

State of Child Health: short report series

Child health in 2030 in England: comparisons with other wealthy countries

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Summary

The health of today's children and young people (CYP) will be one of the key factors in determining whether England is healthy and prosperous over the next 50 years.

We used long-term historical data on key CYP health outcomes and various projection modelling methods to estimate CYP outcomes in 2030 in England compared with other wealthy European and western countries. Our comparison group was the EU15+, consisting of the 15 countries of the EU in 2004 plus Australia, Canada and Norway. Our projections of likely outcomes in 2030 are based upon the assumption that recent trends will continue for the next decade in both England/the UK and, on average, across the EU15+. This assumption is a limitation but one that is common to all forecasting.

Data presented here lead us to two particularly concerning conclusions.

First, England/the UK currently have poorer health outcomes than the average across the EU15+ in most areas studied, and the rate of improvement in England/the UK for many outcomes is lower than across the EU15+. This means that unless current trends improve, England is likely to fall further behind other wealthy countries over the next decade.

Second, the marked inequalities observed in most key outcomes are likely to widen over the next decade as problems in areas such as infant mortality and obesity are worsening more quickly amongst the most deprived section of the population.

Children and young people (CYP) aged 0-19 years made up 24% of the population of England in 2016. Numbers of CYP in England will increase to 13.8 million by 2030, an increase of around 5% over the next decade. This means that we will continue to have a large CYP population with poor health outcomes unless major changes occur.

In summary we found:

- The UK infant mortality decline has stalled and mortality has begun to rise after over more than 100 years of continuous improvement. Currently UK infant mortality is 30% higher than median mortality across the EU15+. If UK infant mortality begins to decline again at its previous rate, the UK will be 80% higher than the EU15+ in 2030. If UK mortality continues the current 'stall' then it will be 140% higher in 2030.
- Key risk factors for infant mortality are higher in England/the UK than in comparable countries. England/the UK has higher proportions of young mothers and higher proportions smoking during pregnancy than most EU15+ countries, with proportions of preterm delivery that are mid-range and rates of breastfeeding that are low compared with the EU15+.
- Amongst older children and young people, the UK has higher 'medical' (i.e. non-injury) mortality than the EU15+ average, with high mortality for preventable causes of death including common infections and chronic respiratory conditions (e.g. asthma)
- Projection of current obesity trends in England suggests that around 23% of 11-year-old boys may be obese in 2030 (an increase of 13% since 2016), with nearly one-third of the most deprived boys being obese (an increase of 18%). International comparison suggests that the UK currently has higher obesity prevalence than other north-western European countries but may see smaller increases than these countries over the next decade.

- Wellbeing amongst English CYP is currently at the lower end of EU15+ countries; however, falls in wellbeing amongst other countries may result in a convergence by 2030.
- Although data are insufficient to estimate trends for diagnosed mental health disorders, reported mental health problems have increased five-fold over the past 20 years and will increase a further 63% by 2030 if current trends continue.
- The prevalence of self-reported injuries amongst CYP in England is currently similar to the median across the EU15+. The UK historically has had low mortality from non-intentional injuries compared with the EU15+, but more rapid declines amongst other countries means that mortality in the UK is likely to be similar to the EU15+ median by 2030.
- Declines in smoking amongst English young people have been amongst the most rapid in the EU15+. Projections suggest smoking amongst young people will be negligible across England and the EU15+ by 2030 if current trends continue.
- Diabetes control amongst CYP in England is poorer than in comparable wealthy countries, although the past five years have seen marked improvement, in concurrence with a national programme to improve quality. Maintenance of this rate of decline in markers of diabetes control may place England at a similar level to other wealthy countries by 2030.
- There are currently 5.5 million Emergency Department (ED) attendances by CYP in England, making up 26% of all age attendances. Highest users for any age are for infants less than a year old. Attendances amongst CYP are projected to increase by 50% to 2030 if current trends are maintained.
- CYP 0 - 19 years attended 11.2 million outpatient visits in England in 2016/17, an increase of 88% since 2003/4. Outpatient attendances amongst CYP are projected to increase a further 48% to 16.5 million by 2030 if current trends continue.

Forecasting the future is notoriously fraught with difficulty, and our forecasts based upon historical data do not take account of potential changes in other factors which may influence outcomes in 2030. For some of the outcomes examined here there is an active policy programme in place across government and the NHS that aims to change outcomes for English CYP for the better. Yet conversely, child poverty is predicted to increase by up to 40% over the next decade, which, if true, may make our predictions under-estimates of the degree to which England / the UK will fall behind other wealthy countries.

The data in this report illustrate the targets that we must aim for – which are not where other wealthy countries are now, but our best guess of where they are likely to be in 2030. We believe that the appropriate target for England and for the UK is to be in the best 10% of comparable wealthy countries. Our children deserve no less. But the data presented in this report suggest that this is a very large ask and changes of this size will inevitably take time. A more pragmatic target is to expect that by 2030 we will have matched the median across the EU15+ on the majority of outcomes, and are on the way to being in the top 10% soon thereafter. The trends apparent in this report show that to reach these targets urgent action is needed across the whole NHS and public health system.

It is important to emphasise that the trends shown here are not inevitable. Each of them could be turned around and our ambitious targets achieved if key actions were undertaken. The improvements in diabetes control in England show that a well-resourced and joined-up national strategy has been effective in improving diabetes control to progressively catch up with outcomes in comparable countries. While for many outcomes action is needed across both health services and wider social determinants, other countries have shown this is possible with an ambitious, well-resourced strategy.

For example, the Netherlands recognised it had a problem with relatively high infant mortality in 2010; following a high-profile national strategy, mortality reduced 20% between 2010 and 2016¹ – during the same period that English infant mortality stalled and increased.

There are a number of admirable policy actions already in place in England – the Childhood Obesity Plan being one such. However, actions in single policy areas are not enough, and, in many cases, they lack the necessary ambition, resources and leadership to have a major impact. We believe that coordinated action is needed in the form of a Children and Young People's Health Strategy for England which will result in a fully funded transformation plan for children's services to ensure our children have the best start in life, receive the care they need and remain healthy into productive, happy adult lives.

Background

The NHS in England has announced the development of a long-term plan to transform services to improve health outcomes over the 10 years to 2029/2030. We welcome the inclusion of a workstream on Healthy Childhood and Maternal Health in the plan, as this provides NHS England with a once-in-a-generation opportunity to transform children's health services. Our ambitions to improve outcomes for England's children through to 2030 are part of our national commitment towards meeting the Sustainable Development Goals for child health and survival. Our children's health is not only their right - but holds the key to our nation's future wellbeing and wealth.

As part of input into the plan by the Royal College of Paediatrics and Child Health (RCPCH), this report uses authoritative data to outline the current state of children and young people's (CYP) health in England, and also to identify where outcomes are most likely to be in 2030. The aim of this is to identify areas where trends demonstrate that action is urgent and essential.

Children and young people (CYP) 0 - 19 years make up 24% of the population of England; there are 15.5 million CYP under 20 years in the UK – more than the all-age population of 19 of the other 27 EU countries. Those aged 0 - 18 years made up 25% of Emergency Department (ED) attendances in 2015-16, 10 - 30% of primary care attendances depending on geography, and comprised around 20% of all surgery and anaesthesia performed in England. Today's CYP are the workforce of the 2020-2040s and the parents of the generation that will work through to the late twenty-first century. Their health will be one of the factors determining whether the UK is healthy and prosperous over the next 50 years.²

Multiple recent reports have identified poor current UK performance in terms of CYP health outcomes in comparison with other wealthy countries. The RCPCH and National Children's Bureau (NCB) report *Why Children Die 2014*³ first outlined concerns that UK child mortality rates had become an outlier amongst wealthy European countries. The RCPCH *State of Child Health 2017*, outlined long-term trends across the four countries of the UK in 25 key indicators of CYP physical or mental health.⁴ The report found that the UK was the European leader in no indicator area. A further recent report by the Nuffield Trust with the RCPCH found, similarly, that many UK CYP health outcomes fared poorly in comparison with other wealthy countries.⁵

In this report we compare outcomes for England (or for the UK where England-only data are not available) with outcomes in comparable wealthy countries in Europe and beyond. The countries we included as our comparators were the 'EU15+', consisting of the 15 countries of the EU in 2004 plus Norway and two non-European countries, Australia and Canada. This group has been used in other comparative studies of UK health outcomes.

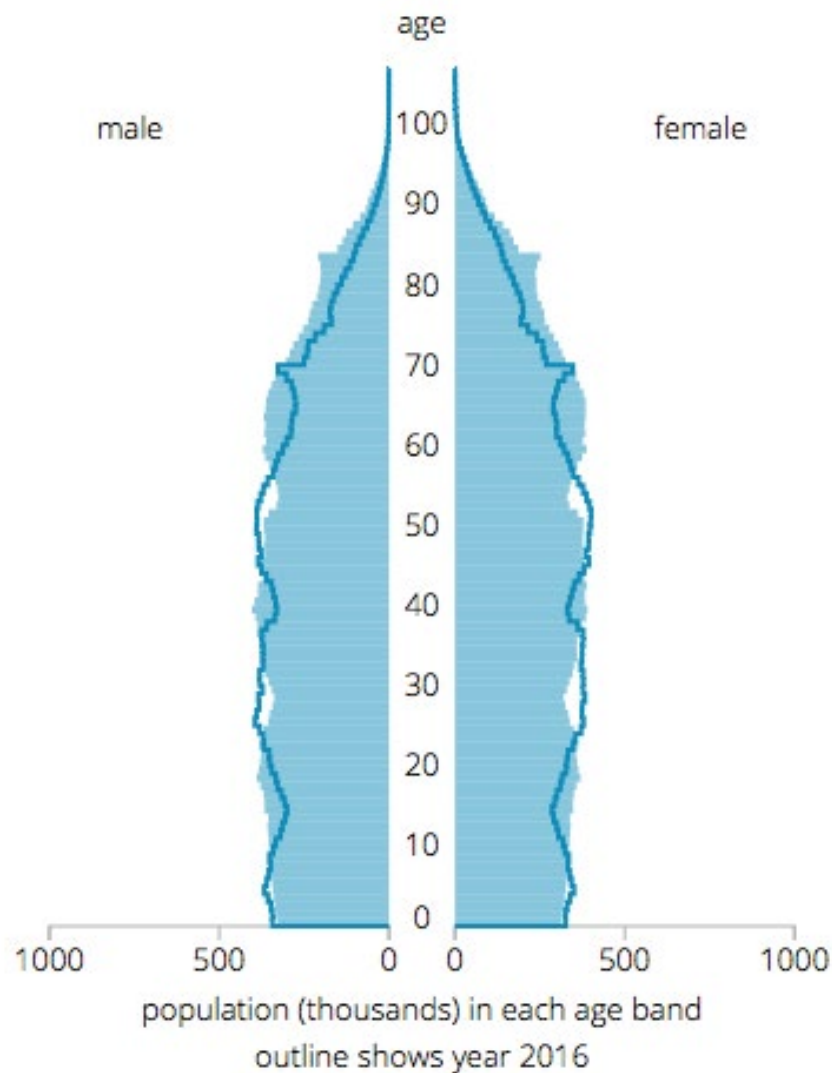
We focused on key outcomes previously identified for CYP in our *State of Child Health 2017* report, including only outcomes for which robust comparative data across other wealthy countries were available. A range of statistical techniques were used to create these projections, each of which relies on existing data, and the methods include techniques which place greater emphasis on more recent data trends to take into account real-life changes. In all figures, data to 2016/17 are shown in solid lines with projected data shown in dashed lines. For details of methods see the Appendix.

