Public Health Research at York
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Acknowledging our funders

The breadth of our research is reflected in a rich and diverse set of external partners and funders, including funding from the National Institute for Health Research, as well as the UK Research Councils, government departments and health research charities.
Introduction

Public health research at the University of York builds on a rich tradition at the University and in the City of York, reaching back to social reformer Seebohm Rowntree’s studies of poverty in York, conducted in 1899, 1935 and 1951. Our current research focuses on the social and environmental determinants of population health, interventions to improve health and wellbeing, and the development and application of advanced methods. Here, we describe York’s expertise and experience in researching the health of the public and present case studies that highlight influential work in this area.

The University of York provides a rich environment for public health research collaborations across disciplinary boundaries. Our research focuses on real world problems and grand challenges to population health across the world. To accomplish this, we work together across the Sciences, Social Sciences and Arts & Humanities, to understand and intervene to improve the public’s health.

Our success builds on York’s strategic commitment to flexible and interdisciplinary working. Academics within departments including Health Sciences, Biology, Centre for Health Economics, Centre for Reviews and Dissemination, Chemistry, Sociology, Economics, Social Policy and Social Work, Environment and Geography, Politics, Law and Management, also connect through interdisciplinary centres, such as the Centre for Future Health, Interdisciplinary Global Development Centre and Leverhulme Centre for Anthropocene Biodiversity, and across our university-wide Research Themes. Public health research can be found within all seven themes: Health & Wellbeing; Justice & Equality; Environmental Sustainability and Resilience; Creativity; Culture & Communication; Risk, Evidence and Decision Making; and Technologies for the Future.

Research at the University of York will continue to aim to improve health for all population groups, reducing inequalities in health and wellbeing and creating social and economic impact as well as reducing suffering and strengthening social justice.
Over past decades, public health research and policy has been dominated by a focus on individual health-related behaviour and interventions designed to change behaviour. Policies have, arguably, paid less attention to addressing the systemic and structural determinants of population health and health inequalities. Global population health is dependent on the health of our environment and at York, in the face of the challenges of climate change, we have developed a holistic perspective towards public health research. The two-way interactions between people and planet, affecting the health and wellbeing of the biophysical environment as well as human beings, are important areas of focus.

Economist Kate Raworth’s ‘doughnut model’ offers a framework for thinking about how we create a world that creates economic development, respects planetary boundaries and has equality, equity and wellbeing at its heart.* The model describes a ‘safe and just space for humanity’ to thrive, supported by strong and inclusive social foundations and consideration of environmental ceilings - limits to planetary resources. In the first two sections of this brochure, we present research at York that seeks to understand and improve public health by addressing each of the social foundations and each of the environmental boundaries of the doughnut model.

*Awww.kateraworth.com
Social foundations

WATER

The United Nations has recognised access to clean water and sanitation as basic human rights since 2010. The UN Sustainable Development Goals for 2030 include targets to tackle the 40% of the world’s population affected by water scarcity, the 663 million without clean drinking water, the 2.4 billion without basic sanitation, and the devastating consequences for human health, dignity and prosperity. Every day, around 1000 children die of preventable water and sanitation-related diseases. Just as important for public health as access to clean water, is what happens to wastewater discharged into rivers and lakes without pollution removal.

Researchers at York design new technologies to provide people in some of the world’s poorest countries with assurance that their water is safe to drink. Instead of imposing technological solutions from outside, they are co-creating solutions designed to meet the needs, skills and environments of communities. Research at York supporting the public health importance of clean water and sanitation has also focused on the ways in which biodiversity underpins the provision of clean water and protects against flooding, and how local implementation of anaerobic digestion treatment of human waste can recover energy and nutrients for local use and reduce downstream water pollution. Historians at York are researching how water-related policies before and after colonialism shaped health and development in east Africa.

CASE STUDY
Tackling ill-health in a South Pacific community with innovative technology that allows access to clean water

On the islands of Vanuatu, an archipelago of over 80 volcanic islands lying 1,750 kilometres off the coast of northern Australia, five thousand isolated rural households depend on unimproved river, lake or spring water supplies that are regularly affected by natural disasters such as drought and cyclones.

An interdisciplinary team of York researchers are working with Oxfam and local communities on the islands to co-design and test sensors that warn residents when their untreated supplies are infected with bacteria, allowing the community to switch to other supplies, or treat their water before they use it.

Traditional approaches for technology development, where technologies are developed on behalf of people, tend to have limited impact. This research is taking a different approach, termed Integrated Participatory Technology Development (iPTD), in which the local community is embedded at every phase of the innovation process from the outset.

Reference
Project Lead – Dr Steve Johnson, Department of Electronic Engineering

For more information visit york.ac.uk/research/themes/vanuatu-clean-water
The United Nations Food and Agriculture Organisation estimates that the world will require 60% more food by 2050. Although globally we currently produce enough to feed everybody, 815 million people worldwide are hungry and 45% of infant deaths are caused by malnutrition. At the same time, 1.9 billion people worldwide are overweight, and a third of all food produced is wasted. In the face of these global challenges, achieving UN Sustainable Development Goal 2 – zero hunger by 2030 – will require new thinking, collaboration and innovation. Closer to home, the obesity epidemic, rising food insecurity, and an unhealthy food environment are causes for public health concern.

AgriFood at York brings together the University’s world-leading centres, researchers and projects to tackle these global problems. We are lead partners in the N8 AgriFood Consortium, combining world-leading crop and livestock research with extensive expertise in social sciences in the eight most research intensive universities in the North of England. N8 AgriFood has three main themes: sustainable food production, resilient supply chains and improved consumption and health. Areas of research expertise include soil science, crop genetics and the socioeconomics of supply chains, tackling food waste and the interdisciplinary study of resilient supply chains across the food industry.

