Public Health England

Environmental Monitoring and Human Health

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PHE Responsibilities

We are responsible for:

- making the public healthier and reducing differences between the health of different groups by promoting healthier lifestyles, advising government and supporting action by local government, the NHS and the public
- protecting the nation from public health hazards
- preparing for and responding to public health emergencies
- improving the health of the whole population by sharing our information and expertise, and identifying and preparing for future public health challenges
- supporting local authorities and the NHS to plan and provide health and social care services such as immunisation and screening programmes, and to develop the public health system and its specialist workforce
- researching, collecting and analysing data to improve our understanding of public health challenges, and come up with answers to public health problems

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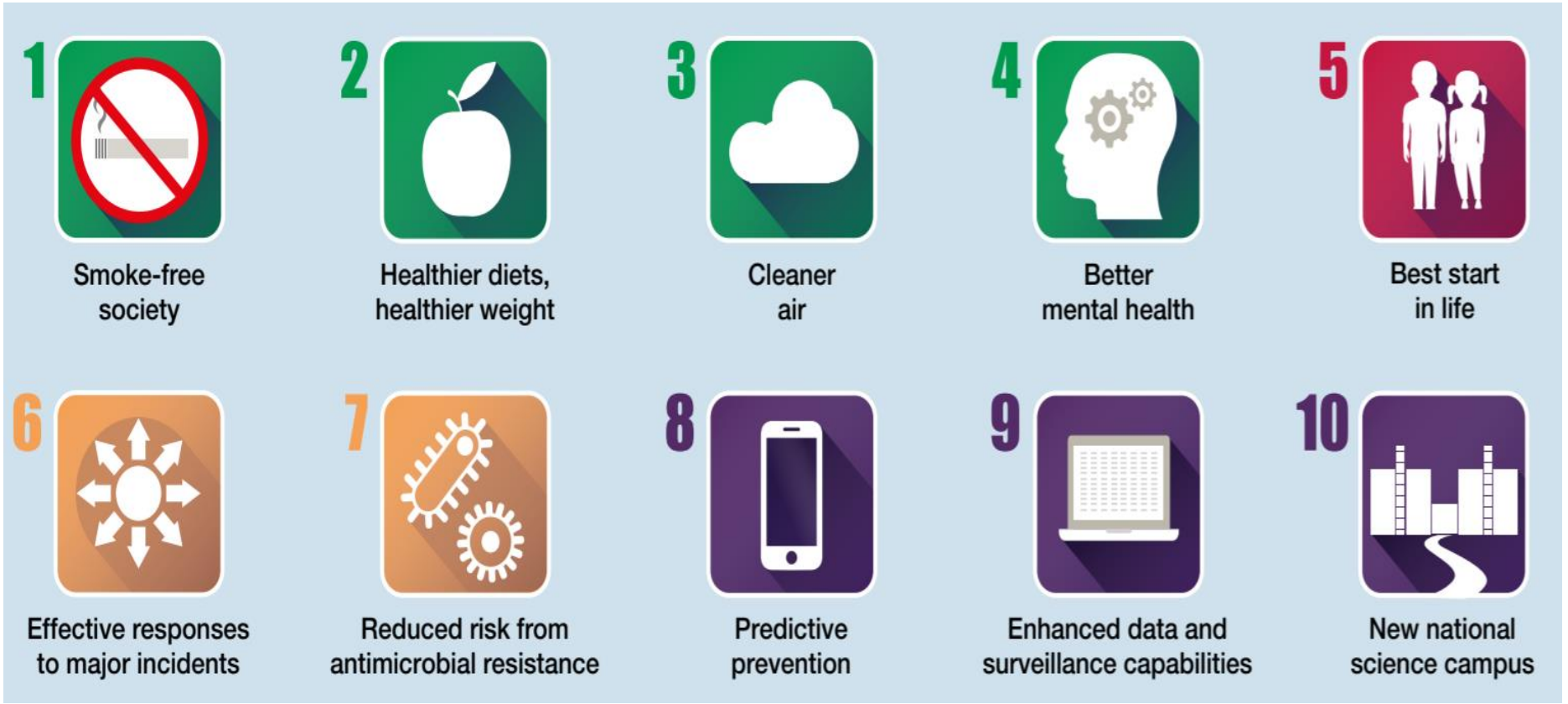
Priorities



