



UNIVERSITY OF
OXFORD



The Future of Health

Professor Sir Andrew Pollard, Director Oxford Vaccine Group



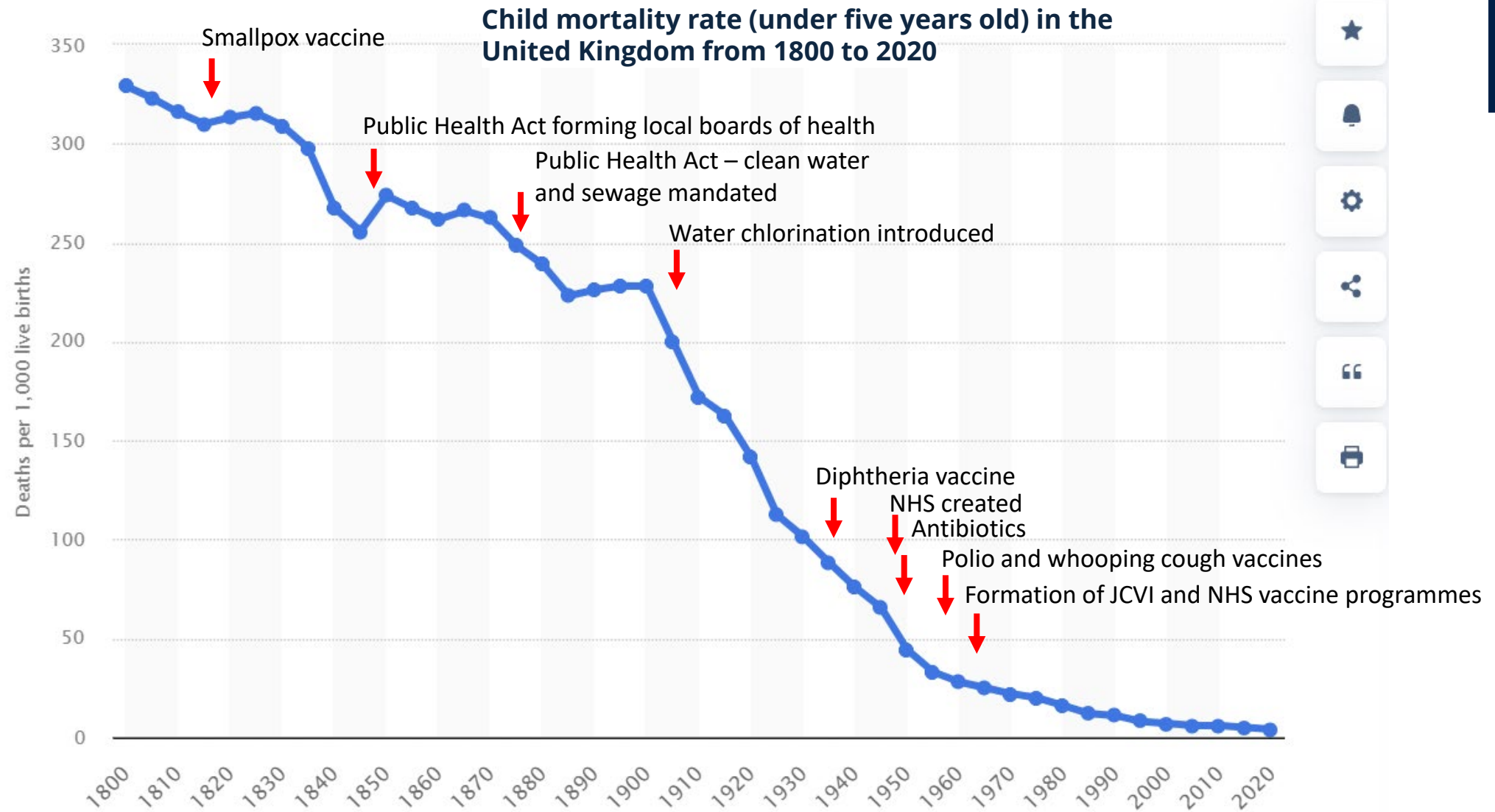
Our World
in Data



-
- Under 15y**
- 46.2% is the average **youth mortality rate** across the shown historical societies
- Under 1y**
- 26.9% is the average **mortality rate for infants in their first year of life** across the shown historical societies
- The global mortality rates declined rapidly in the 20th century**
- Global youth mortality rate in 1950: 27%**
- Global infant mortality rate in 1950: 16%**
- Global youth mortality rate in 2017: 4.6%**
- Global infant mortality rate in 2017: 2.9%**
- Somalia: 14.8%**
Highest youth mortality rate in 2017
- Central African Republic: 8.8%**
Highest infant mortality rate in 2017
- Iceland has the lowest mortality rates in 2017:**
Youth mortality rates: 0.29%
Infant mortality rate: 0.16%
- Teotihuacan (Mexico) 550-700**
62%
- Roman Egypt in the year 0**
57%
- Rome 200 BCE-200**
50%
- Nasca (Peru) 400 BCE-550**
48%
- Spain 400-200 BCE**
45%
- Teotihuacan (Mexico) 300-550**
49%
- Wari (Peru) 600-1100**
53%
- Japan 1300-1400**
48%
- Germany 1692-1899**
60%
- Poland 1875**
55%
- Japan 1776-1875**
51%
- Venice 1800-1900**
51%
- Sweden 1600-1700**
50%
- West Indies 1820-32**
47%
- France 1600-1700**
40%-50%
- France 1816-50**
44%
- Finland and Sweden 1751-1800**
41%
- China 1700-1800**
40%
- Italy 1700-1800**
40%
- Cocos Malay Islands 1888-1912**
38%
- Germany 1700-1800**
35%
- Finland 1749-1773**
35% (up to age 10)
- England, Quakers 1650-1800**
35%
- Germany 1692-1899**
35%
- Sweden 1600-1700**
25%-40%
- Japan 1300-1400**
28%
- England 1500**
27%
- France 1670-1769**
27%
- France 1600-1700**
24.4%-28%
- Imperial China 1650-1800**
26%
- Italy 1700-1800**
25%
- Japan 1700-1800**
22%-25%
- Finland 1600-1700**
23%
- Quebec 1730**
22.5%
- Finland and Sweden 1751-1800**
22%
- United States 1850**
21.6%
- France 1816-50**
20%
- France 1688-1742**
19%
- England 1650-1700**
17%
- Malta 1836**
25%
- Ireland 1836**
23%
- Poland**
23%
- Germany**
22.8%
- Belgium**
19%
- Belgium 1800-1900**
19%
- Japan 1776-1875**
28%
- Venice 1800-1900**
28%
- Iceland**
28%
- Mexico 1900-09**
30%
- Brazil**
23%
- Global youth mortality rate in 1950: 27%**
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Highest infant mortality rate in 2017
- Iceland has the lowest mortality rates in 2017:**
Youth mortality rates: 0.29%
Infant mortality rate: 0.16%



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Mortality rate, under-5 (per 1,000 live births) - Low & middle income

Estimates developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at childmortality.org.

License : CC BY-4.0 



5 million

Streeting: Children in Britain should be part of healthiest generation ever

The shadow health secretary received several standing ovations during his conference speech in Liverpool.

Richard Wheeler • Wednesday 11 October 2023 14:03 BST



Shadow health secretary Wes Streeting speaks during the Labour Party conference in Liverpool (Peter Byrne/PA) (PA Wire)

Current state of play.....

- The health of the UK population is deteriorating, leading to detrimental impacts on both the economy and society.
- Health in the early years forms the basis for mental and physical health and wellbeing through the rest of the life course.
- The importance of the early years to health and wellbeing through childhood into adult life, and to our nation's economic prosperity, is not always recognised in policy development across Government.



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Health

Rise in UK measles cases causing concern

4 May 2023

Coronavirus



GETTY IMAGES

By James Gallagher
Health and science correspondent

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Health

Nine whooping cough deaths in England as cases rise



GETTY IMAGES

Smitha Mundasad
Health reporter, BBC News
@smithamundasad

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Health

Alarming 45-fold rise in measles in Europe - WHO

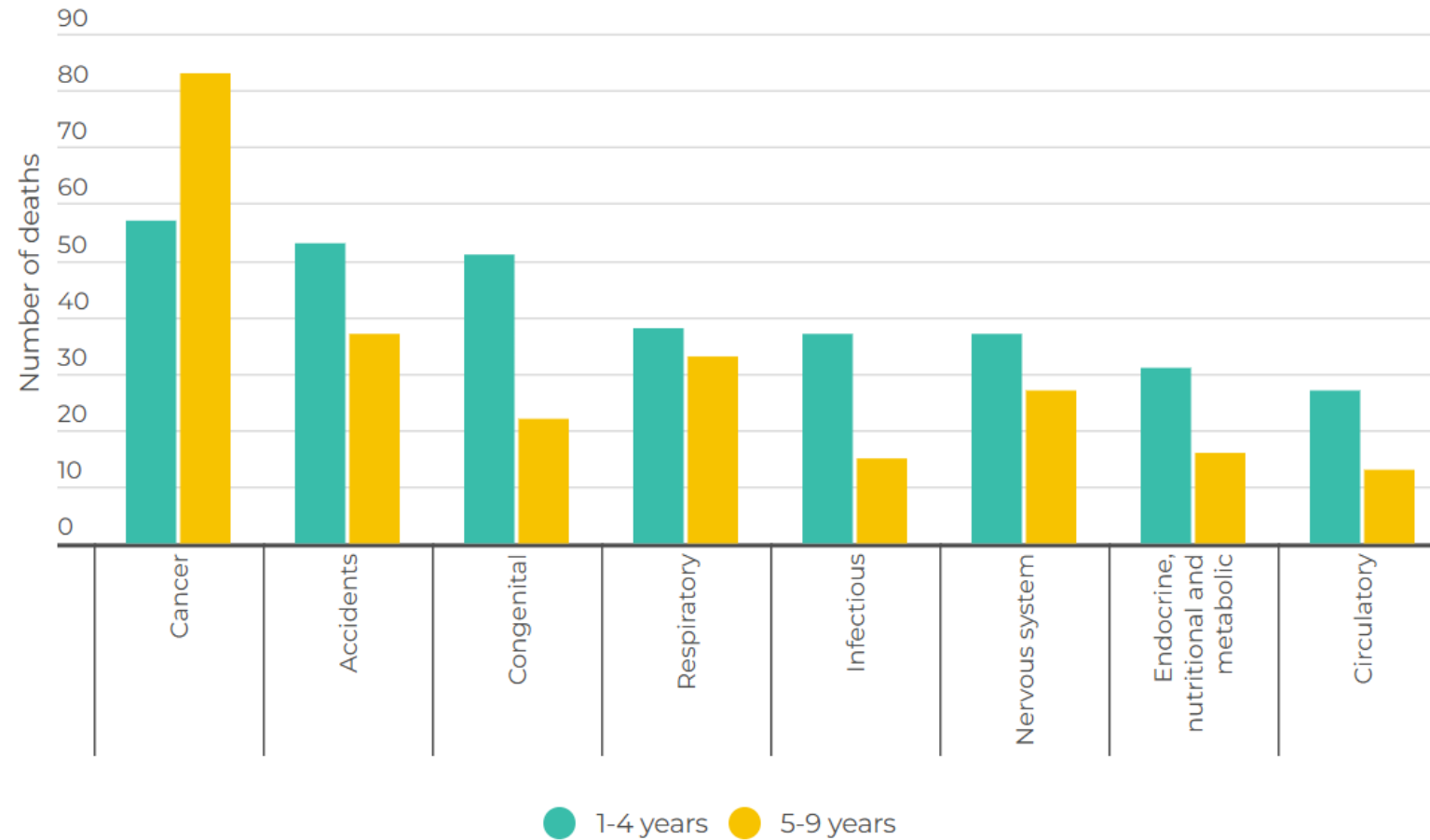
23 January



GETTY IMAGES

By Philippa Roxby
Health reporter

Leading causes of death in children aged 1 to 9 years, England and Wales, 2018

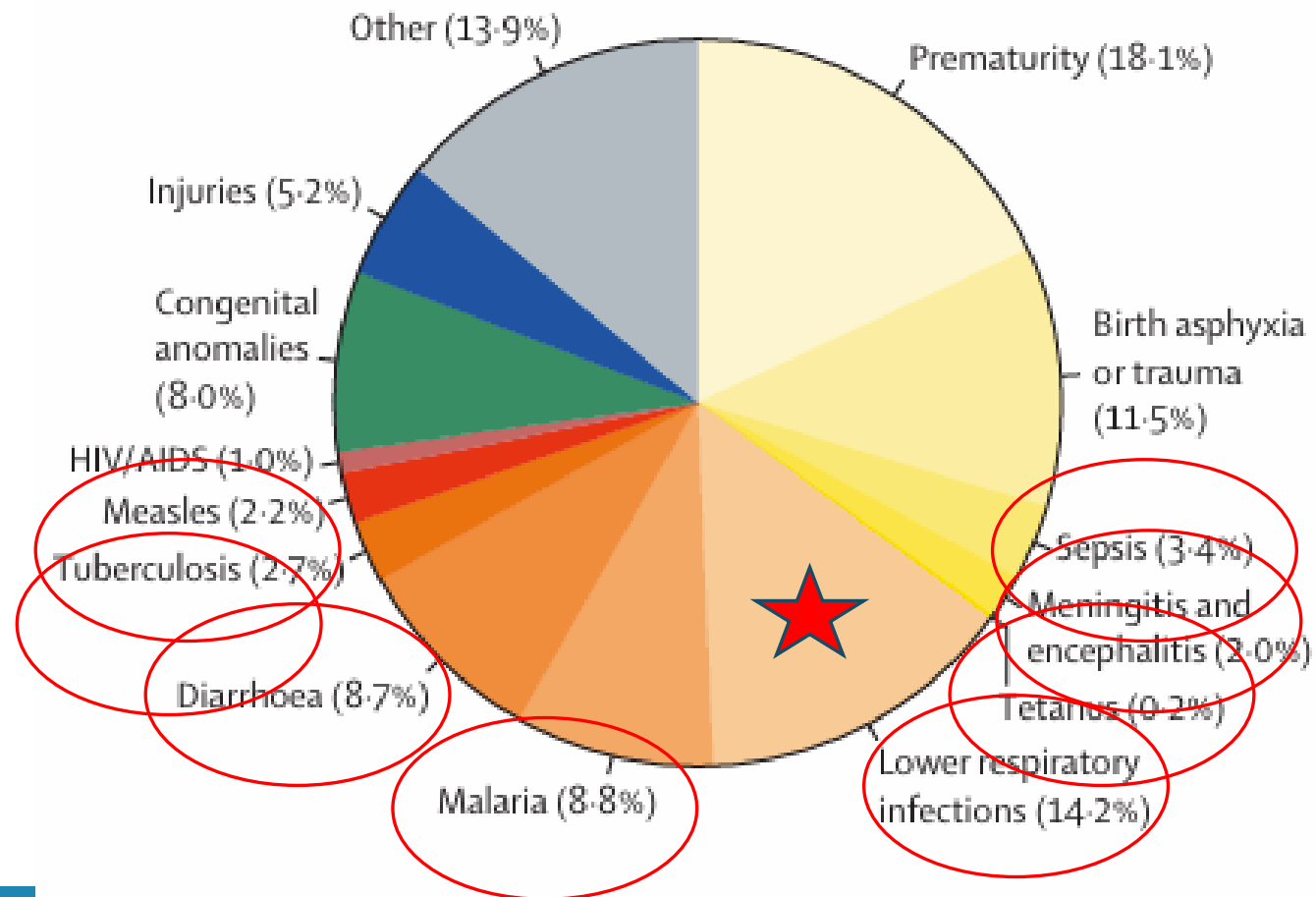


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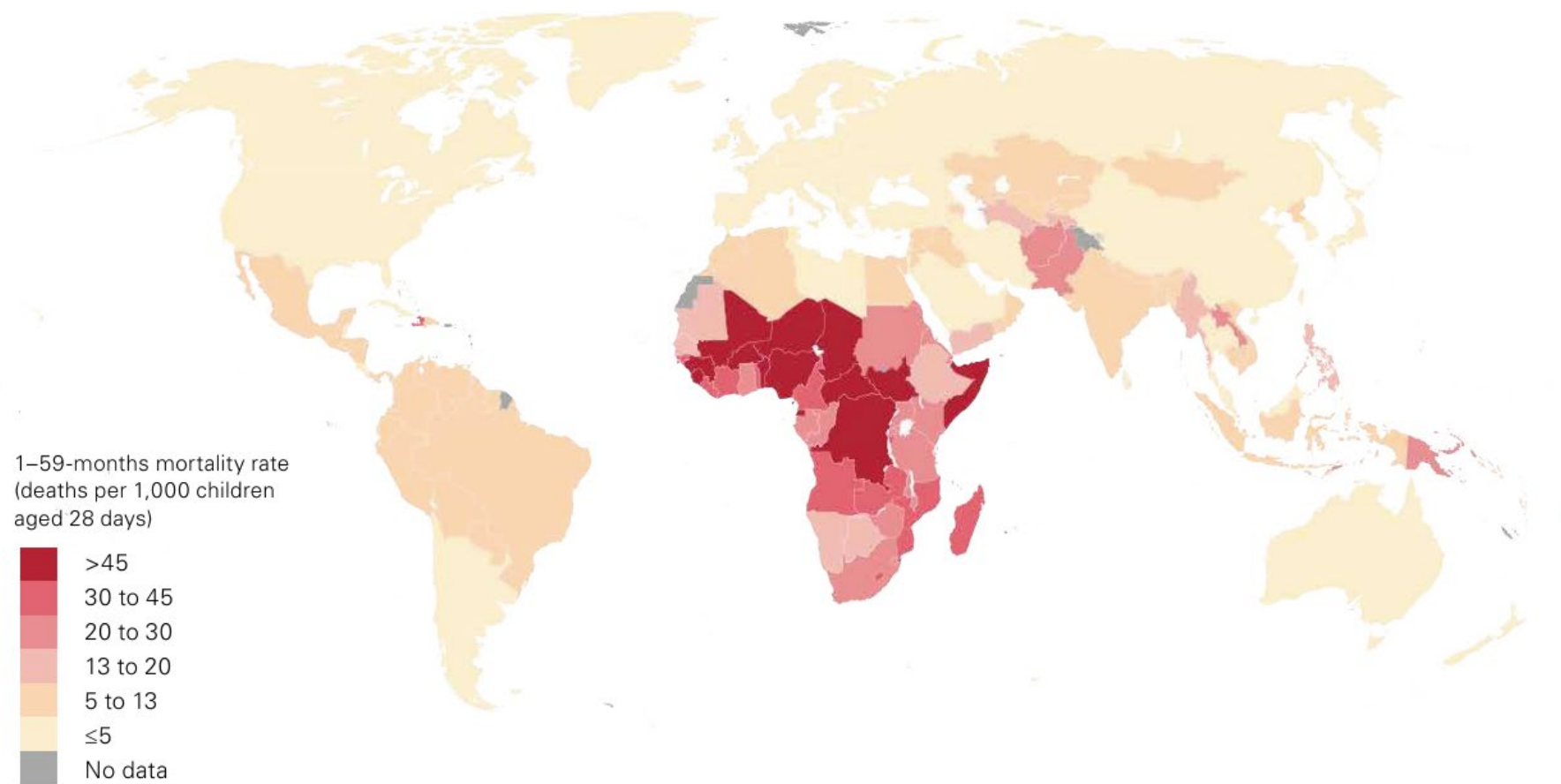
Source: Office for National Statistics. Mortality statistics - underlying cause, sex and age (accessed Dec 2019)