Numbers of children and young people

Children and young people (CYP) 0 to 19 years make up 24% of the population of England, ranging by local authority from 17.1% to 32.3% across England, with highest proportions in deprived urban areas. The developmental period of human life is 0 - 24 years, the first quarter of our lives - now a group that comprises 30% of the population of England.⁶

The numbers of CYP in England have grown by 5.4% over the past decade (2007 to 2017)⁷ and Office for National Statistics (ONS) projections suggest that the population of CYP will continue to increase by a similar number over the next decade, totalling 13.8 million by 2030, an increase of 5.1% on 2017. This means that the proportions of CYP in the population will continue at close to current levels to 2030 or 2040 despite overall population ageing (see Figure 1).⁸

Figure 1. Population pyramid for England by age for 2016 (outline) and projected for 2030 (shaded)



A. Mortality

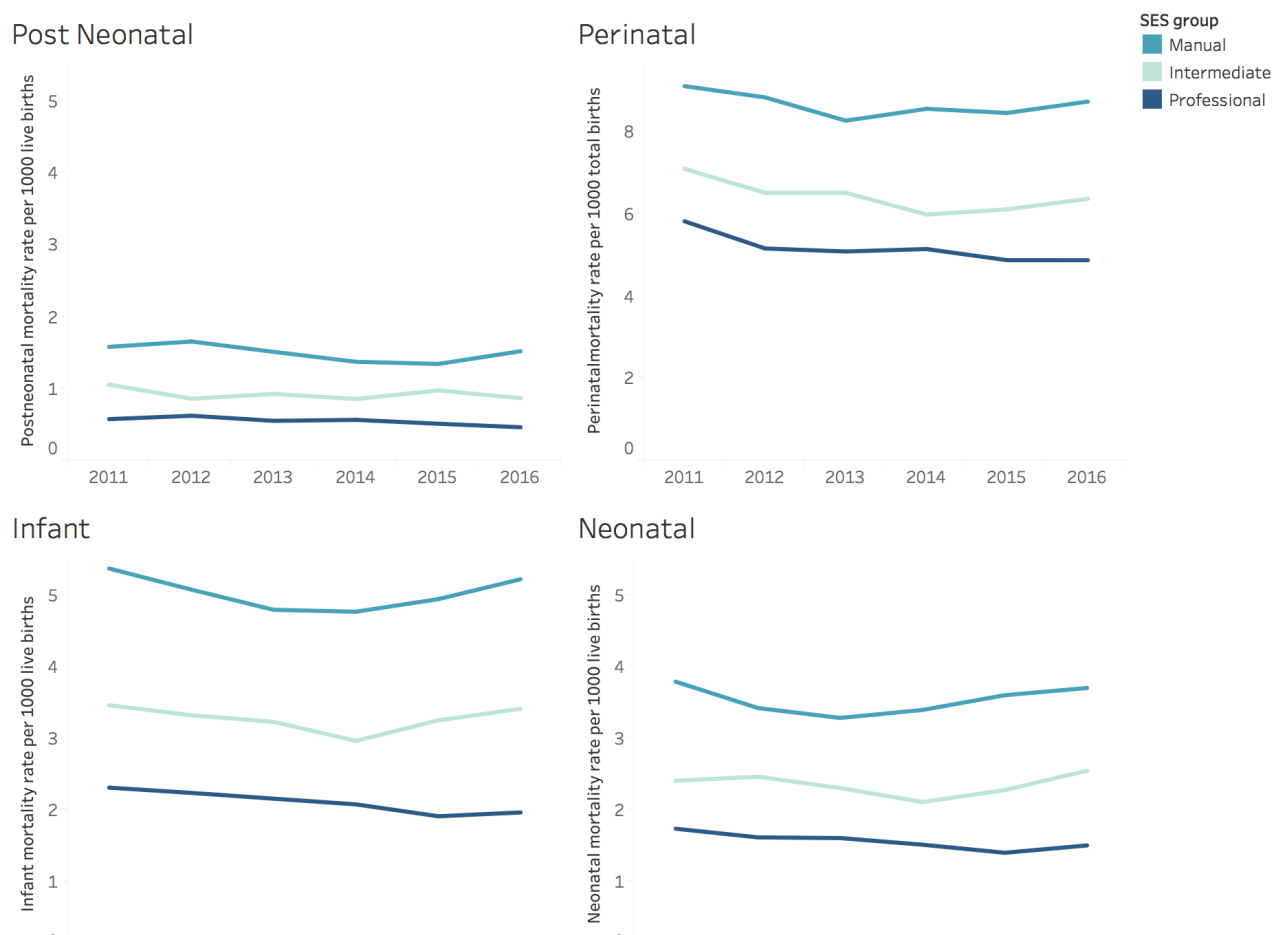
1. Infant mortality

The infant mortality rate is one of the key measures of the health of a population or nation. The main causes of death amongst infants (birth to 365 days) are perinatal conditions related to preterm birth.

Current: Infant mortality in England and Wales rose in 2015 and again in 2016, reversing the long trend (over 100 years) of decline in one of the key indicators of population health. Trends in mortality were similar across each of total infant (0-365 days), neonatal (0-28 days), and post-neonatal (29 - 365 days) infant mortality, as well as in perinatal mortality (children born after 24 weeks gestation without any sign of life plus deaths within the first 7 days of life) (see Figure 2). This suggests a broad causal effect rather than one confined to pregnancy or the first days of life.

The rises in infant mortality are most striking in the deprived portion of the population (Figure 2), although they are visible in even the most affluent portion. Note that infant mortality amongst the most affluent portion of England & Wales is approximately 2 per 1000 – equal to the best in Europe - but mortality amongst the most deprived groups in England is twice this.

Figure 2. England and Wales infant, perinatal, neonatal and post-neonatal infant mortality by socioeconomic status (SEgroup), 2011 to 2016 ⁹



Comparison with other wealthy nations:

Comparison of UK infant mortality with the EU15+ has previously been published (Figure 2).¹⁰ Infant mortality in the UK fell behind the EU15+ median from the early 1990s and has declined at a slower rate than comparators since that time.

Projections: Published projections to 2030 of UK and EU15+ infant mortality ¹¹ are shown in Figure 3. The figure shows UK infant mortality together with the median (average) across the EU15+ and indicators of very good (10th centile line, indicating the best 10% i.e. very low mortality) and very poor (90th centile line, indicating very high mortality) across the EU15+. Solid lines indicate actual data whilst dotted lines represent projected data.

The UK had close to median EU15+ mortality in the mid-1990s but then sat above or around the 90th centile from the early 2000s to 2016. Given the recent plateau in infant mortality in the UK, we projected two scenarios:

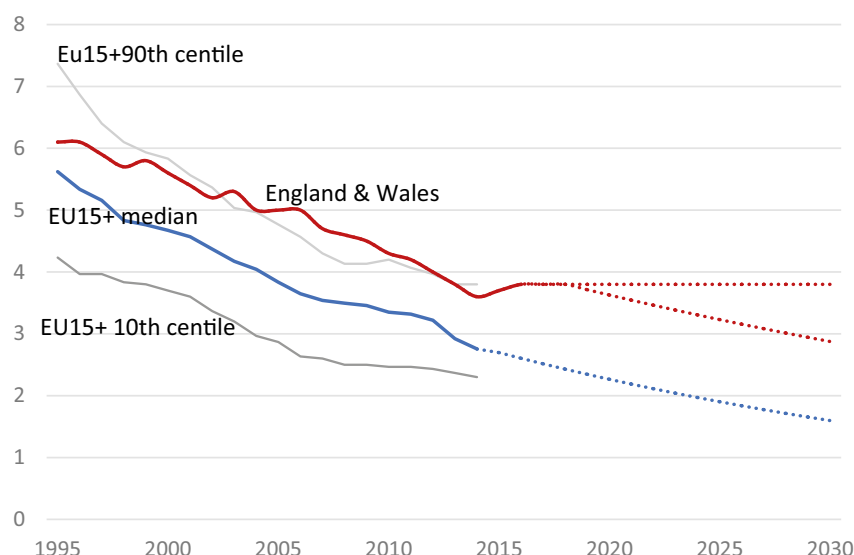
- (1) 'no change' scenario, i.e. infant mortality remained at 2016 levels;
- (2) 'resumed decline' scenario: UK infant mortality resumed a decline at the rate estimated in the published model.

In the no change scenario, by 2030 UK infant mortality will be 138% higher (i.e. 2.4 times) than median EU15+ mortality, an increase from 30% higher in 2013-15.

By contrast, in the 'resumed decline' scenario' UK infant mortality will be 80% higher than the EU15+ by 2030. Both scenarios predict a substantial continued gap between the UK and the EU15+ over the next decade.

The experience from other EU15+ countries tells us that significant reductions in infant mortality can be made at national level. The Netherlands recognised it had a problem with relatively high infant mortality in 2010; following a high-profile comprehensive national strategy focusing on pregnancy and the early years, mortality reduced 20% between 2010 and 2016.¹²

Figure 3. Infant mortality in England and Wales and EU15+ 1995 to 2015/16, projected to 2030¹³



Risk factors for infant mortality in comparison with other wealthy countries

Given that infant mortality represents around 60% of all CYP mortality we briefly examine here the performance of England/the UK in comparison to other EU15+ countries on key risk factors for infant mortality. These include sociodemographic variables (poverty, ethnicity, maternal education), birth characteristics (preterm birth, maternal age and maternal smoking), post-natal factors (e.g. breastfeeding and child management) and health service factors.

There is substantial variation in infant mortality regionally across England, probably representing variations in birth and demographic factors. A recent comparison of infant mortality between England and Sweden concluded that the majority of differences between the countries was explained by demographic characteristics of the mother and factors relating to the birth, emphasising the need to focus on preconception and antenatal care.¹⁴ However, the national perinatal mortality reporting system (MBRRACE-UK) has also identified substantial variation in neonatal mortality across the Local Maternity System/ Populations in England for 2016 that does not appear to be entirely explained by differences in population factors and is likely to represent health system factors.¹⁵

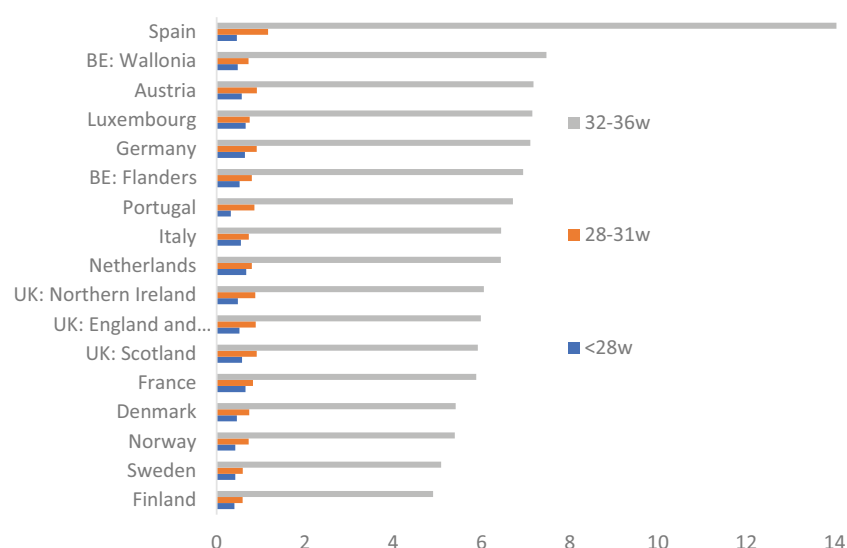
Poverty lies at the root of many other risk factors for infant mortality and all of CYP health. Authoritative projections suggest that child poverty and resultant health inequalities are likely to rise over the next decade – with concerning implications for CYP health.¹⁶ Whilst reduction of poverty is outside the direct control of the health services, the health community has a crucial advocacy role in reducing poverty and the health system has indirect influence through population planning for health services and improving access to and quality of care for poor families. Conditions amongst CYP that are related to poverty are cared for within the health system, and CYP that die from poverty-related disorders usually die within the health system. A high-functioning health system should work to reduce inequalities and ameliorate the effects of poverty on health.

Note that we did not project data on risk factors to 2030. These data are provided to inform actions on infant mortality.

Prematurity

The most prominent risk factor for infant mortality is preterm delivery, itself strongly associated with other risk factors e.g. poverty and maternal smoking. Data from the Euro-Peristat system from 2010 (more recent comparable data are not available) show that England/Wales are in the middle of European countries for proportions of preterm births, although considerably higher than the European leaders.¹⁷

Figure 4. Proportions of live births born preterm by gestational age across Europe: Euro-Peristat, 2010



BE Belgium.