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CRCE

	Radiation	Chemicals	Environmental hazards
Interventions	Metrology, dosimetry, support for environmental remediation, solar monitoring, body monitoring, operational health physics	NPIS, private water sources, support clean-up of contaminated land	Regulatory support (environmental permitting, NSIPs, Planning) cold, heat and flooding plans, NAP, air pollution review , support clean-up of contaminated land
Evidence	Lighting, lasers, EMF, Expert Committees National Risk Assessment	E-cigarette toxicology, environmental epidemiology, Expert Committees, biomonitoring, asthma, nanomaterials, complex materials (UVCBs)	Air pollution evidence development (e.g indoor air, total exposures, vulnerable groups), epidemiology of noise, Expert Committees, HPRUs
Advice	Radon, alerting, UV, electromagnetic fields, PQs Radiation in the environment, medical & dental uses, industrial applications, Consumer Products	REACH, alerting, PQs, fluoridation, food contamination, fungal bioaerosols, flame retardants, composting and waste disposal, fentanyls	Pollution (air, water, land) inc. shale gas, landfill sites, WHO advice on climate change, PQs, local teams, training
Emergency Planning and response	CBRN advice to government, response to incidents, emergency preparedness	CBRN advice to government, response to incidents, emergency preparedness, decontamination	Chemical fires, post-incident monitoring, NIERP, COMAH sites, volcanic eruptions, floods
Standards setting	Medical & dental exposures , BSSD, operational protection, ICRP, ICNIRP, WHO, UNSCEAR, IAEA, BSI	OECD standards, nanoparticles, complex materials, UVCBs, consumer standards	Local air quality metrics, health basis for national AQ standards
Income generation	Radiation protection, consultancy, DXPS, dosimetry, training, metrology, laboratory services , EU projects, research, NIHR	External funding, global health, ROI, Gibraltar, Horizon 2020 programmes, industrial funding	Charged-for services, HPRUs

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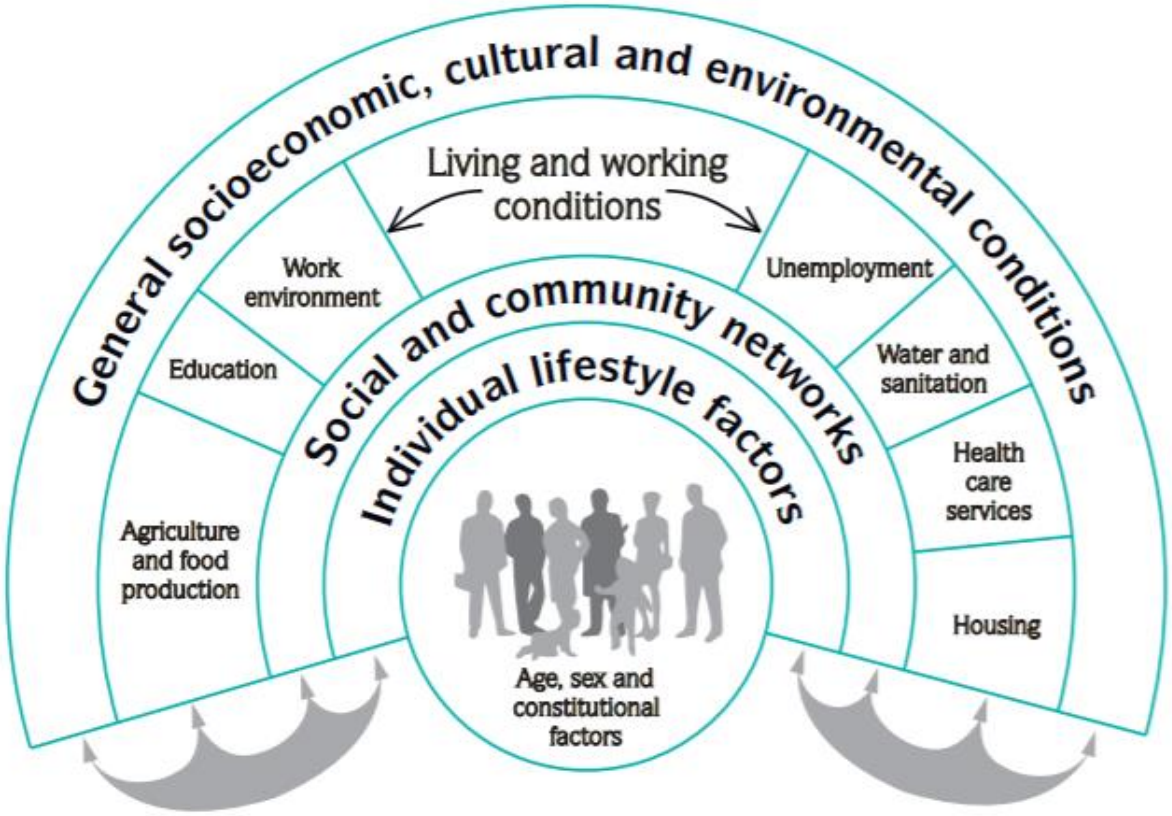
Main determinants of health