Causes of death in children <5 years

A Causes of death in children younger than 5 years (5.1 million deaths)



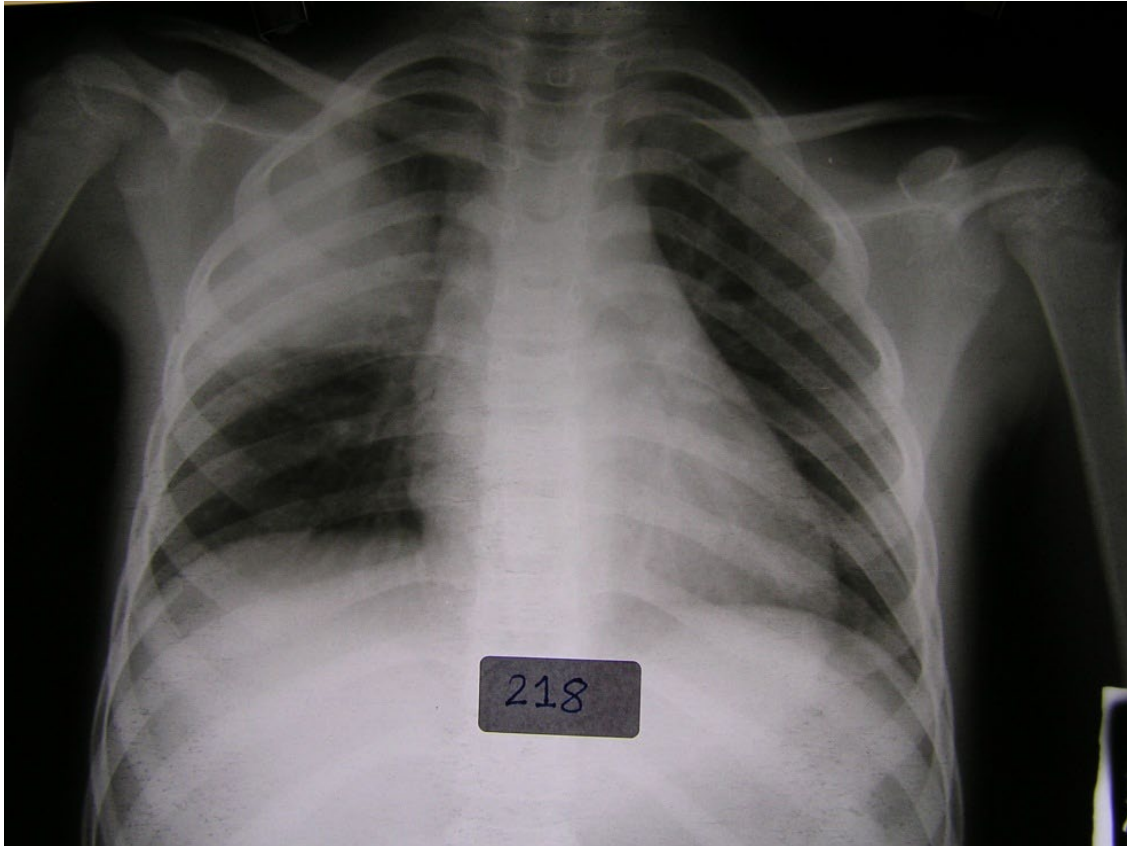
Lancet 2024



Note: Categories are based on unrounded numbers; value ranges are greater than the lower bound number and less than or equal to the upper bound number. This map does not reflect a position by UN IGME agencies on the legal status of any country or territory or the delimitation of any frontiers.

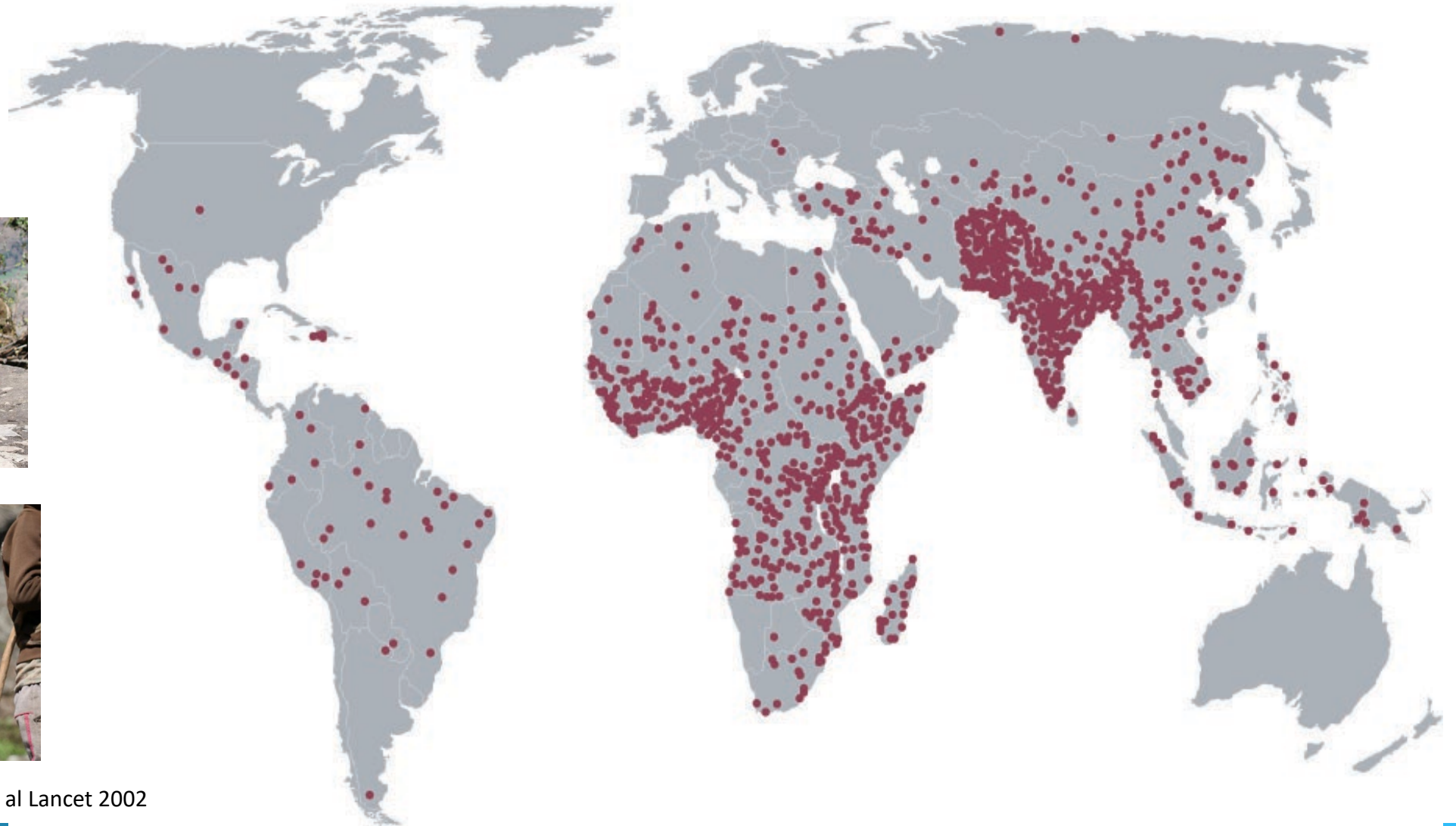
UNICEF-2023-Child-Mortality-Report-1 (1).pdf

Pneumonia



Photographs by Sandeep Mahat and Mitu Maskey

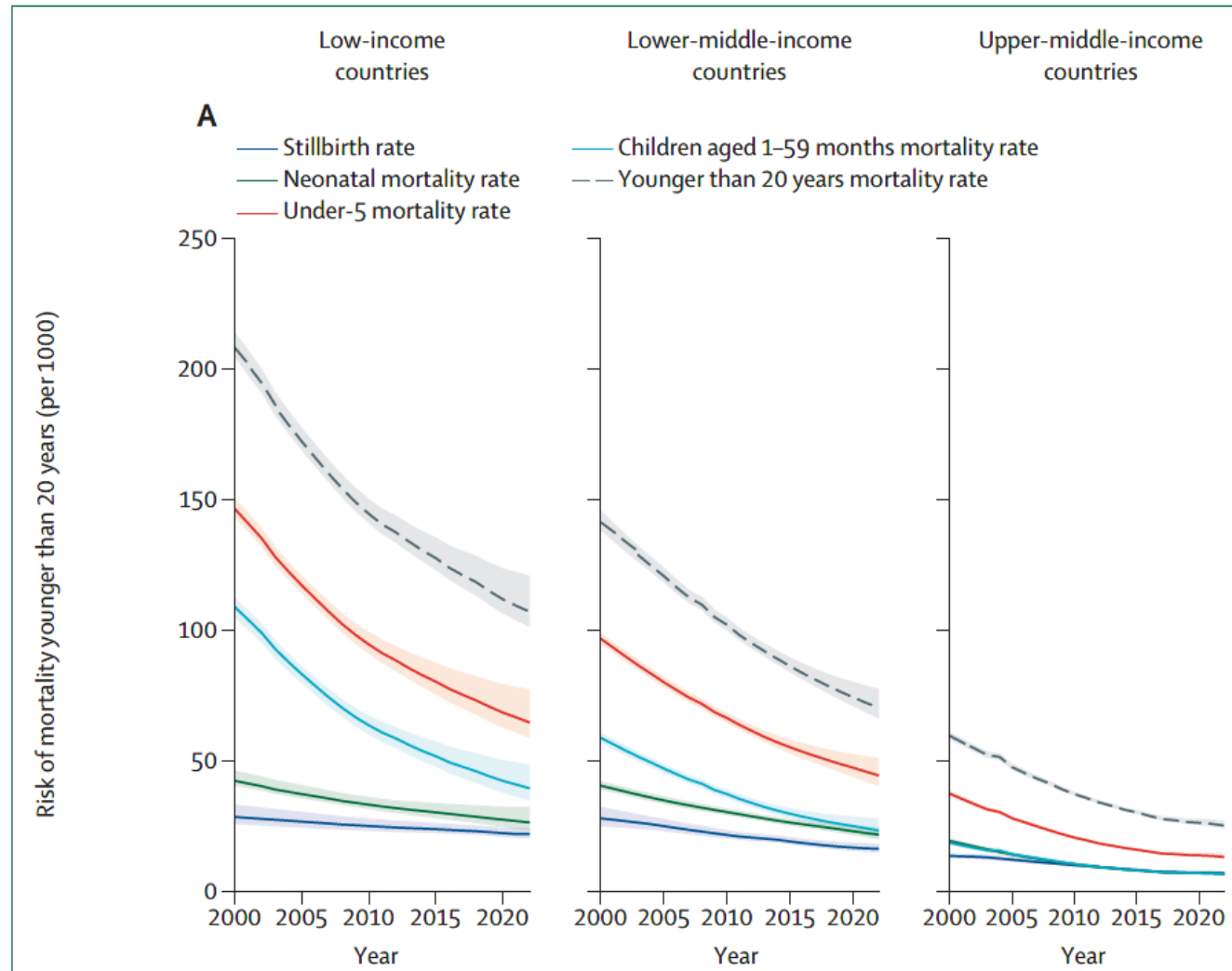
Global distribution of childhood pneumonia deaths



Projections based on Williams BG et al Lancet 2002

Each dot representing 1000 deaths

Annual rate of reduction in under 20 mortality



Amouzou et al, Lancet 2015

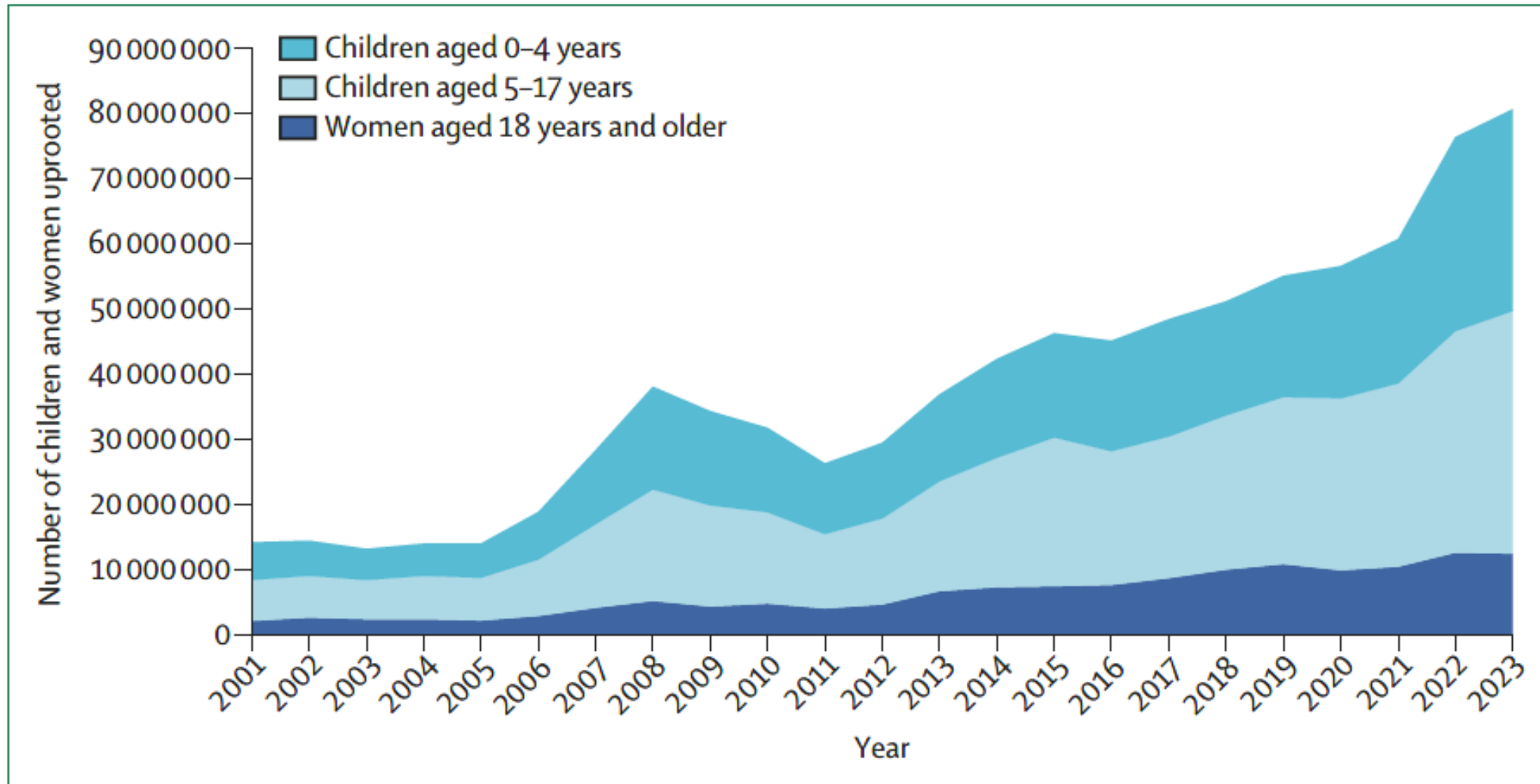


Figure 4: Estimated number of children and women displaced due to conflict in 2001–23

Data sourced from UN High Commissioner for Refugees⁹⁵ and International Displacement Monitoring Centre.⁹⁶

Amouzou et al, Lancet 2015

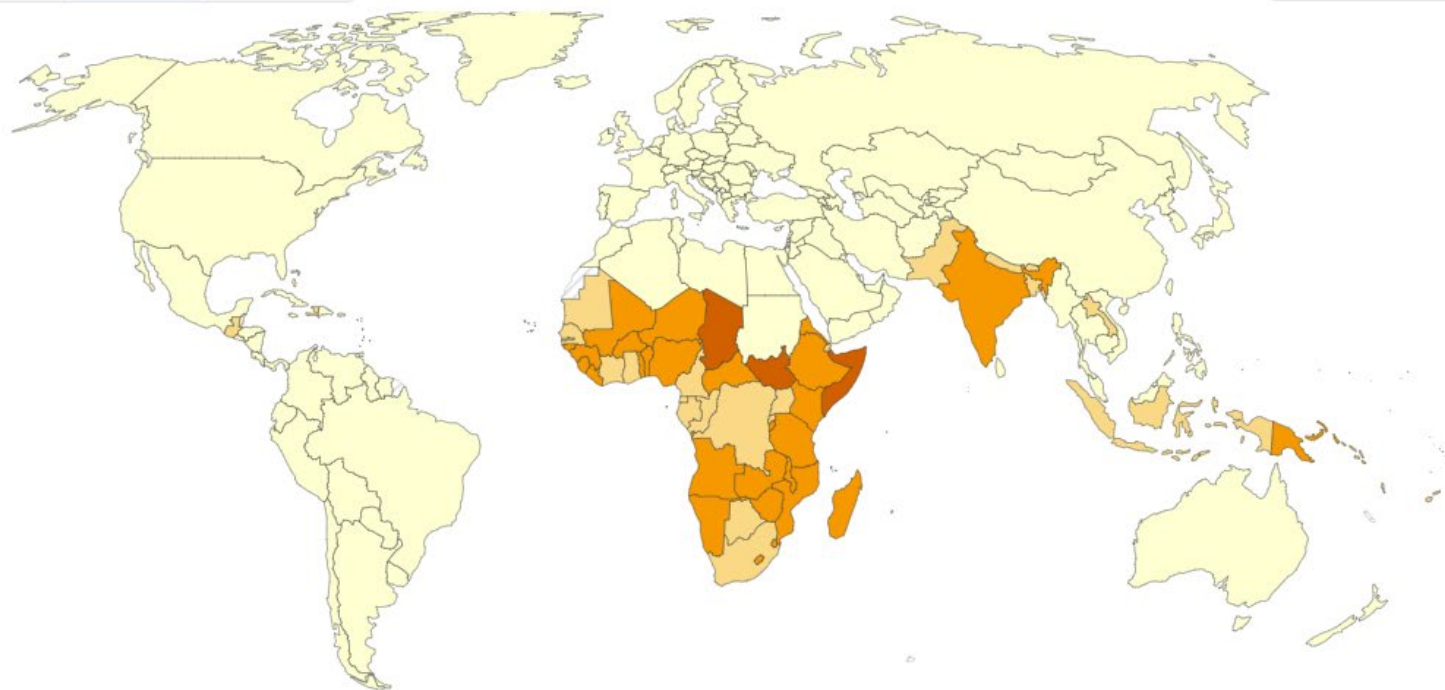
Death rate from unsafe water sources, 2021

Estimated annual number of deaths attributed to unsafe water sources per 100,000 people.

