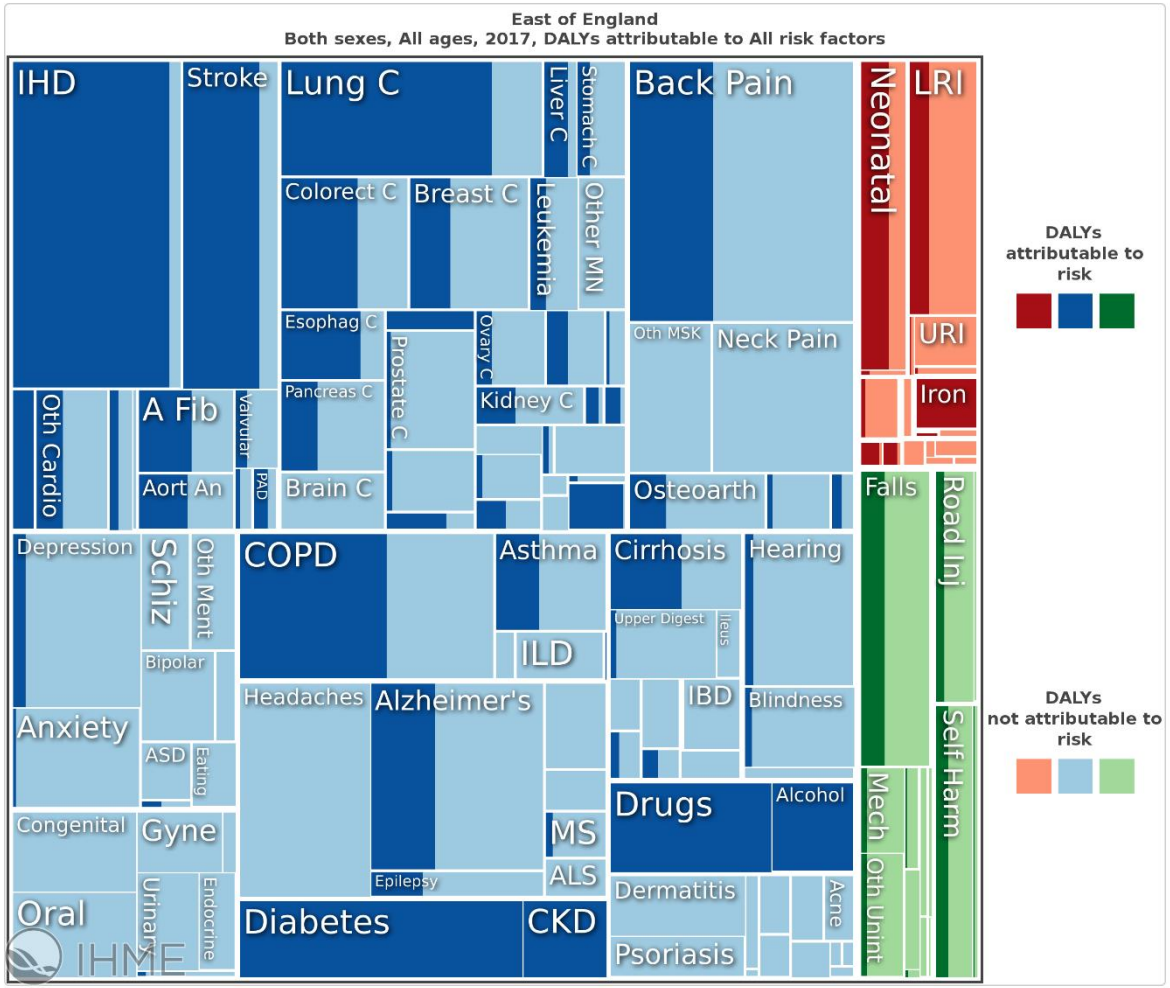
Source: https://vizhub.healthdata.org/gbd-compare/

Causes of Years of lived with disability, East of England 2017



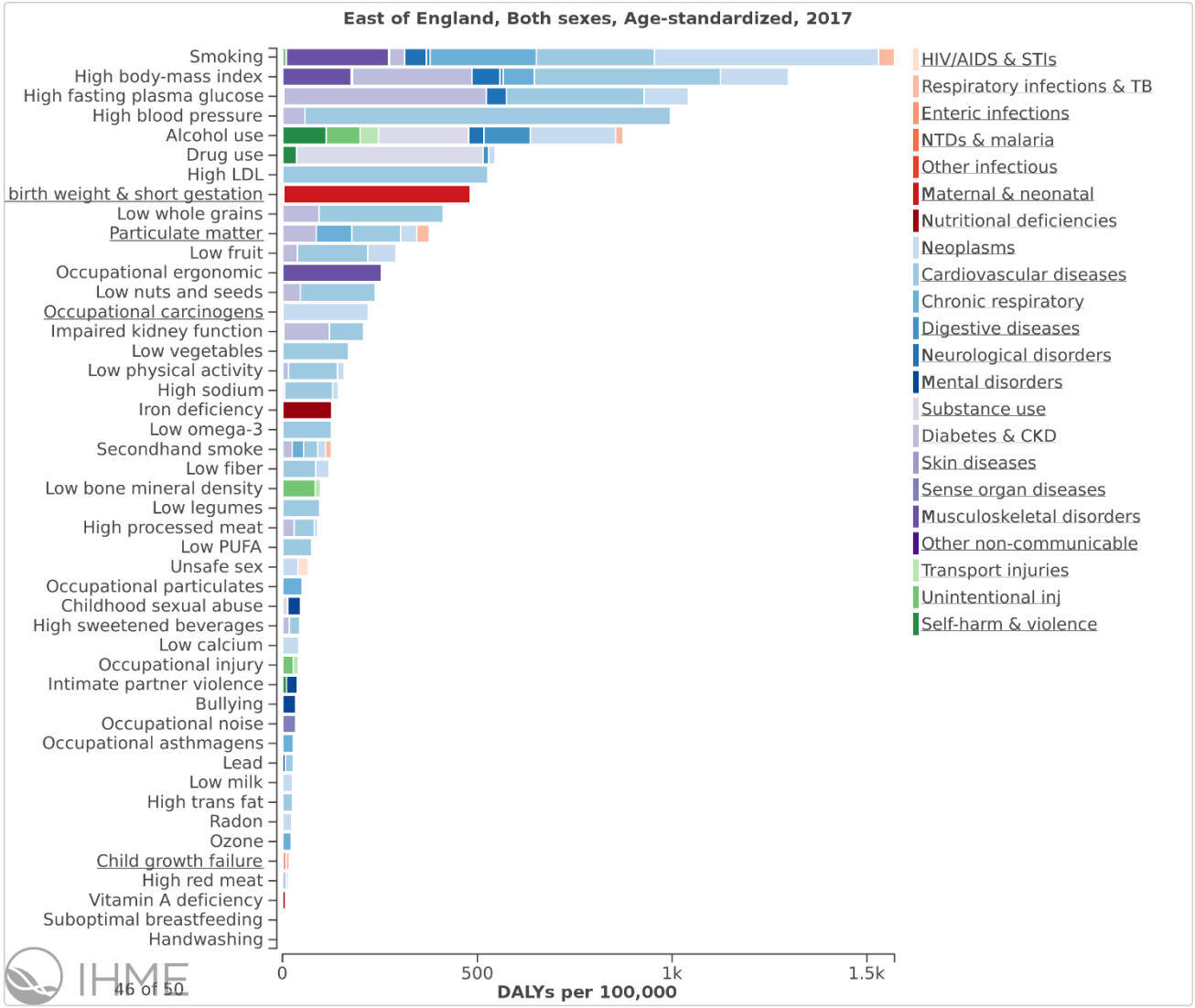
Source: https://vizhub.healthdata.org/gbd-compare/

DALY burden attributed to potentially modifiable risk factors East of England 2017



Source: https://vizhub.healthdata.org/gbd-compare/

Risk factors associated with DALYs, East of England 2017



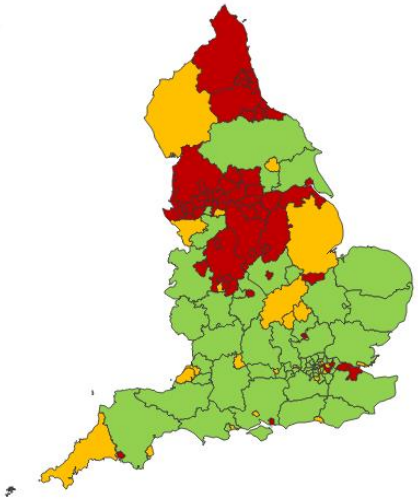
Source: https://vizhub.healthdata.org/gbd-compare/

