The **Academy** *of* **Medical Sciences**

Improving the health of the public through research: an update statement

Academy of Medical Sciences' policy position

Executive summary

The Government must do more to improve the health of the public – working across departments and alongside the bodies delivering public health services. There has never been a more important time to invest in building a robust public health system with a strong underpinning evidence base – not only to respond to future health crises, but also to build our resilience as a nation and address the concerning inequalities in health outcomes across the UK.

The recent public health restructures in England and Scotland, alongside changes to the health and social care system in England, present a significant opportunity to rebuild our public health systems in a way that meets our health of the public aspirations. The UK must seize this opportunity and build on learnings from the Covid-19 pandemic to unite a fragmented public health system if it is to make significant and equitable health gains across the population. Failure to do so will risk not only a detrimental impact on the physical and mental health of the population, with more people living shorter, unhealthier lives, but also on the economic prosperity of the UK, as economic inactivity and pressures on the healthcare system increase.

In 2016, the Academy called for all those working in fields that affect human health to come together and work with the public to significantly enhance the health of the population by 2040.[1] In our report, we set out a series of recommendations to ensure a future in which the UK population experiences substantial improvements in physical and mental health, and associated quality of life. Since then, some important progress has been made. But the Covid-19 pandemic exposed the weaknesses in our public health systems and exacerbated already poor underlying health and stark health inequalities in the UK. Challenges have continued to emerge, notably capacity in the health workforce, steep rises in the cost of living, combined with continuing cuts to funding across the public health and research landscapes.

Working with our Fellows and other key experts, we have identified four priority areas for action that will need to be met if we are to significantly improve the health of the population. While these are mostly positioned in the context of the new health and public health infrastructure in England, the overarching principles are applicable to Scotland, Wales and Northern Ireland.

1. Invest in health of the public research and practice through cross-government and cross-agency working to build an effective, evidence based and integrated public health system.

We welcome the public health research funding initiatives established by the National Institute for Health and Care Research (NIHR), UK Research and Innovation (UKRI) and other funders. However, Government must continue to increase investment in public health research to support more efficient and effective public health practice, and in turn improve the health of the population. Alongside this, there is a need to strengthen the resource provided across the breadth of public health bodies, such as the Office for Health Improvement and Disparities (OHID) and the UK Health Security Agency (UKHSA) as well as regional and local public health teams, to establish a strong collaborative research and evidence function with links to academia. This would enable the development of evidence, the translation of evidence into policy, and the implementation of interventions that will improve health and reduce health inequalities. This investment should be used to build a fully integrated public health system of practitioners, researchers and policy makers. This is especially important given the decline in the public health grant in England – funding from the Department of Health and Social Care (DHSC) to local authorities to provide preventative services that support health – on a real terms per person basis since 2015/16.[2]

2. Harness data and novel methods and technologies for health of the public research and practice.

The UK must build on the progress made during the Covid-19 pandemic by linking data on the wider determinants of health and health outcomes at the local, regional and national level. This would enable those responsible for local public health initiatives, such as Integrated Care Boards (ICBs) in England, primary care networks, local authorities and other key stakeholders, to use a broader range of data to improve health. Departments of health and public health bodies in all UK nations should review the existing mechanisms for generating, collecting and linking wider determinants of health data to identify opportunities to enhance the use of public health data. They should work with Health Data Research UK (HDRUK) and other data repositories, such as the Office for National Statistics (ONS), to identify how this can be done. It will be vital to research and develop better technologies and methodologies for the generation and use of public health data. NHS England and equivalents in all UK nations, the Faculty of Public Health and the General Medical Council should ensure the public health workforce is equipped with the skills to use new approaches to surveillance, diagnostics, data analytics and artificial intelligence (AI).

3. Facilitate the use of health evidence for all policies.

Applying a 'health evidence for all policies' approach across Government departments would help to maximise the benefits to health and the economy through action in other areas, such as supporting employment and education opportunities and mitigating against climate change.[3,4] Policymakers at national, regional and local levels should be better informed as to how they can use and commission evidence from health research to support effective decision making across all policy areas. To reduce inequalities and maximise associated benefits, a priority across Government should be to include evidence about health impacts in all policies.[5]

4. Develop the next generation of public health researchers and practitioners.

The public health research workforce is varied and includes professions beyond medical professionals, such as local public health practitioners and community workers. A future workforce will need to: collect and analyse data; develop methods in data science, surveillance and AI; translate evidence for use in policy making; and communicate across public health stakeholders. The organisations responsible for NHS workforce and training across all UK nations, the Faculty of Public Health, the General Medical Council, and research funders should ensure that the public health workforce is developing the required skills in undergraduate and postgraduate curricula, and in professional and vocational training. Secondments and joint appointments could help to develop and expand the skills of public health professionals by increasing the mobility of the workforce between parts of the system.