Our World
in Data

Table Map Chart

World



No data 0 10 30 100 300 1,000



1990



2021

Data source: IHME, Global Burden of Disease (2024) - [Learn more about this data](#)

Note: To allow for comparisons between countries and over time, this metric is age-standardized.

OurWorldinData.org/water-access | CC BY



Child mortality rate vs. GDP per capita, 2022

The estimated share of newborns who die before reaching the age of five. GDP per capita is adjusted for inflation and differences in living costs between countries.

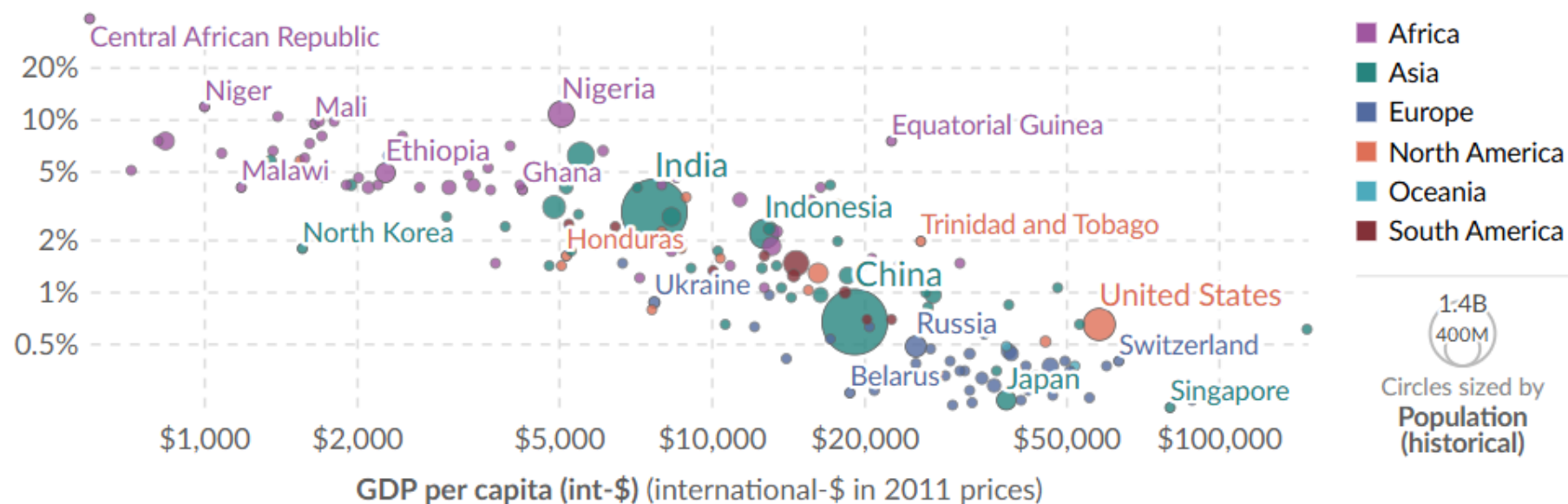
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in Data

Table Chart

Select countries and regions

Settings

Child mortality rate



1950

2022

Data source: Gapminder (2015); UN Inter-agency Group for Child Mortality Estimation (2025); Bolt and van Zanden - Maddison Project Database 2023 – [Learn more about this data](#)

Note: GDP per capita is expressed in international-\$ at 2011 prices.

OurWorldinData.org/child-mortality | CC BY



25/04/2025, 09:21

Aid cuts as disruptive as Covid pandemic for childhood vaccinations

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The Telegraph

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Aid cuts as disruptive as Covid pandemic for childhood vaccinations

Almost 50 countries report moderate to severe disruption to immunisation and supply chains after international funding is slashed

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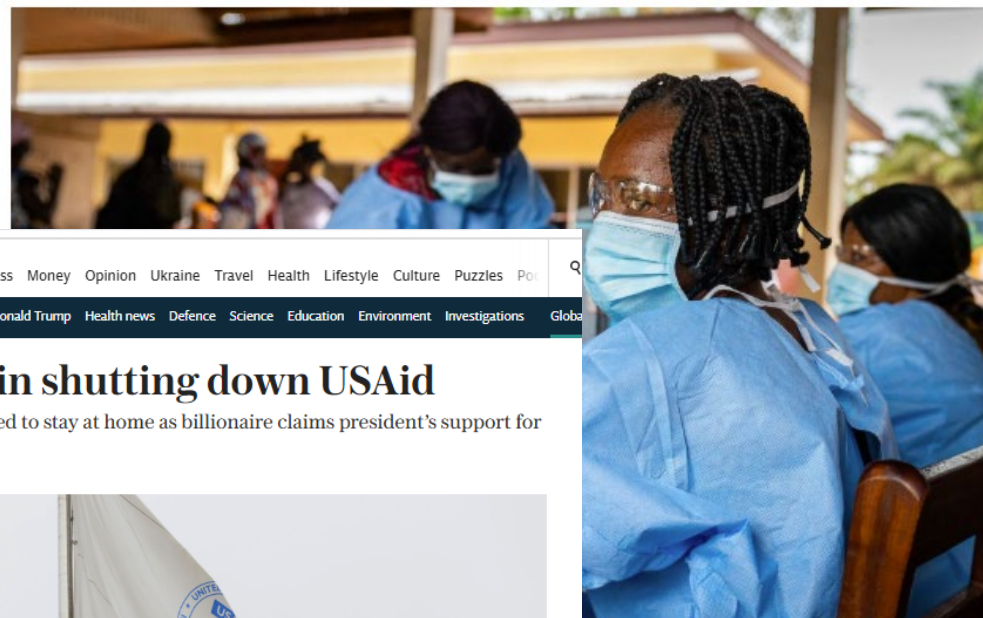
US to stop funding Gavi vaccine alliance

Trump's administration also plans to dramatically scale back support for work to combat malaria – but will continue to fund other grants

Arthur Scott-Geddes Global Health Security Deputy Editor.
Sarah Newey Global Health Security Correspondent, in Bangkok

Related Topics
Global Health Security, Foreign aid, Vaccines, Donald Trump

26 March 2025 5:35pm GMT



t routine vaccinations in the next five years Credit: BARBARA

The Telegraph

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Musk and Trump begin shutting down USAid

Staff at world's single largest aid donor ordered to stay at home as billionaire claims president's support for closing agency

Verity Bowman

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Global Health Security, Foreign aid, Elon Musk, Donald Trump

03 February 2025 6:13pm GMT



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Staff received emails late on Sunday night telling them not to come to the agency's Washington headquarters on Monday Credit: Jason C. Andrew/Bloomberg

USAid employees were ordered to stay at home on Monday after Elon Musk said Donald Trump had agreed to close the international development agency.

"We're shutting it down," Mr Musk said in an audio message on X, adding that he

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POLICY

25 APR 2025

Cuts to UK global R&D funding risk 100,000 lives, report warns

By Sophie Hogan

Share



The impact of the UK's investment in neglected disease R&D

Estimated health impact

Already realised (2000-2024)

- 380,000 lives saved
- 31.6 million DALYs averted
- 26 million cases of disease prevented

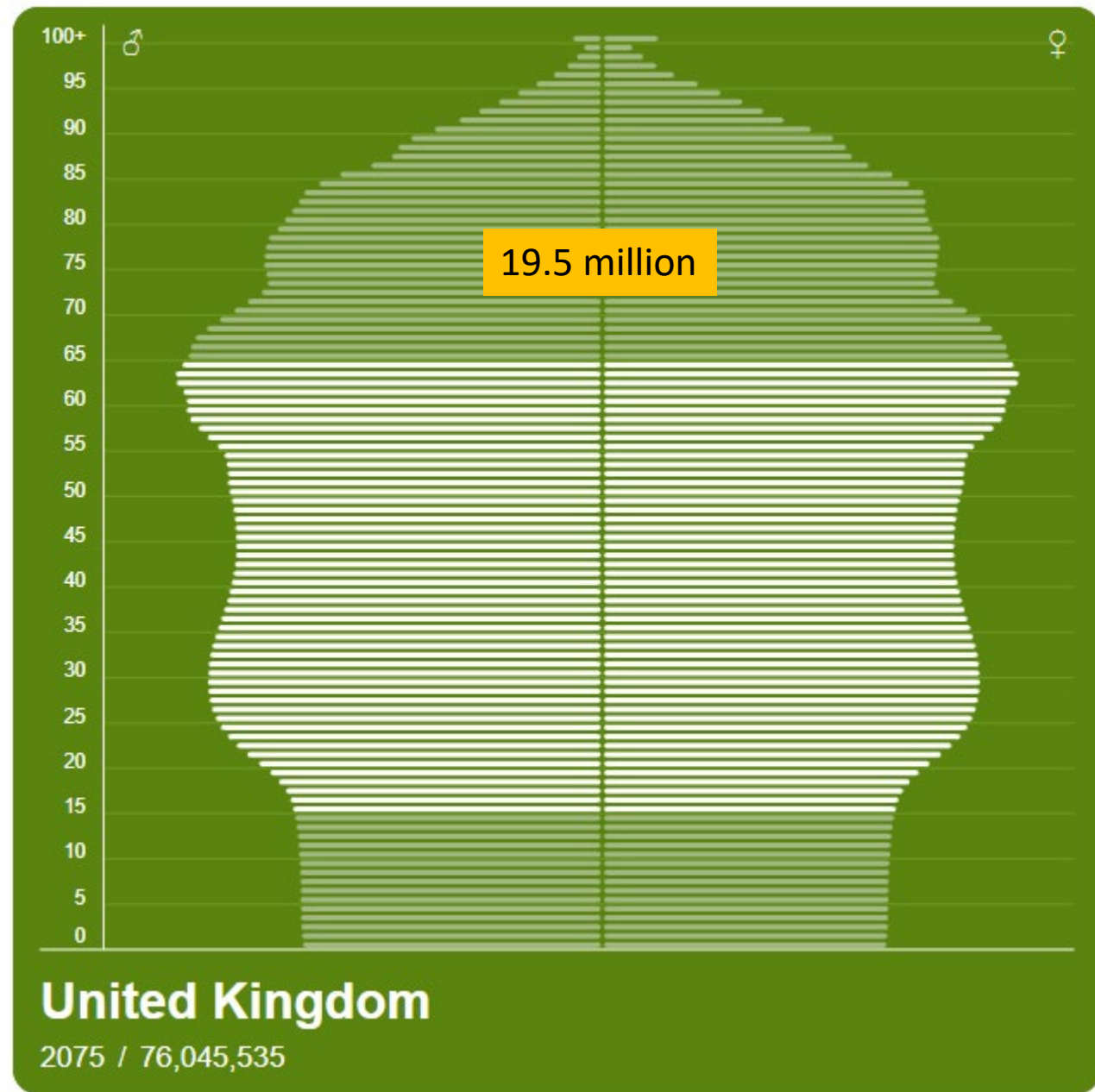
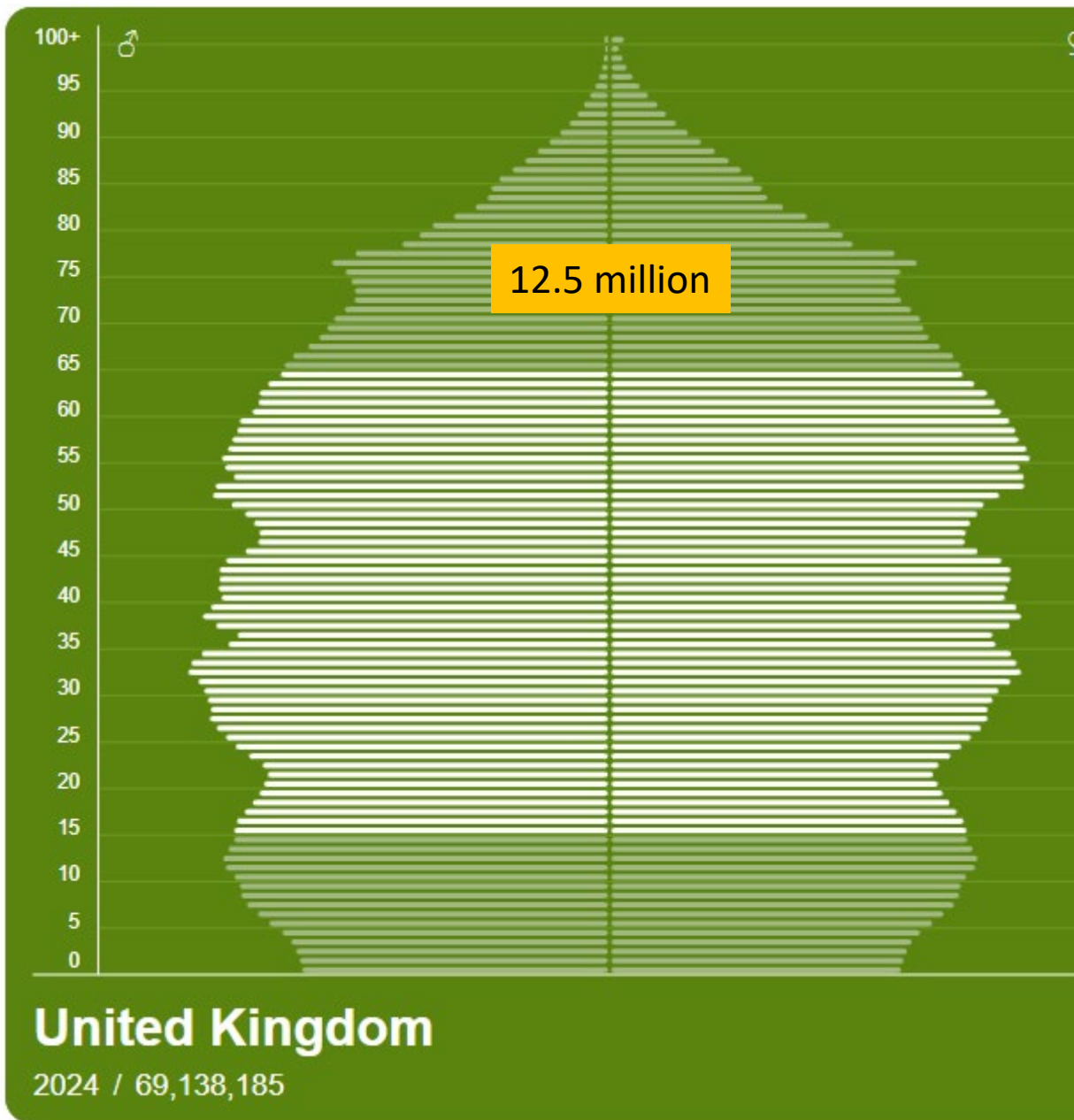
To be realised (2025-2040)

- 1.05 million lives to be saved
- 67.5 millions DALYs to be averted
- 157 million cases of disease to be prevented