Source: Dahlgren and Whitehead, 1993

https://www.who.int/social_determinants/resources/leveling_up_part2.pdf

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Environmental Public Health

Strategic Objectives

- **Health Protection**: protection of the public from radiation, chemicals and other environmental hazards
- **Health Improvement:** optimising the environment to encourage healthy lifestyles
- **Public confidence:** presenting the best scientific evidence in a compelling and accessible manner
- **Strengthened specialist capabilities:** evidence-based and appropriate standards and regulations for radiation, chemicals and other potential environmental hazards to health

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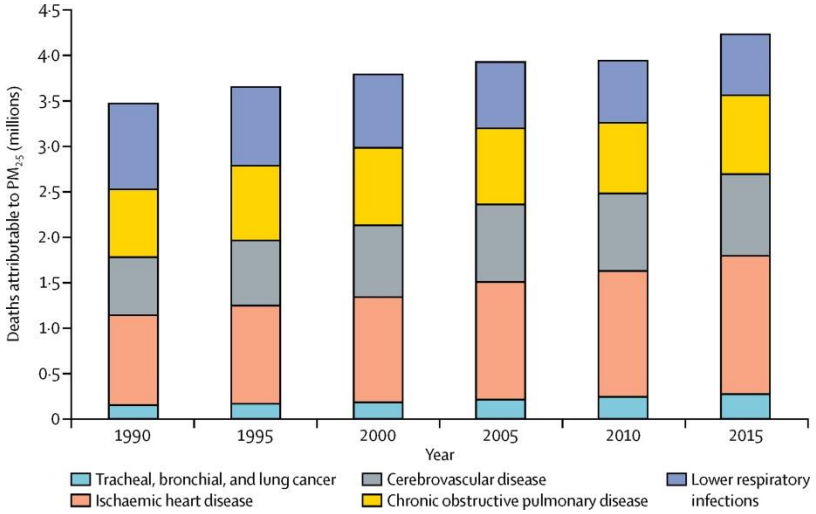
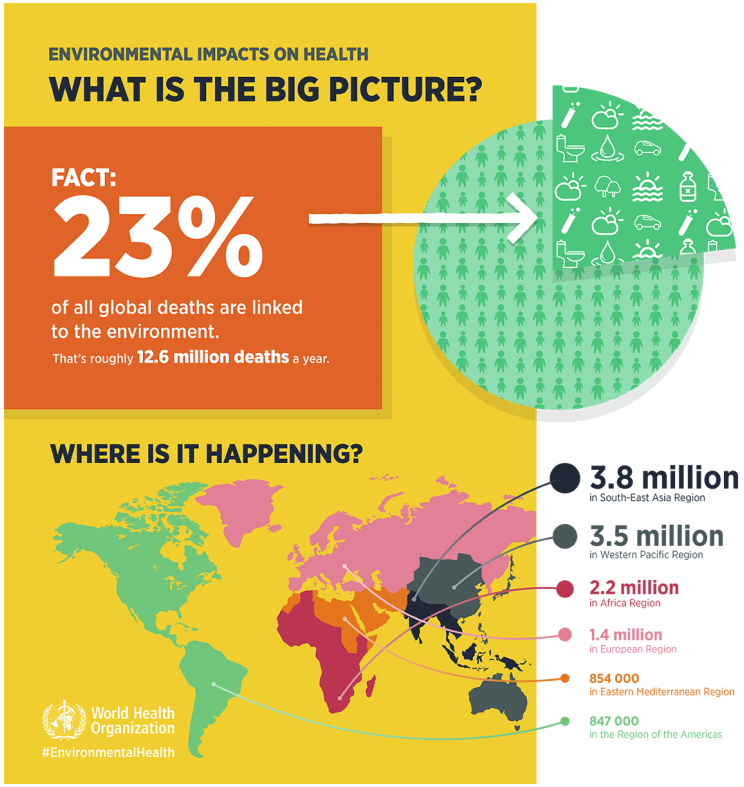
Why does it matter?