Making progress on these four priorities will only be achieved if it is underpinned by efforts to **partner with the public** and **collaborate globally**. Without meaningful public involvement, we risk developing policies that are at best ineffective, and at worst, detrimental to the most underserved communities. The existing Strategic Coordinating Body for Health of the Public Research (SCHOPR) principles include a focus on co-production of research, highlighting the need to develop models of joint working with those who will use and benefit from the evidence.[6] Similarly, the UK must be aware of the global context in which its public health systems operate. There is the opportunity to learn from and work with international colleagues to improve the health of the public in the UK and globally.

Only with ongoing commitment and resource from consecutive Government administrations, and coordination across public health researchers, practitioners and the inclusion of patients and the public, will we be able to address the priorities outlined above and build a healthier, more inclusive, resilient and prosperous society. We call on this Government and those that follow to put the health of the nation at the centre of its ambition to create a more equitable and prosperous nation.

Introduction

The health of the public is influenced by a complex set of factors, including the environment, education, work, housing and food.[7,8] The gap in healthy life expectancy (the time spent in 'good' or 'very good' health) between the most and least deprived areas of the UK is almost two decades.[9] The Health Foundation's Research and Economic Analysis for the long term (REAL) Centre recently reported that the number of people living with major illness is projected to increase by 37% by 2040.[10] Research into the health of the public not only generates evidence to support improvements to health outcomes and address health inequalities, it is a driver and route to economic growth.[11,12,13,14]

In 2016, the Academy undertook a working group project to explore future challenges and opportunities linked to the fundamental determinants of health, with the aim of optimising the UK research environment to improve the health of the public across the UK in future decades. The report, 'Improving the health of the public by 2040', provided recommendations on the requirements for supporting the health of the UK population through enhancing research evidence, transdisciplinary capacity, infrastructure, the workforce and mechanisms for translating research into practice.[15]

Since publication, many of the complex health challenges identified in the report have manifested globally, namely the climate crisis, international conflict, emergent infectious diseases, including the Covid-19 pandemic, threats to food and energy security, an ageing population and increasing inequalities in access to health and social care. In the UK context, related challenges have emerged such as increasing inequalities, exacerbated by the cost of living crisis at the same time as cuts to funding across the public health and research landscape. Opportunities have also surfaced, with public health restructures in England and Scotland and significant changes to the health and social care system in England. The scale and speed of these changes prompted the Academy to review the report recommendations, and develop four priority areas for action.

We have sought to gain an understanding of key issues facing public health systems in all four UK nations, and we recognise the complexity and diversity across these systems. While most of the recommendations in this statement are positioned in the context of the new health and public health infrastructure in England, the overarching principles are applicable to Scotland, Wales and Northern Ireland.

Progress against our recommendations

Since the publication of the Academy's working group report, there has been progress against many of its key recommendations (further detail is provided on the Academy's website).[16] This includes:

- The successful establishment of the Strategic Coordinating Body for Health of the Public Research (SCHOPR), as recommended in our report, to coordinate and advance strategic investment in infrastructure to improve health of the public research.[17]
- Allocated funding for public health research, such as £50 million for research overseen by the National Institute for Health and Care Research (NIHR). This funding enables local authorities to set up Health Determinants Research Collaborations (HDRCs) between academics and other experts to address knowledge gaps in local areas.[18]
- A £12 million package for the UK Prevention Research Partnership also established by NIHR in collaboration with other funders, including the UK Research and Innovation's (UKRI) Medical Research Council (MRC) and Engineering and Physical Sciences Research Council (EPSRC), as well as 14 Health Protection Research Units (HPRUs).[19,20,21]
- Improvements in the ability to link data for population health surveillance and protection enabled by emergency legislation progressed during the Covid-19 pandemic and concerted efforts by key bodies such as the Office for National Statistics (ONS) and Health Data Research UK (HDRUK).

- Advances in transdisciplinary approaches to research, education and training in the health of the public, such as the inclusion of different disciplinary perspectives within Masters programmes in Public Health, and the recently established NIHR Population Health Career Scientist award.[22]
- Mandated requirements in the Health and Care Act 2022 for leaders within the NHS to actively facilitate or otherwise promote research, and for ICBs to set out and report on their research plans, including public health research.