Estimated economic impact within the UK

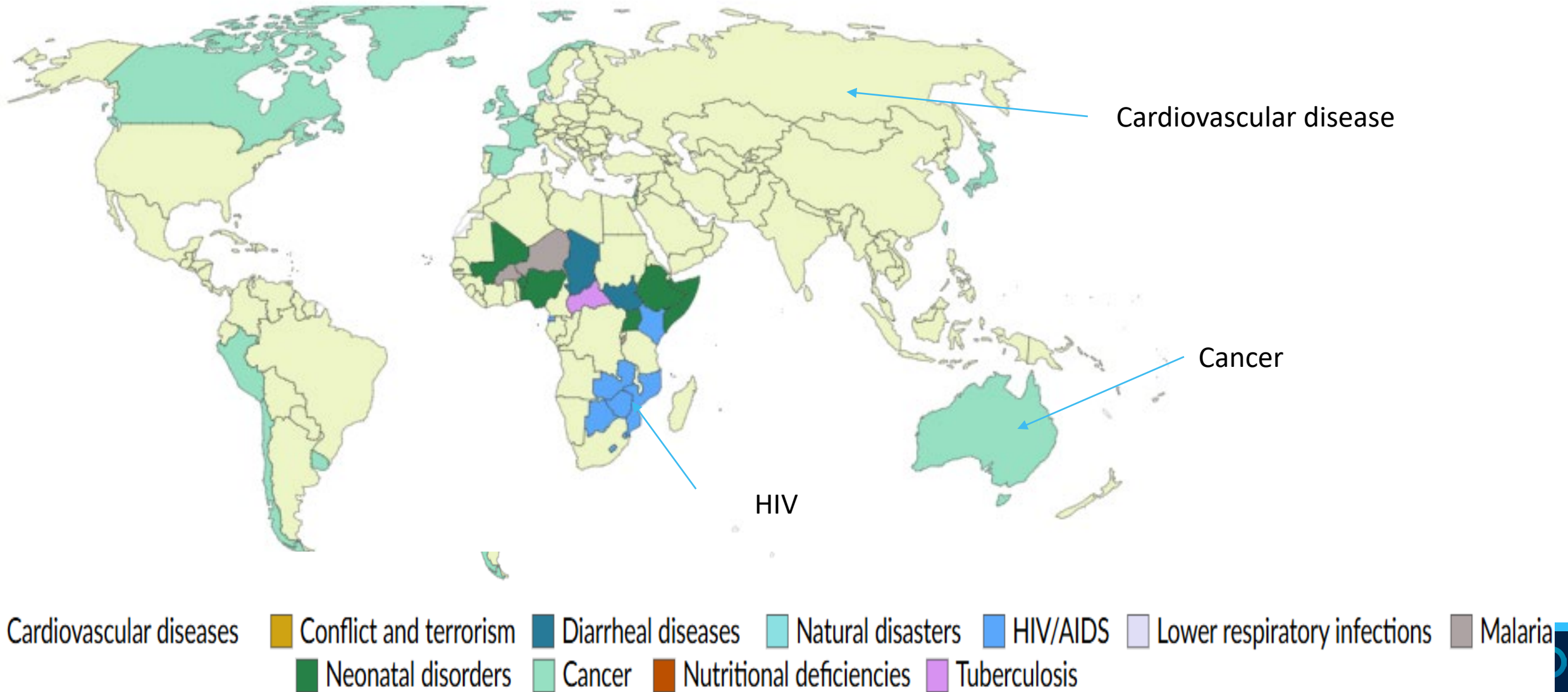
- Nearly £7.7 billion in additional economic activity
- £4.8 billion catalysed in private sector R&D investments
- Nearly 4,000 UK jobs generated
- 54 patents created
- 5,000 publications

The Future



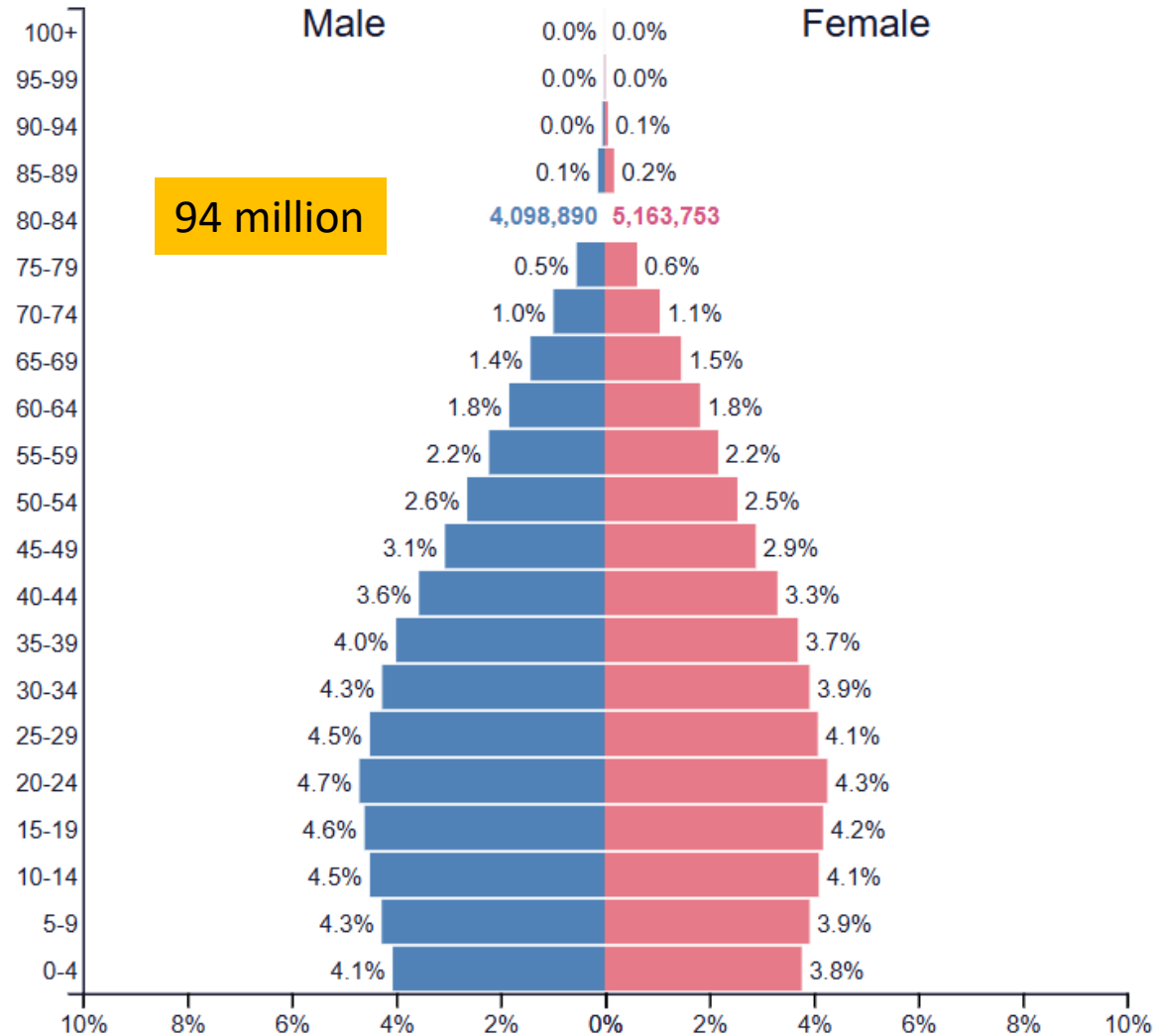
<https://population-pyramid.net/en/pp/united-kingdom>

Global leading causes of death (all ages), WHO



India ▼
2024

Population: 1,450,935,791



India ▼
2075

Population: 1,670,860,307

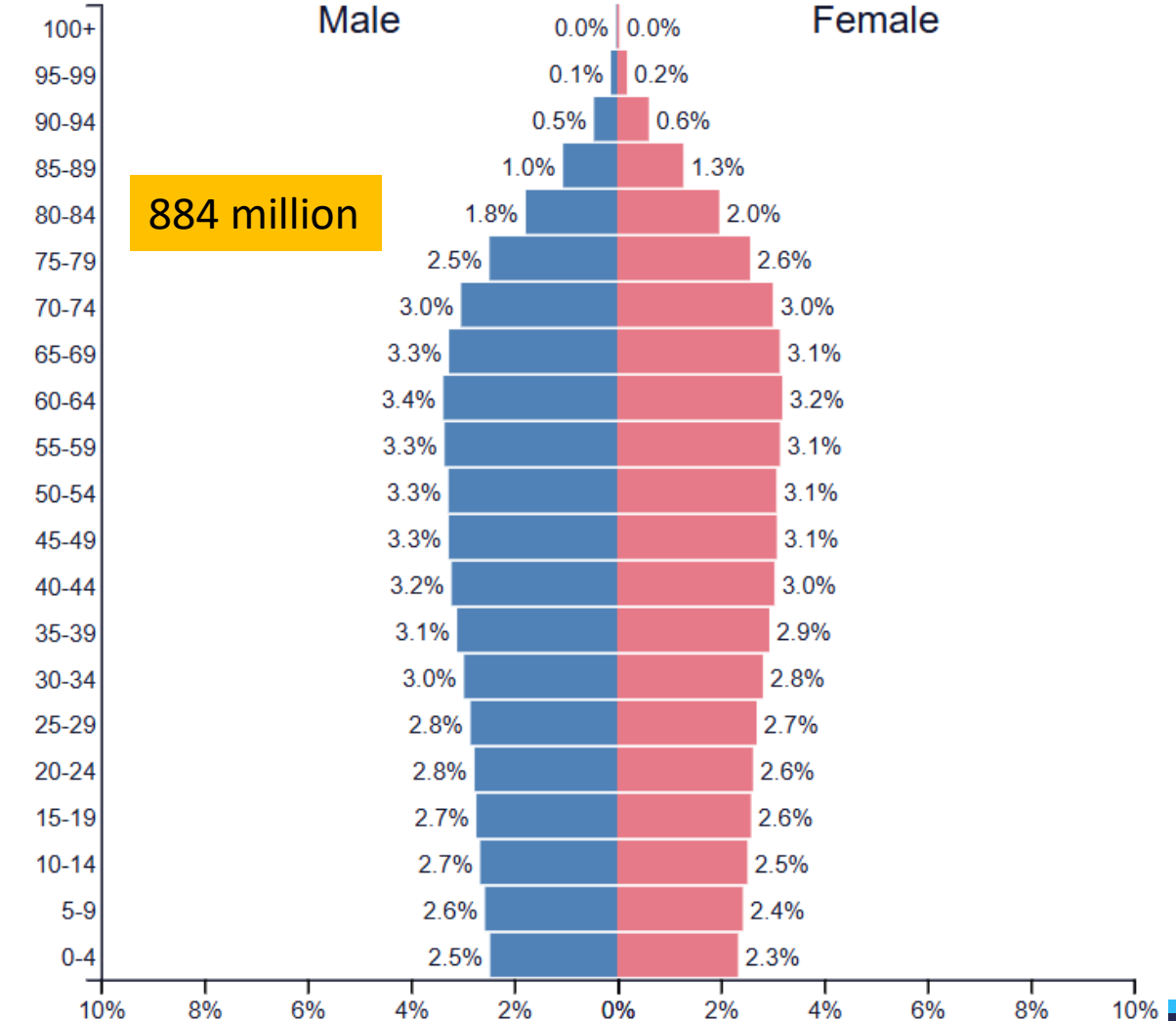


Figure 1: Male age-standardised mortality rates for principal causes of death, all ages, England, 2001 to 2022

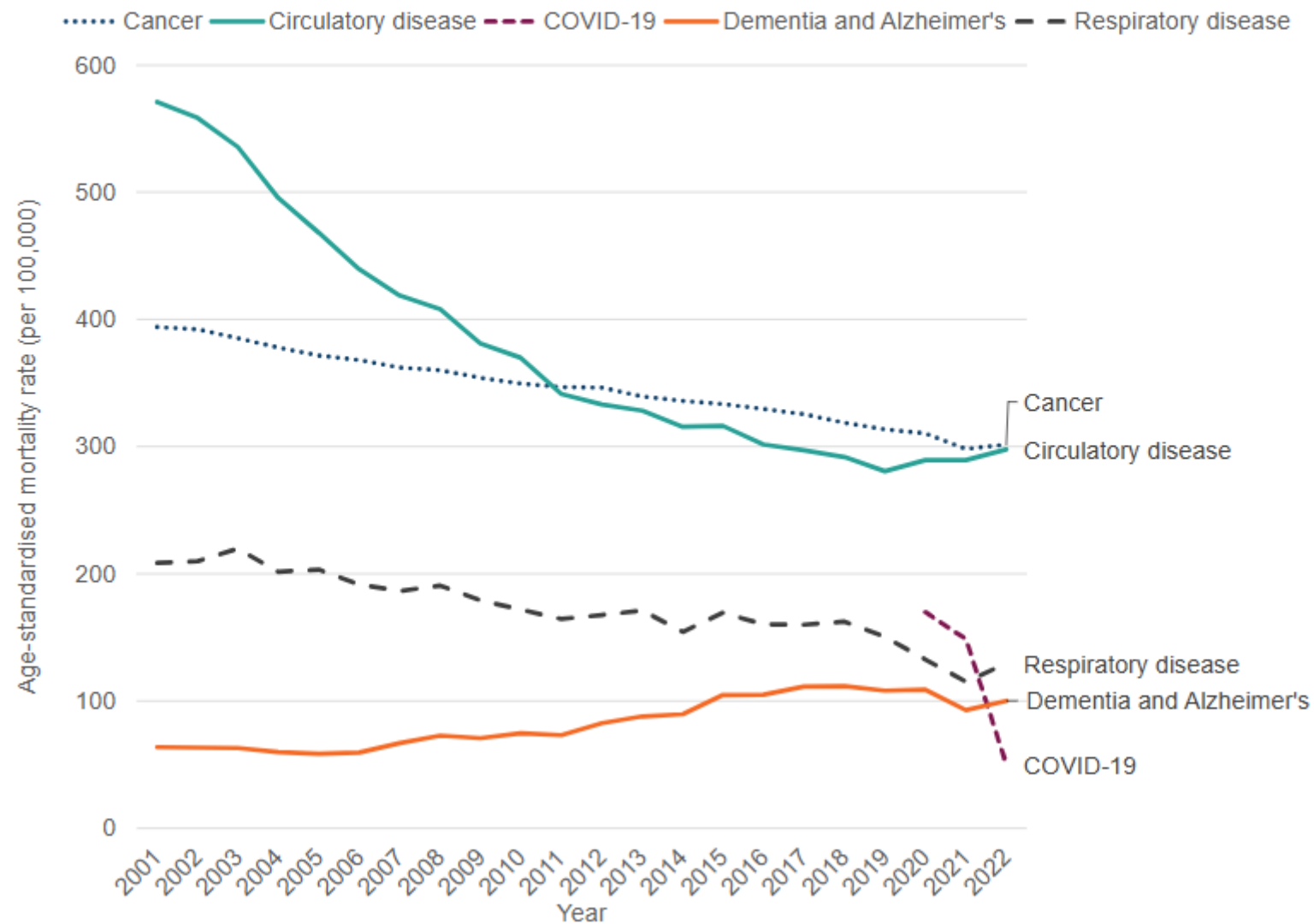
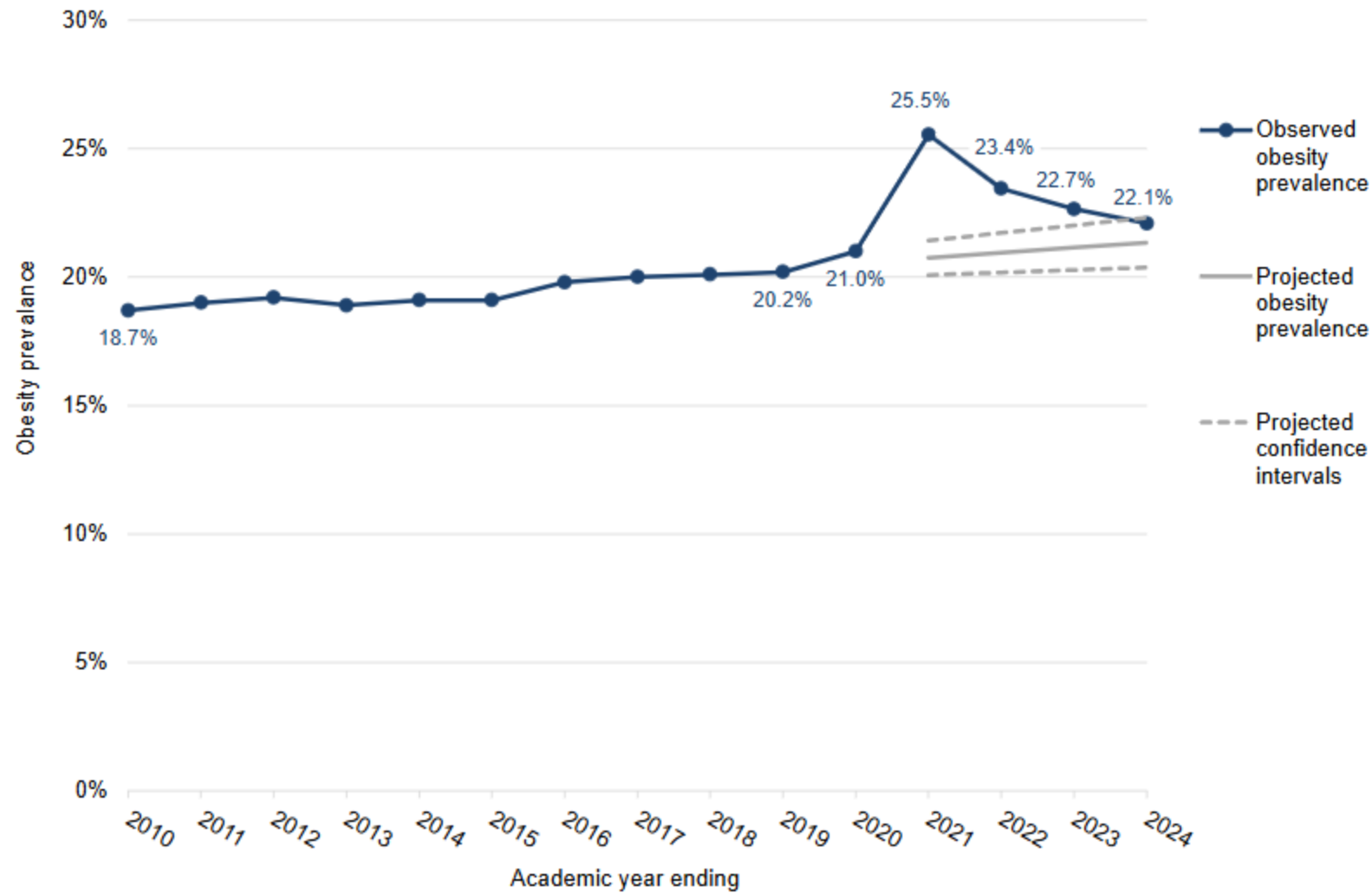


Figure 2: observed prevalence of obesity among year 6 children (age 10 to 11 years) for academic years ending 2010 to 2024, compared with projected prevalence for 2020 to 2021 through to 2023 to 2024



Data source: [National Child Measurement Programme](#).