- Major contributor to morbidity and mortality
- Urbanised and industrialised populations
- CBRN threat
- Global climate change





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Environmental Pollution

Several factors are relevant when assessing the potential impacts of environmental pollution on health:

- Emissions of pollutants
- Environmental concentrations of pollutants
- Public exposures to pollutants
- Health outcomes
- Local plans, policies and programmes on the environment and health

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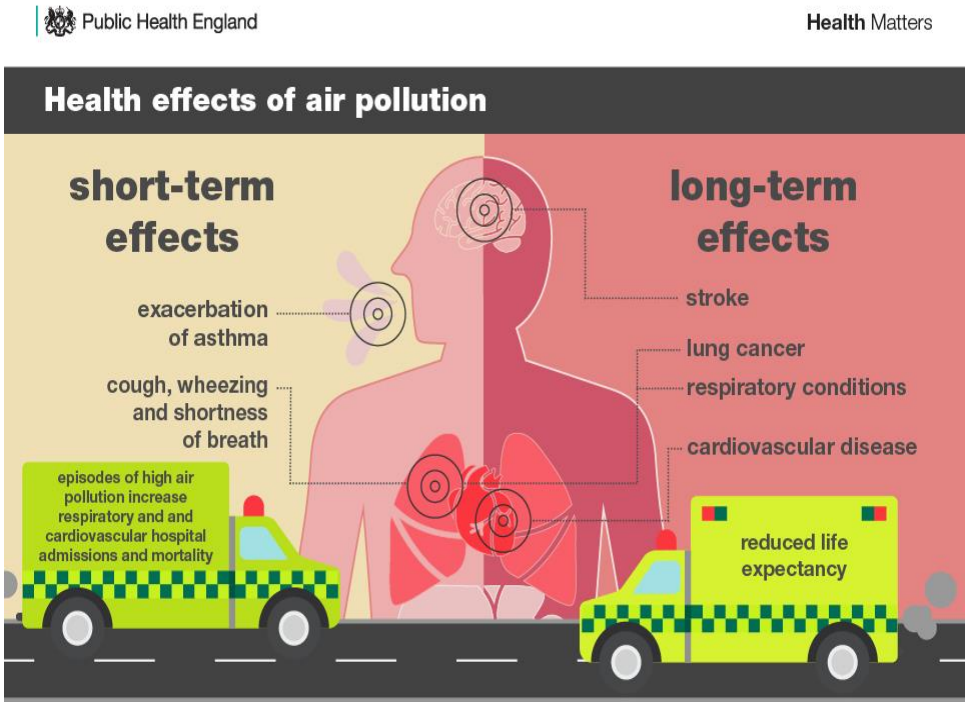
Scale of the Problem



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Air Quality

- Concentrations of air pollutants, such as nitrogen dioxide and particulate matter, recorded at monitoring locations in a given local authority area
- Provides an indication of pollution in a specific location, information collected as part of Local Air Quality Management (the process by which local authorities monitor, assess and take action to improve local air quality

PHOF: Fraction of mortality attributable to particulate air pollution

- Background particulate matter ($PM_{2.5}$) concentrations from Defra **modelling**
- Estimated anthropogenic component (basing the burden on total $PM_{2.5}$ might overstate the potential influence of policy interventions)
- Population-weighted concentrations for each local authority

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Fraction of mortality attributable to particulate air pollution