Outstanding challenges and priorities for action

While there have been gains and improvements in research funding, infrastructure, and capacity within the health of the public domain, significant challenges remain. Changes to the public health systems in England and Scotland, combined with the external challenges such as the Covid-19 pandemic, cost of living crisis and cuts to funding in the public health and broader research landscapes, mean it has never been more important to support the UK's public health system. To tackle the existing public health challenges, and to build resilience to future crises we set out four key priorities for action:

1. Invest in health of the public research and practice through cross-government and cross-agency working to build an effective, evidence based and integrated public health system.

Context

Improving the health of the population provides obvious benefits to the health and wellbeing of individuals, but it also benefits the wealth of the nation. Conversely, poor health predicts premature exit from employment and contributes to increases in economic inactivity.[23,24] The UK Government's Levelling Up Strategy acknowledges the role of public health in reducing inequalities and increasing prosperity through health, human and social capital.[25] Addressing the inequalities in health across the UK would support the Government's commitment to levelling up by helping to increase health and therefore economic productivity in areas where they are currently lower.

Improving the health of the public also benefits the wider health and social care system by reducing demand for treatment and care in the medium to longer term.[26,27] The Covid-19 pandemic demonstrated how vital a strong public health research ecosystem is to provide evidence to underpin an effective public health response.[28] The UK was a world leader in research into Covid-19 vaccines, treatments, genomics and surveillance thanks to previous investment in related research areas and infrastructure. However, the public health system was not equipped with the resources needed to tackle such a huge threat from the outset.

The challenge

The public health system in England has seen decreased investment in real terms per person for almost a decade, negatively impacting on the health of the population.[29,30] The Government committed in the 2021 Spending Review to maintain the public health grant in England – funding from the Department of Health and Social Care (DHSC) to local authorities to provide preventative services that support health – in real terms until 2024/25.[31] However, it has been highlighted that funding for public health has decreased by 26% on a real terms per person basis since 2015/16.[32] Additional time-limited funding for drug and alcohol treatment has been allocated to local authorities,[33] but even when taking this into account, public health funding is 21% lower on a real terms per person basis since 2015/16.[34] These cuts disproportionately affect those living in the most deprived areas of England, who tend to have poorer health outcomes.[35]

Since the publication of our report in 2016, funding for public health has become increasingly complex. Changes to public health funding flows across the UK, particularly following public health restructures in England, adds to the complexity of understanding resource allocations.[36] The recent restructures in England have also put pressure on the already fragile links that exist between different parts of the system (e.g. UKHSA, OHID, NHS, ICBs, regional and local public health structures, academic research, third sector organisations, research funders and regulators).[37] Current connections rely on individual relationships, rather than being embedded in the way that organisations work, meaning that connections are often short lived and not retained in institutions as staff turn over.[38] A fully integrated public health system requires embedded processes that readily enable the flow of resources and information between relevant parts of the system.

SCHOPR has been successful in coordinating some strategic investment in health of the public research. However, the translation of evidence from research into practice is being limited by the reduced resource within the wider public health system.[39] Public health research can help to best direct investment for public health practice, yet investment in public health research has not kept pace with need.[40]

Action required

We welcome the public health funding initiatives established by NIHR, UKRI and others as outlined above. However, **Government must continue to increase investment in public health research, as well as innovate the types of investment, to embed research and evidence in practice and build an evidence base through collaboration between researchers and practitioners.** Areas to target investment include the public health research workforce and data infrastructure. Focusing on studies that would be most impactful at a local level and that address health inequalities could be particularly beneficial. SCHOPR should play a role in identifying where and how to best target funding streams for health of the public research.

Alongside this, **Government should strengthen the resource provided across the breadth of public health bodies,** such as OHID, UKHSA and regional and local public health teams, to establish a strong collaborative research and evidence function with links to academia. This would provide the ongoing capability to participate in research, generate evidence, and embed processes that enable the flow of information between relevant parts of the public health system. This would also support the generation and translation of evidence into policy and embed research in public health practices. Providing guidance and developing capability for public health functions within Integrated Care Systems (ICSs) would enable the development of an integrated public health system of practitioners, researchers and policy makers. Resource should also be used to support the exchange of information between relevant parts of the system, for example, through the Public Health ICS Forum convened by the Local Government Association, Association of Directors of Public Health and NHS Confederation. Further investment will be especially important given the declining investment in the public health grant in England on a real terms per person basis since 2015/16.[41]