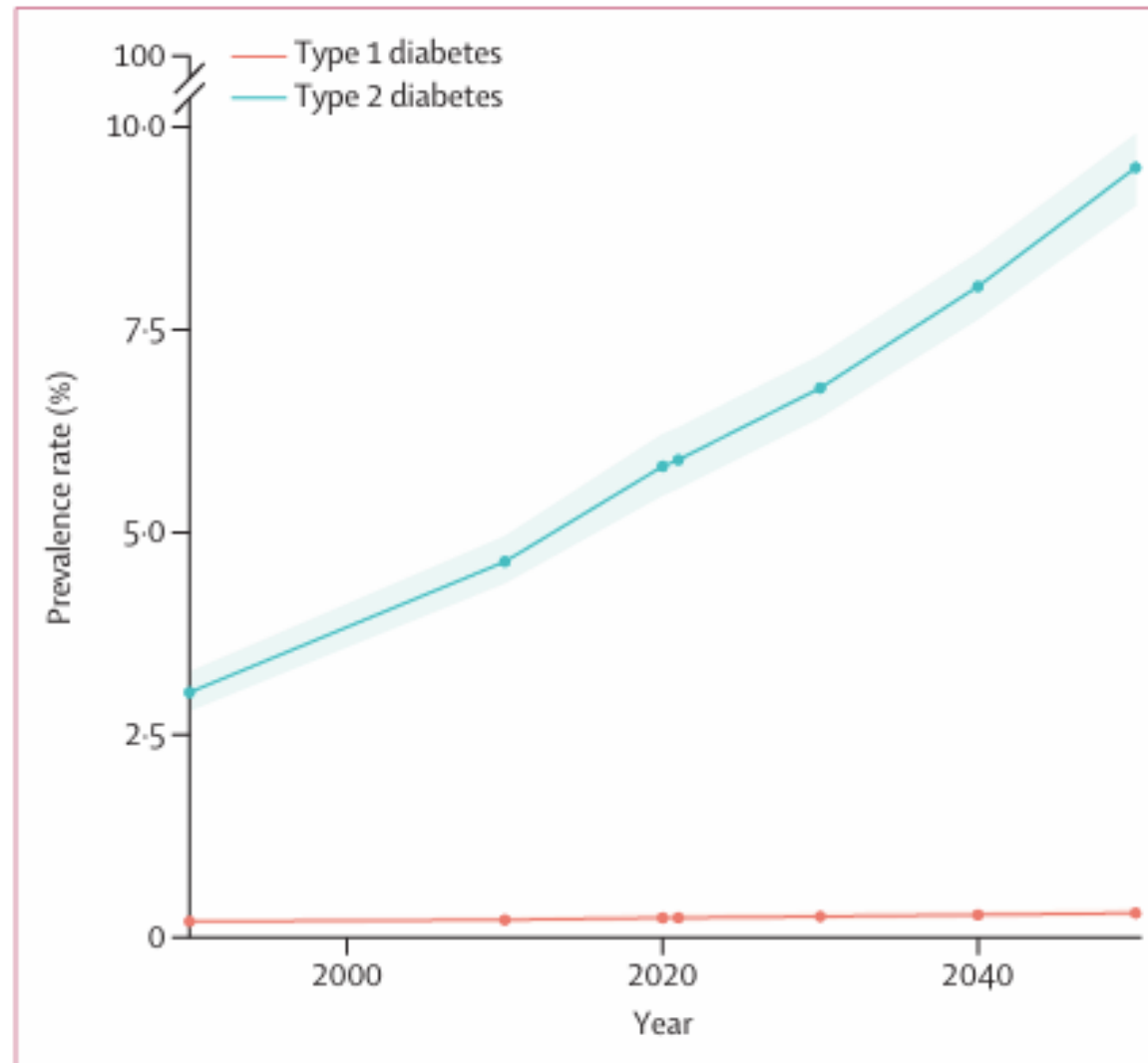


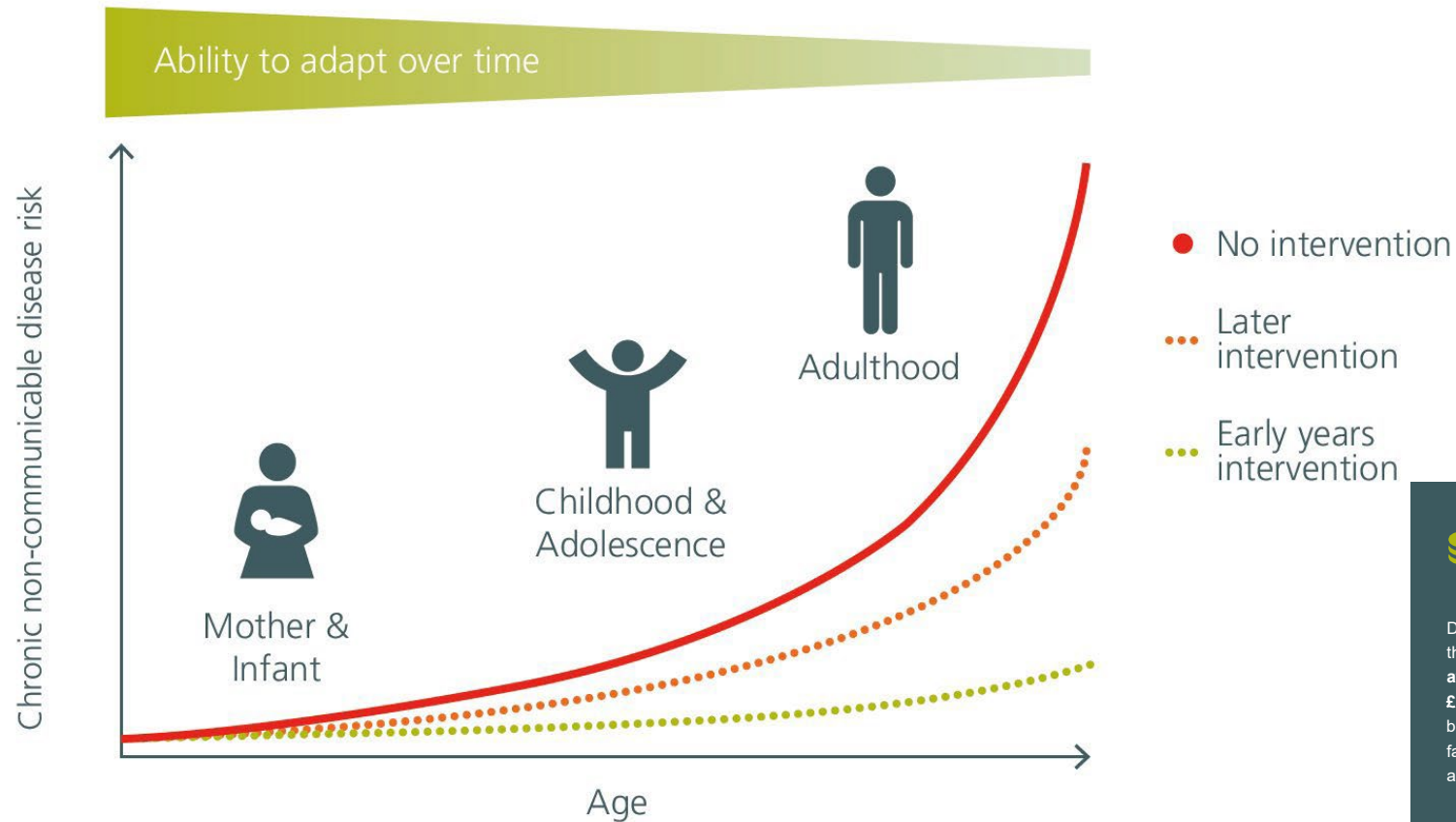
Figure 4: Global age-standardised prevalence of type 1 and type 2 diabetes from 1990 through 2050 forecasts

The shaded area represents 95% uncertainty intervals. Total diabetes is the sum of type 1 and type 2 diabetes.

5 million diagnosis in UK in 2025

Lancet 2023

Prioritise the early years?



A visual representation showing that interventions in childhood are likely to be more effective at reducing the risk of developing a chronic disease across the life course compared with interventions in adulthood.



£16.13 billion
the cost to society of not addressing issues early

Data from the Royal Foundation and the London School of Economics reveal that the cost to society of addressing the issues that might have been avoided through action in early childhood has been estimated to be **£16.13 billion each year (estimates from 2018/19)**. The figure of £16.13 billion is likely to be an underestimate, as it neither includes the later costs of failing to provide the right support early on, nor the losses to the productivity and earnings of individuals over their lifetime.

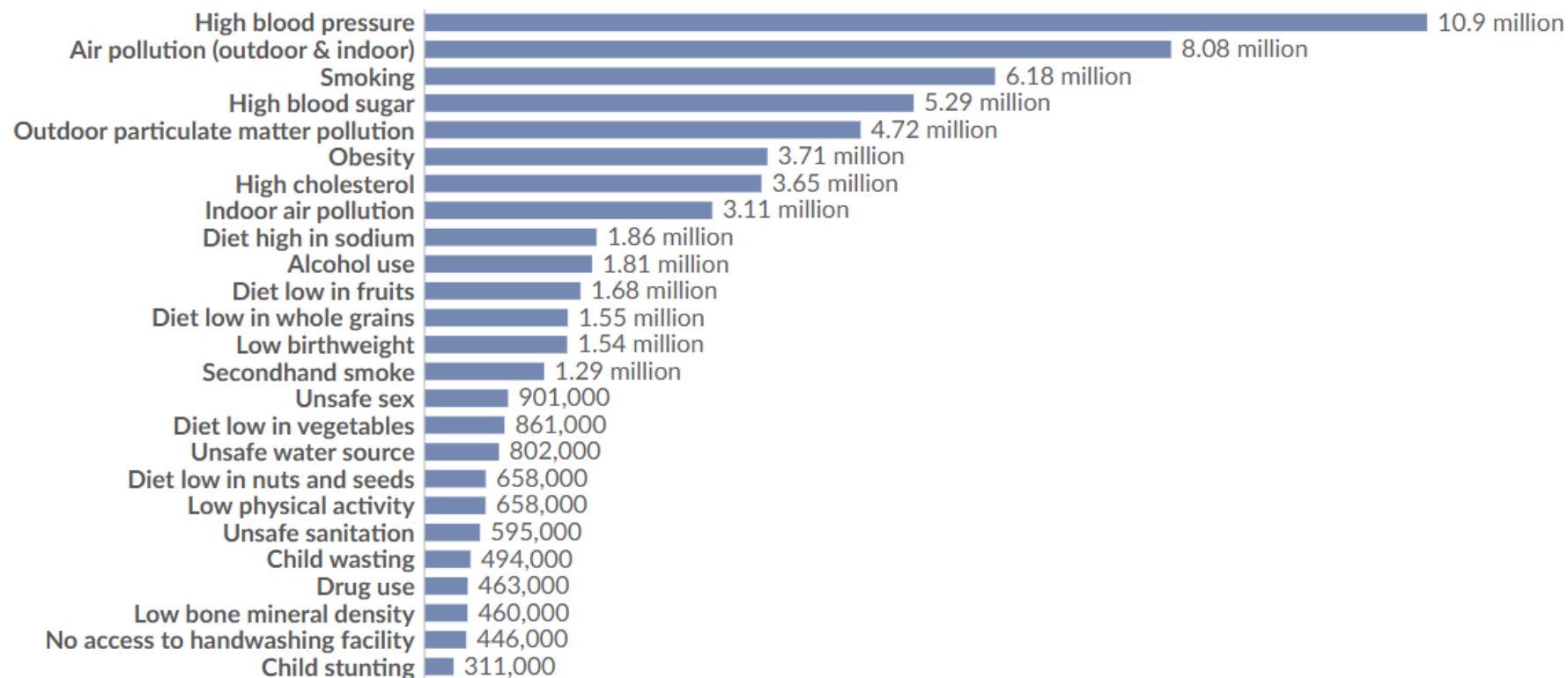
Deaths by risk factor, World, 2021

The estimated annual number of deaths attributed to each risk factor. Estimates come with wide uncertainties, especially for countries with poor vital registration.

Our World
in Data

Table Chart

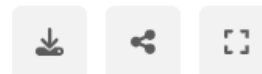
Change country or region



Data source: IHME, Global Burden of Disease (2024) – [Learn more about this data](#)

OurWorldinData.org/causes-of-death | CC BY

Note: Risk factors are not mutually exclusive. The sum of deaths attributed to each risk factor can exceed the total number of deaths.



Modifiable risk?

RISK FACTORS FOR CARDIOVASCULAR DISEASE

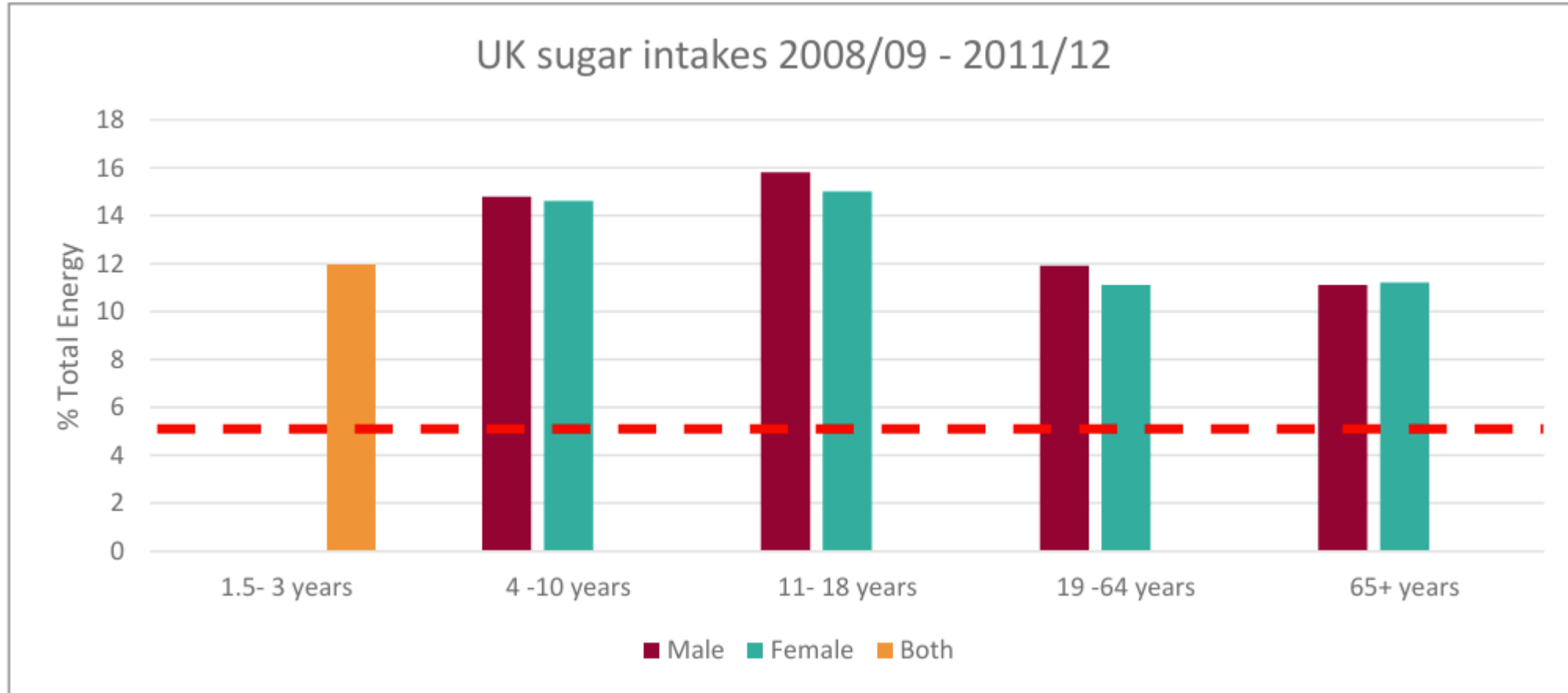
- Smoking.
- Sedentary lifestyle/lack of physical activity.
- Unhealthy diet.
- Alcohol intake above recommended levels.
- **Overweight and obesity.**
- High blood pressure
- **Diabetes mellitus**
- Serious mental health problems
- periodontitis
- Socioeconomic status — death from CVD is 3 times higher among people who live in the most deprived communities
- Lack of social support

RISK FACTORS FOR CANCER

- Smoking.
- Alcohol intake
- Unhealthy diet
- Air pollution
- **Obesity**
- **Diabetes**
- Lack of physical activity
- Drug use
- Other environmental risk factors

Sugar

Figure 3. UK sugar intake compared to the recommended maximum of 5% energy



Public Health England 2015

Obesity

13% return on investment from early years programmes

Evidence from the United States (US) shows that **quality birth-to-five programmes can provide a 13% return on investment for every year of a person's life,**⁴⁰ which included examples of improved trends in body mass measurements which **persisted to adulthood.**¹⁷¹

Table 2. Economic model showing cumulative outputs by each scenario over model time horizon of 25 years

Scenario	Years to achieve target	Outcomes over <u>25 year period</u>		
		Deaths averted ^a	Caries cases avoided ^b	Total NHS cost saving (£bn) ^c
Achieving 5% energy intake for sugar	5	77,300	6,030,000	14.4
	10	68,300	5,101,000	12.1
	15	57,600	4,310,000	9.9

Oral health

60% less tooth decay with water fluoridation

In areas of high deprivation, water fluoridation is calculated to offer a return on investment of £35 for every £1 spent.⁴² According to the Government's 2022 report, **5 year olds in areas of England with higher water fluoride concentrations are around 60% less likely to have dental caries and be admitted to hospital to have teeth removed due to decay than those in areas with low fluoride concentration.**⁴³