Dr Madeleine Power has carried out in-depth studies of food insecurity among White British and Pakistani Muslim families in Bradford, documenting the mental and physical health impact of food insecurity and examining how ethnicity, culture and religion shape food aid and food needs. She is part of the research team of ‘Integrating knowledge for food systems resilience’ (IKnowFood), a four year project led by Professor Bob Doherty at York, funded by the Global Food Security Programme. IKnowFood takes a multi-disciplinary approach to develop understanding of food system resilience, and to produce new datasets, information resources, appropriate technology tools for farmers, decision making tools for business and consumer mobile technologies. In-depth studies in the UK are carried out and examined in the context of global food security.

Reference
Households need access to affordable, clean and renewable energy sources for their own health and the health of the planet. 1.1 billion people throughout the world have no access to electricity. More than 40% of the world’s population use unhealthy and polluting fuel for cooking. Renewable energy from hydropower, biofuels, wind, sun, biogas, geothermal sources, waves and waste offer the possibility to address public health problems resulting from fuel poverty and dirty fuel, but at the moment less than 20% of global energy comes from such sources.

York researchers work on meeting energy needs in the Global South, for example evaluating programmes to improve cooking stoves in Tanzania. Nearer home, researchers in the Department of Social Policy and Social Work have studied the lived experience of fuel poor households coping with welfare reforms, and examined the impact of policy changes on fuel poverty among people living with disabilities. In our Environment and Geography Department, researchers are developing people-centred and justice-based approaches to transitions to sustainable energy in Mozambique.

CASE STUDY
Complex demands of global energy transitions in poorer countries of the Global South call for the development of new theories of energy justice

York researchers, supported by the Global Challenges Research Fund and the British Academy, have investigated how transformative change in access to energy can be achieved in challenging situations where energy systems are underdeveloped. They sought to incorporate multiple perspectives on energy justice, and to consider what conditions make action possible.

Analysis of sustainable energy transitions in post-colonial Mozambique highlights the vital importance of local understandings of energy justice, and also the necessity for people to have autonomy and self-determination in relation to energy - expressed as ‘energy sovereignty’ - if transitions to lower carbon energy sources are to be successful.

Reference
Access to decent and affordable housing for all, in communities which are socially, economically and environmentally sustainable, is vital for population wellbeing. Poor housing and damp, cold or polluted indoor environments contribute to illness and injuries. Overcrowded housing affects stress, risks of infection, child development and general wellbeing. In the wider environment, housing in areas with air and noise pollution, and lack of access to healthy amenities such as green space, is also a public health problem. Neighbourhoods may also be inaccessible to people with limited mobility, undermining wellbeing and independence. Areas characterised by spatial concentrations of poverty are often stressful environments in which to live and in which life chances are restricted. Throughout the world, 828 million people live in slums.

In the UK, bad housing contributes to high rates of respiratory disease, including asthma, particularly for children, and mental health problems among all ages; sustained and recurrent homelessness is also linked to serious mental and physical health problems. Housing cost-induced poverty, frequent unwanted moves and evictions all undermine wellbeing, and disrupt continuity of care and undermine the effectiveness of treatment.

Researchers at York study a wide range of services that support people to stay in their existing homes – including those focussed on older people, people with dementia, disabilities, and mental illness, and those with experience of homelessness, precarious, inadequate and unaffordable housing, domestic violence, and substance misuse.

York’s Centre for Housing Policy is a leading centre for interdisciplinary housing research and the University is currently investing £1m in a collaborative programme of research into housing inequalities and social justice. The programme will explore the intersections between housing, health, life chances and wellbeing.

CASE STUDY
Relative housing space inequality in England and Wales at highest levels in over fifty years

Overcrowding and inequality in housing has generally been measured through absolute rather than relative standards. Professor Becky Tunstall of the Centre for Housing Policy developed a relative measure of housing space consumption and applied it to housing data from England and Wales for the period 1911-2011, in order to analyse whether an overall reduction in overcrowding has been matched by a reduction in inequalities in the use of housing space.

Over 100 years, rates of overcrowding fell from 49% to 4%, but overall inequality in housing space remained almost unchanged. Housing space inequality reduced steadily from the 1920s to the 1980s, but from then on inequality started to increase again and by 2011, by some measures, this new trend had wiped out a century’s worth of reductions in housing space inequality. Possible explanations include increased income inequality, a reduction in social housing, the rise of one-person households, and development of larger homes.

Reference
Social foundations

**EDUCATION**

Education is a key social determinant of health. The knowledge, personal and social skills gained through education help people to access and use information and services to maintain their health and wellbeing and that of their family. Education and learning at all life-stages has been linked to better health.

At York, researchers are developing and evaluating interventions for children with early language difficulties, and parenting skills interventions, with the aim of improving cognitive development and social and emotional wellbeing at school entry. Others study sexual violence and harassment (and their prevention in school settings), how individuals’ social environment relates to their cognitive performance, and the roles of education and wellbeing in sustainable development.

*Reference*


**CASE STUDY**

Youth perspectives on violence and the role schools play in prevention

There are renewed calls from policy makers, activists, and educators in the United Kingdom to increase young people’s awareness of violence and there is increasing debate regarding the role of schools in promoting this awareness and developing preventive solutions. Responding to a robust body of literature emphasising the value of youth-led prevention initiatives, Professor Vanita Sundaram carried out a study across the North of England exploring young people’s views on violence and how it could be prevented, including possible actions of schools.