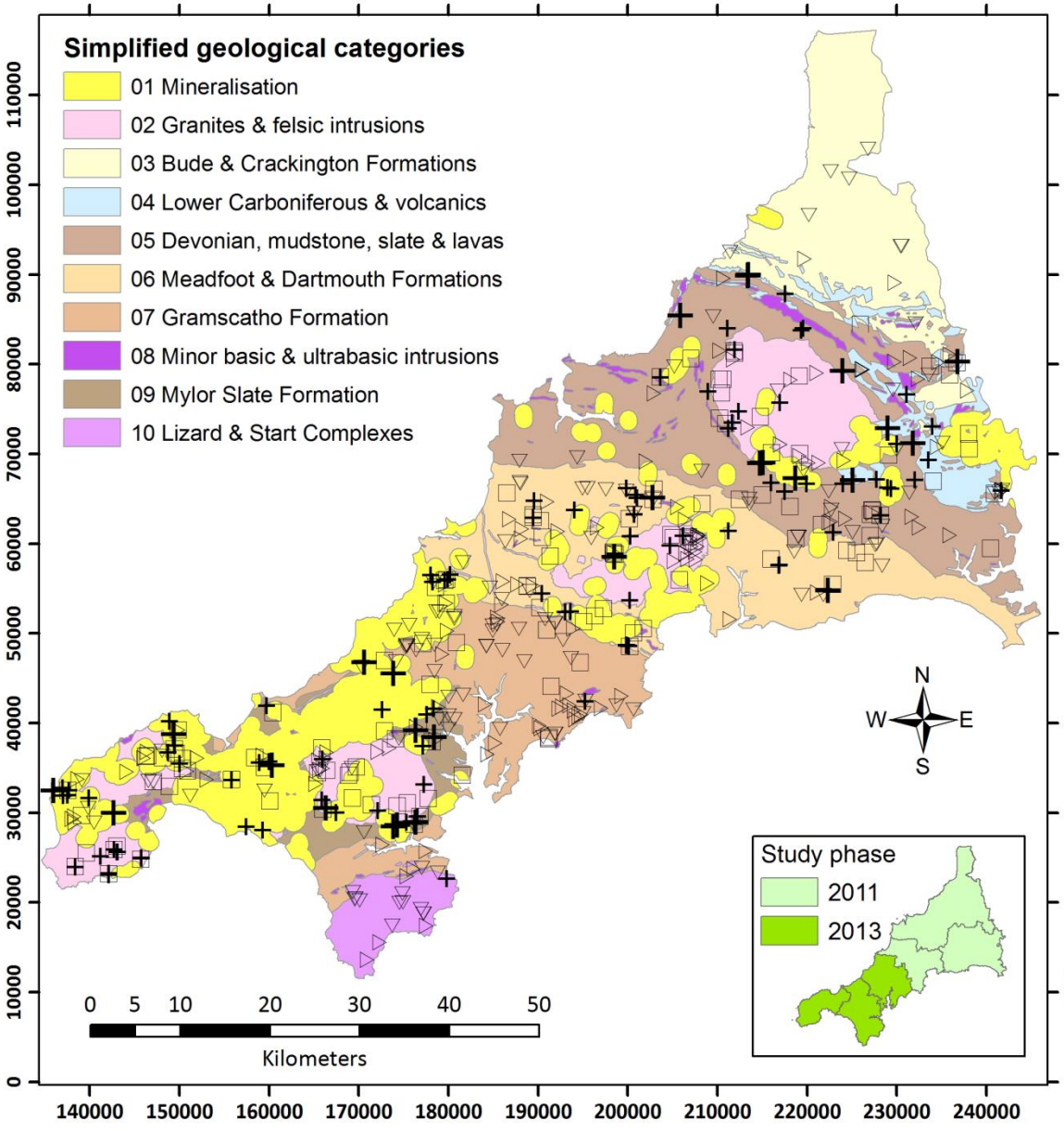
Fraction of mortality attributable to particulate air pollution New data 2018 Proportion - %

Export table as image Export table as CSV file

Area	Recent Trend	Count	Value	95% Lower CI	95% Upper CI
England	–	-	5.2	-	-
North West region	–	-	4.3	-	-
Liverpool	–	-	5.1	-	-
Knowsley	–	-	4.9	-	-
Salford	–	-	4.8	-	-
Manchester	–	-	4.8	-	-
Halton	–	-	4.7	-	-
Bolton	–	-	4.6	-	-
Tameside	–	-	4.6	-	-
St. Helens	–	-	4.6	-	-
Oldham	–	-	4.5	-	-
Warrington	–	-	4.5	-	-
Trafford	–	-	4.5	-	-
Bury	–	-	4.5	-	-
Stockport	–	-	4.4	-	-
Rochdale	–	-	4.4	-	-

The chemistry of private drinking water supplies in Cornwall

Concentration data for all drinking water samples



Arsenic (µg/L)

	11 - 440
PCV	
	1.5 - 10
75th percentile	0.38 - 1.4
50th percentile	0.16 - 0.37
25th percentile	<0.15

Parameter	Arsenic (As)
Prescribed concentration or value (PCV) - maximum concentration	10 µg/L
Total number of samples	491
Samples above the PCV	27
Percentage of samples above the PCV	5

Analysis by ICP-MS.
Map compiled June 2013.