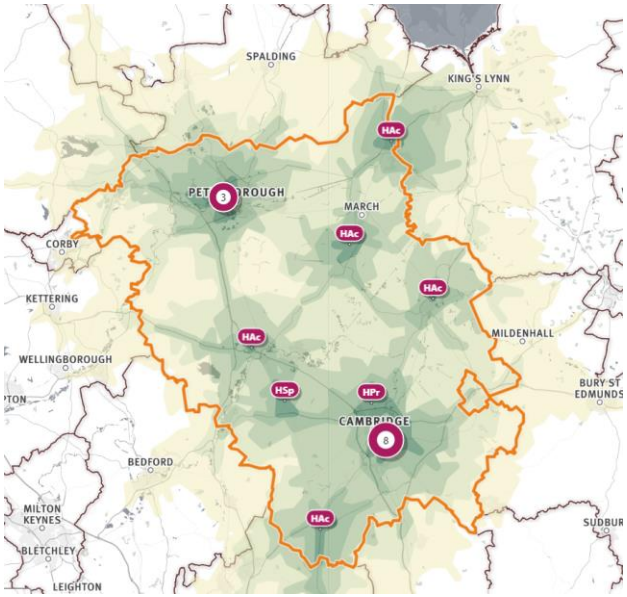
Health intelligence for a range of different users

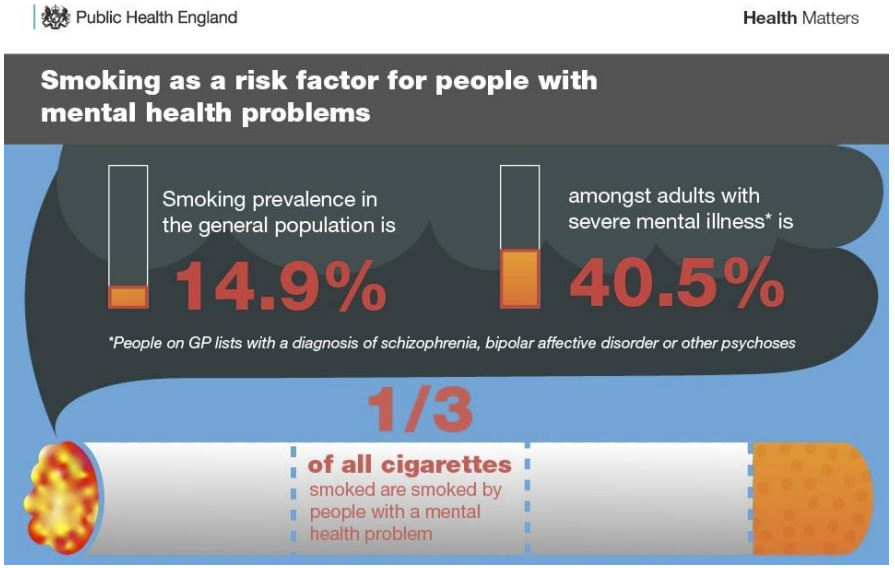
- Health intelligence outputs need to be in a format that is readily accessible to a range of users
- Use a range of approaches to meet needs of different users
- Aim to ensure data visualisations based on high quality health intelligence with appropriate statistical comparison

Range of approaches to data visualisation

Indicator	Indicator I	Parent Co	Parent Na	Area Code	Area Nam	Area Type	Sex	Age	Category T	Category	Time perio	Value
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs			2006/07	1.27548
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Most depr	2006/07	1.224812
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Second m	2006/07	1.710469
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Third mor	2006/07	0.922277
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Fourth mc	2006/07	1.625655
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Fifth more	2006/07	1.145688
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Fifth less c	2006/07	1.399632
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Fourth les	2006/07	1.03478
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Third less	2006/07	0.919456
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Second le	2006/07	1.23921
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	County &	Least depr	2006/07	1.08297
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Most depr	2006/07	1.483104
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Second m	2006/07	1.460395
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Third mor	2006/07	1.231473
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Fourth mc	2006/07	1.622255
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Fifth more	2006/07	1.534333
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Fifth less c	2006/07	1.218305
90316	Reception: Prevalence of under	E92000001	England	England	Persons	4-5 yrs	District &	Fourth les	2006/07	1.125298







PHE Fingertips data platform

- Open access data platform
- 30+ health profiles, 2000+ indicators
- Intended to allow easy access to high quality population health data
- Data presented in range of formats
- Incorporates statistical comparison
- Option to build your own profile based on included indicators
- Can also download underlying data
- Fingertips API
- https://fingertips.phe.org.uk/

Public Health Profiles

Highlighted Profiles

Cardiovascular disease, diabetes and kidney disease

Child and Maternal Health

Local Authority Health Profiles

Mental Health, Dementia and Neurology

National General Practice Profiles

Public Health Dashboard

Public Health Outcomes Framework

National Public Health Profiles

Adult Social Care

AMR local indicators

Atlas of Variation

Cancer Services

Cardiovascular disease, diabetes and kidney disease

Child and Maternal Health

End of Life Care Profiles

Health Protection

Inhale - INteractive Health Atlas of Lung conditions in England

Learning Disability Profiles

Liver Disease Profiles

Local Alcohol Profiles for England

Mental Health, Dementia and Neurology

Modelled prevalence estimates

Mortality Profile

Musculoskeletal Diseases

National General Practice Profiles

NCMP and Child Obesity Profile

NHS Health Check

Older People's Health and Wellbeing

Physical Activity

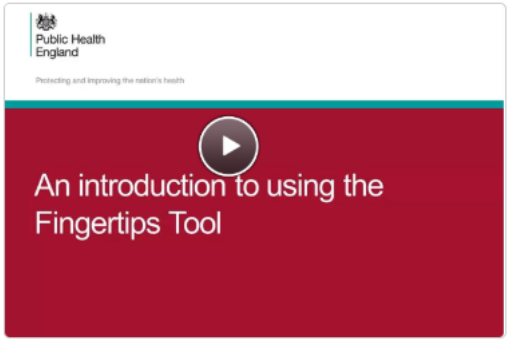
Public Health Dashboard

Public Health Outcomes Framework

Segment Tool

Sexual and Reproductive Health Profiles

User Guide



Latest News

January 2019

Personalise what you see - create your own area lists using **'Your data'** (top right)

December 2018

Mortality Profile launched

June 2018

Overview of Child Health updated

Home > Introduction > Data Further information Technical Guidance Contact us Your data

Public Health Outcomes Framework

Indicator keywords

Overarching indicators | Wider determinants of health | Health improvement | Health protection | Healthcare and premature mortality | Supporting information

Overview | Compare indicators | Map | Trends | Compare areas | Area profiles | Inequalities | England | Population | Box Plots | Definitions | Download

Area type: County & UA Areas grouped by: Region Benchmark: England

Area: Bedford Region: East of England

Search for an area CIPFA nearest neighbours to Bedford Filter indicators

* a note is attached to the value, hover over to see more details

Compared with benchmark: Better | Similar | Worse | Not compared

Quintiles: Best | Worst | Not applicable

Display: Values | Trends | Values & Trends Export table as image

Indicator	Period	England	East of England region	Peterborough	Luton	Southend-on-Sea	Thurrock	Norfolk	Bedford	Suffolk	Essex	Cambridgeshire	Central Bedfordshire	Hertfordshire
0.1i - Healthy life expectancy at birth (Male)	2014 - 16	63.3	64.7	63.6	61.6	60.7	64.0	64.7	63.8	63.6	64.6	65.2	67.5	66.1
0.1i - Healthy life expectancy at birth (Female)	2014 - 16	63.9	64.6	62.2	61.5	64.9	60.7	64.4	64.4	65.4	63.5	65.8	64.4	66.1
0.1ii - Life expectancy at birth (Male)	2014 - 16	79.5	80.4	78.6	78.4	78.6	79.1	80.0	80.1	80.8	80.1	81.0	81.5	81.0
0.1ii - Life expectancy at birth (Female)	2014 - 16	83.1	83.7	82.2	82.2	82.9	82.3	83.7	83.4	84.2	83.4	84.3	84.0	84.2
0.1ii - Life expectancy at 65 (Male)	2014 - 16	18.8	19.2	18.4	18.4	18.5	18.1	19.3	19.5	19.7	19.0	19.5	19.8	19.4
0.1ii - Life expectancy at 65 (Female)	2014 - 16	21.1	21.5	20.8	20.6	21.0	20.3	21.8	21.3	21.9	21.2	21.9	21.6	21.6