She found that a vital aspect of effective anti-violence education is a focus on gender, enabling young people to recognise and reject restrictive gender norms, expectations and identities. Schools have a key role to play in proactive violence prevention.

*Reference*

Social foundations

INCOME AND WORK

Income has a profound effect on health, and health improves with every step up the social ladder. Money matters not only to enable people to buy goods and services that improve health, but also because chronic stress caused by invidious social comparisons and anxiety is bad for health. Inequalities in income and wealth - the gap between rich and poor - are also linked to poor population health.

The quality of people’s work environments matters just as much as the money they earn - security of employment, a sense of control and fairness in the workplace, and how fulfilled and socially connected people feel in their work have all been linked to a wide range of health outcomes.

York has a strong tradition of work on poverty, income inequality and employment. Social scientists in sociology, epidemiology, social policy, management, politics and economics contribute, often in interdisciplinary teams, to advancing knowledge in this area. Recent research includes studies of the gender pay gap, in-work poverty, Universal Basic Income, low pay, the Living Wage, and the benefits system.

CASE STUDY

Rise of the conditional social security system: Does anyone benefit?

Benefit sanctions are now a central component of the UK’s increasingly conditional social security system. The WelCond study, a large five-year project led by Professor Peter Dwyer of the Department of Social Policy and Social Work, clearly demonstrates the severe negative material, health and housing outcomes that ensue when social security rights are removed or diminished by benefit sanctions. As well as on those sanctioned, there were clear negative emotional and health impacts on other family members, including children.

The study provides further strong evidence that the threat or application of a sanction resulted in behaviour changes and outcomes that undermine the possibility of people working in the future, particularly vulnerable people such as those with mental health problems. This challenges assertions that conditional social security regimes are likely to increase recipients’ engagement with paid work. Conditionality may well be more likely to exacerbate existing illness and disability, reducing the likelihood of employment.

Reference

The design, functions and financing of public health and health and social care services are important determinants of population health. Different health and care systems affect the effective and efficient delivery of improvements in both average levels of health and reductions in health inequalities and inequities.

At York, we have a strong tradition of research in this area – in the most recent national assessment of research quality, our research environment was rated joint first in the country in public health, health services and primary care. Health policy research, health economics and evidence synthesis are key areas of strength but York researchers contribute to many areas of health and care systems and health services research, nationally and around the world. For England’s Department of Health and Social Care, York researchers lead, co-lead or are partners in Policy Research Units on the economics of health systems and social care, economic methods of evaluation and public health policy, and fast-response policy analysis and rapid review facilities to support policy development, implementation and evaluation.

York researchers work to improve health services and systems around the world, including substantial projects on improving mental and physical health together in South Asia (IMPACT), on addressing smokeless tobacco use in South Asia (ASTRA), on the health system consequences of conflict in Colombia, and on using economics to inform health policy decision making and resource allocation in Malawi and Uganda, (Thanzi la Onse).

Since the mid-1990s, excess mortality has increased markedly for young adults in the north compared with the south of England. With colleagues from the University of Manchester, Professor Tim Doran examined the underlying causes of this and the contribution of socioeconomic deprivation. Sharp relative rises in deaths from cardiovascular reasons, alcohol misuse and drug misuse in the north compared with the south seem to have created new health divisions between England’s regions. This gap might be due to worsening social and health inequalities that have been experienced for many years. These divisions suggest increasing psychological distress, despair, and risk taking among young and middle-aged adults, particularly outside of London.

Reference
Health and wellbeing are profoundly compromised by war, conflict, injustice and social exclusion. Peaceful and inclusive societies, access to justice for all, and building effective, accountable institutions is as important for population health as health systems and services. Researchers at York are concerned with the mental and physical health impact of war and conflict and with societal, community and individual post-traumatic stress. We have a strong focus on welfare rights within the UK and the EU, on inclusion in education, the role of human rights defenders, and on citizenship, political, social, cultural belonging and individual and collective rights in sustainable development throughout the world.

CASE STUDY
Call to implement the Human Rights Principles and Guidelines to improve the protection of children at risk or affected by malnutrition

Noma (cancrum oris) is a disease which affects malnourished children living in extreme poverty conditions. This gangrenous disease starts in the mouth and spreads rapidly, destroying the muscles and the bones of the face. Every year 140,000 children in Africa, Asia and Latin America are affected; the disease has a mortality rate of 90% and survivors face severe discrimination and violations of a wide range of human rights. If diagnosed at the earliest stages, noma can be easily treated.

Dr Ioana Cismas of the Centre for Applied Human Rights and the York Law School is working to increase the impact of her research on noma, human rights and global health. Cismas is working in partnership with a member of the UN Human Rights Council Advisory Committee, and other stakeholders to raise awareness about the existence of this disease, to remove the attached social stigma which stifles action by families and states, and to convince states, UN institutions, and the World Health Organisation, to show political will in addressing noma as a global public health issue.

Reference
Social foundations

SOCIAL EQUITY AND GENDER EQUALITY

Poor health and health inequalities are caused by ‘vertical inequalities’ of wealth, income, education and social class, ‘horizontal’ inequalities of gender, ethnicity, language, migration status, age, disability, and the intersections between them.

Academics at York have demonstrated the impact of income inequality, poverty and educational inequality on a range of health and social issues and shown how inequality affects the rich as well as the poor. They address issues of prejudice, discrimination and intolerance in relation to health, as well as the positive benefits of solidarity, inclusivity and tolerance.