Maternal age

Young maternal age (<20 years) is a risk factor for infant mortality. England has had great success in reducing the number of conceptions to teenagers 15 - 17 years over the past 20 years, with a 60% reduction since 1998 (Figure 5),¹⁸ resulting from a funded and coordinated national programme across the health and education sectors. However, the UK continues to have the highest teenage pregnancy rate in the European Union. This is reflected in the UK having the highest proportion of first-time mothers aged <20 years in the EU15+, well above the EU15+ median - despite a notable fall in this proportion in the UK in the past four years (Figure 6)

Figure 5. Conceptions per 1,000 women aged 15-17 years in England 1998-2016

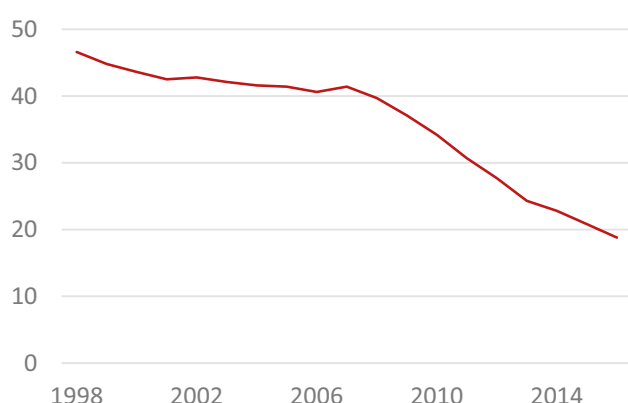
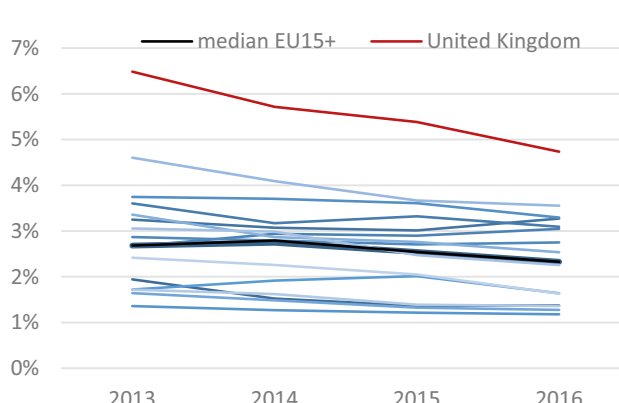


Figure 6. Maternal age <20 years in the UK & the EU15+ 2013-16¹⁹

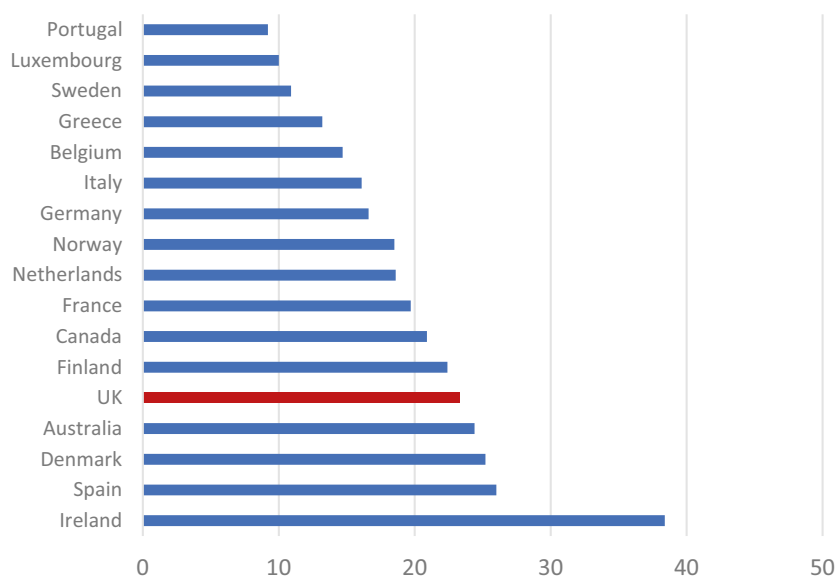


Smoking during pregnancy

Smoking during pregnancy is one of the most important modifiable risk factors for infant mortality and other aspects of CYP health (e.g. a risk factor for obesity). Despite moderate declines in the past 10 years in England, rates of smoking during pregnancy in the UK remain higher than in many EU15+ countries.

Currently it is estimated that 23.3% of women in the UK smoke at some time during pregnancy.²⁰

Figure 7. Smoking at any time during pregnancy in the UK and EU15+, 2015

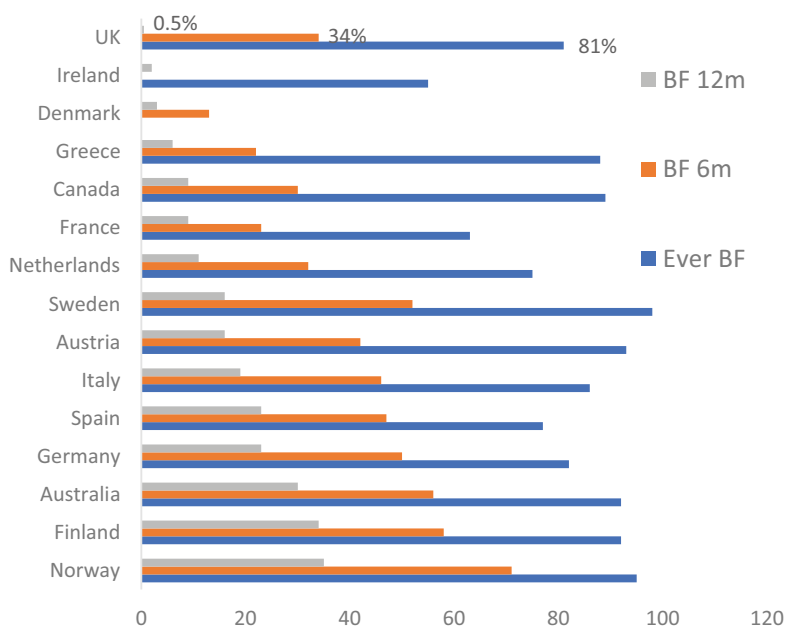


Breastfeeding

Breastfeeding is protective against infant and child mortality in low-income countries and potentially in high-income countries, and is associated with multiple other health gains for baby and mother.²¹

The UK has relatively high rates of initiation of breastfeeding compared with other EU15+ countries (e.g. 81% ever breastfed) but only moderate rates at 6 months and the lowest proportion (0.5%) still breastfeeding at 12 months. The UK therefore has the greatest fall-off in breastfeeding from initiation to six months then 12 months amongst comparable wealthy countries.²²

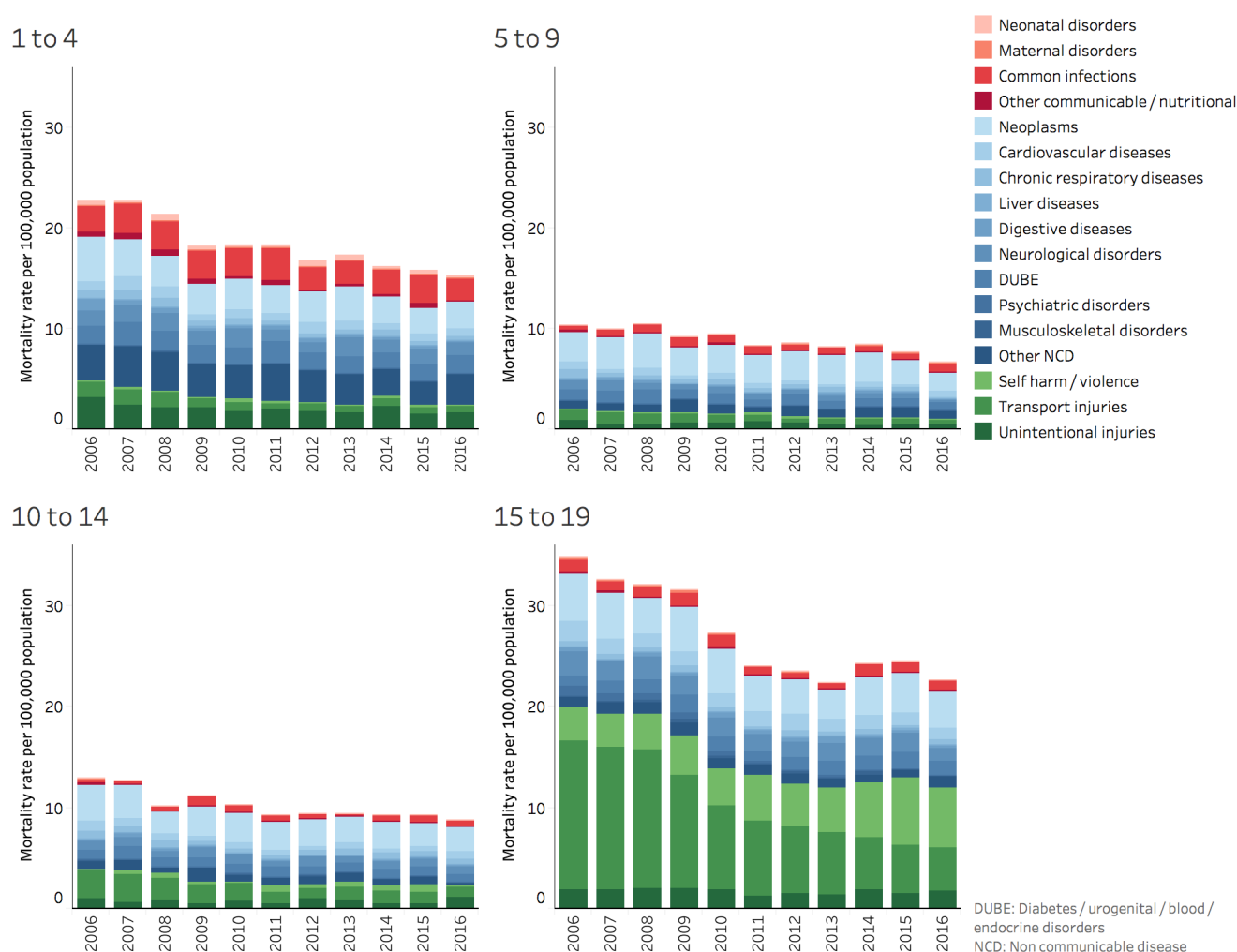
Figure 8. Breastfeeding (BF) in the EU15+ (approximately 2010-12): Ever BF, any BF at 6 months and any BF at 12



2. Mortality after infancy

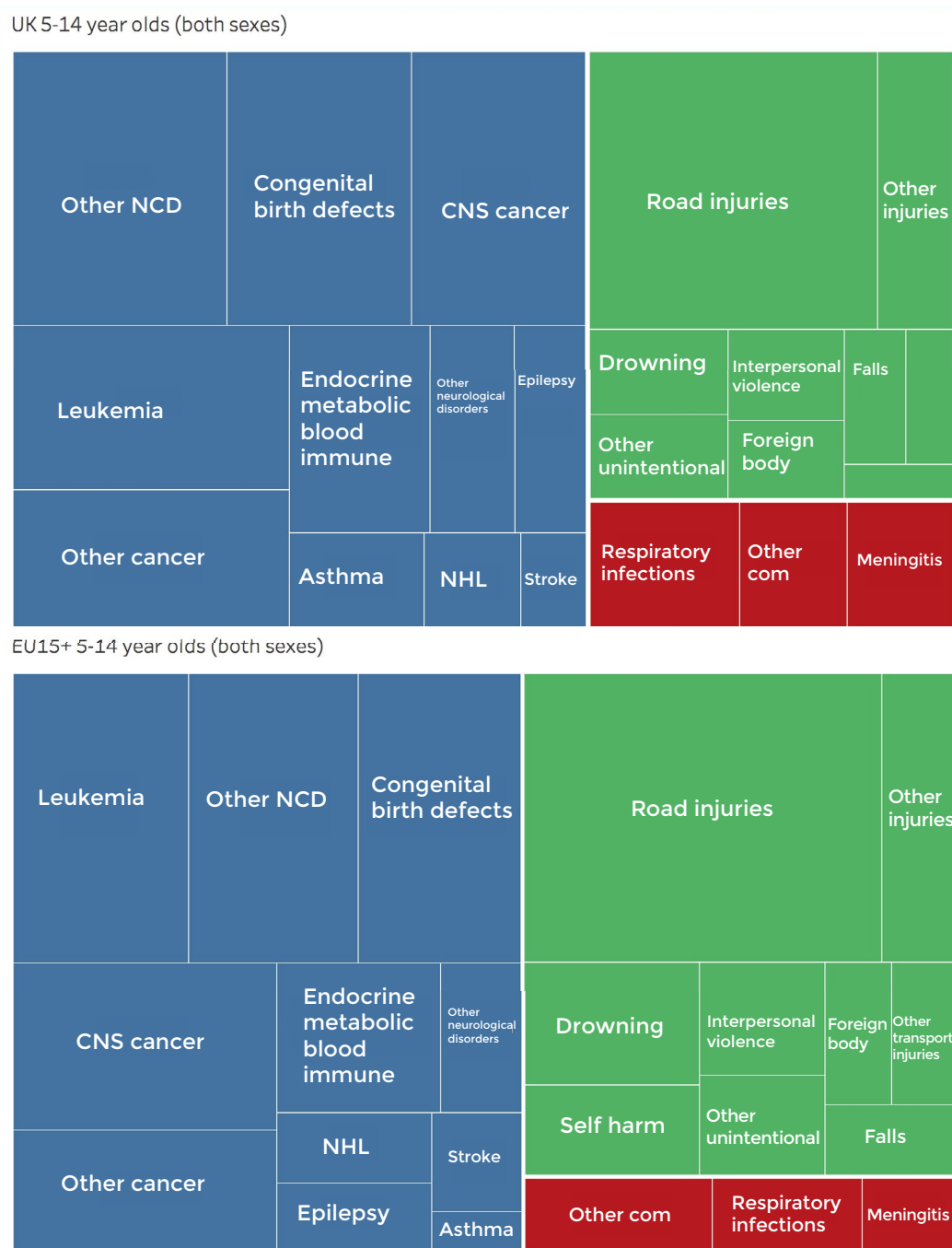
In 2016 across England and Wales, there were 443 deaths amongst 1 – 4 year olds, 240 amongst 5 – 9 year olds, 285 amongst 10 – 14 year olds and 759 amongst 15 – 19 year olds. Trends in different causes of death over the last decade in England/Wales are shown by age group for both sexes in Figure 9. Mortality rates fell in most causes in each age group, with the exception of deaths due to self-harm and violence amongst 15 – 19 year olds. The largest falls were in transport injuries and neurological conditions in all age-groups.²³