Areas are ranked by level of multiple deprivation (IMD 2015)

Can visualise multiple indicators for an area

Compared with benchmark: Better Similar Worse Not compared

Recent trends: – Could not be calculated; Increasing / Getting worse; Increasing / Getting better; Decreasing / Getting worse; Decreasing / Getting better; No significant change; Increasing; Decreasing

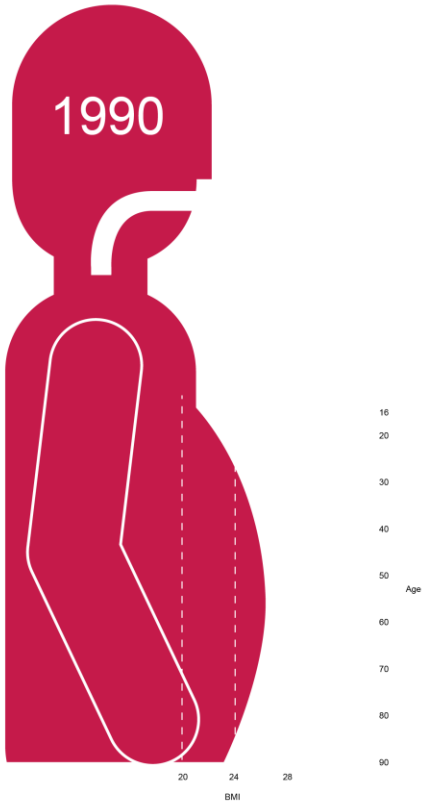
Benchmark Value

Worst | 25th Percentile | 75th Percentile | Best

Export table as image

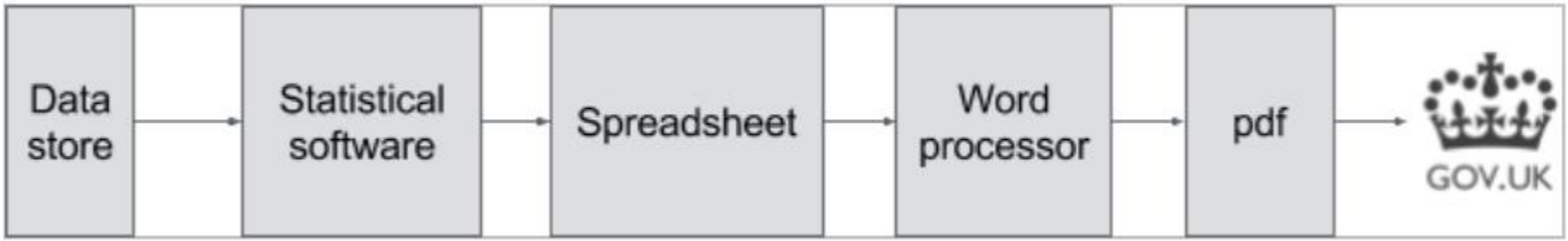
Indicator	Period	East of England			England			
		Recent Trend	Count	Value	Value	Worst	Range	Best
Life expectancy at birth (Male)	2014 - 16	–	-	80.4	79.5	77.8		80.6
Life expectancy at birth (Female)	2014 - 16	–	-	83.7	83.1	81.5		84.2
Under 75 mortality rate: all causes	2015 - 17	–	49,357	302	332	396		294
Under 75 mortality rate: cardiovascular	2015 - 17	–	10,444	64.1	72.5	87.0		59.9
Under 75 mortality rate: cancer	2015 - 17	–	20,887	128.1	134.6	155.9		123.6
Suicide rate	2015 - 17	–	1,488	9.3	9.6	10.8		8.6
Killed and seriously injured on roads	2014 - 16	–	7,720	42.3	39.7	50.6		26.0
Hospital stays for self-harm	2016/17	–	9,663	160.3	185.3	246.3		84.1
Hip fractures in older people (aged 65+)	2016/17	–	7,032	579	575	643		499
Cancer diagnosed at early stage	2016	→	14,080	54.9%	52.6%	49.1%		55.0%
Diabetes diagnoses (aged 17+)	2017	–	-	75.5%	77.1%	71.2%		85.6%
Dementia diagnoses (aged 65+)	2018	–	49,343	63.3%	67.5%	61.8%		74.8%
Alcohol-specific hospital stays (under 18s)	2014/15 - 16/17	–	1,002	25.7	34.2	64.8		19.4
Alcohol-related harm hospital stays	2016/17	–	34,628	579	636	866		525
Smoking prevalence in adults (aged 18+)	2017	–	687,542	14.2%	14.9%	17.0%		13.7%
Physically active adults (aged 19+)	2016/17	–	-	66.8%	66.0%	62.6%		70.4%
Excess weight in adults (aged 18+)	2016/17	–	-	61.9%	61.3%	66.1%		55.2%
Under 18 conceptions	2016	↓	1,738	17.1	18.8	24.6		15.0
Smoking status at time of delivery	2017/18	↓	6,477	10.3%	10.8%	16.3%		5.0%
Breastfeeding initiation	2016/17	↑	52,281	76.1%	74.5%	59.0%		79.5%
Infant mortality rate	2015 - 17	–	696	3.2	3.9	5.9		3.2
Obese children (aged 10-11)	2017/18	↑	11,476	17.9%	20.1%	23.1%		16.8%

Eye-catching methods of presentation (created by Sebastian Fox, PHE PHDS)



Transforming the way we produce statistics: Reproducible Analytical Pipeline (RAP)

From this:



To:

Using open source

https://dataingovernment.blog.gov.uk/2017/03/27/reproducible-analytical-pipeline/

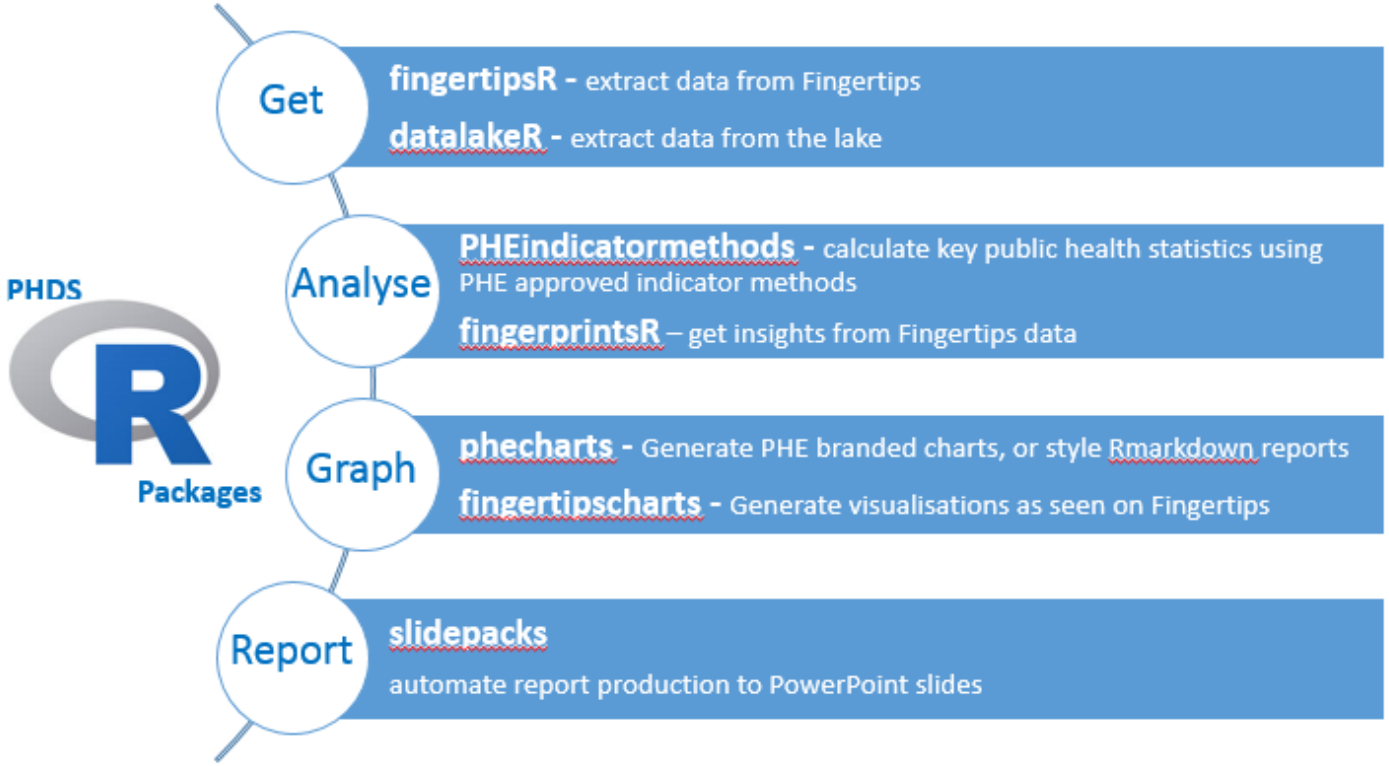
Reproducible Analytical Pipeline (RAP)– why?