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

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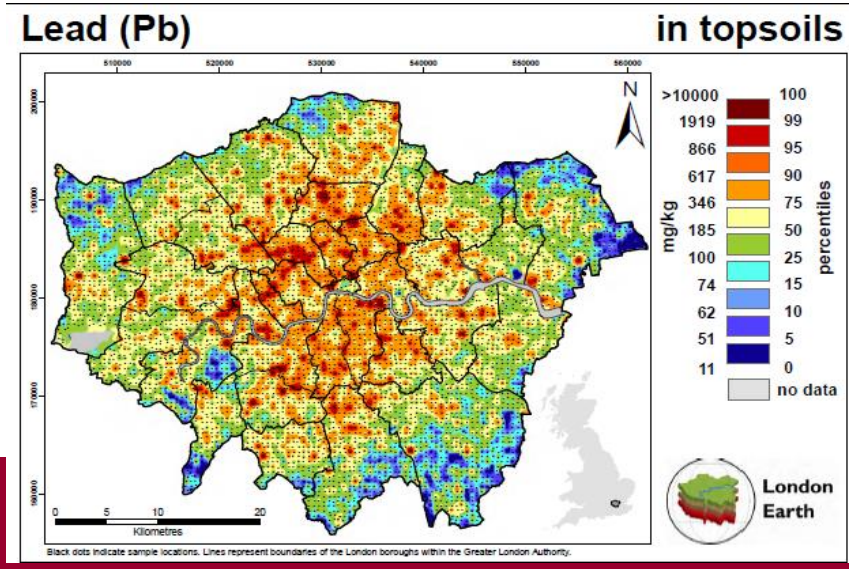
Background Soil Levels

G-Base/London Earth (BGS)

- Assessment of geochemical variation in the shallow subsurface
- Survey data provide background values to set the context for site specific investigations.
- Highest concentrations concentrated on the oldest, most intensely urbanised/Industrialised areas
- Enhances our understanding of interactions between people and ecosystems.



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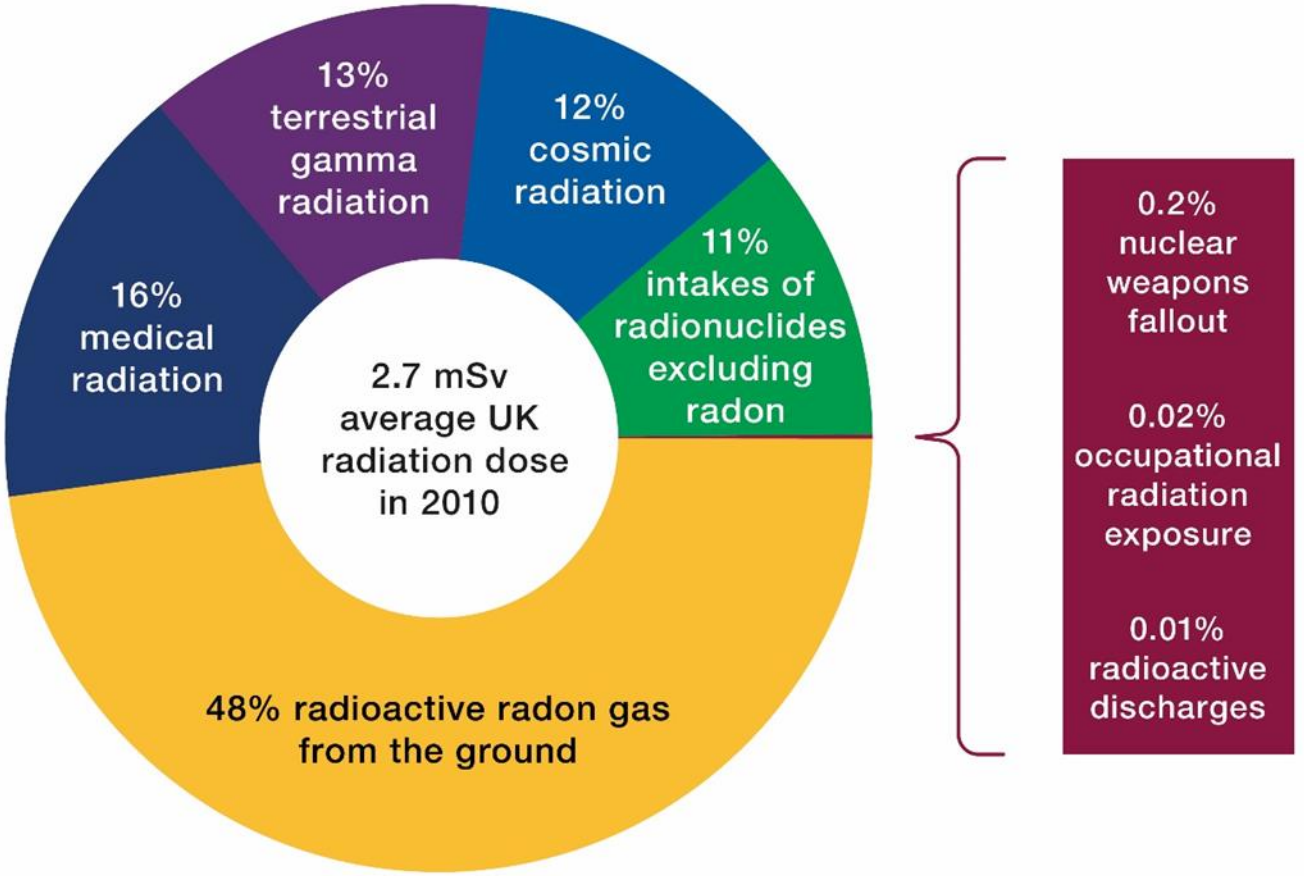
UK average radiation exposure