Figure 9. Mortality rate per 100,000 population by age and cause group in England and Wales 2006-2016 (both sexes)



Previous studies have shown that total UK mortality is higher than across the EU15+ amongst 1 – 4 year olds and that amongst 5 – 19 year olds the UK has higher ‘medical’ causes of death (all deaths not due to injuries) than in the EU15+.²⁴ This is also illustrated in Figure 10, which shows that the proportion of mortality made up by non-communicable diseases (NCDs, in blue) and infectious diseases (in red) is larger in the UK (top panel) amongst 5 – 14 year-olds than across the EU15+ (bottom panel).²⁵ Further, the proportions of deaths due to common infections (respiratory infections, meningitis) and common long-term conditions (asthma, epilepsy, other neurological disorders) appear higher in England than across other Western European countries.

Figure 10. Causes of death amongst 5 - 14 year-olds of both sexes in the UK and the EU15+ in the 2016 Global Burden of Disease study, across non-communicable diseases (in blue), communicable diseases (red) and injuries (green)



Notes: NCD = non-communicable disease; NHL = non-Hodgkins lymphoma; other com = other communicable disease

Examination of how the UK ranks for different causes of death is useful to identify areas where the UK has a particular problem compared with the EU15+. Table 1 shows the UK's rank in mortality (from 1 (best) to 17 (worst)) when compared with 16 EU15+ countries for cause-specific mortality for 2015.²⁶ Green shading represents good UK ranking (in top third of distribution), red represents poor UK ranking (lowest third) with yellow-orange indicating middle third. The UK has poor or mid-range ranking consistently across early childhood to adolescence for communicable diseases and non-communicable diseases (NCDs), with good ranking for injury deaths, although this latter good performance is faltering (see section on injuries). The UK has the highest or near highest mortality across all ages in common infections and chronic respiratory diseases (e.g. asthma), which are largely preventable.

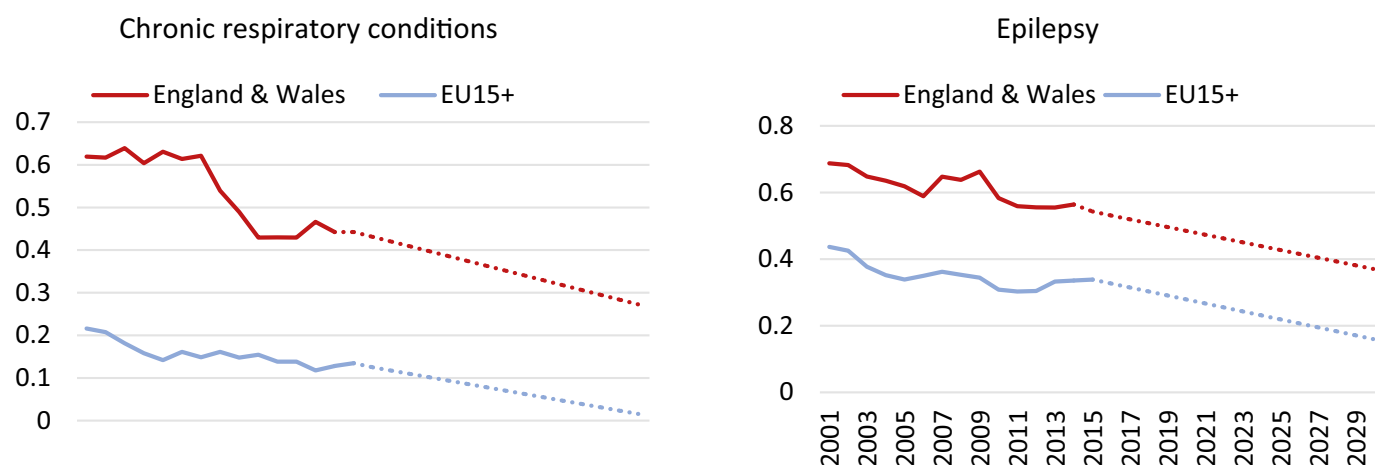
Table 1: Cause-specific mortality rank for the UK compared with 16 other EU15+ countries in 2012 - 2015

MALES				
	1 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years
Communicable Disease				
HIV/TB	7	8.5	17	6.5
Common infections	17	17	16	17
Tropical diseases	9	16	9	8.5
Neonatal disorders	16	12	6	6
Nutritional deficiencies	16	8.5	8.5	9
Other communicable	13	12	16	10
NCD				
Neoplasms	8	9	7	8
Cardiovascular diseases	13	10	12	15
Chronic respiratory diseases	15	17	17	15
Liver diseases	10	16	13	16
Digestive diseases	12	10	16	15
Neurological disorders	15	9	13	16
Psychiatric disorders			8	7
DUBE	12	11	14	16
Musculoskeletal disorders	14	12	9	16
Other non-communicable diseases	10	15	12	7
Injuries				
Transport injuries	4	5	11	7
Unintentional injuries	4	5	9	9
Self-harm and interpersonal violence	2	6	4	9
FEMALES				
	1 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years
Communicable				
HIV/TB	7	7.5	6	7.5
Common infections	15	15	16	17
Tropical diseases	9	8.5	8	7.5
Maternal disorders			9	15
Neonatal disorders	11	11	7	11
Nutritional deficiencies	16	8.5	9	8
Other communicable	11	14	6	10
NCD				
Neoplasms	11	4	6	13
Cardiovascular diseases	14	15	12	12
Chronic respiratory diseases	16	15	17	17
Liver diseases	10	15	7.5	13
Digestive diseases	16	17	15	17
Neurological disorders	13	10	12	16
Psychiatric disorders			15	11
DUBE	9	9	13	16
Musculoskeletal disorders	16	16	10	17
Other non-communicable diseases	9	10	12	9
Injuries				
Transport injuries	7	6	8	8
Unintentional injuries	12	5	10	9
Self-harm and interpersonal violence	4	7	5	5
Forces of nature, conflict	7.5	8	7.5	8.5

DUBE = Diabetes, urogenital, blood and endocrine conditions

More detailed examination of comparative trends in mortality rates in chronic respiratory conditions (e.g. asthma) and neurological conditions such as epilepsy is shown in Figure 11²⁷ and shown for unintentional injuries in the injury section. England and Wales had notably high mortality for 1 - 19 year olds for both chronic respiratory conditions and epilepsy compared with the EU15+ median across the period 2001 to 2015, despite substantial falls in England/Wales mortality. Projection to 2030 suggests that England/Wales mortality in both conditions is likely to remain substantially higher than the EU15+ median if current trends continue.

Figure 11. Mortality amongst 1 – 19-year-olds in England & Wales and the EU15+ for chronic respiratory conditions and epilepsy from 2001 to 2030



These findings raise the question of whether health system factors play a role in the UK's high proportion of medical mortality and poor performance on mortality for epilepsy, common infections and chronic respiratory conditions, the latter two of which are largely preventable. The contribution of health system factors independently of demographic and deprivation factors remains unclear.

A recent comparative analysis of mortality in England and Sweden found that there were no significant differences in 1 - 4 year mortality between the countries when adjusted for birth and socioeconomic factors, suggesting that focusing on preconception and antenatal care is essential for reduction of childhood as well as infant mortality.²⁸ However, it is impossible to separate sociodemographic factors such as poverty from health system factors, as access and use of health systems and services are intimately connected with deprivation and education.

There is also evidence that structural factors in the NHS mean that opportunities to mitigate the impact of poverty on child health outcomes may be missed.²⁹

B. Obesity

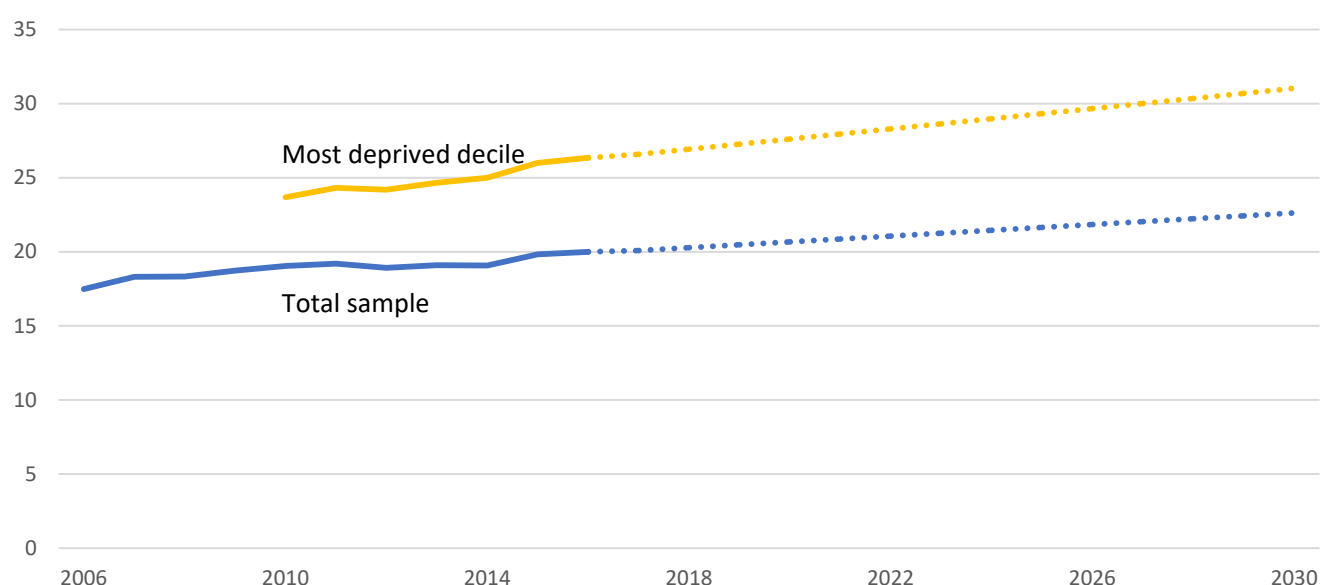
Childhood obesity is a national public health and clinical priority, given that obesity onset in childhood impacts upon cardiovascular and cancer risk and mental health life-long.

Current: The National Child Measurement Programme (NCMP) reported that 20% of 10 – 11-year-olds were obese in 2016/17, using the Department of Health and Social Care (DHSC) population definition (BMI > 95th centile), with obesity amongst the most deprived decile being 26.3%.³⁰ Estimates using a more stringent clinical definition of obesity (BMI >98th BMI; also used by the World Health Organisation) showed that 11.2% (1.22 million) of CYP in England were obese in 2015/16. A similar estimate (10.8% obese in 2015 using the WHO definition) was recently published by the NCD Risk Factor Collaboration (NCD-RisC), which modelled data from multiple sources to estimate obesity trends internationally from 1975 to 2015.³¹

As well as a public health issue, CYP obesity is a clinical issue for health services today. Viner et al. (2017) used NICE guidance to estimate that 1.22 million CYP in England were eligible for primary care assessment and for community life-style modification for obesity; 2.6% (n=283,500) of all CYP were estimated to be likely to attend primary care for obesity and 5.1% (n= 556,000) were eligible for secondary care referral for obesity. Amongst 13 – 18-year-olds, 8.2% (n= 309,000) were eligible for anti-obesity drug therapy and 2.4% (90,500) were extremely obese and eligible for bariatric surgery. CYP from the most deprived quintile were 1.5 – 3-fold more likely to be eligible for obesity management.