- ...creates efficiencies
- ...standardises processes and outputs
- ...improves coding skills
- ...reduces the steep learning curve
- ...is collaborative (nationally and internationally)

- Innovation – improved access to modern/novel techniques

PHE and RAP

- Developing R packages around regular analytical public health pipelines to support analysts to create products
- At present, small team within PHE developing the packages but potential for collaboration
- GitLab (internal) and GitHub (external)



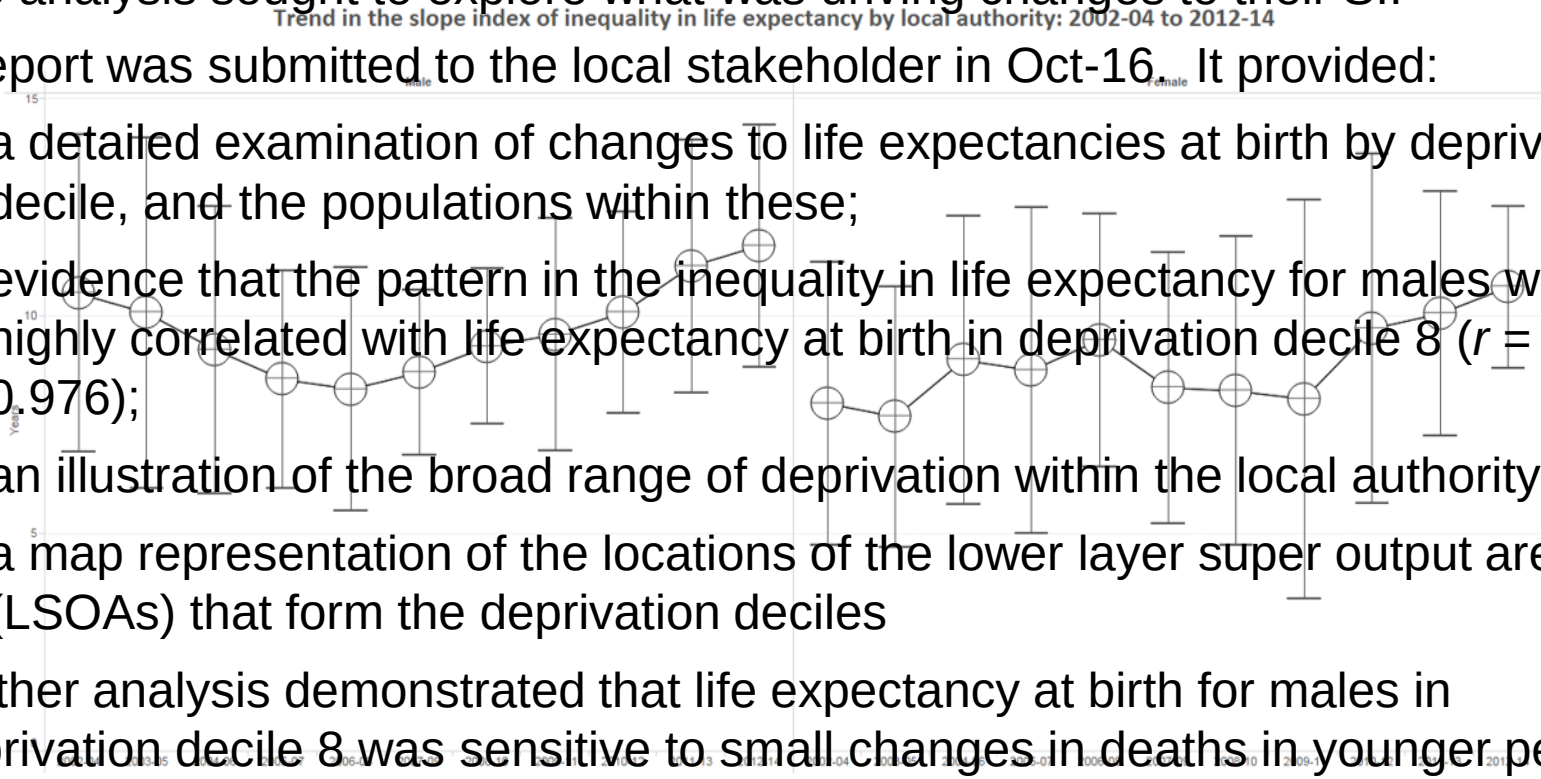
Public Health England

CASE STUDY: INEQUALITIES IN LIFE EXPECTANCY

Background

In Sep-16 a local stakeholder requested LKISEast's assistance to examine changes to their inequality in life expectancy at birth

The analysis sought to explore what was driving changes to their SII

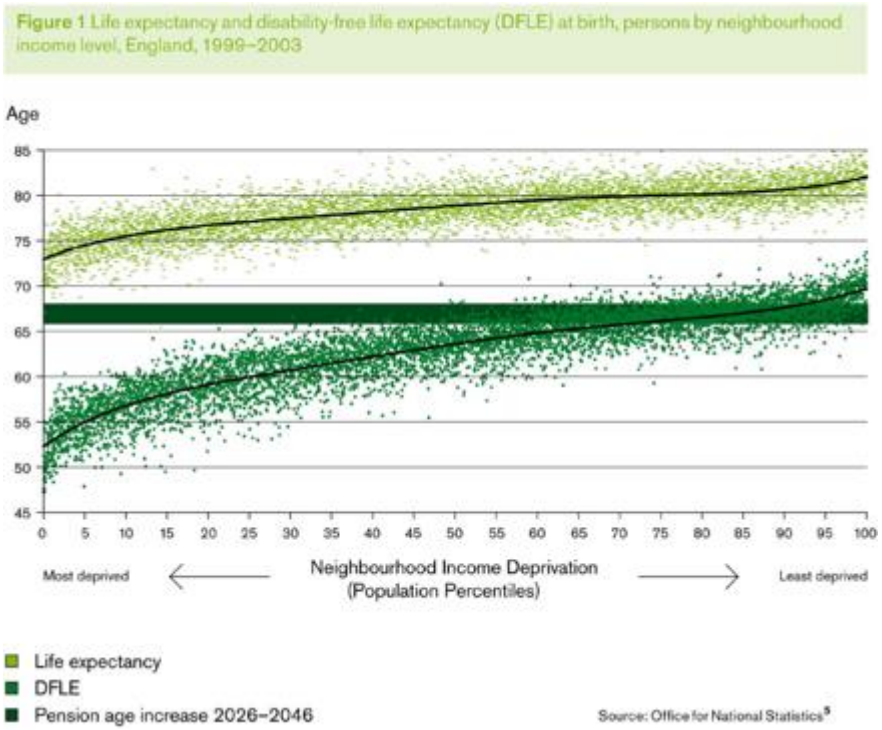


A report was submitted to the local stakeholder in Oct-16. It provided:

- a detailed examination of changes to life expectancies at birth by deprivation decile, and the populations within these;
- evidence that the pattern in the inequality in life expectancy for males was highly correlated with life expectancy at birth in deprivation decile 8 (r = 0.976);
- an illustration of the broad range of deprivation within the local authority; and
- a map representation of the locations of the lower layer super output areas (LSOAs) that form the deprivation deciles

Further analysis demonstrated that life expectancy at birth for males in deprivation decile 8 was sensitive to small changes in deaths in younger people

Some inspiration for the dashboard



Marmot, M. (2010) *Fair Society Healthy Lives (The Marmot Review)* UCL Institute of health equity. Marmot, M. (2010). Available at: http://www.instituteofhealthequity.org/resources-reports/fair-society-healthy-lives-the-marmot-review

Han's Rosling's 200 countries, 200 years, 4 minutes, BBC, https://www.bbc.co.uk/programmes/p00cgkfk

Case study: Exploring inequalities in Stockton-on-Tees

NEWS

Health

Dying young in Stockton - England's most unequal town

By Richard Bilton
Reporter, BBC Panorama

The life expectancy gap between rich and poor people in England has been widening for nearly two decades.