Respiratory Health

Indoor air pollution

Smoking

Outdoor air pollution

Respiratory infection

388,000

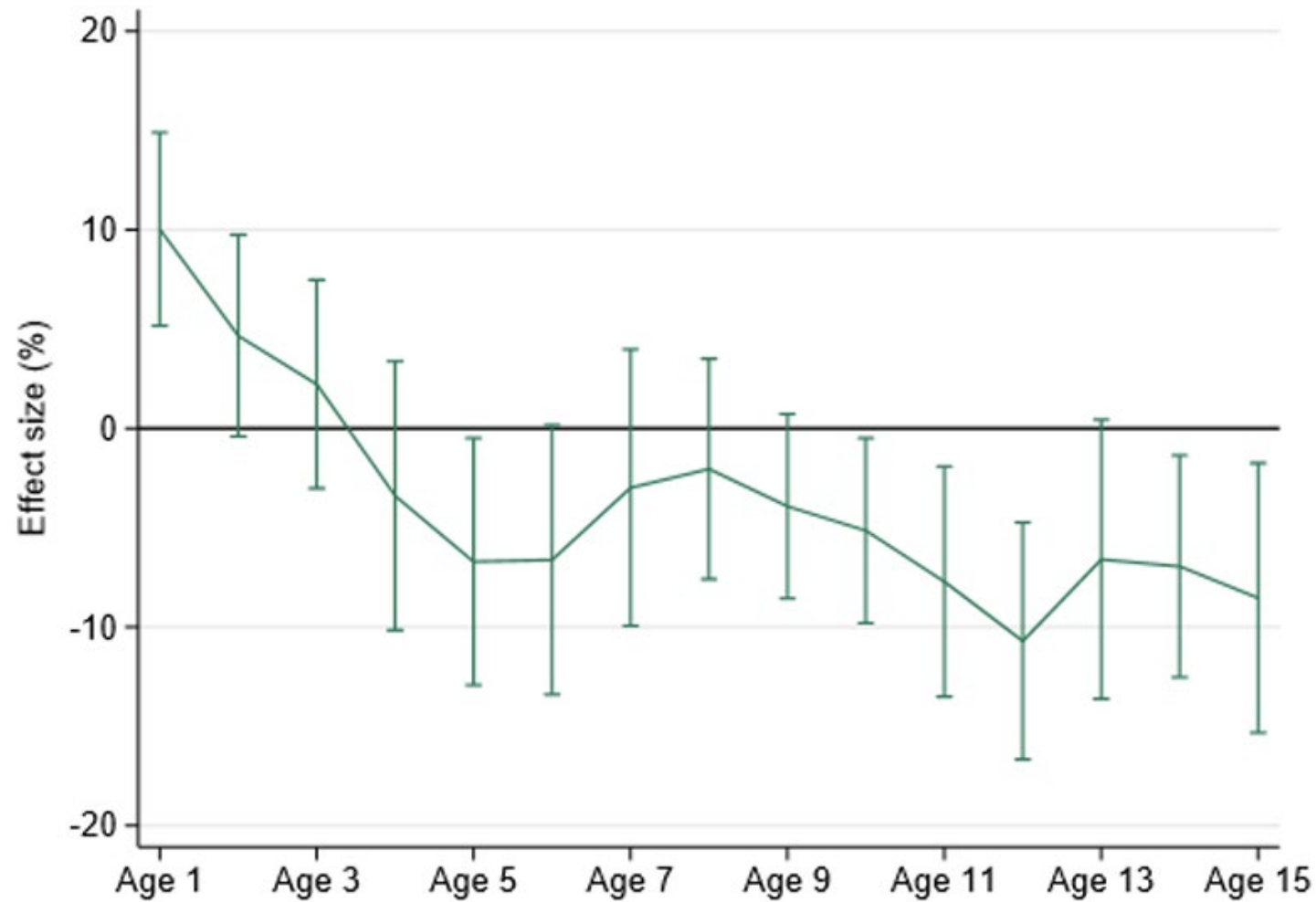
fewer days with asthma symptoms

Meeting climate change targets by achieving the WHO interim target on air pollution for fine particulate matter could lead to children across the UK suffering **388,000 fewer days with asthma symptoms**. Total health and economic benefits across children and adults of reducing air pollution in the UK are valued at £383 billion between 2018 and 2134, with 11.5 million life years gained across the UK population in this time.⁴⁵

Sure Start for under fives

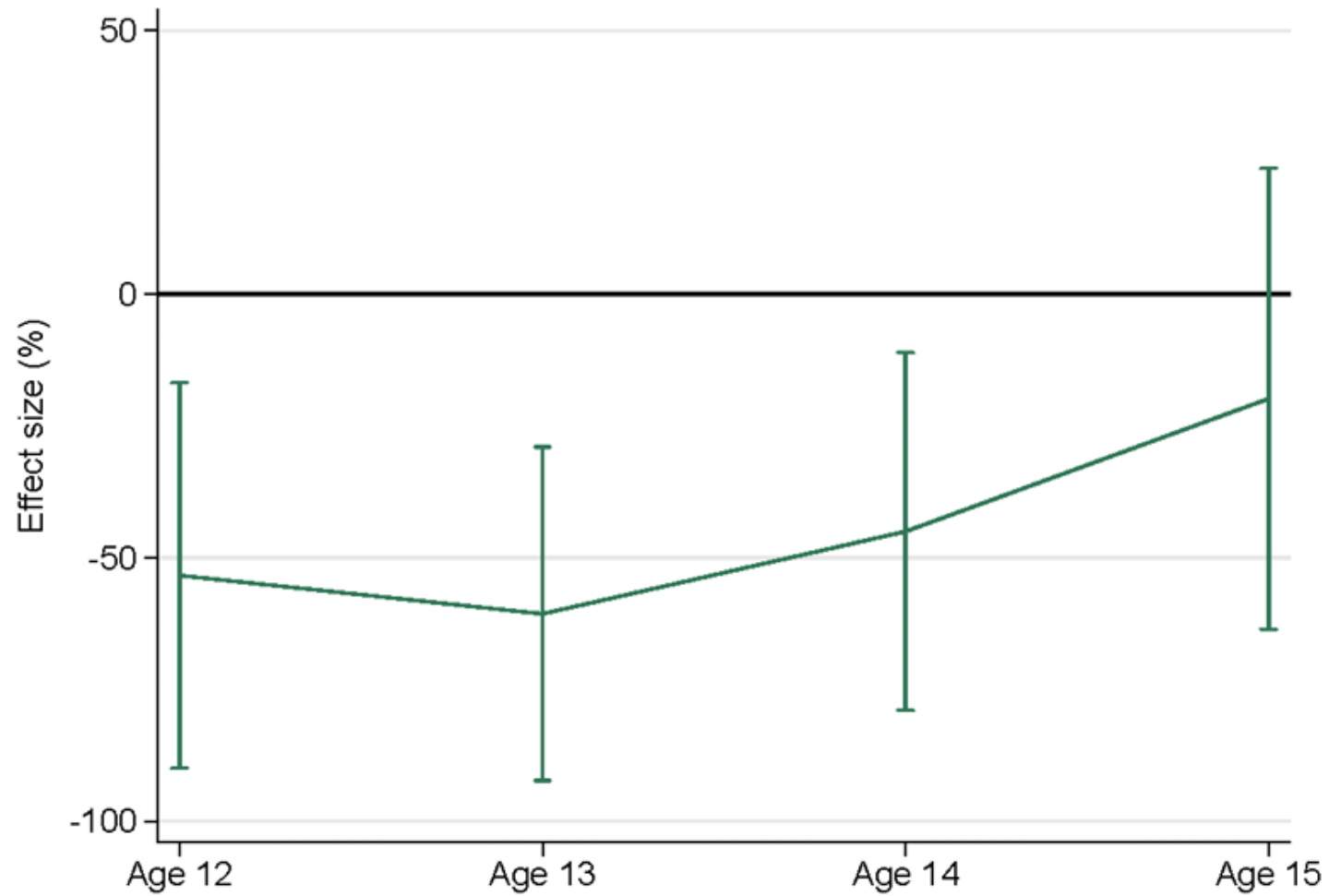
- (1) outreach and home visiting;
- (2) support for families and parents;
- (3) good quality play, learning and childcare;
- (4) primary and community healthcare including advice about child and family health;
- (5) support for children and parents with specialised needs.
- (6) Additional services are personalised to local population needs.

Figure 4.1. Sure Start's effect on probability of any hospitalisation in the neighbourhood, rescaled by baseline probability



Institute for fiscal studies

Figure 4.6. Sure Start's effect on probability of any hospitalisation, rescaled by baseline probability: admissions for mental health causes



Sure Start

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Family & Education | Young Reporter

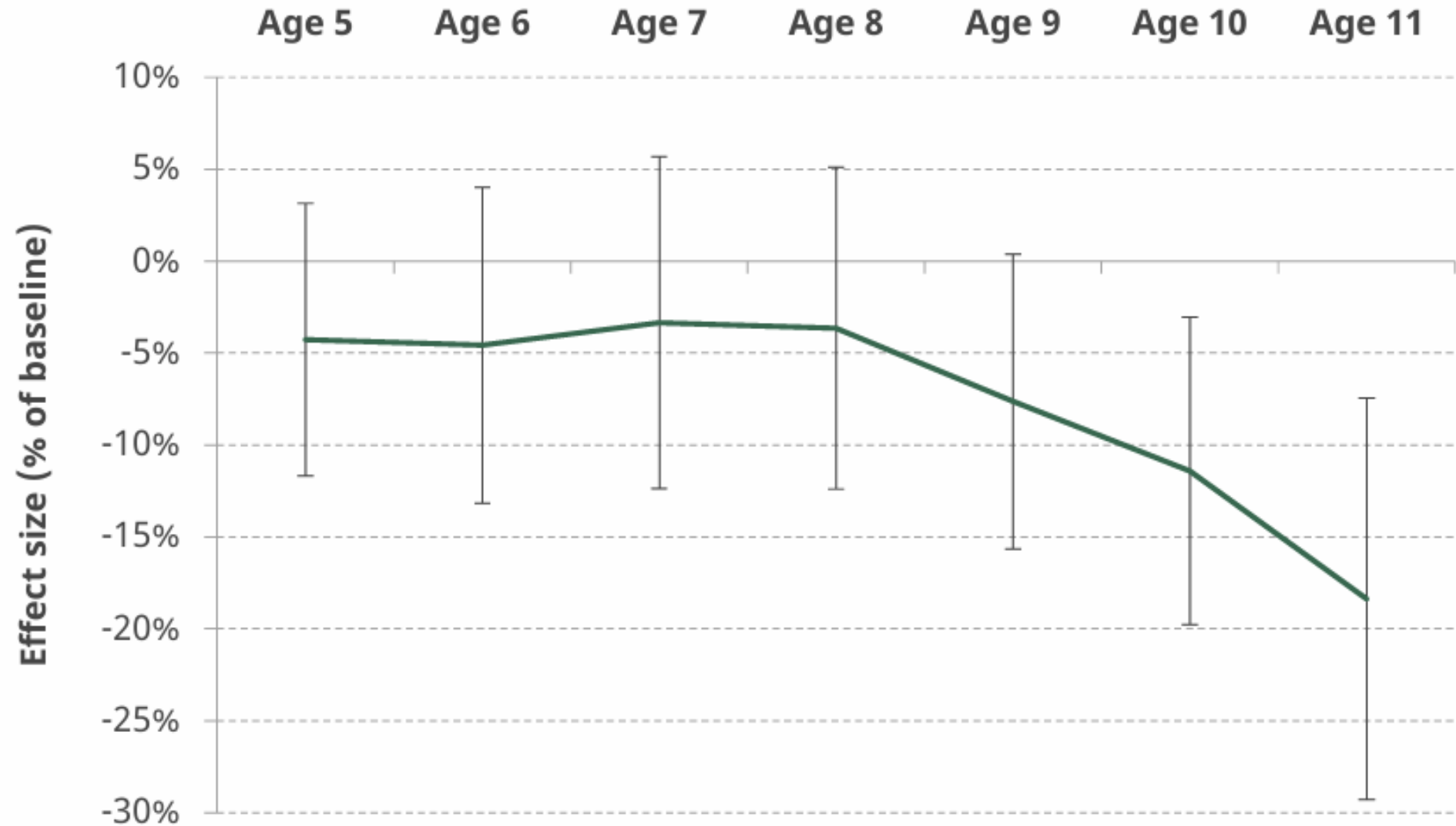
Children living near Sure Start centres did better at GCSEs, study suggests

9 April · 953 Comments



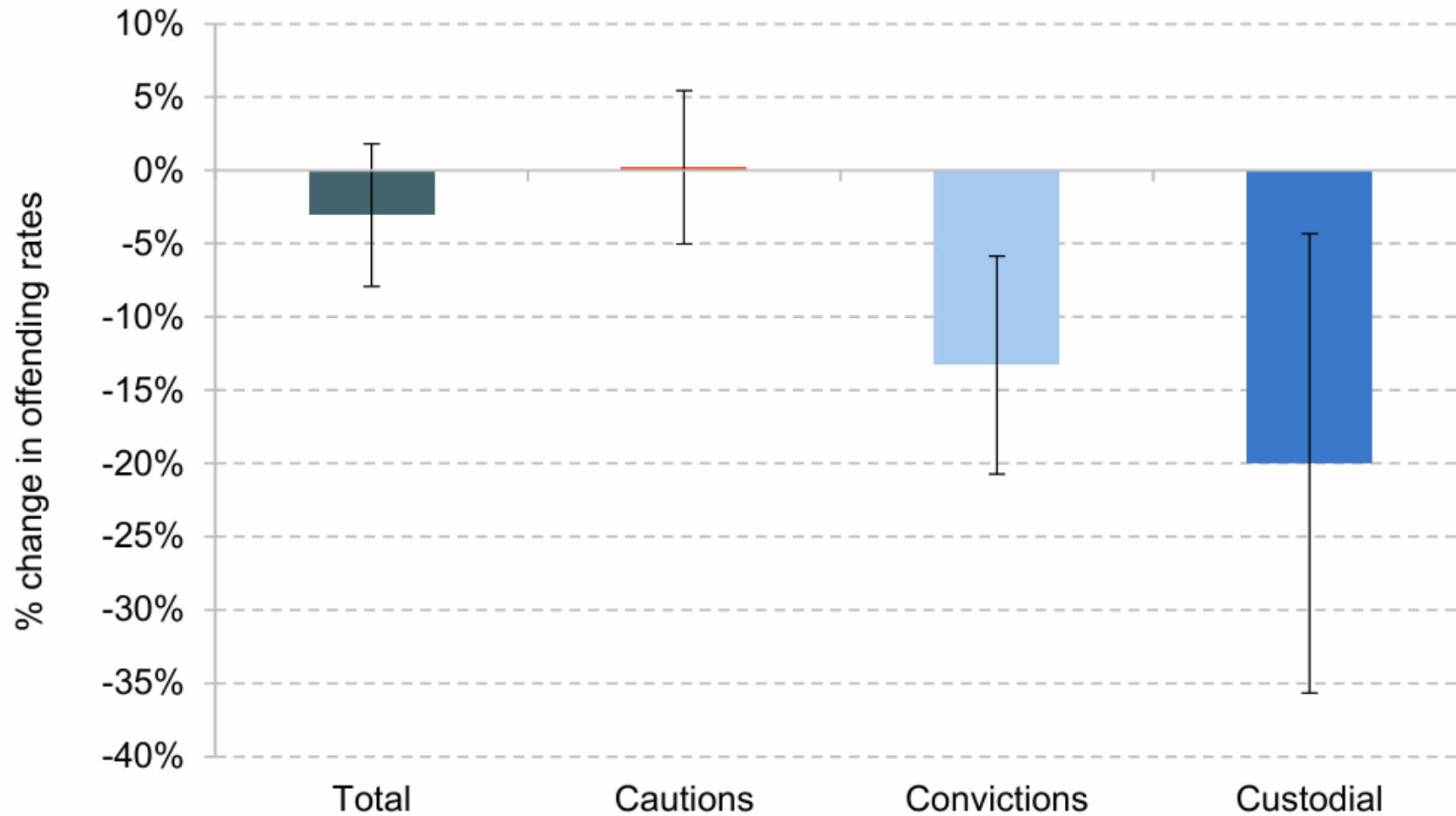
Sure Start centres were designed for parents of children under five to access integrated support around health, education

Figure 5.2. Effect of an increase in Sure Start coverage on probability of any hospitalisation in the neighbourhood, rescaled by baseline probability



Institute for fiscal studies

Figure 5.3. Effect of living near a Sure Start centre on the probability of receiving each type of sentence up to age 16



Institute for fiscal studies

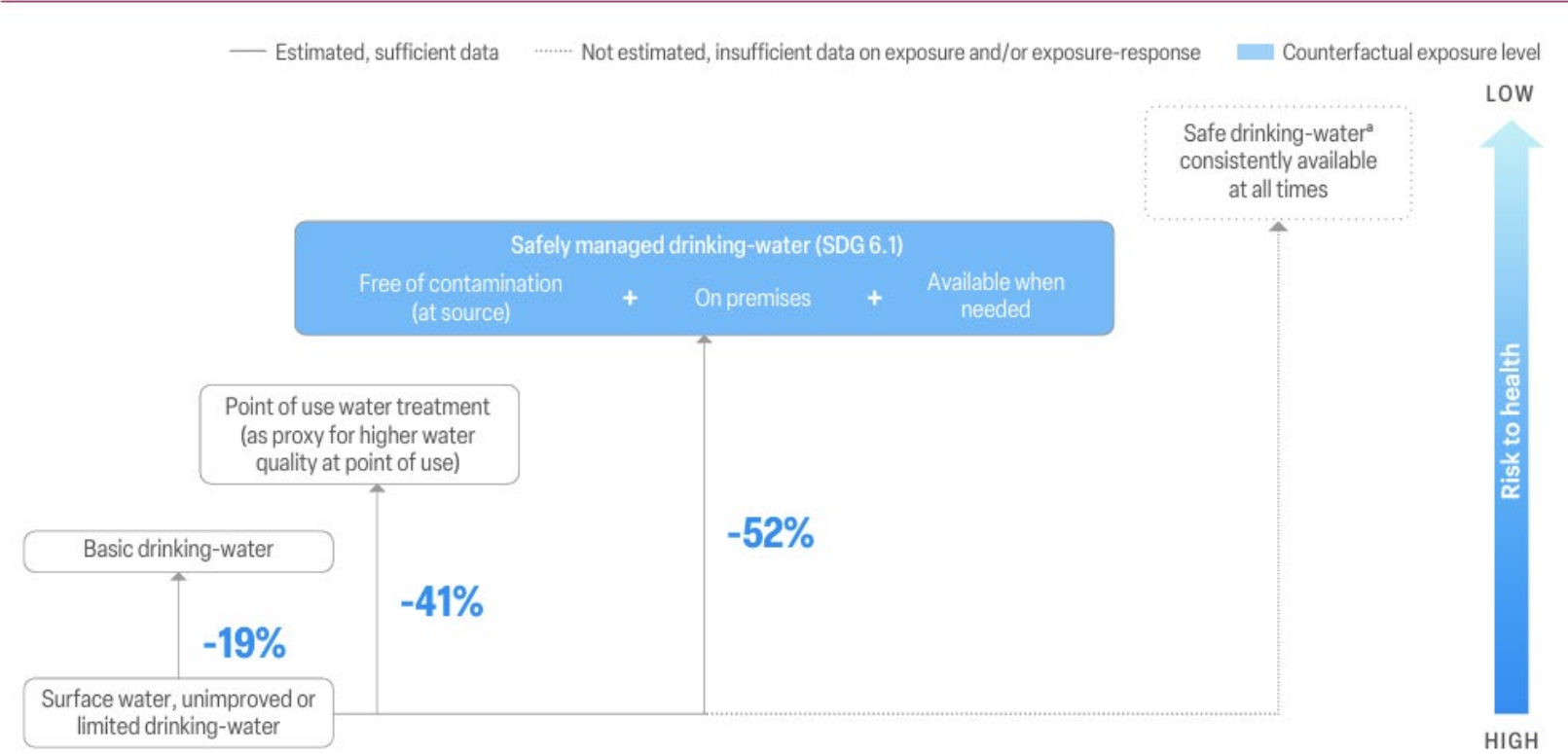
Improving access to water, sanitation and hygiene can save 1.4 million lives per year, says new WHO report

28 June 2023 | Departmental update | Reading time: 4 min (981 words)

Half of the world’s population still does not have adequate access to safe drinking water, sanitation and hygiene (WASH) which could have prevented at least 1.4 million deaths and 74 million disability-adjusted life years in 2019, according to latest report by the World Health Organization (WHO) and an accompanying art published in The Lancet.