CASE STUDY

The effect of economic recession on health inequalities in smoking during pregnancy

The University of York has a long-standing collaboration with the Born in Bradford (BiB) research programme. BiB is based on family cohort studies with extensive data linkage to health, social care and education and aims to understand poor health and health inequalities in Bradford, working with the NHS and local authority to improve child health and wellbeing.

Dr Noortje Uphoff studied the impact of the UK 2008-2010 economic recession on maternal health. She found that women were more likely to continue smoking during pregnancy if they were exposed to the recession during pregnancy, compared to women who were pregnant before the recession - contrasting with a broader trend of decreasing rates of smoking in pregnancy over time. Women who reported experiencing a difficult financial situation, or a worse financial situation than they had a year ago were also more likely to smoke, and these experiences mediated the impact of the recession. The study suggests that structural aspects of our economies should be targeted to reduce rates of smoking during pregnancy.

Reference

Social foundations

Our social relationships are vital to health and wellbeing; friendship has been shown to be as protective for health as smoking is bad for it.

Our intimate, interpersonal relationships with family and friends matter, but so does the degree to which people in society can trust people they have never met. Social support, social networks, social capital - all are linked to population health.

At York, researchers across the social sciences are engaged in the study of social connections and health across multiple departments and research centres. Research areas include the impact of loneliness and social isolation on wellbeing among the elderly, parenting skills and social and emotional development in children, using religious settings and institutions for health promotion, and how health and social care workers can help people develop and maintain social relationships.

CASE STUDY
People and their connections: Social networks and severe mental illness

There have long been concerns about the impact of loneliness and social isolation on mental health and the opportunities for recovery from severe mental illness (SMI). The importance of connectedness and meaningful activities as a central dimension of personal recovery has been emphasised, however studies report that people with SMI have smaller and poorer-quality social networks compared to the general population, which limits their access to social support and social capital.

Researchers in the Department of Social Policy and Social Work have explored how mental health and social care practitioners can support people to extend their social networks. Their findings suggest that when an approach called Connecting People is closely followed it can help people to improve access to social capital through their networks.

Reference
Planetary boundaries

CLIMATE CHANGE

Human induced climate change has profound implications for population health. Climate change is already affecting food and water supplies, reducing ecosystem services, increasing exposure to harm from natural disasters and extreme weather, and changing patterns of infectious disease transmission. The World Health Organisation estimates that climate change will cause an additional quarter of a million deaths worldwide, each year, between 2030 and 2050 and has already caused widespread morbidity and mortality. In Europe in 2003, the summer heat wave caused more than 70,000 excess deaths.

Researchers at York contribute to the Lancet Countdown reports on climate change and health and to GEO6, the United Nations Environment Programme’s flagship environmental outlook report. The Health of Populations and Ecosystems (HOPE) project has shown that people attach great value to policies that protect the environment for the health of future populations. Other research teams are developing crops resistant to climate change to create sustainable food supplies for vulnerable populations, and working with governments and experts to develop policy innovations and ideas for enhancing public engagement with climate and energy governance.

CASE STUDY
International collaboration tracking progress on health and climate change

Professor Hilary Graham of the Department of Health Sciences is a contributor to The Lancet Countdown: tracking progress on health and climate change (lancetcountdown.org), an international, multidisciplinary research collaboration between academic institutions and experts across the world, dedicated to tracking progress on health and climate change from 2016 to 2030. Funded by the Wellcome Trust, the collaboration reports annually on key indicators that reflect progress on health and climate change, across five interrelated thematic working groups. Graham is leading the Countdown’s working group tracking public and political engagement in health and climate change.

Reference
Planetary boundaries

CHEMICAL POLLUTION

Research in the Department of Environment and Geography and the York Environmental Sustainability Institute (YESI) focuses on understanding emerging and future ecological and health risks posed by chemical pollution. York researchers develop technology to detect and analyse the environmental effects and risks of various contaminants, including pharmaceuticals and nanomaterials.

The CAPACITIE project spanned disciplines related to the monitoring of pollutants, including environmental science, chemistry, electronics, sociology, computer science and physics. Researchers quantified levels of pollution at greater frequencies and spatial resolutions than previously possible, monitored locations that in the past have been difficult to sample (e.g. hostile environments) and characterised human and ecological exposure to the plethora of chemicals that have never been monitored before. York researchers also lead the iPiE project (see Case Study), and the York City Environment Observatory (YCEO), an environmental data resource including chemical pollution monitoring, which will help decision-makers improve the health and well-being of the community.

CASE STUDY
Assessing pharmaceuticals in the environment to reduce impact to human health and the environment

Professor Alistair Boxall’s research focuses on understanding emerging and future ecological and health risks posed by chemical contaminants in the natural environment. He leads a team of York researchers working on the European-funded iPiE project (Intelligent Assessment of Pharmaceuticals in the Environment), a multi-million pound programme involving an industrial consortium of the world’s largest pharmaceutical companies.

iPiE will develop a framework to produce methods to prioritise new and existing medicinal compounds for comprehensive environmental risk assessment. It will support and inform regulatory activities designed to assess and reduce the environmental impact of active pharmaceutical ingredients.

Reference
Planetary boundaries

FRESHWATER WITHDRAWAL

When water is withdrawn from surface or groundwater sources, for use in households, businesses and agriculture, it can reduce the water available to others, in ways that can affect population health. As populations grow and economies develop, new constraints on freshwater resources are of critical concern.