2. Harness data and novel methods and technologies for health of the public research and practice.
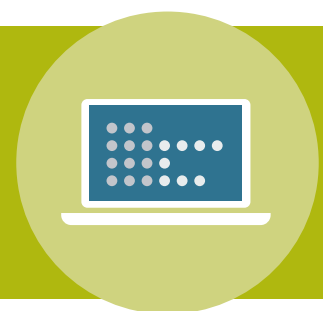
Context

The access and linkage of data relating to health protection improved during the Covid-19 pandemic. The improved data linkage and access was largely due to the transient relaxation of legislation on data, facilitated by changes to the Control of Patient Information Regulation (COPI) and associated data governance changes.[42] These changes ultimately enabled greater sharing of healthcare data to manage and mitigate against Covid-19. There was also significant Government funding for public health research, notably through the National Core Studies.[43] Rapid progress was made in expanding

surveillance capability and capacity and applying digital technologies and new surveillance methods, developed by the ONS and researchers in a wide range of academic institutions to support this data sharing.

Participants of the Academy's workshop 'Embedding research in public health' highlighted a number of initiatives to support data linkage, including the ability of Public Health Scotland to link and share data relating to health and its wider determinants across multiple public services.[44] There is also ongoing work to link national level data to local datasets, to enable more granular analyses.[45,46] Such cases could be used as exemplars to learn from.

The challenge

The legislative changes to the COPI were temporary and expired in June 2022. We have heard that the UK is not maintaining or progressing the positive developments gained during the pandemic to improve data access and linkage. The UK therefore risks losing the lessons learnt from streamlining governance processes, and the benefits gained from improved access to and linkage of data.

The pandemic also surfaced key issues related to health inequalities and wider determinants of health.[47] While HDRUK holds data related to illness, data related to the wider determinants of health are not readily captured. Public health research would greatly benefit from the systematic collection of wider demographic data, such as socioeconomic, race and ethnicity data, and its linkage to health records. However, clarity is needed on how best to capture and store such data to enable this linkage.

The Goldacre review recommended that Trusted Research Environments (TREs) should be established for the use of health data for research.[48] These provide a secure environment for the storage and analysis of health data, but it remains challenging to integrate other datasets on the wider determinants of health within TREs due to complex governance issues.

Action required

We must harness the progress made during the Covid-19 pandemic in data linkage and governance, as well as in modelling and novel diagnostic and surveillance technologies, to better inform health of the public research and practice. There is a unique opportunity to further link data on the wider determinants of health at the local, regional and national level, which would ultimately enable ICBs, primary care networks, local authorities and other key stakeholders to use relevant data to inform public health interventions, address health inequalities, and improve health. To achieve this, it will be necessary to invest in skills and research to develop better technologies and methodologies for the generation and use of public health data. NHS England and equivalents in all UK nations, the Faculty of Public Health and the General Medical Council should ensure the public health workforce is equipped with the skills to use such tools.

Departments of health and public health bodies in all UK nations, including OHID and DHSC, should review the existing mechanisms for generating, collecting and linking wider determinants of health data to identify opportunities to enhance the use of public health data. The Academy understands that HDRUK is working with others in the sector, such as the ONS, on how this can best be done. This must form part of the current Sudlow review 'Unifying health data in the UK', which aims to map the health data landscape in the UK and propose solutions to enhance the use of data for the benefit of patients and the public.[49] Similarly, improving the quality and availability of social care data is vital to understand the wider context that the health and public health system is operating in and should be a central part of any review of UK health data.

Any initiatives to enhance data collection and linkage will require careful coordination and adequate resource, as well as consultation with the public, to ensure they are as representative as possible, achieve their purpose and ultimately improve the health of the public.

3. Facilitate the use of health evidence for all policies.

Context

Most policy areas – including housing, transport, education, work, communities, energy – will impact on health. As such, a 'whole system' approach is required to make significant improvements in population health. For example, the gap in healthy life expectancy between the most and least deprived populations is due to a complex set of factors beyond health and social care provision.[50] Improving the health of underserved communities will require policy changes in areas outside of healthcare that reduce inequalities more broadly. As such, policy development across all Government departments would benefit from the inclusion of evidence on the implications for health.

The challenge

Government policy and decision making is often siloed, with individual departments focused on their own policy area without systematically considering links between different domains.