The rich stay healthy longer. The poor die younger.

That bleak assessment is based on national data.

Stockton-on-Tees is the town with England's biggest gap in life expectancy, according to Public Health England, and resident Rob Hill, who is only 46, is getting ready for his death.

https://www.bbc.co.uk/news/health-44985650

Key messages

"*…Town with the biggest health gap, where the rich enjoy old age, while their poorer neighbours die 18 years younger…*"

"*…Life expectancy here is 85 years, 4 years above the national average…"*

"*… In his two mile drive, life expectancy will fall by 16 years…*"

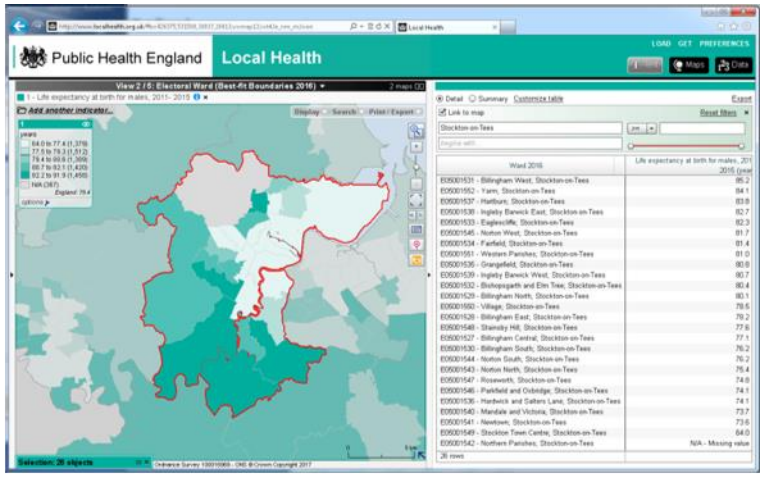
"*…Eaglescliffe, where your life expectancy can be 82, …. and you come into Stockton, and your life expectancy is dropping towards the 60's…*"

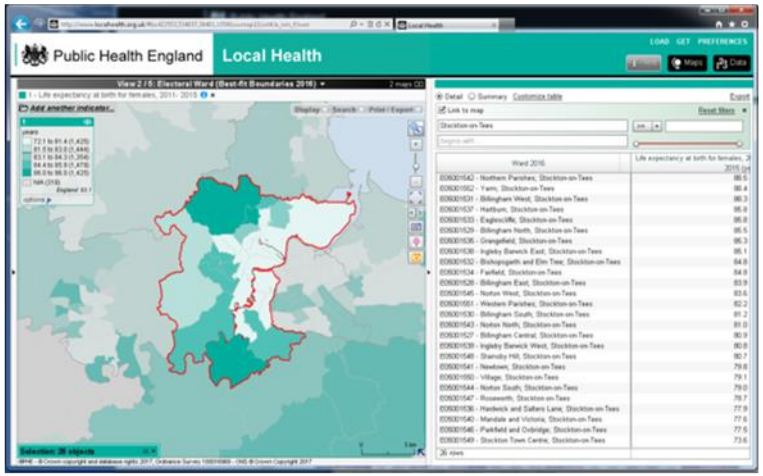
"…Stockton town centre, where life expectancy for men is 64. That's the same as Ethiopia…"

"*…This is Yarm, just 4 miles from the town centre. Life expectancy here is 86…*"

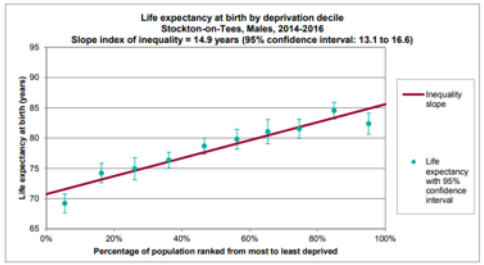
Panorama: Get Rich or Die Young,
https://www.bbc.co.uk/programmes/b0bdm7zm

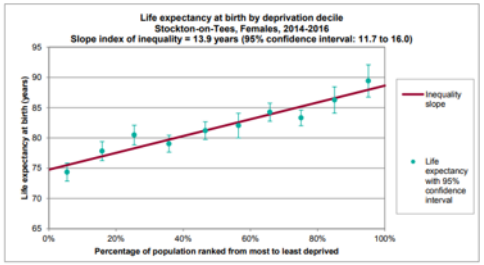
Using PHE's existing tools and resources to explore inequalities in Stockton-on Tees





Local Health, www.localhealth.org.uk





Public Health Outcomes Framework (PHOF) Further Information, https://fingertips.phe.org.uk/profile/public-health-outcomes-framework/supporting-information/further-info

PHOF Fingertips Profile, https://fingertips.phe.org.uk/profile/public-health-outcomes-framework

Latest version of dashboard (beta version)

Inequality in life expectancy dashboard

Introduction

This dashboard has been developed to help local authorities explore their data around inequalities in life expectancy at birth and at 65 in more detail. It contains data for both upper tier and lower tier local authorities, most of which is already contained within the Public Health Outcomes Framework (PHOF) Fingertips profile [1], but provides additional visual representations to enable key insights to be uncovered.

The slope index of inequality (SII) is a measure of health inequality. [2] The SII in life expectancy is a measure of the social gradient in life expectancy, i.e. how much life expectancy varies with deprivation, and is a key high-level health inequalities outcome. It is available in the PHOF.

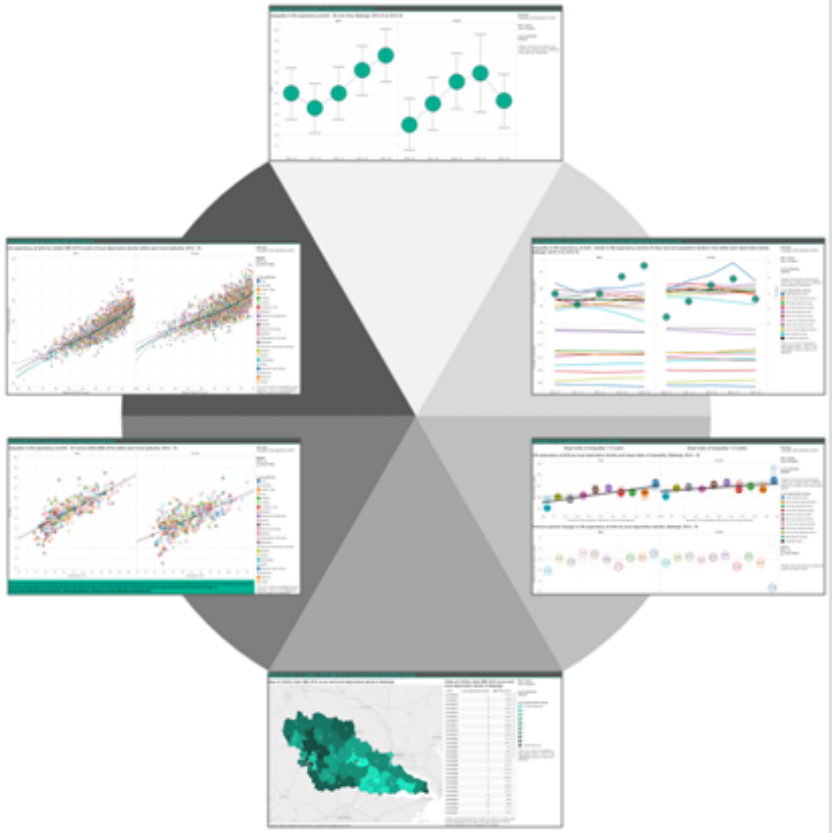
There is a natural tendency to focus attention on increasing overall life expectancy within an area. However, this may not result in reducing inequalities. If interest lies in inequalities within an area, it is important to recognise that the life expectancies in an area's deprivation deciles, as well as the population within these deciles, are used to calculate its SII in life expectancy. Changes over time to either of these measures can have an impact on the SII in life expectancy. This dashboard therefore contains data for these measures and provides visual representations to highlight this impact.

It has been developed jointly by Public Health England (PHE) Local Knowledge and Intelligence Service East of England (LKISEast) and the national Epidemiology and Surveillance team.

The content from this dashboard can be downloaded. Clicking on the "Download" button in the bottom right corner of the toolbar gives the user the option to download the entire workb..