CASE STUDY

Crises in water management in Thailand signpost to management of future risks and vulnerability with global relevance

Dr Richard Friend of the Department of Environment and Geography has used emerging crises in water management in North East Thailand as a case study to examine the ability of existing institutional structures and processes to adapt to an uncertain future climate. This region’s experience of dealing with a prolonged period of variability in water availability and competing demands for water use is an important example with global relevance. Similar challenges are being faced by other parts of the world, with obvious risks to population health.

Findings illustrate that water managers on the front line of dealing with climate variability are constrained by the interaction of infrastructure that was designed for different times and needs, and by institutional structures and processes. Critically, the research finds that there is no explicit consideration of climate change, but rather universally-held assumptions that patterns of water availability will continue as they have in the past.

Reference


Photograph: Dr Richard Friend.
Planetary boundaries

Biodiversity loss

Biodiversity is crucial for food, clean air and water, flood protection, and recreational green and blue space, and it underpins human health and wellbeing. Biodiversity is threatened by climate change, intensive and mono-agriculture, and demands for water and biofuels.

Scientists at York have examined the role biodiversity plays in the ecosystems provided by Britain’s landscapes and are developing tools for measuring, and conserving, the ecological, environmental and social dimensions of ecosystems. Research teams study how climate change is affecting human health, and how the natural environment plays a role in antimicrobial resistance. The NERC-funded Biodiversity and Ecosystem Services Sustainability Directorate investigated the role of biodiversity in key ecosystem processes within landscapes, including health and wellbeing impacts. The Leverhulme Trust have funded a 10-year research centre for anthropocene diversity at York, which will include a focus on the benefits of biodiversity for human wellbeing and examine human-caused biodiversity gains as well as losses.

Case study

The role of the natural environment in integrative management of antimicrobial resistance

Antimicrobial resistance (AMR) is one the greatest current global health challenges, and is forecast to be the leading cause of death worldwide, claiming an estimated 10 million lives a year by 2050, primarily in low- and middle-income countries.

AMR connects human health to the health of ecosystems and the natural environment, and the World Health Assembly has called for global action on AMR including integrated management of the interfaces between humans, animals and the natural environment at individual, population and ecosystem levels.

Professor Piran White from the Department of Environment and Geography asserts that, given its role in contributing to AMR, the role of the natural environment needs to be integrated more fully into existing and new National Action Plans, so as to maximise chances of finding holistic and sustainable solutions to this global health threat.

Reference

Iossa G., White P.C.L. The natural environment: a critical missing link in national action plans on antimicrobial resistance. World Health Organisation Bulletin, July 2018
Planetary boundaries

AIR POLLUTION

Poor indoor and outdoor air quality is linked to over seven million deaths each year around the world, and in England up to 36,000 deaths per year can be attributed to air pollution. 96% of people in large cities are exposed to pollutant levels that are above recommended limits, and it is predicted that by 2030, air pollution will be the largest cause of preventable deaths globally.

Researchers at York work on air pollution across the scientific spectrum, from fundamental science to applied research. In the Wolfson Atmospheric Chemistry Laboratory, teams study gas and aerosol phase processes in the atmosphere, developing high quality, ultra sensitive atmospheric measurements and modelling the effects at global level. In the Department of Environment and Geography, and the Stockholm Environment Institute, researchers focus on the effects of air pollution on the wider environment and on human health, using sensing devices, robotics and citizen science. York researchers also work with policy makers to develop plans and strategies to improve air quality and human health. We work on our doorstep, leading the York City Environmental Observatory, and around the world, including projects on air pollution in Antarctica, Borneo, Cape Verde, Tasmania, sub-Saharan Africa and the megacities of Asia.

Case Study
Increase in the estimates of respiratory mortality due to ozone pollution

Ground-level concentrations of ozone have increased since preindustrial times in urban and rural regions and are associated with cardiovascular and respiratory mortality.

Researchers in the Stockholm Environment Institute at York and in the Department of Environment and Geography used atmospheric modelling to update estimates of the global burden of long-term ozone exposure on premature respiratory mortality in adults over the age of 30. Updated results showed that globally the number of premature respiratory deaths is much larger than previous studies, at more than double the previous estimates, which suggests that the impact of air quality policies to reduce ozone may have underestimated the health benefits of such strategies.

Reference
Planetary boundaries

OZONE LAYER DEPLETION

Reduced ozone levels in the atmosphere means that we have less protection from the sun's rays and more exposure to the UVA/UVB band of ultraviolet radiation, with multiple effects on health. UVB exposure is known to be damaging to DNA, a cause of melanoma and other skin cancers, and is linked to the development of cataracts. Ozone is also a significant pollutant, causing damage to the lungs; York researchers are at the forefront of measuring the health impacts of ozone pollution.

Researchers at York have contributed to assessments showing that the ozone layer is recovering since international regulation in 1987 led to a reduction of greenhouse gas emissions, and studied how human-induced climate change has affected natural ecosystem processes that affect the ozone layer.

CASE STUDY
Ozone depleting substances in the atmosphere

Ozone in the upper atmosphere (stratosphere) protects humans and crops from harmful ultraviolet radiation. Stratospheric ozone destruction resulting from human activities is caused mainly by long-lived chlorine-containing and bromine-containing molecules. The 1987 Montreal Protocol and its subsequent amendments have resulted in the phasing-out of the production of many of the substances that deplete the ozone layer.

York researchers led by Peter Bernath and Lucy Carpenter strengthened the science underlying the Montreal Protocol, by determining the atmospheric lifetimes of halogen-containing molecules much more precisely than previously, and by determining that oceans represent a vast reservoir of organic compounds incorporating bromine, which are released to the air and impact significantly on ozone destruction.