Understanding how current and former policies have performed is vital to effective decision making. The Covid-19 pandemic exposed weaknesses in many policy evaluation systems (with the exception of those that are mandated, such as monitoring the safety of medicines).[51,52] The National Audit Reports of 2013 and 2021 also identified issues relating to how evidence is valued and incorporated in Government policy development.[53,54]

Action required

The Government should adopt a 'health evidence for all policies' approach across all government departments to maximise the additional benefits of improving health to other domains, including supporting economic growth.[55] A priority across all departments and levels of government should be to include evidence about health impacts in all policies, to reduce inequalities and maximise associated benefits, such as improved education and employment. Initiatives such as the Government's Policy Lab or the Government Office for Science, including its Foresight projects, could provide mechanisms to support policy making across Government departments that would improve the health of the public.[56,57,58,59] An additional mechanism has been proposed in a recent report in the form of a new legislative body – a Committee on Health and Prosperity to independently advise and keep Government accountable to the mission to improve the health of the nation.[60]

Policymakers at national, regional and local levels should work to better understand how health research and evidence is used in (and can better support) evidence-based policymaking.[61] As discussed under priority 1 above, adequate resources are needed to ensure that public health research can generate the necessary evidence to inform policy development at all levels. DHSC and OHID, specifically, have an important coordinating role in informing the UK Government's approach to public health, by bringing together expert advice, research analysis and policy expertise to share learnings across the system.[62] In Scotland, Wales and Northern Ireland, respective departments of health should work with public health bodies in a similar fashion.

Formal evaluations of any policy changes should occur in accordance with the Government's Magenta Book for evaluation of interventions, and should include an element of health evaluation.[63] An example of this is the evaluation of minimum unit pricing for alcohol in Scotland, which includes a sunset clause whereby the Scottish Government will formally explore whether the policy should continue based on evidence from robust evaluation.[64,65]

4. Develop the next generation of public health researchers and practitioners

Context

The public health workforce is varied and includes professions beyond physical and mental healthcare professionals, including local public health practitioners and community workers, as well as the many professions whose work impacts on health (e.g. environmental health officers, architects, and town planners). Progress against the other key priorities highlighted above requires a highly skilled and transdisciplinary workforce to: identify and address mental and physical health challenges; collect and analyse data and to develop methods in data science, surveillance and AI; translate evidence for use in policy making; consider equality, diversity and inclusion; and communicate across public health stakeholders.

Progress has been made in transdisciplinary working since the Academy's working group report was published in 2016. For example, we are aware of some higher education institutions incorporating different disciplinary perspectives within Masters programmes in Public Health, and the NIHR Population Health Career Scientist award has recently been established to support the next generation of independent public health research leaders from a wide range of disciplines that have an impact on the determinants of health.[66]

The challenge

The Academy's working group report 'Improving the health of the public by 2040' emphasised the importance of transdisciplinary working to move beyond professional silos and address health needs holistically. Certain disciplines – such as social care, and environmental and occupational health – were noted as underrepresented in health of the public research and we have heard that they continue to be underrepresented today.

Health of the public researchers have expressed the need for improved connections with policymakers to better understand the evidence they need to inform decisions to guide research questions.[67] This would help researchers to develop relevant research questions and present the findings in ways that are useful to policymakers.[68]

Action required

The organisations responsible for NHS workforce and training across all UK nations, research funders, the Faculty of Public Health and General Medical Council should regularly review curricula to ensure the public health workforce is developing the necessary and evolving skills at undergraduate and postgraduate levels, and in professional and vocational training. This should include a focus on transdisciplinary working and equality, diversity and inclusion training, with efforts to ensure the public health workforce reflects the diversity of the population.[69] Secondments and joint appointments could help to develop and expand the skills of public health professionals by increasing the mobility of the workforce between parts of the system.

The Academy's workshop on 'Embedding evidence in public health' explored several initiatives that could be taken forward to support the development of the public health research workforce and facilitate interactions to reduce the silos between policymakers and public health researchers.[70] For example, considering funding activities that enable the 'reverse translation' of policy into research, including secondments for policymakers and researchers to gain a greater appreciation of each other's priorities and ways of working. The workshop report also outlines a potential action for Research England to recognise team science and transdisciplinary research as a measure of research quality in future iterations of the Research Excellence Framework (REF).

Building on the original report's findings and previous scoping work with The Health Foundation, the Academy is developing a new transdisciplinary scheme for health of the public research. The scheme will be open to researchers from any discipline or sector who wish to conduct research tackling a health of the public challenge.

Principles underpinning these priorities

To maximise the success of addressing the above priorities, Government, public health practitioners and researchers will need to partner with the public and collaborate internationally.