Breakdown of the average UK radiation dose in 2010 by source of exposure

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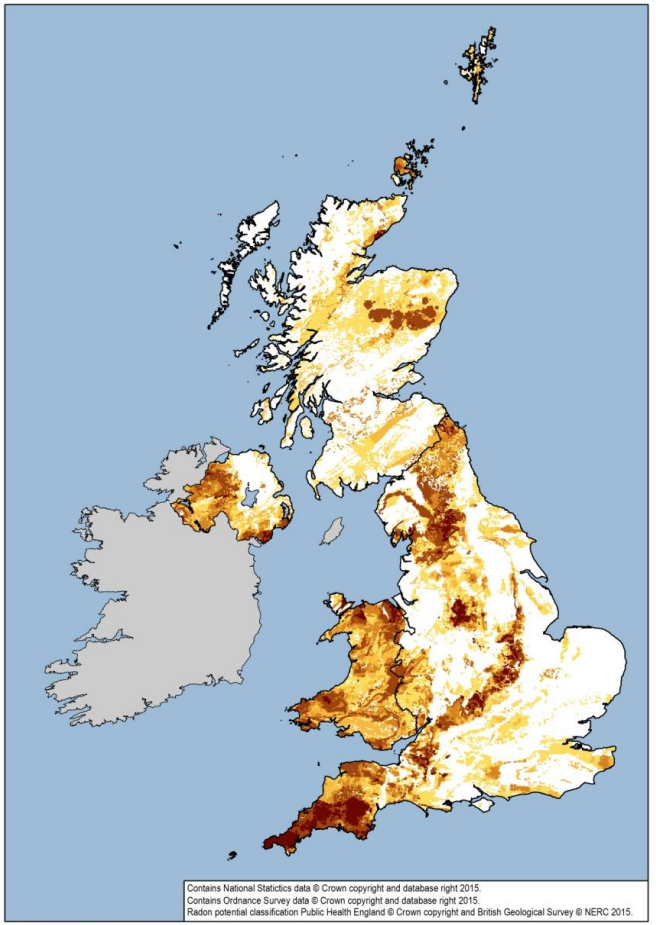
Radon

- Radon is an established carcinogen – strong synergy with smoking
- Maps highlight areas of greatest risk
- Ground (geology) is main source, modified by building construction and use
- Undertake measurements to determine radon levels – assess against action level for homes (200 Bq m^{-3}) or IRR17 (300 Bq m^{-3}) annual average radon concentration
- Can mitigate existing buildings or protect new buildings from radon ingress
- www.ukradon.org



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Emerging Issues

- Landfill Directive EU targets – 55% municipal waste recycled by 2025
- No. composting facilities increasing
- Compost often contains plastic due to improper disposal
- Preliminary examination of microplastic emissions from an industrial composting facility in the UK.
- Microplastics were found in air and compost samples

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Known environmental impacts are the tip of the iceberg

Air pollution mortality
Radon
Lead
Occupational radiation
UV
Fires

Asthma and allergens
Morbidity
Impact on behaviour
Noise
Indoor environments
Variable chemical mixtures
Emerging technologies
Mental health
Environment and mental health/dementia
Impact of climate change

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Environmental net gain - health benefits

- Defra's *25 Year Plan to Improve the Environment:* " aims to embed an 'environmental net gain' principle for development, including housing and infrastructure"
- **Environmental net gain principles embed assessment and improvement of the environment and health and realisation of benefits**
- Practical use in **spatial planning**, **environmental permitting**, and **procurement**

Environmental public health evidence is already being used in natural capital work, for example:

- **Water, air and land quality**
- **Vegetation: air pollution removal**
- **Noise mitigation**
- **Flood risk reduction**
- **Urban cooling**