The Montreal Protocol has prevented millions of cases of skin cancer deaths and cataracts, and has also reduced emissions of greenhouse gases very substantially.

Reference
Carpenter L. (lead author) Chapter 1: Update on Ozone-Depleting Substances (ODSs) and Other Gases of Interest to the Montreal Protocol. World Meteorological Organization’s Scientific Assessment of Ozone Depletion, peer-reviewed publication 2014 Chapter 1 pp 21-125
Planetary boundaries

OCEAN ACIDIFICATION

Ocean acidification occurs when increases in carbon dioxide (CO₂) in the earth’s atmosphere lead to greater absorption of CO₂ in our oceans leading to an increase in the acidity of seawater. Ocean acidification is harmful to coral reefs and shelled animals, including seafood consumed by humans, and organisms that play an important role in the food chains of fish that we harvest from our oceans for food. Acidification also leads to algal blooms, some of which produce toxins that are harmful to human health. Human wellbeing is also indirectly affected by ocean acidification through negative economic impacts on fishing, other marine industries and tourism.

CASE STUDY

Growth of scallop fisheries and future impacts of ocean warming and acidification cause concern

Concerns have been raised about the effects of the recent growth of UK scallop fisheries among scientists and conservation bodies, as well as amongst the public. 95% of scallop landings are made by vessels towing scallop dredges, a type of fishing gear known to cause substantial environmental impacts. Scallop stocks are showing signs of overexploitation and there is concern over future impacts of ocean warming and acidification (causing scallop shell erosion, increasing vulnerability to predators).

Dr Bryce Stewart of the Department of Environment and Geography has described how long-term protected areas are providing insights into the recovery and composition of these habitats in the absence of dredging. Continued study of these areas will improve understanding in the future. Scallop and other fisheries must be managed better together to restore diversity and resilience to an uncertain future of climate change and growing human pressure.

Reference

The conversion of forests, woodlands, wetlands and other natural landscapes to agricultural production, urban development or mineral extraction is one of the biggest environmental challenges worldwide. Land conversion can lead to loss of fertile soils, worsen the consequences of low rainfall and drought, and destroy human livelihoods. Scientists estimate that land conversion increases the risks of flooding, landslides and infectious diseases, such as Ebola. When people lose their livelihoods or land tenure, land conversion can lead to social and economic instability, conflict and migration.

Researchers at York are investigating land conversion in relation to climate change and examining the atmospheric and environmental impacts of changing the way we manage land. They are exploring the process of UK coastal transformations, and have partnered with Natural England and the Royal Society for the Protection of Birds to explore how agricultural ecosystems can be used to store carbon while providing revenue streams for farmers and provide habitat for migrating waterfowl while reducing the use of pesticides and herbicides. York researchers are also involved in Global Challenges Research Fund projects exploring how rapidly developing regions can effectively utilise their available land and resources to sustainably address waste and sewage issues, with important consequences for regional health and equality of access to water and energy.

CASE STUDY
Afforestation of peatlands in the UK; considering the effects of restoration on climate change

Peatlands are a globally significant store of carbon and knowledge about the effects of afforestation on UK peat bog carbon is sparse: at present it cannot be reliably determined whether afforestation of open UK peatlands exacerbates or ameliorates climate change. As existing forests on peat come to harvesting age, decisions must be taken to either restock trees or, where possible, to restore bog habitats. The benefits of restoration on biodiversity are well understood, but the effects on carbon are more uncertain.

Researchers in the Department of Geography and Environment argue that a coordinated effort between a wide range of organisations (government, academic, charity and non-government) is required urgently to plan and share peatland forestry research, to provide a sound body of evidence for approaching policy decisions.

Reference
Planetary boundaries

NITROGEN AND PHOSPHORUS LOADING

When rivers, lakes, coastal waters and oceans become overloaded with nitrogen and phosphorous, usually through agricultural and fish farming processes and the discharge of household and industrial waste, water can become unsafe to drink and unusable for recreation and other human activities. When this becomes severe, it can cause massive toxic algal blooms, with risks to human wellbeing; exposure to toxins can cause rashes, stomach, liver and respiratory problems, and neurological effects.

In addition to direct impacts on human health, there are economic impacts on industries and activities, such as fish farming, that require clean water.

While much of the industrialised world experiences problems of nitrogen and phosphorous overload, many low income countries have a shortage of these critical nutrients in soils.

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While much of the industrialised world experiences problems of nitrogen and phosphorous overload, many low income countries have a shortage of these critical nutrients in soils.

CASE STUDY
Examining trace gas fluxes as a way of understanding the microbial community and the ecosystem capacity to cycle nitrogen

Natural coastal ecosystems generally manage nitrogen and phosphorous efficiently but the capacity of human-managed salt marshes to do so is unclear. Dr Kelly Redeker and colleagues at York have examined newly human-created salt marshes to explore how effective they are in processing these critical nutrients. Their research has focused on developing a tool that uses gases released from the marsh sediments to identify active nutrient-cycling processes in marsh communities, to improve understanding of the overall environment and the limits this places on nutrient cycling capacity.

Reference

Photograph: Dr Kelly Redeker.
Public health research at York reflects the social and environmental foundations of health and wellbeing, and consequently evaluates interventions that influence health at different levels, from preventative interventions aimed at individuals, through community and organisational service developments, to national and international regulatory policy.