Partnering with the public

To develop effective public health interventions that address unmet priorities for the public and are acceptable to them, the public must be involved meaningfully in all stages of the research-to-policy process, including priority setting, research design, policy design, implementation, and evaluation.[71,72] This ultimately requires improving the ability for public health practitioners and researchers to communicate meaningfully with the public and diverse communities.

When developing inclusive research and policies to tackle public health priorities, particularly health inequalities, it is important to promote open dialogue with stakeholders (including communication about the wider social determinants of health),[73,74] co-design of technologies, careful assessment of the enabling context, and meaningful involvement with vulnerable individuals and underserved groups. These strategies may encourage public agency and data sharing for research purposes, while ensuring social acceptance and greater trust in public health technologies.[75,76]

The existing SCHOPR principles include a focus on co-production of research, highlighting the need to develop models of joint working to co-produce research with those who will use and benefit from the evidence, including: the public, practitioners, the third sector, local authorities and policymakers across all nations of the UK.[77] Funders, academics, policy makers and third sector organisations should continue to explore new models of joint working with key communities to ensure research, policy and interventions are co-produced with them.

The Covid-19 pandemic provided the public with a chance to regularly engage with scientific data and evidence. There is a window of opportunity to capitalise on this engagement and keep the public as 'partners' by promoting evidence in diverse, accessible and trusted ways.[78]

Collaborating globally

Although the focus of this updated position is on the UK public health ecosystem, we recognise that drivers of population health are global, and the threats disproportionately impact more vulnerable populations.[79] The Covid-19 pandemic has highlighted the importance of international research collaboration to prepare for and protect against health threats on a global scale. The UK benefited during the pandemic by learning from international colleagues – for example, through the sharing of knowledge, including learning from successful and unsuccessful policies elsewhere, the UK adapted its approach to mitigating the spread of the virus.

Looking ahead, there is a need for continued focus on and mitigations against the risks from zoonotic diseases (including future pandemics), non-communicable diseases, and climate change. The Academy has explored the implications of climate change on health in its report 'A healthy future – tackling climate change mitigation and human health together'.[80] Future international initiatives should include horizon scanning to consider emerging risks, and advance global health system sustainability and security.

Conclusion

The Covid-19 pandemic has highlighted the importance of a robust public health system and the role of public health research in responding effectively to crises, despite the consequences of disinvestment prior to the pandemic.

There is a renewed interest from the public to improve health and reduce inequalities.[81,82] The Government should seize this opportunity and capitalise on the restructuring of public health structures in England to address the above key priorities to improve the health of the public, and ultimately improve the wealth of the nation while building resilience against future shocks.

Only with ongoing commitment and resource from consecutive Government administrations, coordination across public health researchers, practitioners and the inclusion of patients and the public, will we be able to address the priorities outlined above and build a healthier, more inclusive, more resilient and more prosperous society.

The Academy's position was informed by interviews and roundtables with key experts from across the UK's public health landscape, including academic researchers, research funders, representatives from public health bodies and public health practitioners. It has also been informed by a workshop held in October 2022 on 'Embedding evidence in public health', which explored the challenges and opportunities associated with the use of research evidence in the context of England's new public health structures.[83]

The Academy is grateful to all those who contributed their time and expertise to inform this policy position.

References

1. Academy of Medical Sciences (2016). *Improving the health of the public by 2040.* https://acmedsci.ac.uk/file-download/41399-5807581429f81.pdf

2. The Health Foundation (2023). *Public Health Grant: What it is and Why Greater Investment is Needed.* https://www.health.org.uk/news-and-comment/charts-and-infographics/public-health-grant-what-it-is-and-why-greater-investment-is-needed

3. The Policy Institute (2019). *Better health is within our reach – but it requires us to properly plan for the future.* https://www.kcl.ac.uk/policy-institute/assets/PolicyReview2019.pdf

4. IPPR Commission on Health and Prosperity (2023). *Healthy people, prosperous lives.* https://www.ippr.org/files/2023-04/1682577258_healthy-people-prosperous-lives-april-2023.pdf

5. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

6. Strategic Coordination of Heath of the Public Research committee (2019). *Public health research principles and goals.* https://acmedsci.ac.uk/file-download/70826993

7. The Marmot Review (2010). *Fair Society, Healthy Lives (The Marmot Review).* Institute of Health Equity. https://www.instituteofhealthequity.org/resources-reports/fair-society-healthy-lives-the-marmot-review