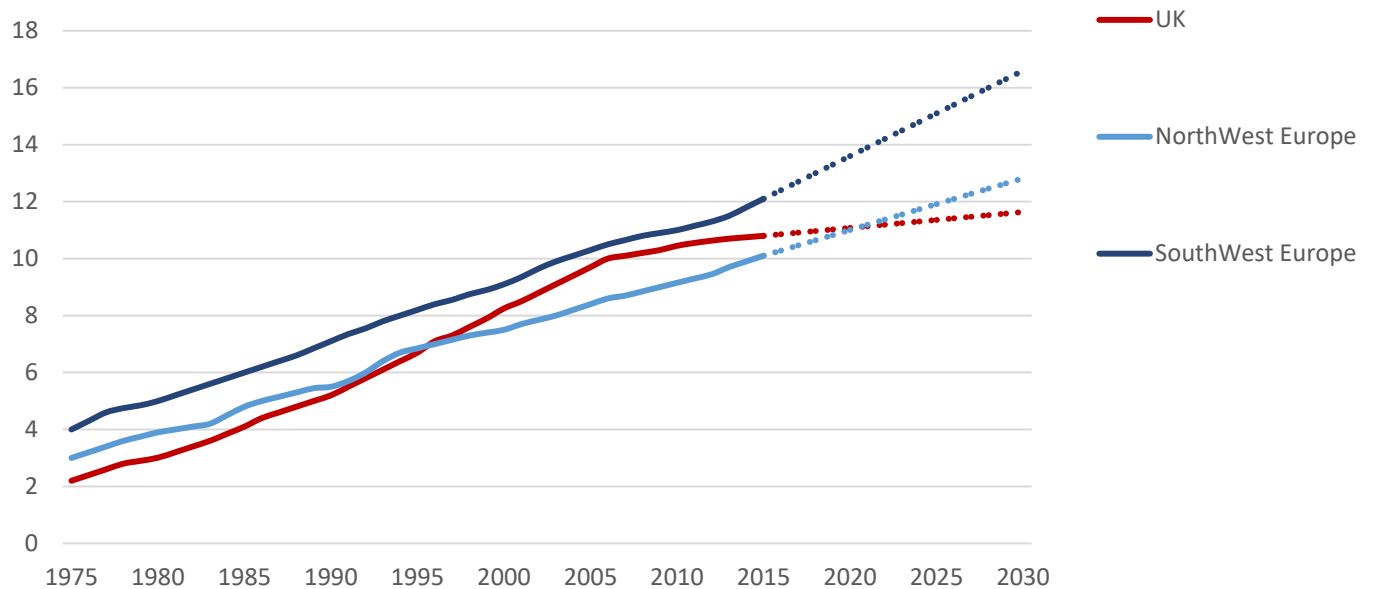
Projection: Trend data are available for England from the NCMP and comparative UK and European data from the NCD-RisC collaboration. Within England, Figure 12 shows NCMP obesity trends for 10 - 11 year old boys for the total sample and for those in the most deprived population decile.³² Projections suggest there will be a gradual increase in total obesity if current trends continue, but a particularly steep increase in boys in the most deprived decile, so that by 2030 around one-third of deprived boys will be obese. These projections do not take into account interventions announced as part of the government's Childhood Obesity Plan, which contains measures which we believe will help to reverse current trends.

Figure 12. Obesity amongst 10-11 year old boys in England, 2006 to 2030



International comparative data (Figure 13) shows that in 2015 the UK had a higher obesity rate than the average across northern Europe due to much faster rises in obesity through the 1990s and early 2000s, although the trend in the UK appeared to be flattening. In the projections, if the flatter increase in UK trends is maintained, the UK may have similar to or lower obesity than other countries across north-west Europe by 2030, although nearly 12% of boys in the UK will be clinically obese.

Figure 13. Clinical obesity amongst boys 5-19 years old across the UK and Europe, 1975-2015 projected to 2030

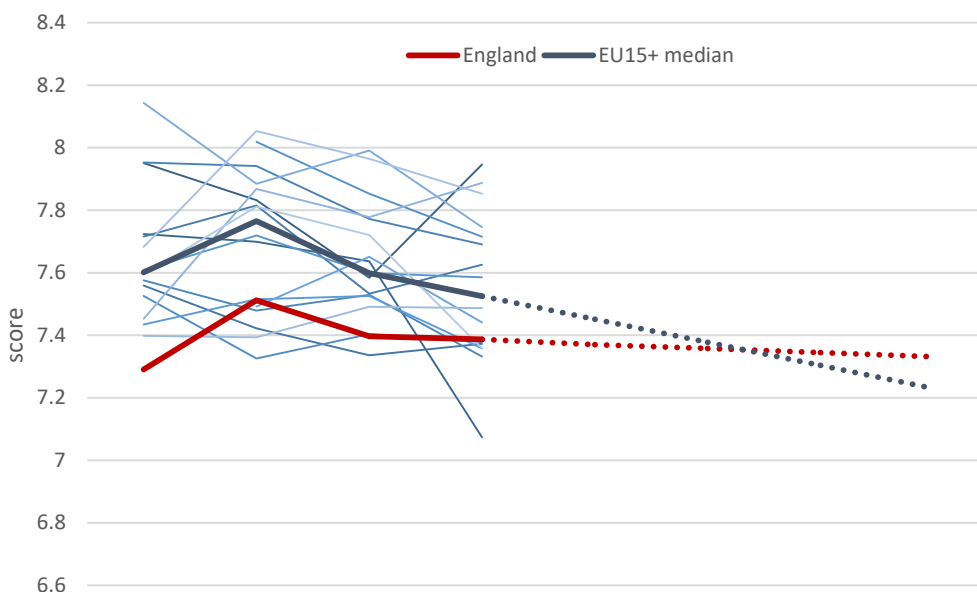


C. Mental health and wellbeing

Wellbeing

The measurement of wellbeing does not have a long history and there are few comparable data across countries. One source of comparable data is from the international Health Behaviour in School-aged Children (HBSC) study, which provides data on life satisfaction in 11 – 15-year-olds in four sequential cross-sectional surveys between 2001 to 2014 across most EU15+ countries.³³ CYP were asked to rate their overall satisfaction with life between 0 (worst possible life) and 10 (best possible life) using the Cantril ladder, an accepted indicator of wellbeing. Across the period 2001 to 2014, each cohort of young people in England had a mean life satisfaction consistently at the lower end across the EU15+ (Figure 14). However, there was a trend towards poorer life satisfaction over time across many other EU15+ countries whilst trends in England were flat. Projection of trends in wellbeing is fraught with difficulty, and future trends are likely to be highly subject to unpredictable influences in differing countries. However, if the falling median trend across the EU15+ persists, whilst life satisfaction in England continues around its current level, young people's life satisfaction in England may converge with other countries at a relatively low level by 2030.

Figure 14, Life satisfaction amongst 11-15 year olds in England and the EU15+ 2001-2030



Mental health problems

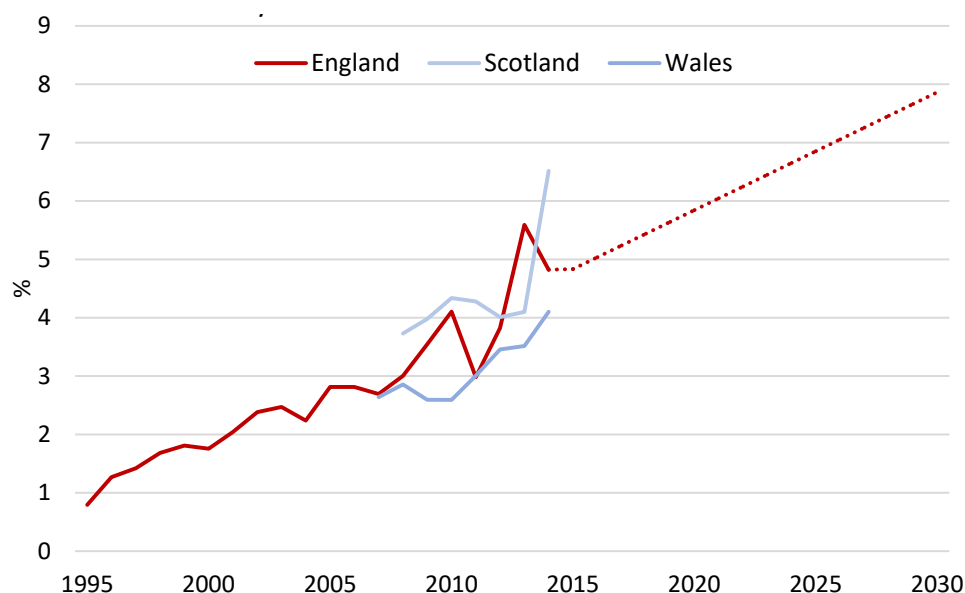
There are few data available on long-run trends in mental health problems for CYP. National prevalence surveys identifying cases of psychiatric disorder with high confidence undertaken in 1999 and 2004 appeared to show little difference over the 5 years.³⁴ (Table 2); subsequent national prevalence data were collected in 2017 and are not yet available. It is therefore not currently possible to comment on potential trends in psychiatric disorders to 2030.

Table 2. Trends in mental disorders in 11 – 15-year-olds in Great Britain, by gender, 1999 and 2004

	Males		Females	
	1999	2004	1999	2004
	%	%	%	%
Emotional disorders	5.1	3.9	6.1	6
Conduct disorder	8.6	8.8	3.8	5.1
Hyperkinetic disorders	2.3	2.6	0.5	0.3
Any emotional, conduct or hyperkinetic disorder	12.5	12.1	9.2	9.8
Any disorder	12.8	13.1	9.6	10.2

There have been a number of more recent studies reporting incidence of mental health problems based upon screening instruments which can identify potential cases only rather than cases with high certainty. These report notably higher proportions of CYP with problems, particularly amongst girls. An international systematic review of time trends in CYP mental health based upon such studies, including the UK, concluded that there was evidence of an international increase in internalizing (i.e. emotional disorder) problems in adolescent girls but that externalizing (i.e. behaviour) problems and problems in younger children appeared to be stable in most countries.³⁵ There are no comparable data on mental health problems across the EU or EU15+ using screening or diagnostic instruments.

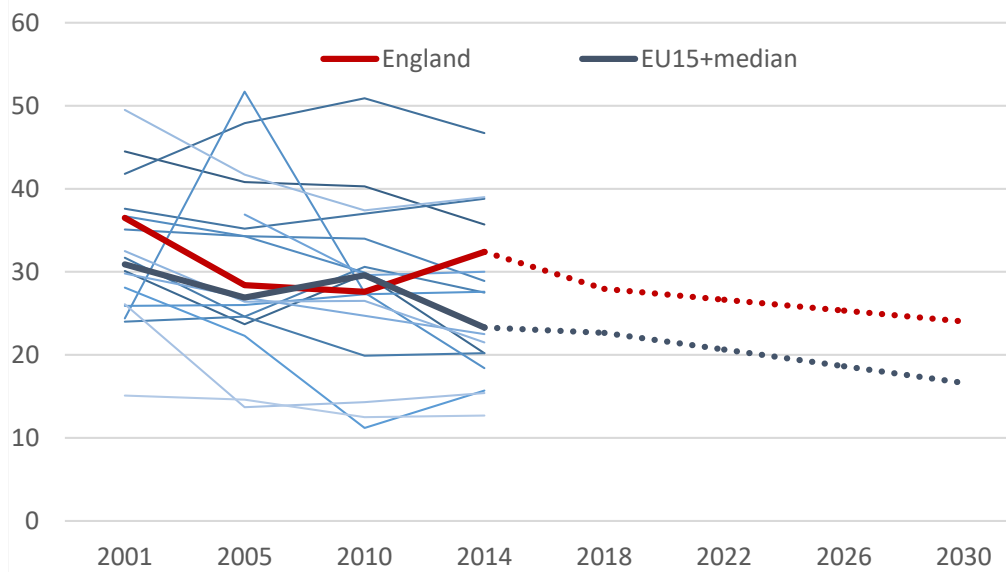
Data are, however, available on historical trends in self-report of mental health problems across the UK countries. There is evidence of an increase in burden from self- or parental-reports of having a mental health condition from the Healthy Survey For England from 1995 through to 2014 and similar surveys in Scotland and Wales (see Figure 15).³⁶ In England, there was a more than five-fold increase in proportions reporting having a mental health condition in 2014 compared with 20 years previously. Note that the proportion reporting having mental health condition is lower than the 10 - 13% estimated to have disorders from the 2004 national prevalence survey, potentially reflecting both under-reporting but also unmet need. Whilst fewer data were available for Scotland and Wales, the similarity in trends to those in England suggests these trends cannot be dismissed. Forward projection suggests reports of mental health problems will increase in England by 63% by 2030. No similar data are available for other wealthy countries.