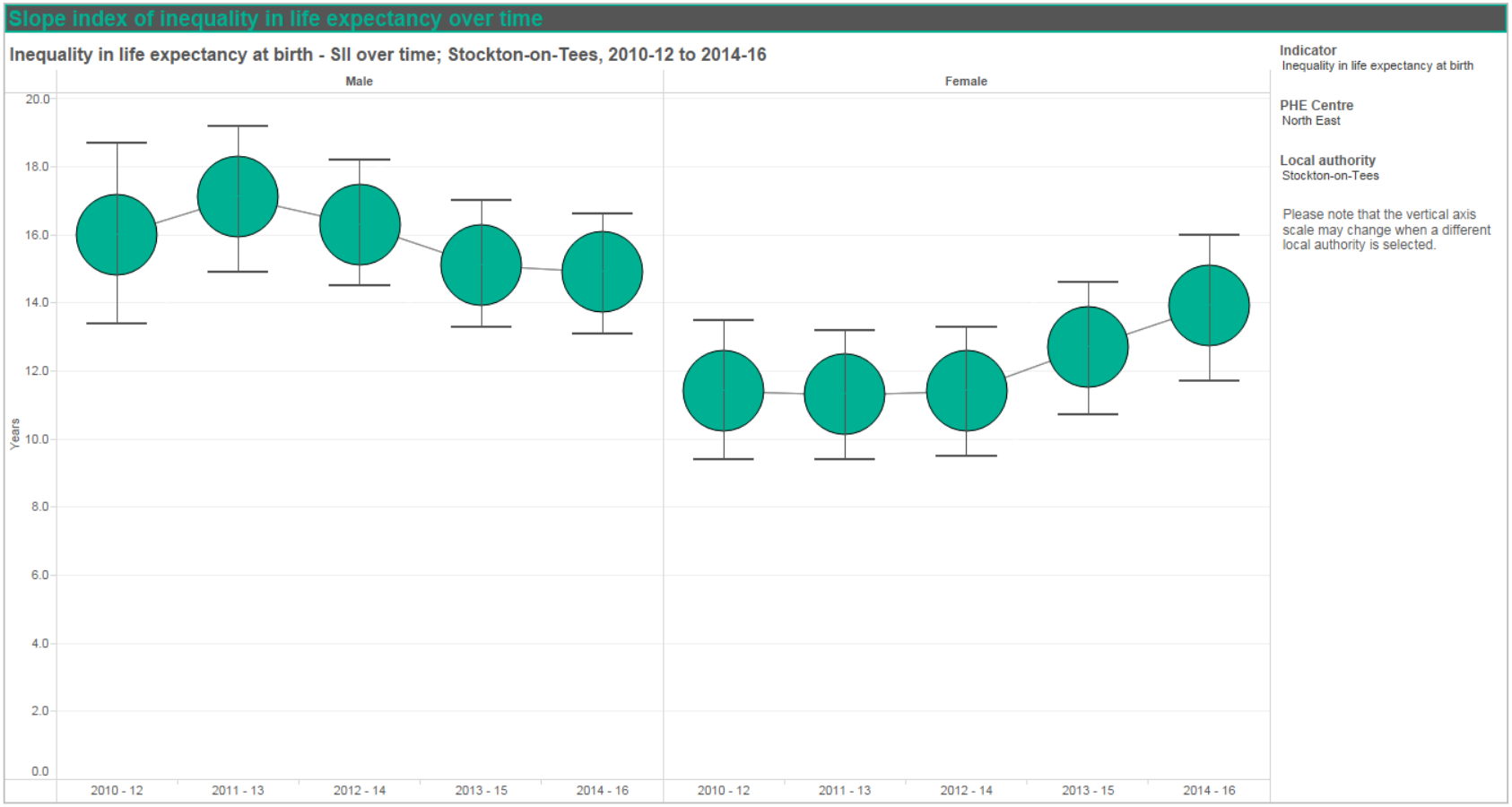
LKISEast@phe.gov.uk

Last updated: September 2018

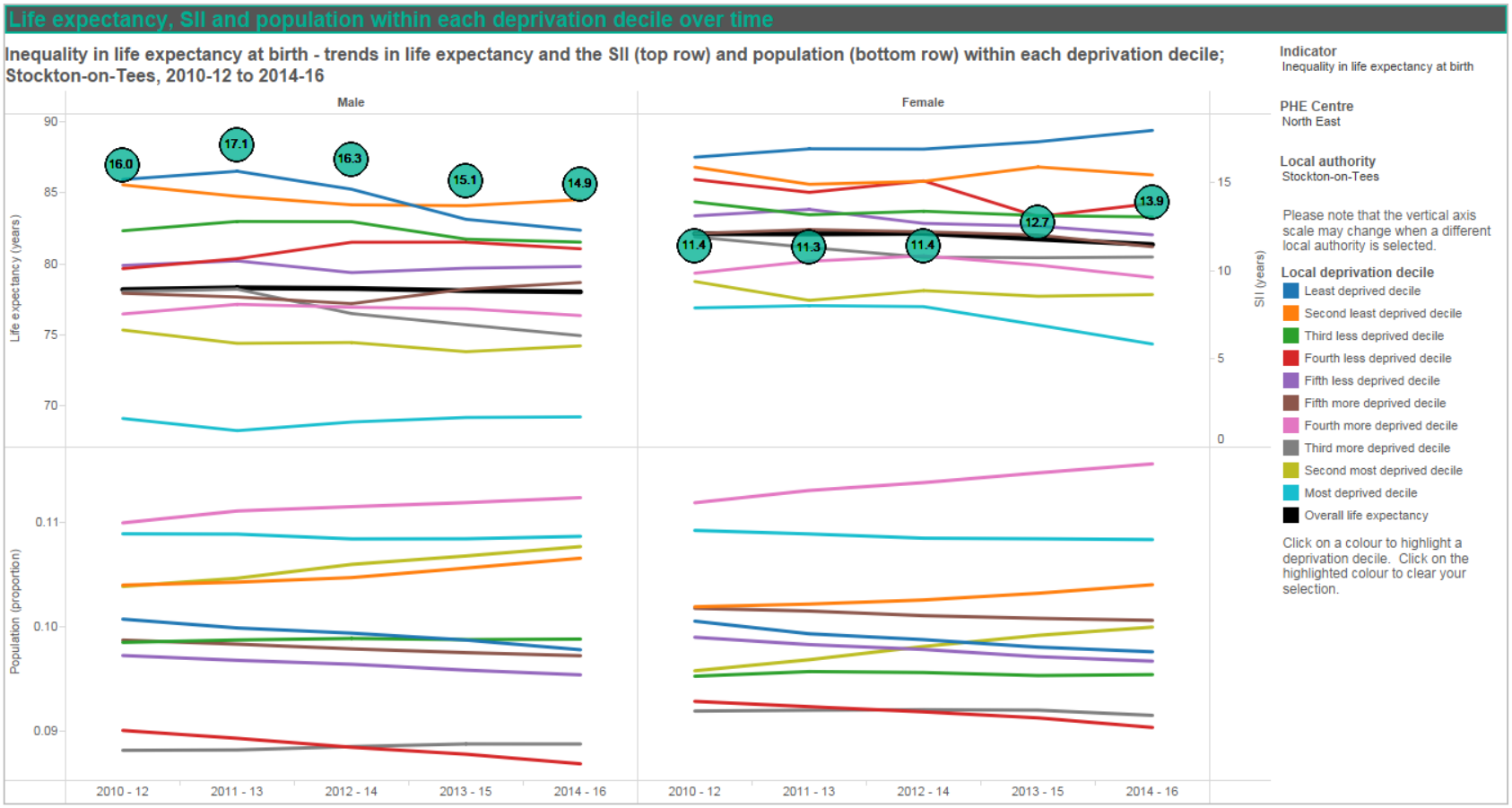


https://public.tableau.com/profile/population.health.beta#!/vizhome/Inequalityinlifeexpectancydashboardpost PS/Introduction