8. Marmot M, Allen J, *et al.* (2020). *Health Equity in England: The Marmot Review 10 Years On.* Institute of Health Equity. https://www.health.org.uk/publications/reports/the-marmot-review-10-years-on

9. The King's Fund (2022). *What are health inequalities?* https://www.kingsfund.org.uk/publications/what-are-health-inequalities#:~:text=towards%20the%20end.-,Inequalities%20in%20life%20expectancy,to%20people's%20socio%2Deconomic%20circumstances

10. The Health Foundation REAL Centre (2023). *Health in 2040: projected patterns of illness in England.* https://www.health.org.uk/publications/health-in-2040

11. Academy of Medical Sciences (2022). *Autumn statement: Academy President's response.* https://acmedsci.ac.uk/more/news/autumn-statement-academy-president-responds

12. Academy of Medical Sciences, Arthritis Research, Medical Research Council, National Institute for Health Research, Wellcome Trust (2018). *Medical Research: What's it Worth? A Policy Briefing.* https://acmedsci.ac.uk/file-download/54792223

13. IPPR Commission on Health and Prosperity (2023). *Healthy people, prosperous lives.* https://www.ippr.org/files/2023-04/1682577258_healthy-people-prosperous-lives-april-2023.pdf

14. Institute for Public Policy Research (2022). *Getting Better? Health and the UK Labour Market.* https://www.ippr.org/files/2022-12/getting-better-chp-dec22.pdf

15. Academy of Medical Sciences (2016). *Improving the health of the public by 2040.* https://acmedsci.ac.uk/file-download/41399-5807581429f81.pdf

16. Academy of Medical Sciences (2023). *Summary of recommendations and updates.* https://acmedsci.ac.uk/hotp-table

17. National Institute for Health and Care Research (n.d.). *The Strategic Coordination of Health of the Public Research committee (SCHOPR).* https://sites.google.com/nihr.ac.uk/schopr/

18. National Institute for Health and Care Research (2022). *£50 million awarded to local government to tackle interventions for health inequalities through research.* https://www.nihr.ac.uk/news/50-million-awarded-to-local-government-to-tackle-interventions-for-health-inequalities-through-research/31654

19. UKPRP (n.d.). *Funding partners.* https://ukprp.org/about-us/our-funding-partners/

20. NIHR (2022). *NIHR Population Health Career Scientist Award.* https://www.nihr.ac.uk/documents/nihr-population-health-career-scientist-award-specification-document/30300

21. NIHR. *Research Units.* https://www.nihr.ac.uk/explore-nihr/support/research-units.htm

22. NIHR (2022). *NIHR Population Health Career Scientist Award.* https://www.nihr.ac.uk/documents/nihr-population-health-career-scientist-award-specification-document/30300

23. Institute for Public Policy Research (2022). *Getting Better? Health and the UK Labour Market.* https://www.ippr.org/files/2022-12/getting-better-chp-dec22.pdf

24. Haldane A and Rebolledo I. (2022). *Health is wealth? Strengthening the UK's immune system.* The Health Foundation. https://www.health.org.uk/publications/reports/health-is-wealth

25. Department for Levelling Up, Housing and Communities (2022). *Levelling Up the United Kingdom.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052706/Levelling_Up_WP_HRES.pdf

26. NHS England (2019). *The NHS Long Term Plan.* https://www.longtermplan.nhs.uk/areas-of-work/prevention/treating-and-preventing-ill-health/

27. Department of Health and Social Care (2019). *Advancing Our Health: Prevention in the 2020s Consultation Document.* https://www.gov.uk/government/consultations/advancing-our-health-prevention-in-the-2020s/advancing-our-health-prevention-in-the-2020s-consultation-document

28. Office for National Statistics (2022). *Half a million more People are out of the Labour Force because of Long-Term Sickness.* https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/economicinactivity/articles/halfamillionmorepeopleareoutofthelabourforcebecauseoflongtermsickness/2022-11-10#:~:text=Source%3A%20Office%20for%20National%20Statistics%20%E2%80%93%20Labour%20Force%20Survey&text=Long%2Dterm%20sickness%20is%20an,of%20the%20COVID%2D19%20pandemic

29. The Health Foundation (2023). *Public Health Grant: What it is and Why Greater Investment is Needed.* https://www.health.org.uk/news-and-comment/charts-and-infographics/public-health-grant-what-it-is-and-why-greater-investment-is-needed