“With growing WASH-related health risks seen already today through conflicts, t emergence of antimicrobial resistance, the re-emergence of cholera hotspots, a

Fig. 9. Drinking-water supply transitions and associated reductions in diarrhoeal disease risk



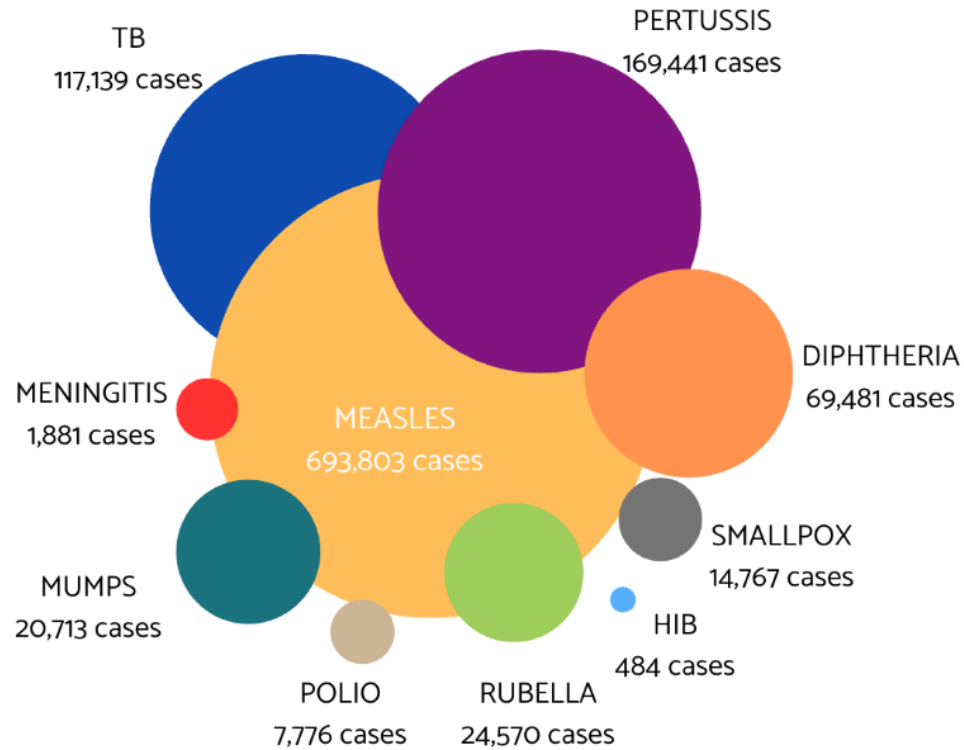
^a Safe drinking-water does not represent any significant risk to health over a lifetime of consumption (18).

Source: Adapted from (1)

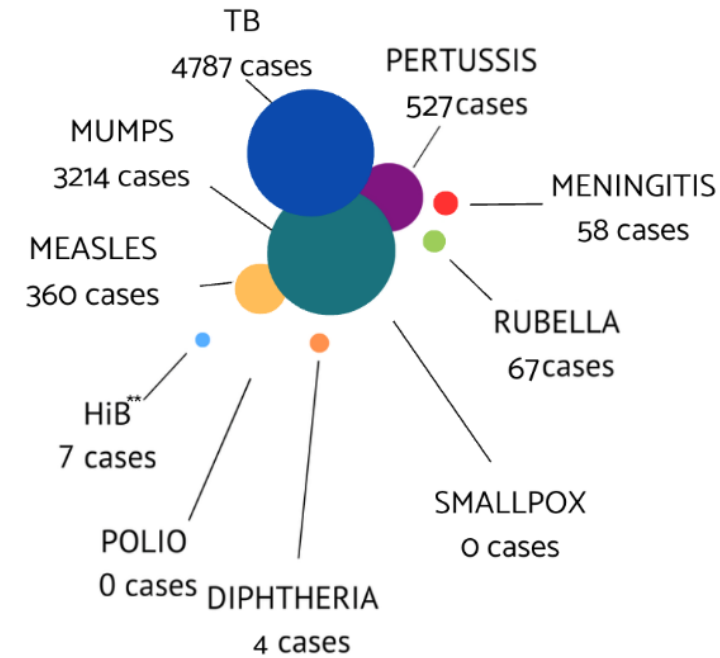
Burden of disease attributable to unsafe drinking-water, sanitation and hygiene WHO 2019 Update

Annual total figures for cases of notifiable infectious in England and Wales

1900s*



2021

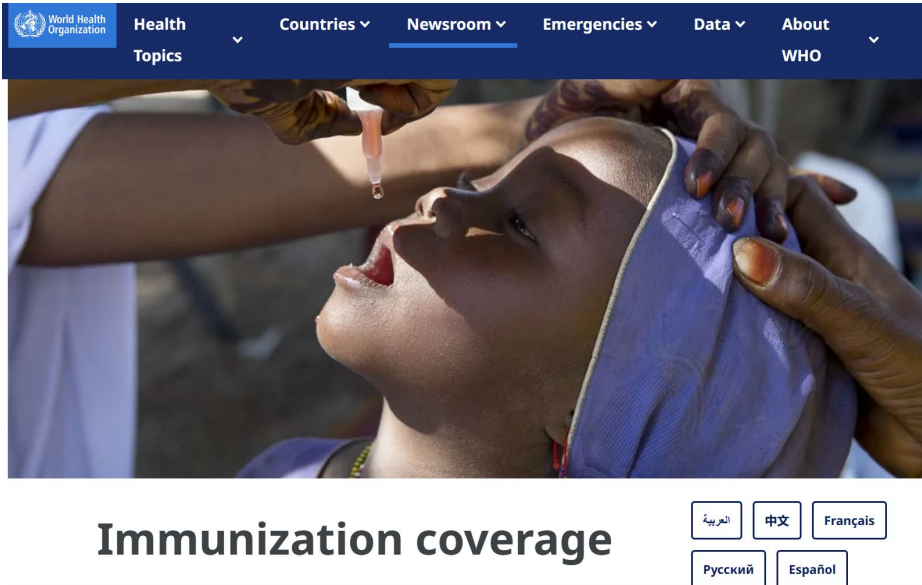


* Measles cases from 1955, Pertussis cases from 1951, Diphtheria cases from 1920, Smallpox cases from 1927, Rubella cases from 1989, Polio cases from 1947, Hib cases from 1992, Mumps cases from 1989, Meningitis cases from 1971, TB cases from 1913

** Hib cases from 2021 and 2022

Data source: www.gov.uk & WHO. The Infographics displayed are for illustrative purposes and are not drawn to scale.

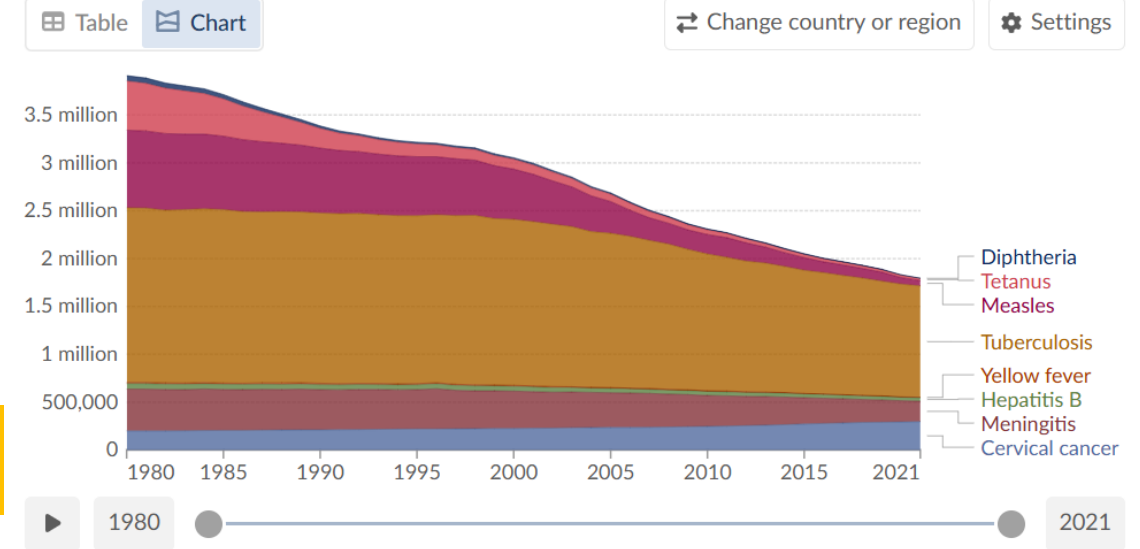
Global deaths prevented by immunisation



Zero dose children – 14.5 million in 2023

Deaths caused by vaccine-preventable diseases, World

The estimated annual number of deaths caused by several vaccine-preventable diseases, based on statistical modeling. Estimates come with wide uncertainties, especially for countries with poor vital registration.



Data source: IHME, Global Burden of Disease (2024) – [Learn more about this data](#)
OurWorldinData.org/vaccination | CC BY

3.5-5 million deaths averted per year

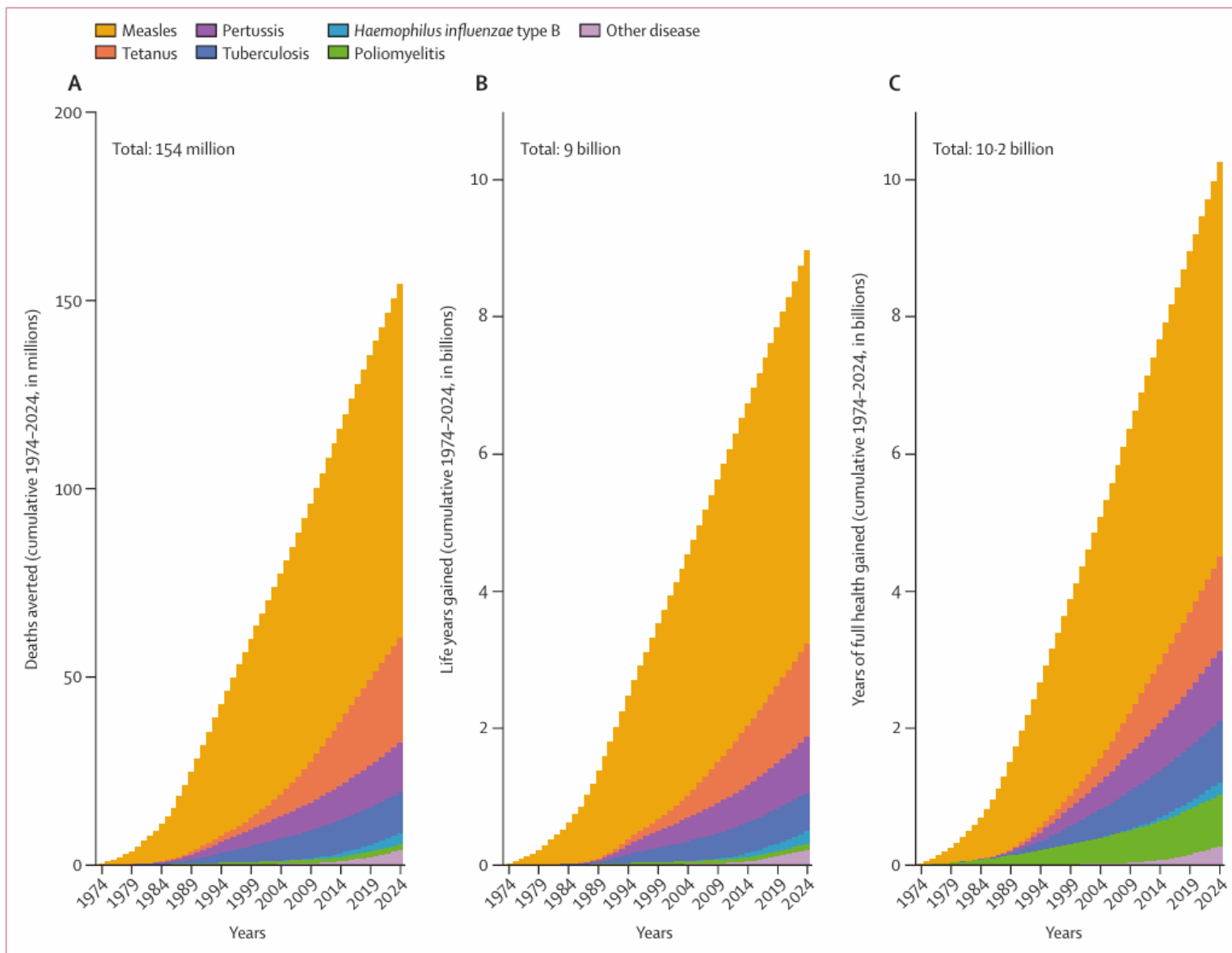


Figure 1: Deaths averted, years of life saved, and years of full health gained due to vaccination
 Data are cumulative 1974–2024. Measles: deaths averted: 93.7 million; years of life saved: 5.7 billion; years of full health gained: 5.8 billion. Tetanus: deaths averted:

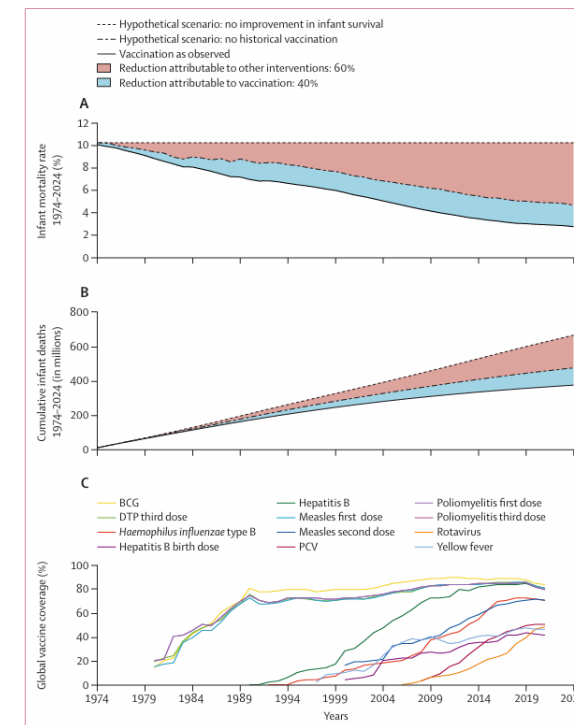


Figure 2: Infant mortality 1974–2024, the proportional effect of vaccination on overall decreasing trends, and global vaccine coverage
 DTP=diphtheria-tetanus-pertussis. PCV=pneumococcal conjugate vaccine.