Existing health cost-benefit tools can inform natural capital appraisals

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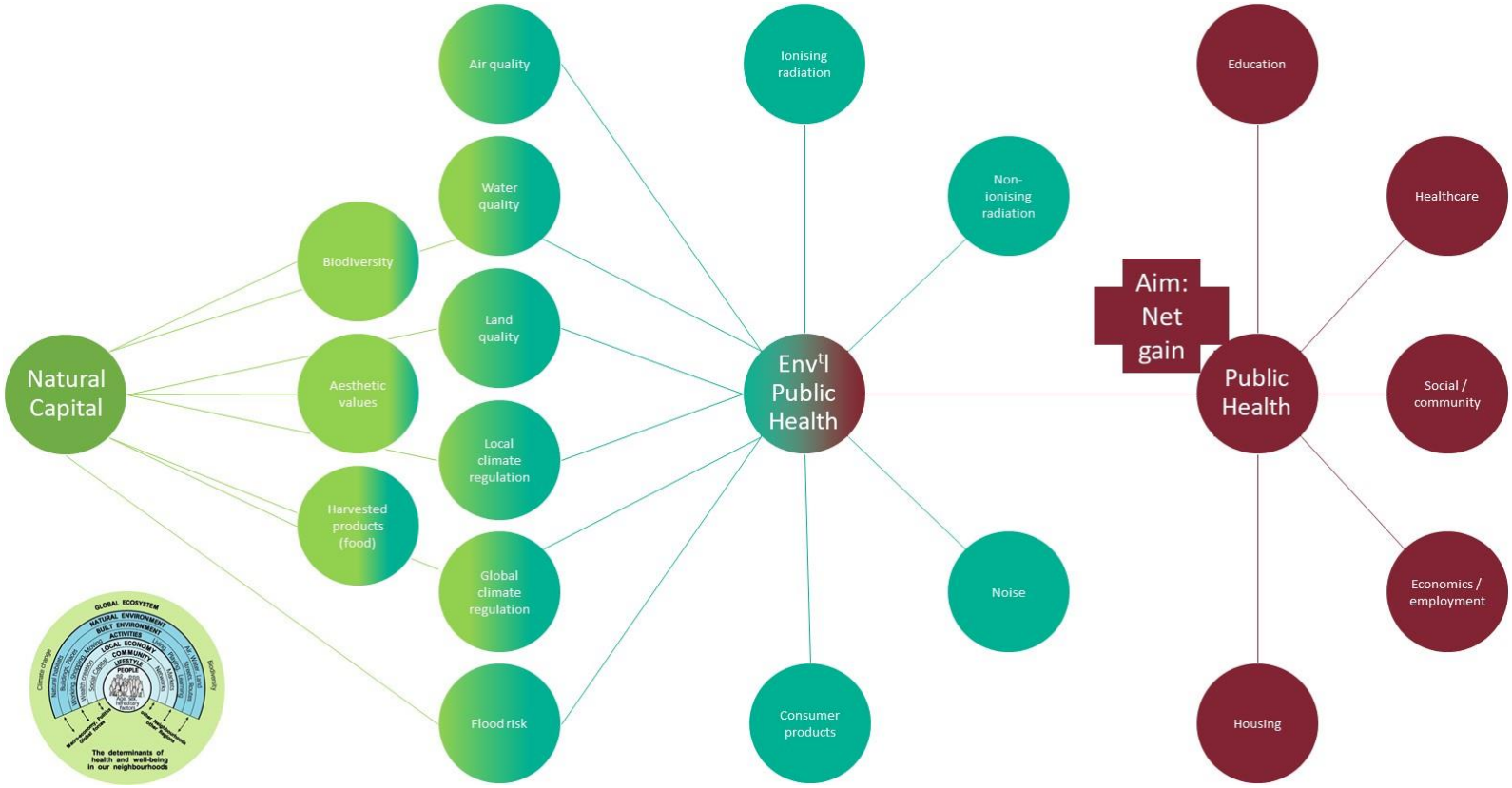
Natural capital and public health frameworks…



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Delivering in partnership

Environment is increasingly recognised as a key element in protecting and improving the public's health – huge opportunities remain

We aim to provide leadership in environmental public health, but we cannot do it alone

- EPH forms part of a broader national and international environmental and public health agenda
- much of this must be developed, customised and delivered locally – our local authority partners are key
- we are part of an ecosystem that also includes NHS, devolved administrations, other government departments and agencies, the voluntary sector, and many others