**INDIVIDUAL**

Researchers at York develop and evaluate individual interventions across a wide range of factors which influence health, including novel ways of reducing harmful health behaviours, but also promoting health and well-being, laying good foundations for future health. To reduce the harm from smoking, for example, researchers in the Wolfson Atmospheric Chemistry Laboratory highlighted the risk of tobacco particles even third-hand, on clothing. In Health Sciences, researchers demonstrated that secondhand smoke exposure during pregnancy accounts for more stillbirths in the third world than active smoking. And in the York Trials Unit, Mental Health and Addictions Research Group and the Public Health and Society Research Group, teams are developing, applying and evaluating interventions to prevent smoking in young people and help people quit, in the UK and around the world. Researchers focus particularly on high risk groups such as pregnant women and people with other health problems, including severe mental illness and tuberculosis.

**CASE STUDY**

**Targeted smoking cessation for people with severe mental ill health (SCIMITAR)**

People with severe mental ill health are three times more likely to smoke but typically do not access conventional smoking cessation services, contributing to widening health inequalities and reduced life expectancy. A team led by Professor Simon Gilbody in Health Sciences at York have developed targeted interventions for this group, and have recently delivered the largest ever trial in this area. Based on evidence-supported behaviour change techniques and effective pharmacotherapy, the NIHR-funded SCIMITAR+ trial doubled the chances of successful quitting at six months.

The York-led SCIMITAR+ team are now working with Action on Smoking and Health (ASH), Public Health England (PHE) and the National Centre for Smoking Cessation Training (NCSCT) to ensure these results translate into practice and inform policy.

**Reference**

Interventions

ORGANISATIONS AND SERVICES

Public health interventions aimed solely at individuals often fail. To change habits and sustain healthy behaviours, we all need encouragement and support, and health care providers, other public services and community organisations can often play an important role. York’s research reflects the important organisational contribution that can be made to public health, evaluating health promotion interventions delivered in hospitals, such as brief interventions to reduce hazardous or harmful drinking; in schools, such as lessons about dental health; and in community and religious organisations, such as working with mosques, madrasas and Islamic women’s circles to prevent obesity in UK South Asian children.

CASE STUDY
Assessing stepped-care interventions for older alcohol users in Primary Care

Estimates suggest that 20% of people aged over 55 years consume alcohol at levels hazardous to their health, and this is associated with a wide range of physical, psychological and social problems. Researchers from York were part of a multi-centre team assessing the clinical and cost-effectiveness of opportunistic screening and stepped care interventions for older hazardous alcohol users in primary care. Stepped care had similar effects to standard practice, in terms of alcohol consumption, alcohol-related problems and quality of life, but stepped-care had a greater probability of being more cost-effective than a brief intervention.

Reference
Interventions

Perhaps the most important public health interventions are those implemented nationally and even globally, through regulation, taxation and incentives. Teams at York focus on regulation of the alcohol, food, tobacco and gambling industries, on fiscal interventions such as taxes on sugary drinks, and on the health effects of direct cash transfers such as the UK winter fuel payment. For these macro-level interventions, ‘gold-standard’ experimental evaluation is not possible, but it is nevertheless crucial to evaluate their effects. Researchers in York specialise in using sophisticated quasi-experimental and other techniques to estimate the effectiveness and value of interventions like these.

CASE STUDY
Evaluating the effect of the sugar-sweetened beverage tax in Chile

The use of fiscal incentives to combat obesity and related diseases is viewed as a promising policy tool in the eyes of many countries and of the WHO. A team from the Centre for Health Economics led by Professor Marc Suhrcke, along with colleagues from the University of Chile, evaluated the effect of Chile’s sugar sweetened beverage (SSB) tax on consumption of sugary drinks.

Surprisingly, results showed the reduction in soft drink purchasing to be most evident amongst higher socioeconomic groups and for those that used to purchase greater quantities of sugary soft drinks, while the overall population effect was less clear. The comparatively small magnitude of the fiscal incentives as well as its exact design and implementation explain part of the findings.

Reference
Methods

EPIDEMIOLOGY

Epidemiology, the study of how and why diseases happen in different groups of people, is a key discipline underpinning research and practice in public health. Research groups at York have a long history of developing, refining and applying epidemiological methods to inform policy and practice, exploring particularly links between social and health inequalities. Current research includes work to investigate, explain, and intervene to prevent and address mental health inequalities. Those with severe mental illness die between ten and 25 years earlier than the rest of the population, and also those with long-term chronic physical illness are more likely to suffer mental health problems. This bi-directional relationship requires careful epidemiological analysis to underpin intervention research.

Researchers at York work closely with the Born in Bradford and Born in Bradford Better Start cohort studies, tracking the lives of over 30,000 Bradfordians to find out what influences the health and wellbeing of families, and to develop new and practical ways to work with families and health professionals to improve the health and wellbeing of the community.

CASE STUDY
Making the case for a causal connection between income inequality and health

Including substantial new research evidence, Professors Kate Pickett and Richard Wilkinson conducted a literature review within an explicit epidemiological causal framework of the relationship between income inequality and health.

They concluded that the body of evidence strongly supports a causal interpretation, with the important criteria of temporality, biological plausibility, consistency and lack of alternative explanations robustly supported. Income differences between rich and poor are increasing in most regions of the world and in most countries but narrowing the gap could substantially improve the health and wellbeing of populations.

Reference
Researchers in the York Trials Unit (YTU) conduct a wide variety of randomised controlled trials in the field of public health. Health care is responsible for only around a quarter of our health outcomes, and we need rigorous evidence about ‘what works’ to improve population health outside the health care system, to guide our own efforts to have a healthy lifestyle, as well as the activities of local authorities and national government. Our trials span the life course, from evaluating health promotion activities in schools, through work-related interventions such as slip-resistant shoes to prevent falls in NHS staff, to interventions to prevent depression in older people. These trials, conducted at York with a range of collaborators, inform how we can best improve population health and well-being, prevent health problems and reduce the chances of existing conditions worsening.