Proportion of reduction in mortality attributable to vaccines

Andrew Shattock et al, 2024

UK Immunisation schedule

Vaccine/Age	Maternal	2 months	3 months	4 months	12 m	18m	3-5 years	5-11 years	13-18 y	Adults
Diphtheria, Tetanus, Pertussis, Polio, Hib, HBV	DTaP	DTaP-IPV-HBV-Hib	DTaP-IPV-HBV-Hib	DTaP-IPV-HBV-Hib		DTaP-IPV-HBV-Hib			dT-IPV	
Meningococcal ACWY									MenACWY	
Rotavirus		Rv	Rv							
Measles, Mumps, Rubella, Varicella					MMRV	MMRV				Zost
Pneumococcal	GBS			PCV13	PCV13					PCV20
Cervical cancer (HPV)									HPVx1	
Meningococcal B		MenB	MenB		MenB					
Influenza	TIV						LAIV	LAIV		Influenza
RSV	RSV									RSV

Neurological conditions
EBV
VZV/HSV

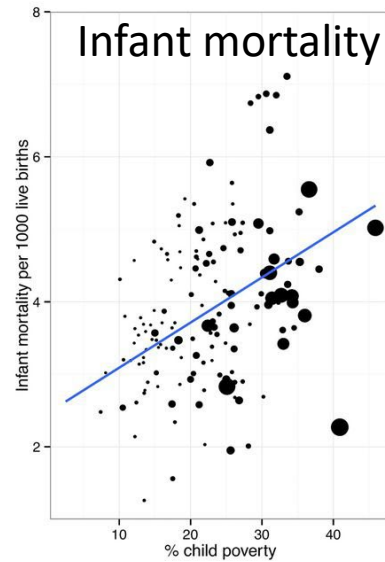
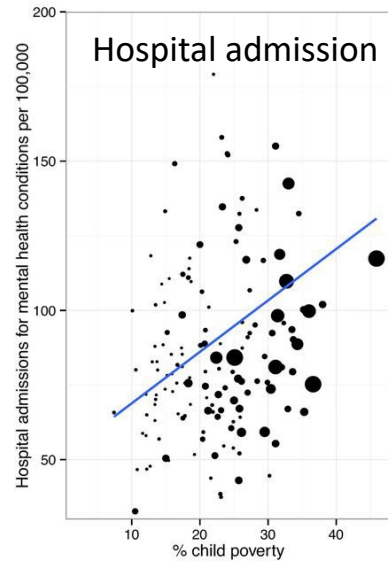
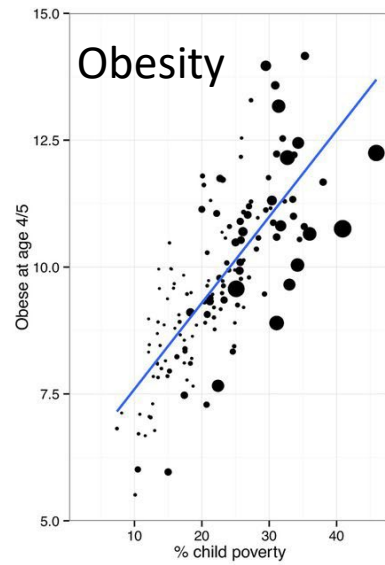
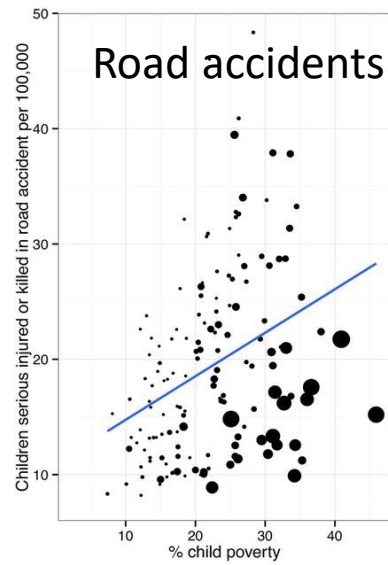
Nosocomial infections
Staph.
Gram negatives
C Diff

Cancer

E coli

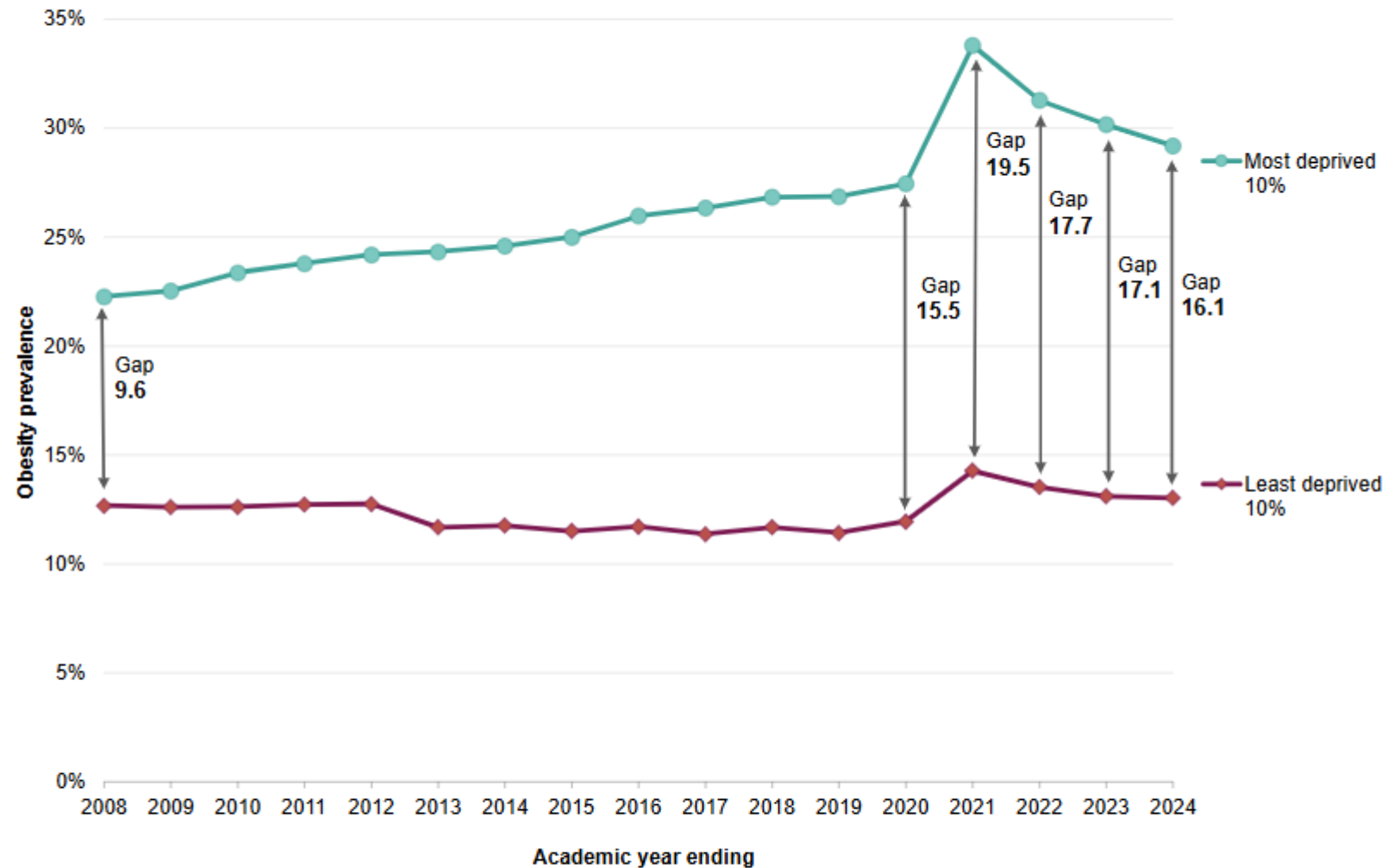
hMPV
Paraflu

Respiratory viruses
hMPV
Paraflu



Child health outcomes strongly associated with poverty

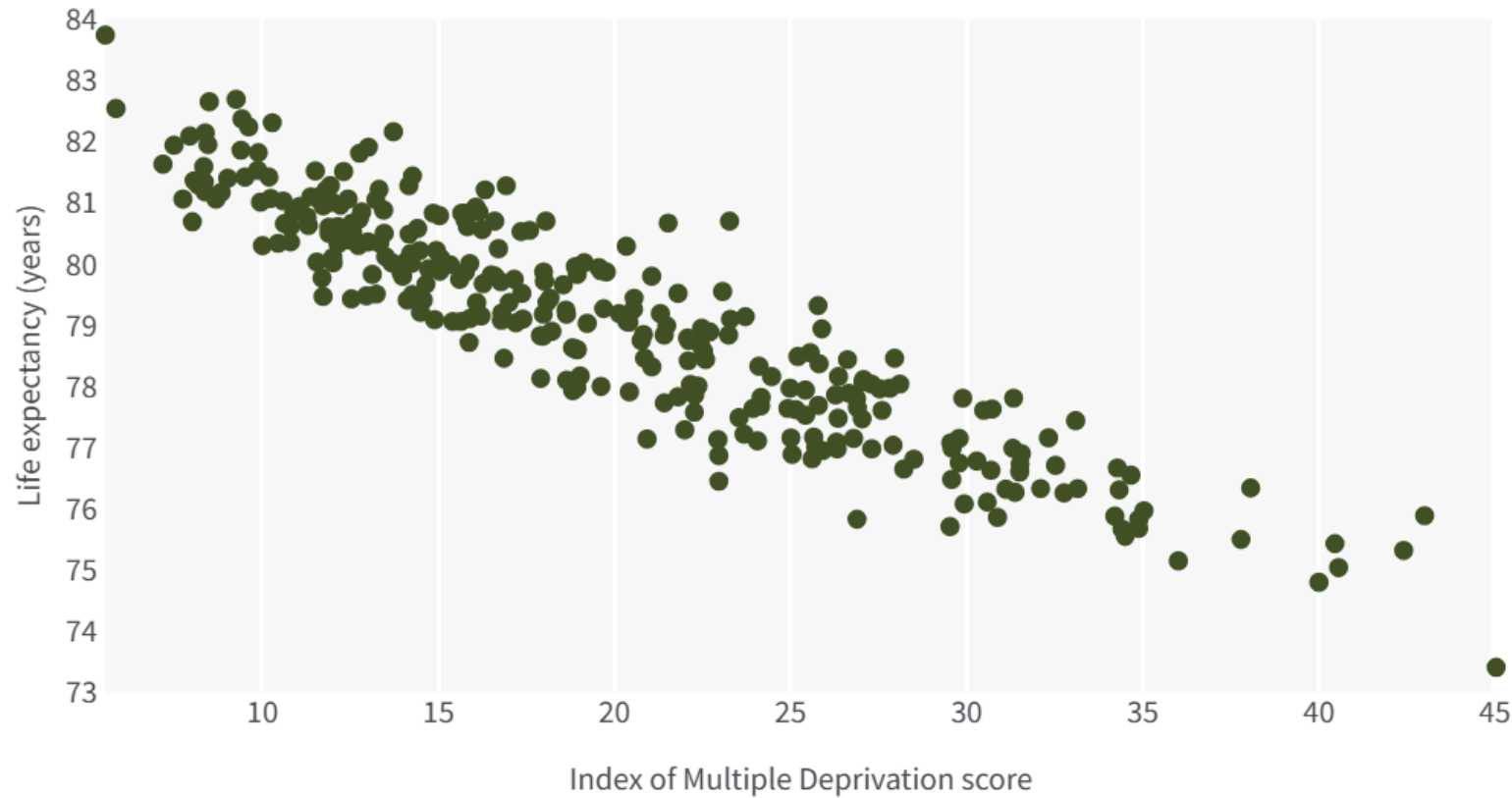
Figure 4: inequalities gap in obesity prevalence among year 6 (age 10 to 11 years) children for academic years ending 2008 to 2024, based on area of child residence.



Data source: [National Child Measurement Programme](#).

Figure 3 Life expectancy for local authorities by deprivation, males

England, 2020–22



Source: [Office for National Statistics \(2024\)](#), [Ministry of Housing, Communities and Local Government \(2019\)](#).

Local authorities that were formed or removed since the 2019 release of Index of Multiple Deprivation scores have not been included

TheKingsFund>

What is the underlying cause of poor health and global under 5 deaths?

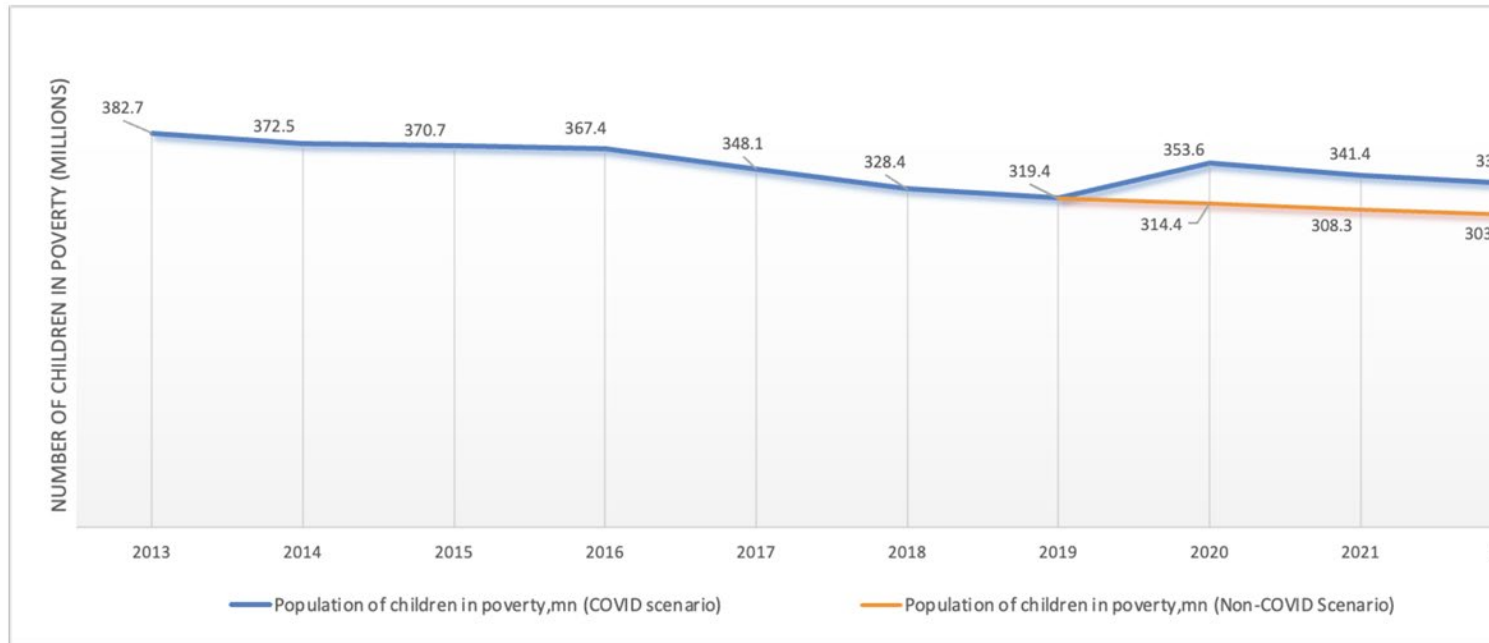
Poverty

Extreme Poverty

surviving on less than \$2.15 a day (£1.57)

333 million children

Figure 1: Children (millions) living in extreme poverty (\$2.15), trends.



The future of health rests on prevention

- The future of health and health systems depends on the environment we provide for children <5 years.....mainly not health solutions
- Health systems will have to increasingly focus on NCDs for the next generation unless we improve the health and life chances of children now
- Poverty is strongly associated with poor health
- Vaccine-preventable disease is still the major threat to children globally in 2024

Prevention: the future of health



But its invisible

UNDER-FIVE MORTALITY RATE - TOTAL

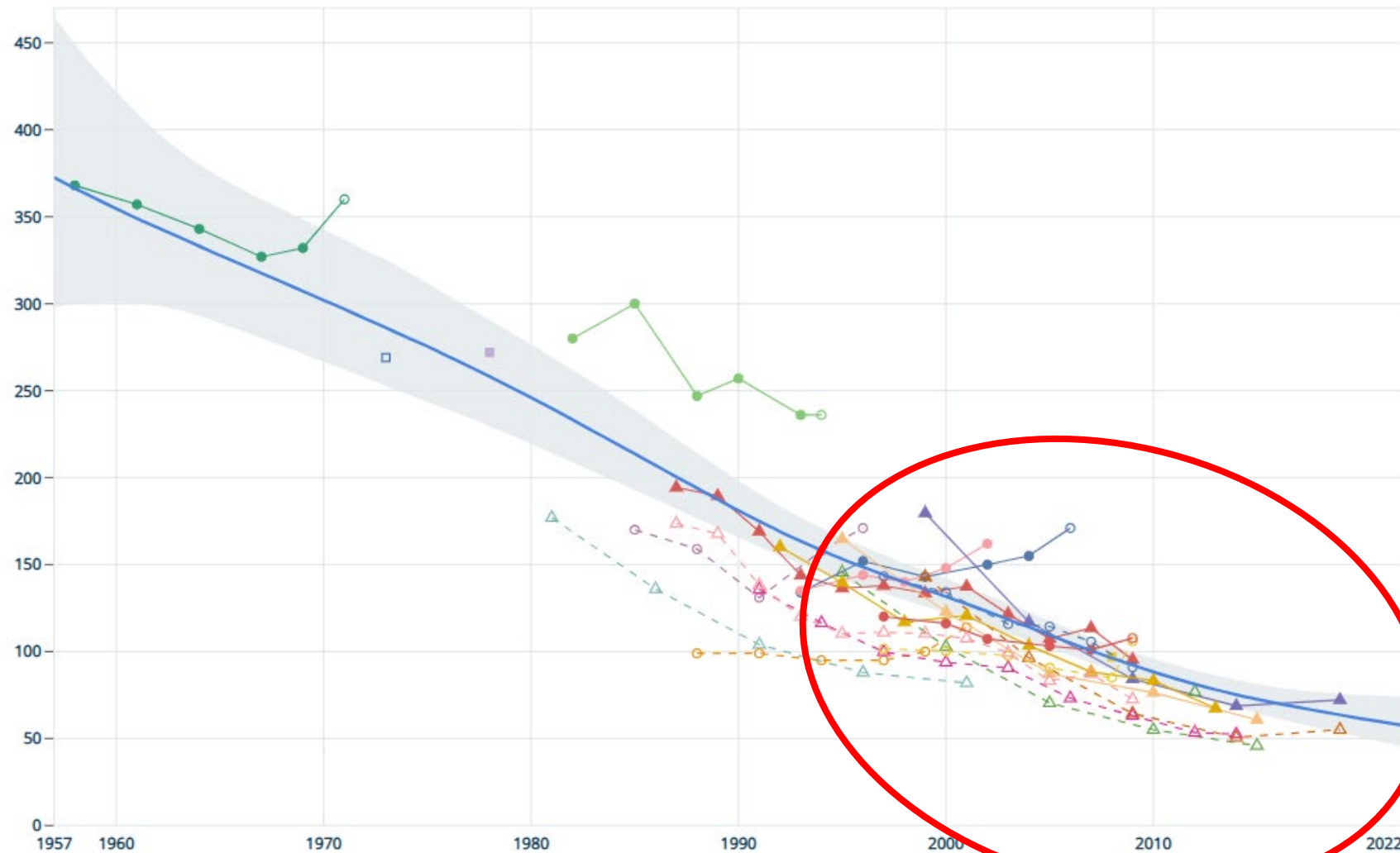
CHART

ESTIMATES

SOURCE DATA

Deaths per 1,000 live births

Estimation model: B3



558 deaths/hour

UN Inter-agency
Group for Child
Mortality Estimation

Oxford Vaccine Group 2024 (30th anniversary)