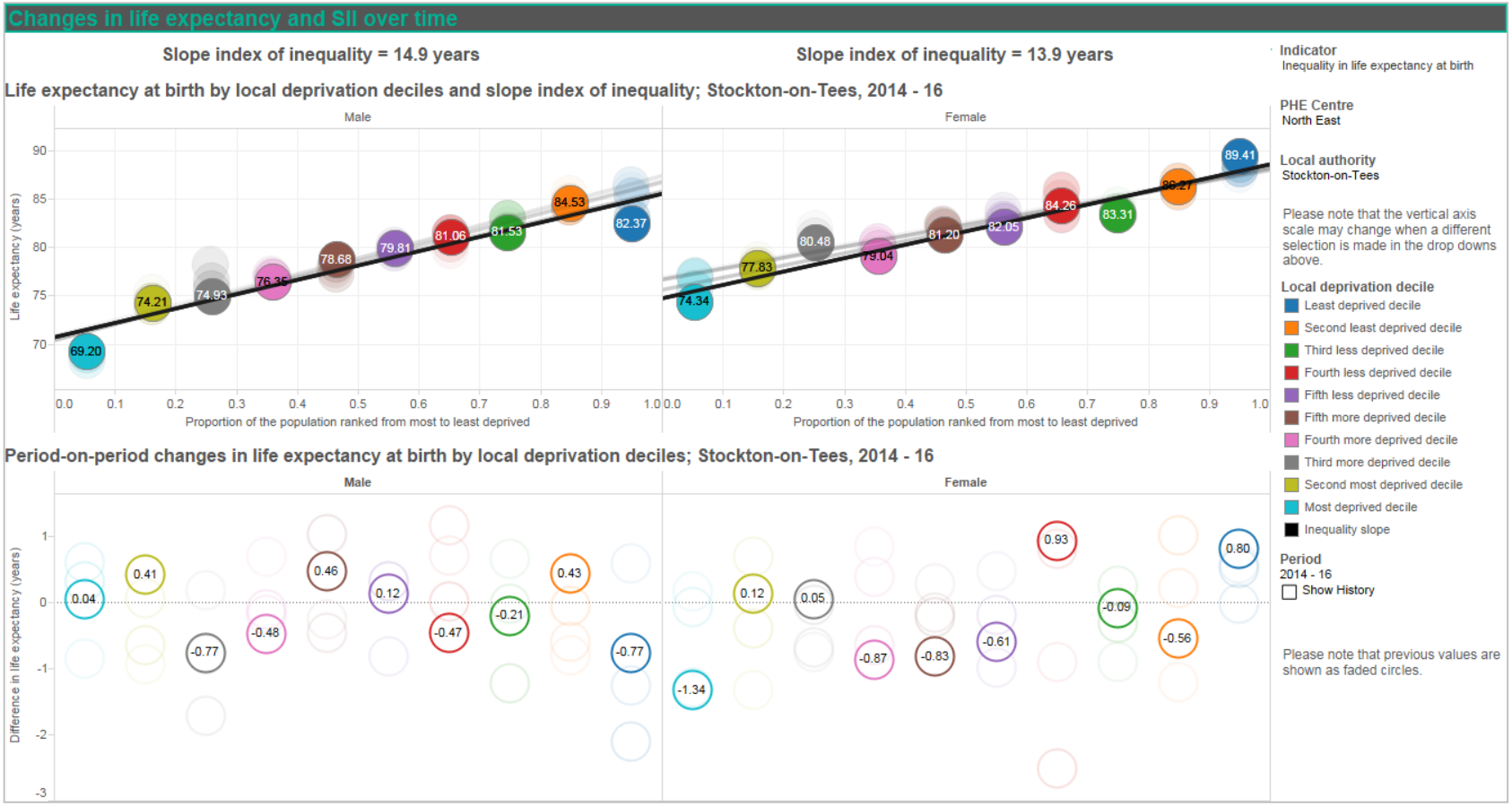
Page 1 Slope Index of inequality in life expectance over time



Page 2 Life expectancy, SII and population within each deprivation decile over time



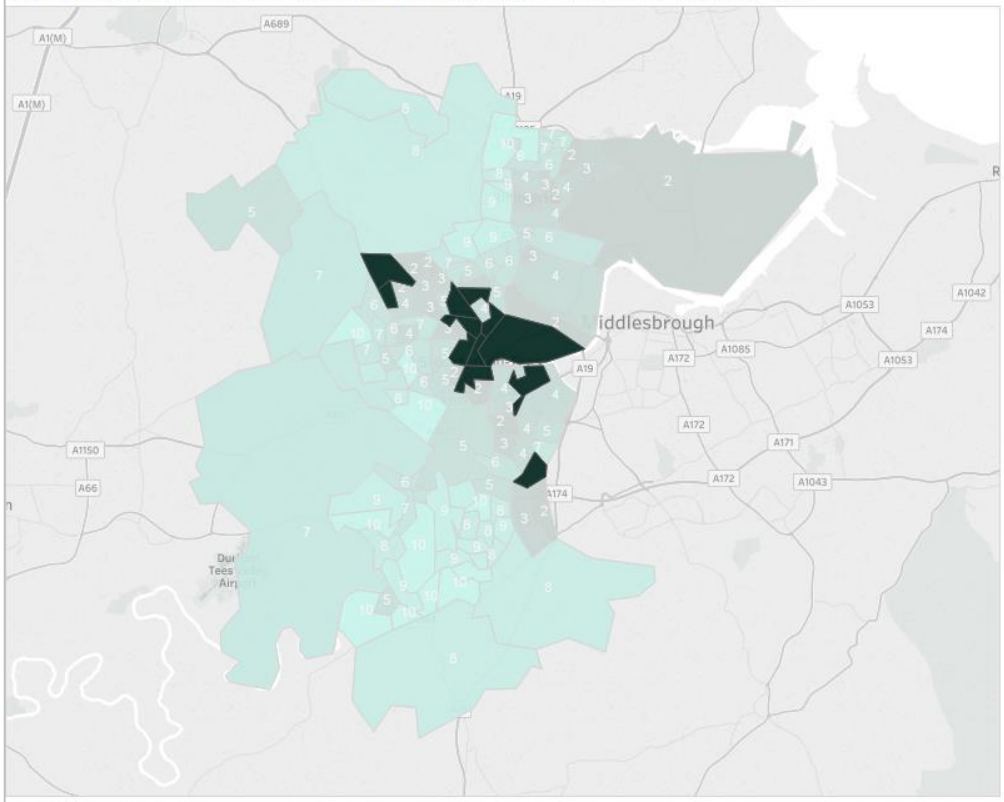
Page 3 Changes in life expectancy and SII over time



Page 4 Map and table of LSOAs, their IMD 2015 score and local deprivation decile

Map and table of LSOAs, their IMD 2015 score and local deprivation decile

Map of LSOAs, their IMD 2015 score and local deprivation decile in Stockton-on-Tees



Contains National Statistics data © Crown copyright and database right 2017

Table of LSOAs, their IMD 2015 score and local deprivation decile in Stockton-on-Tees

LSOA	Local deprivation decile	IMD 2015 score
E01012187	6	16.33
E01012188	10	6.20
E01012189	7	10.06
E01012190	7	9.31
E01012191	5	18.79
E01012192	5	22.04
E01012193	3	36.36
E01012194	4	30.79
E01012195	1	66.09
E01012196	4	29.42
E01012197	4	30.11
E01012198	2	46.98
E01012199	10	4.76
E01012200	8	7.77
E01012201	10	5.57
E01012202	7	11.68
E01012203	9	6.49
E01012204	7	9.95
E01012205	6	14.78
E01012206	4	27.76
E01012207	6	12.44
E01012208	10	6.44
E01012209	6	12.21
E01012210	9	6.60
E01012211	9	6.51
E01012212	7	9.31
E01012213	6	15.85

Please note that where the number of LSOAs exceeds what can be displayed in the table, the right scroll bar can be used to navigate to the remainder of the table.