Figure 15. Reported mental health problems amongst 4-19 year olds across the UK 1995 to 2014

Bullying

Bullying is a key risk factor for mental health problems amongst young people. The most useful comparative data across the EU15+ comes from the HBSC surveys, which provide self-report of being bullied in the past two months in England and across the EU15+ in surveys from 2001 to 2014.³⁷ Around 30% of 11–15-year-olds in England reported being bullied one or more times in the previous two months, a level which although unacceptably high, remained near the EU15+ median between 2001 and 2014 (Figure 16). If current trends continue, bullying in England will continue close to or above the median across the EU15+ to 2030.

Figure 16. Being bullied in past 2 months, 11-15 year olds in England and the EU15+ 2001 to 2030

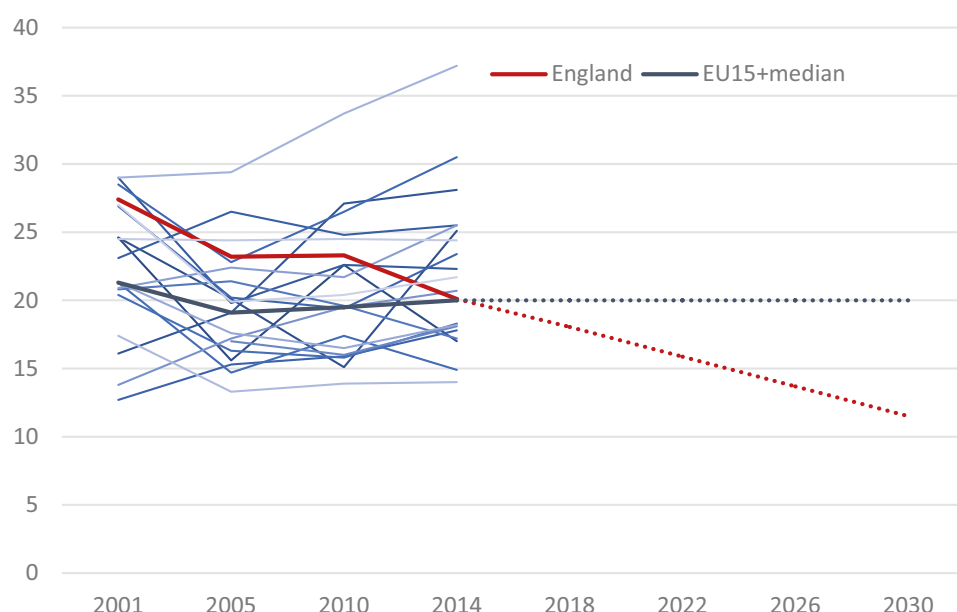


D. Injuries

Injuries are one of the highest causes of morbidity and mortality amongst CYP, particularly amongst teenagers.

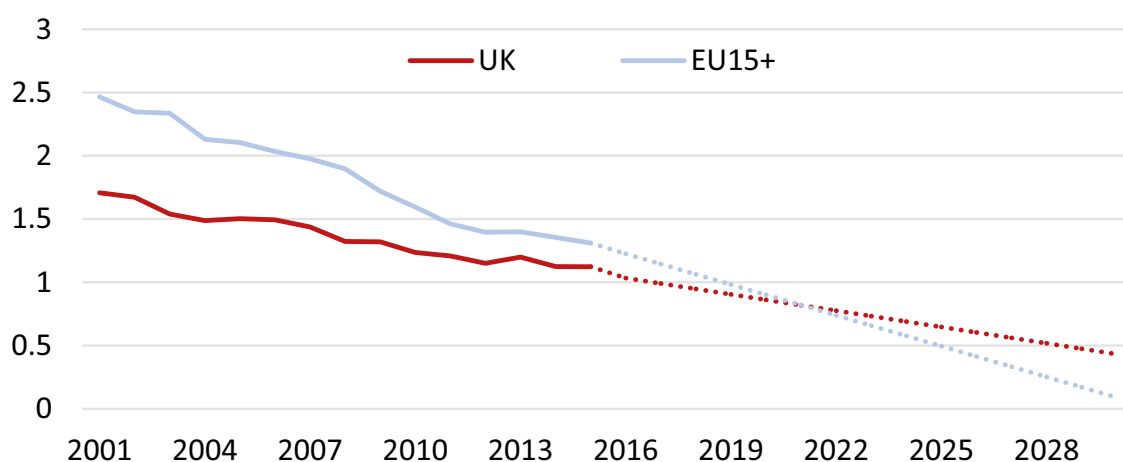
Comparative data across the EU15+ on self-reported injuries requiring medical or nursing attention in the past 12 months are available from the HBSC surveys from 2001 onwards (Figure 17).³⁸ Prevalence of ≥ 2 injuries in the past 12 months in England fell from amongst the highest in the EU15+ in 2001 to the same as the EU15+ median in 2014 – and projection of this trend to 2030 suggests that if current trends continued, England would have low injury prevalence compared with the EU15+.

Figure 17. ≥ 2 injuries requiring medical attention in past 12 months



The pattern for injury mortality is similar, as mortality from non-intentional injuries in the UK is low compared with the EU15+ median (Figure 18). However, the rate of fall appears higher across the EU15+ than in the UK, and projections suggest that the UK advantage in injury mortality may be lost by 2028.

Figure 18. Non-intentional injury amongst 0-19 year olds in the UK and EU15+ (median) from 2001 to 2030

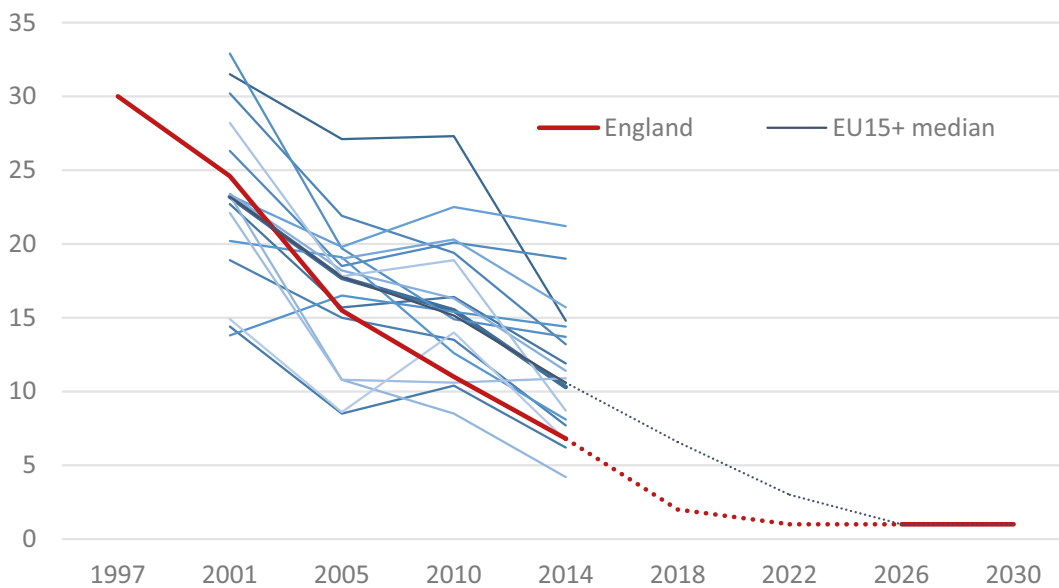


E. Substance use

Tobacco

Approximately 90% of those who ever smoke initiate smoking in adolescence in the UK³⁹ - and stopping smoking initiation in adolescence is the key to eradicating tobacco from our population. Regular smoking (smoking weekly or more often) amongst 15-year-olds in England fell sharply between 2001 and 2014.⁴⁰ These falls were greater than in other comparable countries. In 2001, England was close to the EU15+ median, but by 2014 England was amongst the lowest in the group (Figure 19). Projection of the UK and EU15+ median into the future suggests smoking rates may be negligible by 2030.

Figure 19. Regular weekly smoking amongst 15 year olds in England and the EU15+ 1997 to 2030



Robust comparable data to enable projection of CYP alcohol use or illicit drug use to 2030 are not available for this group of countries.

F. Long-term conditions and disability

Approximately 28% of CYP in England have a long-term condition requiring medical follow-up,⁴¹ and it is estimated that approximately 6% have a disability⁴² (note these proportions are not exclusive of each other).

With the exception of mortality, i.e. death rates, for particular conditions, there are very few data available across England and the EU15+ on outcomes for long-term conditions to allow projection through to 2030. The only long-term condition with useable data for our purposes is type 1 diabetes.

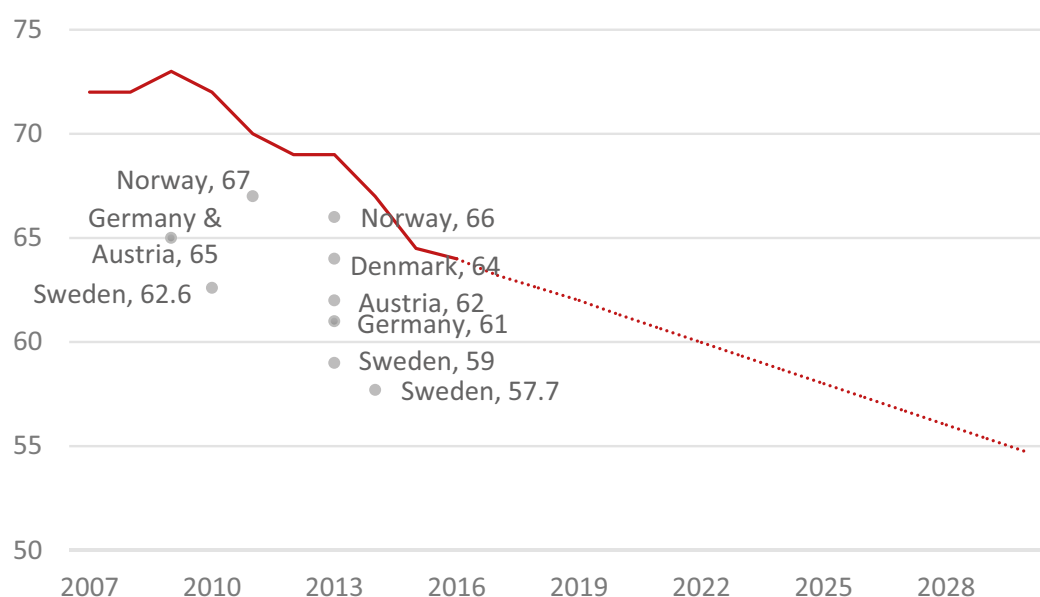
Diabetes control

Diabetes is one of the commonest serious long-term conditions (LTCs) in children, with a prevalence of type 1 diabetes (T1D) of approximately 1 in 500. There are approximately 29,000 CYP in the UK with T1D,⁴³ and the mean age of onset is 12 years. Incidence of T1D in England is the highest in Europe after the Nordic countries.