**Methods**

**BIOSTATISTICS & TRIALS**

CASE STUDY

**REFORM Trial: A multifaceted intervention aimed at preventing falls**

Falls are a major cause of morbidity among older people. Multifaceted interventions may be effective in preventing falls and related fractures. The REFORM (REducing Falls with ORthoses and a Multifaceted podiatry intervention) trial was a pragmatic multicentre cohort randomised controlled trial in England and Ireland, led by the York Trials Unit.

The trial tested a podiatric intervention including routine podiatry care, foot and ankle exercises, foot orthoses and a review and provision of footwear, aimed at reducing the incidence of falls among people at high risk of falling. The intervention showed a small reduction in falls and was marginally more beneficial in terms of health-related quality of life, which is likely to justify the modest cost of the intervention.

**Reference**

Methods

EVIDENCE SYNTHESIS

The Centre for Reviews and Dissemination (CRD) develops and applies methods of evidence synthesis to address important public health questions. Many of the systematic reviews carried out in CRD, including those commissioned within the Public Health Research Consortium and the Policy Reviews Facility, both funded by the NIHR Policy Research Programme, are explicitly designed to inform public health practice and policy decisions.

CRD researchers evaluate interventions aimed at individual level behaviour change as well as interventions that address the structural and social determinants of health that operate at the community, policy or systems level, for example in housing, transport, education and social welfare.

CASE STUDY

Scoping review and narrative synthesis of evidence base on novel psychoactive substances

Despite concerns about the use of novel psychoactive substances (NPS) over recent years, there has been little study of the public health burden associated with their use, and a lack of clarity on research priorities in a rapidly developing literature.

A scoping review of evidence was undertaken by a team from the Centre for Reviews and Dissemination and the Department of Health Sciences to synthesise what is known about NPS use related harms, and potential responses. Most of the studies relate to individual adverse effects attributable to NPS use, and there is very limited evidence available on responses. All of the available evidence was found to be at an early stage of development.

Reference

Economists at the Centre for Health Economics, and in other departments at the University of York, have considerable expertise in the economics of public health. This includes consideration of health system efforts on prevention and public health, how best to commission public health services and assess the impact of health reforms on access to health care and health inequalities, and analysing the socioeconomic determinants of health alongside the economic consequences of health and illness.

Researchers at York also conduct economic evaluation of public health interventions. For individual interventions, where possible we use randomised controlled clinical trials with accompanying economic evaluation, for example testing the use of nicotine patches before attempting to quit smoking, or assessing the cost-effectiveness of web-based self-management for type 2 diabetes. Where individual randomisation is not possible, for example when national information campaigns or regulatory interventions are introduced, we use sophisticated econometric methods and micro-simulation. To inform NHS and local government decision making on public health, York researchers have developed ‘health equity indicators’, to judge progress on improving health inequalities.

### Methods

#### HEALTH ECONOMICS

CASE STUDY

**Monitoring the equity effects of health interventions**

Most evaluation studies report the average effects of an intervention, neglecting the distribution of effects. Researchers at York are analysing who gains and who loses from health policies, particularly relating to public health. Professor Richard Cookson and colleagues in the Centre for Health Economics and the Department of Health Sciences have developed health equity indicators that NHS and local government decision makers are using to find out what impacts their actions are having on health inequalities.

**Reference**


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Unplanned hospitalisation for chronic ambulatory care sensitive conditions (<crg-inequalities.co.uk>)

Social gradient in preventable hospitalisation. Source: Richard Cookson ([https://cooksonblog.wordpress.com/author/richardcookson1](https://cooksonblog.wordpress.com/author/richardcookson1))
Policy makers are increasingly recognising that humanities have a vital role to play in developing successful responses to global health challenges and in understanding the socially and culturally embedded nature of disease. York’s Faculty of Arts and Humanities is advancing our understanding of human health.

In Archaeology, pioneering laboratory-based analyses are not only advancing our understanding of the interaction of disease, diet and environmental change in diverse historical contexts, but are also enabling us to supplement written records by reconstructing the microbial landscapes of the past. York’s literary scholars are analysing the cultural representations of disability and the role of narrative in framing and structuring the experience of impairment and ill health. Philosophers are helping to develop bioethics and the ethics of public health interventions. York’s medical historians examine sickness, healing and the cultures of health in a remarkable range of chronological and geographical contexts, ranging from medieval Europe, to seventeenth-century South East Asia to modern global health policy. Together they document how health and medicine are entwined with their particular social, political, economic and environmental contexts, and offer a wealth of insights into contemporary public health challenges.

CASE STUDY
Study of mass TB vaccination campaigns in the Caribbean

Mass BCG campaigns, funded by UNICEF/WHO, were carried out in seven Caribbean colonies between 1951 and 1956. Professor Henrice Altink of the Department of History explored the reasons behind the campaigns, their nature and aftermath, and also compared them to vaccination campaigns in other non-European countries, discussing them in the context of decolonisation.

Professor Altink’s study explained the very high testing rate amongst schoolchildren and also amongst adults, as in part due to populations well aware of the dangers of TB as a result of years of campaigning by local Anti-TB societies, coupled with a high level of school attendance and medical departments keen on administering BCG on a large scale.

The success of the campaigns was not sustained in the following years, as despite political decolonisation, many social and political structures remained unchanged, including medical services, whose priorities remained divided between a preventive/public health agenda and a curative/clinical focus.

Reference
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