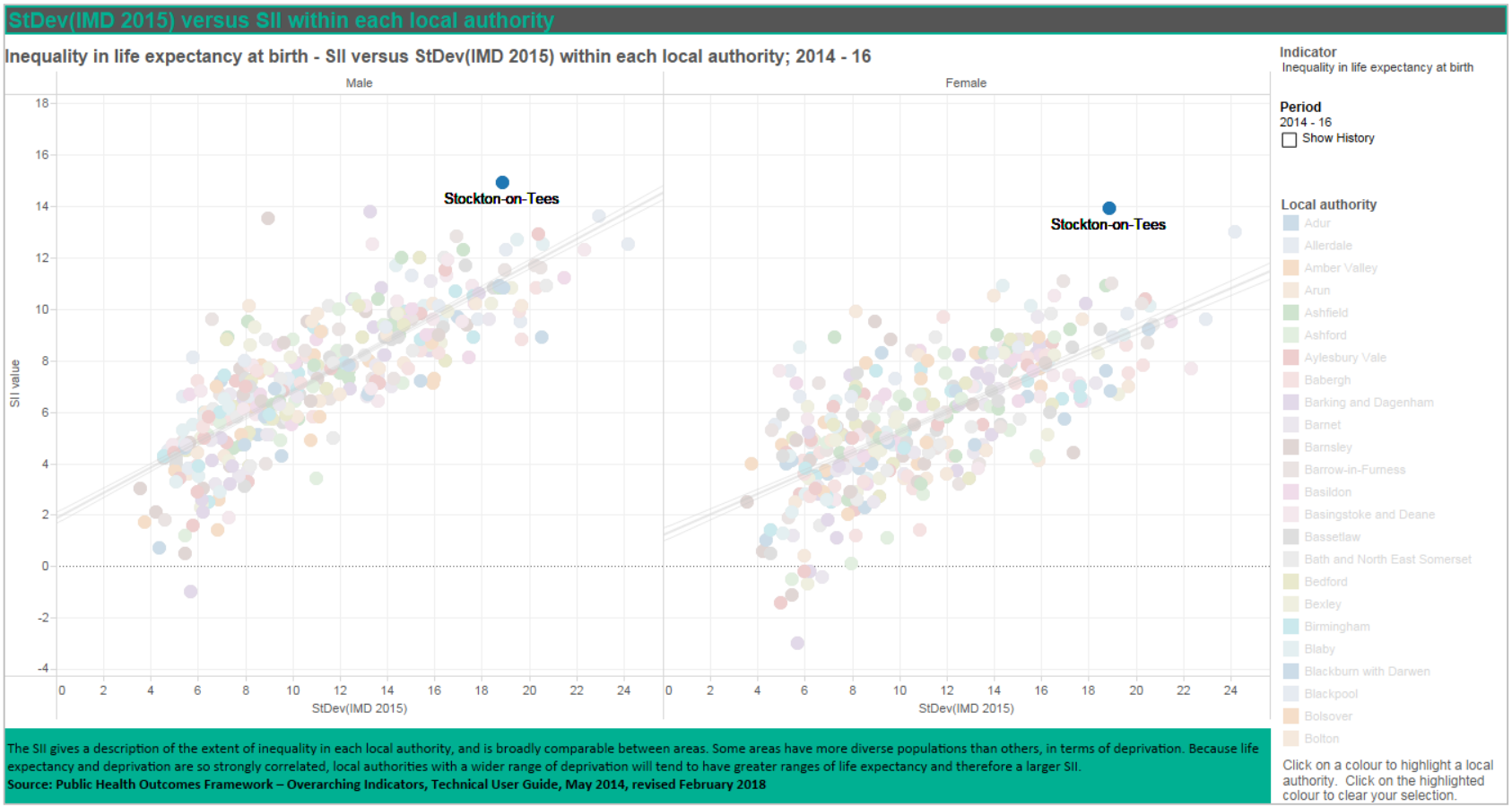
PHE Centre
North East

Local authority
Stockton-on-Tees

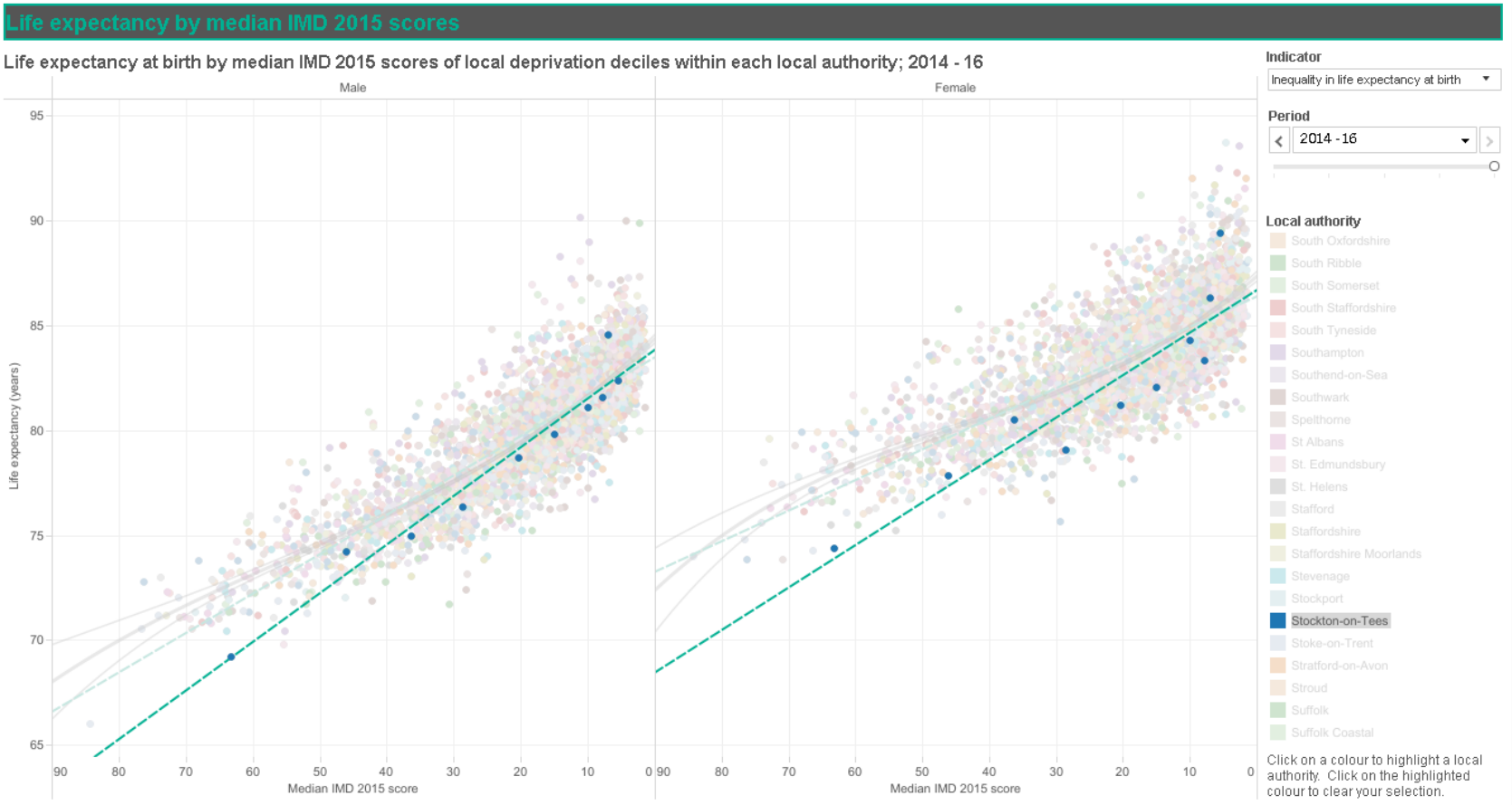
Local deprivation decile
10 (Least deprived)
9
8
7
6
5
4
3
2
1 (Most deprived)

Click on a colour to highlight a deprivation decile. Click on the highlighted colour to clear your selection.

Page 5 StDev(IMD2015) versus SII within each local authority



Page 6 Life expectancy by median IMD 2015 scores



Case study: summary

- Publicly available as a beta version at https://public.tableau.com/profile/population.health.beta#!/vizhome/Inequalityinlifeexpectancydashboardpost PS/Introduction
- Brings together data pertinent to life expectancies and inequalities in life expectancy into one resource
- Contains data for all upper tier and lower tier local authorities
- Contains visualisations and analyses to enable user to gain insight into their SII, and what might be driving changes to it
- Logical order and interactivity aids story telling
- It can be used to support further analyses, i.e. decomposition by age and causes of death
- It complements existing PHE resources, not replace them

References:

- Local Health, www.localhealth.org.uk
- Public Health Outcomes Framework, https://fingertips.phe.org.uk/profile/public-health-outcomes-framework

Public Health England

WAYS THAT YOU CAN GET INVOLVED

Ways that you can get involved

- Sign up for regular updates on health intelligence releases
- Present your work at network events
- Opportunities for honorary placements and apprenticeships to work on public health data
- Support the new PH Research & Evaluation hub: designed to create stronger links between academics and frontlines service practitioners
- Contribute to the Reproducible Analytical Pipeline

Contacts

PHE East of England knowledge hub
https://khub.net/group/pheeastofengland

Local Knowledge and Intelligence Service East
LKISEast@phe.gov.uk

Sian.Evans@phe.gov.uk
Stephen.yeung@phe.gov.uk