Glycosylated haemoglobin (HbA1c) is a well-accepted marker of T1D control and predictor of later diabetes complications, and is an appropriate measure of overall diabetes control. Lower HbA1c values in an individual and across a population indicate lower average blood glucose and thus lower exposure to risk of diabetic complications. National targets for CYP are to achieve an HbA1c of <48mmol/mol in order to minimise diabetic complications.⁴⁴

England runs a very high quality National Paediatric Diabetes Audit (NPDA), and long-term trends in HbA1c across England show a recent reduction year-on-year in median national HbA1c (Figure 20), associated with a national quality improvement programme. Median HbA1c in 2016/17 across England was 64mmol/mol.⁴⁵

Figure 20. England median HbA1c in the NPDA 2007 to 2016, plus mean HbA 1c in other wealthy countries in 2013



However, a very recent international comparison amongst seven countries found that CYP in England had significantly poorer overall diabetes control than other European countries for 2013/14 (Figure 20).⁴⁶ These differences persisted after adjustment for population factors. England levels have now dropped closer to Norway/Denmark levels for 2013, although rates for these and other countries are likely to have also reduced further. For example, mean HbA1c fell from 65mmol/mol in Germany and Austria in 2009 to 61 and 62 respectively in 2013. In Sweden, the rate of decline is similar to that seen in England, although beginning from a lower baseline.⁴⁷

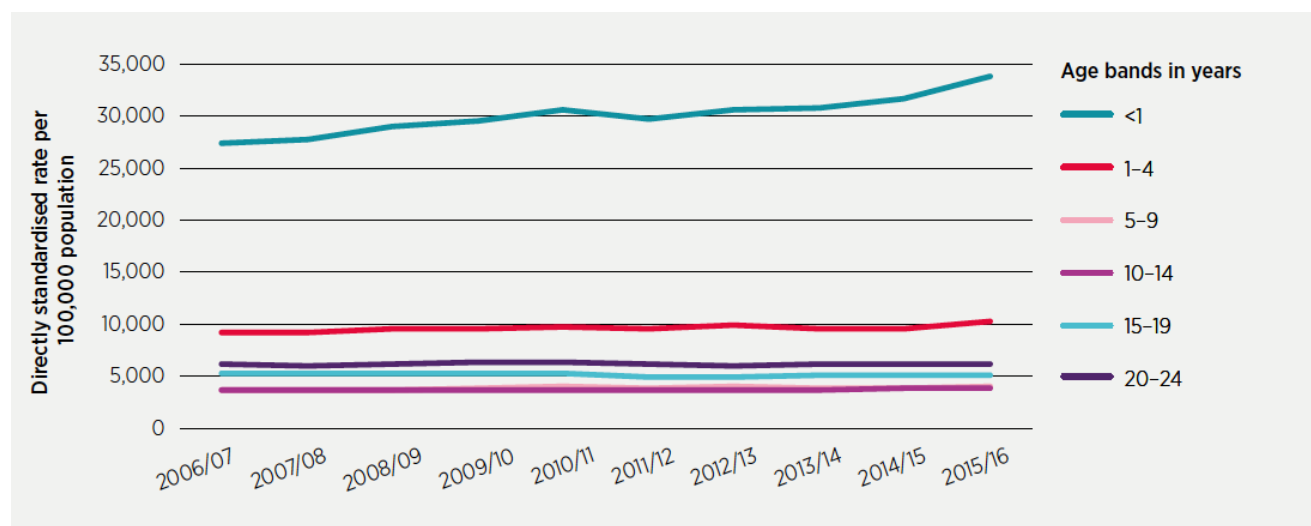
Projection of decline in mean HbA1c is contentious, as this is a biological marker, although we believe it is reasonable to model trends in the population median. If recent declines in England continue, England may achieve a median HbA1c similar to or lower than values currently achieved in Sweden. However, it is again important to note that national performance in other countries appears likely also to have fallen if their declines continue.

G. Health service use – emergency, outpatient and inpatient service use

Routine publication of hospital administrative data across England allows examination of trends in health service use by CYP. Comparative national data for CYP health service use are not available across the EU15+. Trends in health service use over the past decade are in part driven by changes in the population of CYP. Whilst the proportion of the population of England who are 0 - 19 years has remained steady at 24% from 2007 to 2017, the numbers of CYP increased from 12,486,551 in 2007 to 13,169,095 in 2017, an increase of 5.4% across the decade.⁴⁸ As numbers will increase a further 5.1% from 2017 to 2030, this suggests the projection to 2030 based upon historical data is unlikely to be inaccurate because of population change.

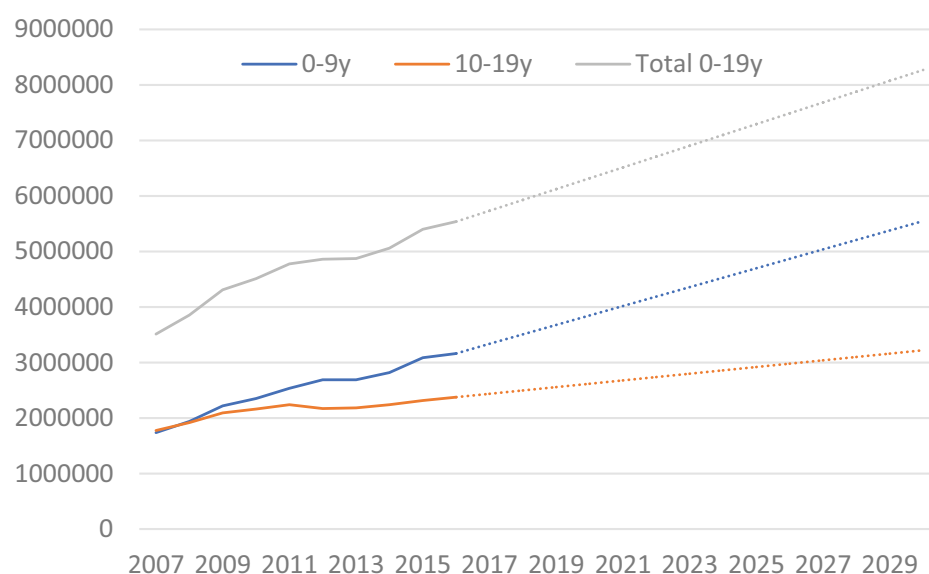
A recent Quality Watch publication found that there had been a 14% rise in emergency admissions for CYP over the past decade, with the majority of the increase amongst very young children (Figure 21).⁴⁹ This is in excess of the population increase during the same period.

Figure 21. Emergency admissions for children and young people in England from 2006/07 to 2015/16



ED attendances and emergency admissions

Hospital administrative data for England show that CYP <20 years make up 26% of ED attendances in England, and attendances increased 58% from 2007 to 2016.⁵⁰ There are no comparable data across EU15+ countries. Projections based upon historic data suggests (Figure 22) that ED attendances are likely to further increase by approximate 50% by 2030, with an annual increase of nearly 200,000 attendances per year. These increases are markedly higher than the 5% population increase amongst CYP across the same decade. Increases appear to be particularly driven by higher attendances amongst children 0 - 9 years. The most deprived children and young people overall were 60 - 70 per cent more likely to go to A&E than the least deprived in 2015/16.⁵¹

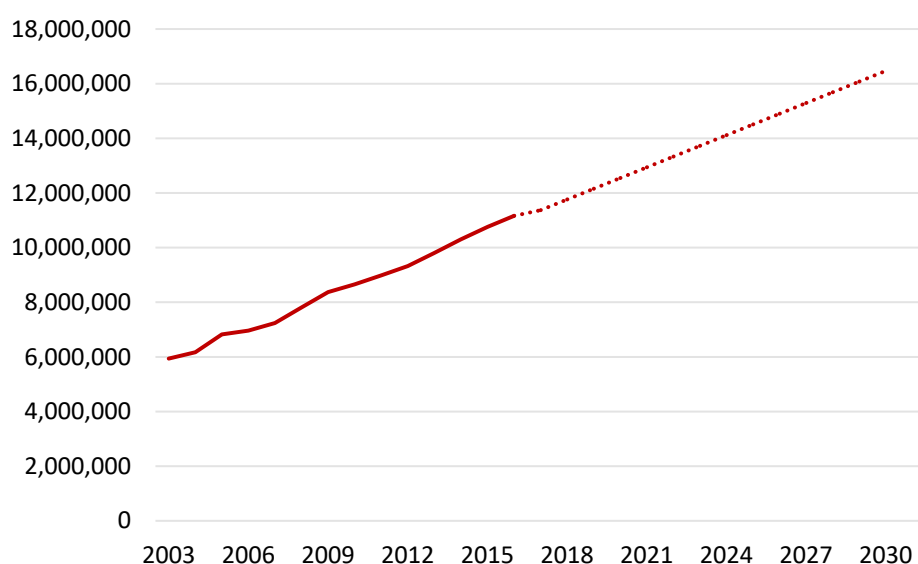
Figure 22. ED attendances for England 2007 to 2016 by 0 - 19 year olds, projected to 2030

Emergency (unplanned) admissions from ED increased to a lesser extent (approximately 10%) from 2007 to 2016, although again with marked inequalities in that the most deprived CYP were two to three times more likely to be admitted.⁵²

The much smaller increase in unplanned admissions than ED attendances suggests that much of the increase in A&E attendances has been for more minor conditions that could potentially be managed in primary care or community-based integrated care services.

Outpatients

CYP 0 - 19 years attended 11.2 million outpatient visits in England in 2016/17, an increase of 88% since 2003/4 (Figure 23).⁵³ This was considerably higher than expected from a population increase of around 6% over this period. There are no comparable data across EU15+ countries. Projection of outpatient attendance data to 2030 suggests that, if current trends continue, there will be a further increase of 48% to 16.5 million outpatient visits annually for this age group by 2030. This is considerably higher than expected from the population increase of 5.1% projected for the same period.

Figure 23. Outpatient attendances for 0-19 year olds in England, 2003/04 to 2016/17

Appendix

Data were obtained for England where available; otherwise UK data were substituted. As far as possible we compared England outcomes with the same group of countries deemed most comparable with the UK, i.e. the EU15+ (the original 15 countries of the EU in 2004 plus Australia, Norway and Canada). This comparator group has been used in previous comparative analyses of UK child and adult health outcomes, and expands the comparison beyond original EU countries by including similar wealthy non-EU (Norway) and Anglo-Saxon countries (Australia, Canada). Note that where there were no available recent data for international comparisons (e.g. for various long-term conditions), we used published modelled data from the Global Burden of Disease (GBD) study which used a range of published and unpublished sources to model historic long-run trends in most conditions.

Projections to 2030 were undertaken where there were sufficient historical data to allow modelling to inform forward projection. The only input data used were previous values for each outcome, i.e. no attempt was made to include potentially contributory variables or risk factors in models. We used a range of forecasting methods to examine possible trends. These included simple linear regression and a range of exponential smoothing adaptive-forecasting algorithms appropriate to data showing likely trends, including double exponential smoothing and Holt-Winters non-seasonal algorithms. Holt-Winters algorithms model linear trends in which the intercept and the coefficient on time vary over time. Exponential smoothing was used for data with longer series and annual data as these methods place declining value on older data, allowing recent trends to dominate predictions.⁵⁴ For data with less than five time points, simple linear regression was used.

Analyses were undertaken using the `tssmooth` or `regress` commands in Stata 15.0 (StataCorp, College Station, TX) with the forecast horizon being 2030. Exponential smoothing algorithms were instructed to identify the best smoothing parameters for trend and the models associated with the lowest sum of squares of the model errors were chosen. Note that, for infant mortality, projections of UK performance to 2030 based upon multilevel models have already been published by Viner et al. in 2018.⁵⁵

For the unpublished mortality analyses presented here, we used publicly available national mortality estimates coded to ICD10 from the WHO World Mortality Database (WMD).⁵⁶ We grouped causes of death using the Global Burden of Disease (GBD) 2016 mortality hierarchy⁵⁷ to three level 1 GBD categories: (communicable, maternal, neonatal, and nutritional diseases; NCD; injuries) and 21 level 2 GBD categories (7 communicable disease causes; 10 NCD causes; 4 injury causes). We then separately mapped causes within neurological conditions to level 3 GBD category in order to analyse trends in deaths due to epilepsy. When analysing mortality trends we used mean mortality rate over the previous three years due to the low number of deaths for some causes.

A significant proportion of deaths within the WMD are assigned ill-defined or ambiguous codes ("garbage codes"). We use a modified version of the GBD methodology for redistribution of these deaths to other causes. We first classified garbage codes (level 1-4) as described by the GBD 2016, and then proportionately redistributed deaths within GBD level 1 and 2 cause groups. Level 1 garbage codes were defined as deaths unable to be assigned level 1 GBD category. We redistributed these deaths proportionately within each country year, sex and age group across all causes. Level 2 garbage codes were defined as causes of death where level 1 GBD category could be determined, but not a level 2 category (e.g. unspecified injuries). Joseph Ward and Russell Viner assigned these deaths a level 1 GBD category. We then redistributed these deaths within each country year sex and age group and level 1 GBD category. For level 3 garbage codes, (deaths where a level 2 category could be determined, but level 3 was unknown) and level 4 (deaths where a level 3 category could be determined, but level 4

was unknown), Joseph Ward and Russell Viner assigned each cause a level 1 and level 2 GBD category. These deaths were then proportionately redistributed within each country, year, sex, age group, level 1 and level 2 category. Where there were no appropriately coded deaths within a level 2 category for each country year, sex and age-group, we redistributed level 3 and 4 garbage codes within their level 1 category only. Where there were no appropriately coded deaths within a level 1 category for each country, year, sex and age group, garbage codes were proportionately redistributed across all causes. Where there were no appropriately coded deaths in any cause group for each country, year, sex and age-group, we were unable to use proportional redistribution, and these deaths were excluded (n=9).

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- ¹ Dutch Ministry of Health, Wellbeing and Sport. Action Program: Promising Start. 2018. <https://www.rijksoverheid.nl/documenten/publicaties/2018/09/12/actieprogramma-kansrijke-start>.
 - ² Viner R. NHS must prioritise health of children and young people. BMJ 2018;360:k1116 doi: 10.1136/bmj.k1116 (Published 14 March 2018).
 - ³ Wolfe I, Macfarlane A, Donkin A, Marmot M, Viner R. Why children die: death in infants, children and young people in the UK. RCPCH, London: 2014.
 - ⁴ RCPCH. The State of Child Health Report. Royal College of Paediatrics & Child Health, London: 2017.
 - ⁵ Cheung, R. International comparisons of health and wellbeing in early childhood. Nuffield Trust & Royal College of Paediatrics and Child Health, 2018. https://www.rcpch.ac.uk/sites/default/files/2018-04/international_comparisons_of_health_and_wellbeing_in_early_childhood_-_ronny_chenug_2018-03.pdf.
 - ⁶ ONS mid 2017 population estimates for England.
 - ⁷ ONS population data for 2007 from England Population Estimates 1971 to 2014 <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/adhocs/004359englandpopulationestimates1971to2014>. Estimates for 2017 from ONS mid 2017 population estimates.
 - ⁸ Estimate for 0-19y population in 2041 is 22% and 0-24y is 28%. ONS National population projections 2016. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2016basedstatisticalbulletin>. Interactive population pyramid for England for 2030: https://www.ons.gov.uk/visualisations/dvc418/pyramids_projections/index.html#14/21/2/null/null/false/true/2016/0.
 - ⁹ Source: Office for National Statistics Child Mortality Statistics 2016. Deaths occurring in a calendar year. We used parental national statistics socioeconomic classification (NS-SEC) to define three SES Groups as follows: professional (1,1,1,2,2); intermediate (3,4); manual (5 and above including not classified).
 - ¹⁰ EU15+ is the most comparable group for health purposes, moving outside the EU15 but excluding the USA. 2014 was the last year in which all countries had data at the time of these analyses. See Viner et al. Countdown for UK Child Survival 2017: mortality progress and targets. Arch Dis Child. 2018 May;103(5):474-479.
 - ¹¹ Viner et al. Countdown for UK Child Survival 2017: mortality progress and targets. Arch Dis Child. 2018 May;103(5):474-479.
 - ¹² Dutch Ministry of Health, Wellbeing and Sport. Action Program: Promising Start. 2018. <https://www.rijksoverheid.nl/documenten/publicaties/2018/09/12/actieprogramma-kansrijke-start>.
 - ¹³ Data for the UK are taken from ONS data and available to 2016; data for the EU15+ were taken from Viner et al 2018, *ibid* – and are available for the whole group only to 2014.
 - ¹⁴ Zylbersztejn et al. Child mortality in England compared with Sweden: a birth cohort study. Lancet. 2018 May 19;391(10134):2008-2018.
 - ¹⁵ Source: MBRRACE-UK Perinatal Mortality Surveillance Report 2017, <https://www.npeu.ox.ac.uk/downloads/files/mbrpace-uk/reports/MBRRACE-UK%20Perinatal%20Surveillance%20Full%20Report%20for%202016%20-%20June%202018.pdf>. Note that MMBRACE data are reported by hospital trusts / boards and are separate to ONS death registration data. The primary difference between ONS and MMBRACE mortality data is that MMBRACE exclude all terminations and neonatal deaths before 24 weeks gestation. ONS report these as neonatal deaths if there were any signs of life after birth.

- ¹⁶ Browne & Hood. Living Standards, Poverty and Inequality in the UK: 2015–16 to 2020–21. Institute for Fiscal Studies, 2016. <https://www.ifs.org.uk/uploads/publications/comms/R114.pdf>.
- ¹⁷ Euro-Peristat Perinatal Health Indicators, 2010. <http://www.europeristat.com/our-indicators/euro-peristat-perinatal-health-indicators-2010.html>. These data included Norway but did not include Canada or Australia.
- ¹⁸ ONS Statistical bulletin: Conceptions in England and Wales: 2016. <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/conceptionandfertilityrates/bulletins/conceptionstatistics/2016>, accessed 17 August 2018.
- ¹⁹ Eurostat. Live births by mother's age. <https://ec.europa.eu/eurostat/data/database>, accessed 19 August 2018. All EU15+ countries were included except Australia and Canada.
- ²⁰ Lange et al. National, regional, and global prevalence of smoking during pregnancy in the general population: a systematic review and meta-analysis. *Lancet Global Health* 2018; 6: e769–76.
- ²¹ Victora et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* 2016; 387: 475–490.
- ²² Victora et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. *Lancet* 2016; 387: 475–490. Note some countries are missing data for some categories (e.g. Ireland; Denmark).
- ²³ Mortality data were accessed from the World Health Organisation World Mortality Database. Causes were categorised using Global Burden of Disease level 2 causes of death.
- ²⁴ Viner et al. Deaths in young people aged 0–24 years in the UK compared with the EU15+ countries, 1970–2008: analysis of the WHO Mortality Database. *Lancet* 2014; 384: 880–92.
- ²⁵ Data from Global Burden of Disease study: downloaded from <http://ghdx.healthdata.org/gbd-results-tool>, accessed 23 August 2018 by J. Ward.
- ²⁶ Ward, Wolfe & Viner, in preparation, 2018. Data were obtained from the WHO World Mortality Database. This analysis averaged mortality for each included country over the 3 most recently available years. Causes are level-2 causes as defined by the Global Burden of Disease study. Mortality estimates are averaged over the previous 3 years from latest date available. Greece was not included as data were only available for 2014.
- ²⁷ Data obtained from the WHO World Mortality Database as above. We used chronic respiratory conditions to avoid potential coding issues across countries relating to asthma. Figures show 3 year moving averages for 2001 to 2015 (ICD-10 coded deaths only).
- ²⁸ Zylbersztejn et al. Child mortality in England compared with Sweden: a birth cohort study. *Lancet*. 2018 May 19;391(10134):2008–2018.
- ²⁹ Cecil et al. Primary Care Access, Emergency Department Visits, and Unplanned Short Hospitalizations in the UK. *Pediatrics* 2016; 137(2) February 01, 2016 e20151492. doi: 10.1542/peds.2015-1492.
- ³⁰ <https://digital.nhs.uk/data-and-information/publications/statistical/national-child-measurement-programme>.
- ³¹ Viner et al. Archives of Disease in Childhood 2017; NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* 2017; published online Oct 10. [http://dx.doi.org/10.1016/S0140-6736\(17\)32129-3](http://dx.doi.org/10.1016/S0140-6736(17)32129-3).
- ³² IMD: Index of Multiple Deprivation
- ³³ HBSC data accessed from <http://hbcs-nesstar.nsd.no/webview/> on 7-9-18. Data were available for all EU15+ countries with the exception of Australia. Note that two values for Belgium (Flanders, French-speaking) were included in the EU15+ median to aid precision.
- ³⁴ Green et al (2005) Mental health of children and young people in Great Britain, 2004.
- ³⁵ Bor et al. Are child and adolescent mental health problems increasing in the 21st century? A systematic review. *Aust N Z J Psychiatry*. 2014 Jul;48(7):606–16.
- ³⁶ Pitchforth et al. Mental health and well-being trends among children and young people in the UK, 1995 – 2014; analysis of repeated cross-sectional national health surveys. *Psychological Medicine* 2018; 1–11. <https://doi.org/10.1017/S0033291718001757>. Data available from parent report for younger children and self-report for older children and teenagers. Note that data for England and Scotland refer to self/parent-report of having a mental health condition whilst Welsh data refer to report of being currently treated for a mental health condition.

- ³⁷ HBSC data accessed from <http://hbsc-nesstar.nsd.no/webview/> on 7-9-18. Data were available for all EU15+ countries with the exception of Australia. Note that two values for Belgium (Flanders, French-speaking) were included in the EU15+ median to aid precision.
- ³⁸ Data accessed from <http://hbsc-nesstar.nsd.no/webview/> on 7-9-18. Data available for all EU15+ countries with the exception of Australia. Note that two values for Belgium (Flanders, French-speaking) were included in the EU15+ median.
- ³⁹ Viner et al. Adolescence and Later Life Disease Burden: Quantifying the Contribution of Adolescent Tobacco Initiation From Longitudinal Cohorts. *Journal of Adolescent Health* 2017; 61:171-178.
- ⁴⁰ Data from HBSC International: Data accessed from <http://hbsc-nesstar.nsd.no/webview/> on 7-9-18. Data available for all EU15+ countries with the exception of Australia. Note that two values for Belgium (Flanders, French-speaking) were included in the EU15+ median.
- ⁴¹ Wiljars et al. Chronic conditions in children and young people: learning from administrative data. *Arch Dis Child* 2016; 101: 881-85.
- ⁴² Chief Medical Officer Report 2012. Our Children Deserve Better. Chapter 9.
- ⁴³ National Paediatric Diabetes Audit (NPDA) 2016-17. Royal College of Paediatrics & Child Health, 2018. https://www.rcpch.ac.uk/sites/default/files/2018-07/npda_annual_report_2016_-_2017_april_2018_final_updated_2.pdf.
- ⁴⁴ NICE Guideline: Diabetes (type 1 and type 2) in children and young people: diagnosis and management (NG18). National Institute for Health & Care Excellence (NICE), 2015. www.nice.org.uk/guidance/ng18.
- ⁴⁵ National Paediatric Diabetes Audit (NPDA) 2016-17. Royal College of Paediatrics & Child Health, 2018. https://www.rcpch.ac.uk/sites/default/files/2018-07/npda_annual_report_2016_-_2017_april_2018_final_updated_2.pdf.
- ⁴⁶ Charalampopoulos et al. Exploring Variation in Glycemic Control Across and Within Eight High-Income Countries: A Cross-sectional Analysis of 64,666 Children and Adolescents With Type 1 Diabetes. *Diabetes Care* 2018; 41: 1180-1187.
- ⁴⁷ Data for Germany & Austria from Rosenbauer et al. Improved Metabolic Control in Children and Adolescents With Type 1 Diabetes: A trend analysis using prospective multicenter data from Germany and Austria. *Diabetes Care*. 2012;35(1):80-86; data for Sweden from Samuelsson et al. Continued improvement of metabolic control in Swedish pediatric diabetes care. *Paediatric Diabetes* 2018. 19; 150-157.
- ⁴⁸ ONS population data for 2007 from England Population Estimates 1971 to 2014 <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/adhocs/004359englandpopulationestimates1971to2014>. Estimates for 2017 from ONS mid 2017 population estimates.
- ⁴⁹ Keeble E & Kossarova L. Quality Watch: Emergency hospital care for children and young people. Nuffield Foundation, 2017.
- ⁵⁰ <https://digital.nhs.uk/data-and-information/publications/statistical/hospital-accident--emergency-activity>.
- ⁵¹ Kossarova et al. Admissions of inequality: emergency hospital use for children and young people. Nuffield Trust, December 2017 <https://www.nuffieldtrust.org.uk/files/2017-12/nt-admissions-of-inequality-web.pdf>.
- ⁵² Kossarova et al. 2017.
- ⁵³ NHS Digital. Hospital outpatient activity. 2004/5 to 2016/17. <https://digital.nhs.uk/data-and-information/publications/statistical/hospital-outpatient-activity> accessed 19-9-2018.
- ⁵⁴ Holt CC. Forecasting seasonals and trends by exponentially weighted moving averages. *Int J Forecasting* 2004;20:5-10.
- ⁵⁵ Viner et al. Countdown for UK Child Survival 2017: mortality progress and targets. *Arch Dis Child*. 2018 May;103(5):474-479.
- ⁵⁶ World Mortality Database. World Health Organisation, Geneva. http://www.who.int/healthinfo/mortality_data/en/ Accessed August 2018.
- ⁵⁷ Naghavi M, Abajobir AA, Abbafati C, et al. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. *The Lancet* 2017;390(10100):1151-210.

State of Child Health short report series:

Child health in 2030 in England: Comparisons with other wealthy countries
Recommendations

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