30. Department of Health and Social care (2022). *Public Health Ringfenced Grant 2022 to 2023: Local Authority Circular.* https://www.gov.uk/government/publications/public-health-grants-to-local-authorities-2022-to-2023/public-health-ringfenced-grant-2022-to-2023-local-authority-circular

31. HM Treasury (2021). *Autumn Budget and Spending Review* (2021). https://www.gov.uk/government/publications/autumn-budget-and-spending-review-2021-documents

32. The Health Foundation (2023). *Public Health Grant: What it is and Why Greater Investment is Needed.* https://www.health.org.uk/news-and-comment/charts-and-infographics/public-health-grant-what-it-is-and-why-greater-investment-is-needed

33. Office for Health Improvement and Disparities. *Additional drug and alcohol treatment funding allocations: 2023 to 2024 and 2024 to 2025.* https://www.gov.uk/government/publications/extra-funding-for-drug-and-alcohol-treatment-2023-to-2025/additional-drug-and-alcohol-treatment-funding-allocations-2023-to-2024-and-2024-to-2025

34. The Health Foundation (2023). *Public Health Grant: What it is and Why Greater Investment is Needed.* https://www.health.org.uk/news-and-comment/charts-and-infographics/public-health-grant-what-it-is-and-why-greater-investment-is-needed

35. The Health Foundation (2023). *Public Health Grant: What it is and Why Greater Investment is Needed.* https://www.health.org.uk/news-and-comment/charts-and-infographics/public-health-grant-what-it-is-and-why-greater-investment-is-needed

36. Kings Fund (2022). *Local Government Public Health Funding: Putting the Jigsaw Together Without the Picture on the Box.* https://www.kingsfund.org.uk/blog/2022/03/local-government-public-health-funding

37. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

38. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

39. The Health Foundation (2022). *Good health: an investment worth making.* https://www.health.org.uk/news-and-comment/blogs/good-health-an-investment-worth-making

40. Masters R, Anwar E, Collins B, *et al.* (2017). *Return on investment of public health interventions: a systematic review.* J Epidemiol Community Health **71**, 827-834. https://jech.bmj.com/content/71/8/827

41. The Health Foundation (2023). *Public Health Grant: What it is and Why Greater Investment is Needed.* https://www.health.org.uk/news-and-comment/charts-and-infographics/public-health-grant-what-it-is-and-why-greater-investment-is-needed

42. Department of Health and Social Care (2020). *Coronavirus: notification to organisations to share information.* https://www.gov.uk/government/publications/coronavirus-covid-19-notification-of-data-controllers-to-share-information

43. Government Office for Science (2022). *National Core Studies Programme.* https://www.gov.uk/guidance/national-core-studies-programme

44. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

45. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

46. Public Health Scotland (2022). *A Scotland where everybody thrives: Public Health Scotland's Strategic Plan 2022 to 2025.* https://www.publichealthscotland.scot/media/16485/public-health-scotland-strategic-plan-2022-2025.pdf

47. Devakumar, D *et al.* (2022). *Racism, xenophobia, discrimination, and the determination of health.* The Lancet, 400, **10368**, 2097. https://doi.org/10.1016/S0140-6736(22)01989-4

48. Goldacre B, *et al.* (2022). *Better, broader, safer: using health data for research analysis.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1067053/goldacre-review-using-health-data-for-research-and-analysis.pdf

49. HDRUK (2023). *The Sudlow Review.* https://www.hdruk.ac.uk/helping-with-health-data/the-sudlow-review/

50. The King's Fund (2022). *What is happening to life expectancy in England?* https://www.kingsfund.org.uk/publications/whats-happening-life-expectancy-england

51. National Audit Office (2021). *Initial learning from the government's response to the COVID-19 pandemic.* https://www.nao.org.uk/insights/initial-learning-from-the-governments-response-to-the-covid-19-pandemic

52. Royal Statistical Society (2021). *Statistics, Data and Covid: Ten Statistical Lessons the Government Can Learn from The Past Year.* https://rss.org.uk/RSS/media/File-library/Policy/2021/RSS-Stats-Data-and-Covid-FINAL-embargoed-09-03-21.pdf

53. National Audit Office (2014). *National Audit Office Annual Report and Accounts 2013-14.* https://www.nao.org.uk/wp-content/uploads/2014/06/NAO-annual-report-2013-141.pdf

54. National Audit Office (2021). *Evaluating government spending.* https://www.nao.org.uk/wp-content/uploads/2021/12/Evaluating-government-spending.pdf

55. The Policy Institute (2019). *Better health is within our reach – but it requires us to properly plan for the future.* https://www.kcl.ac.uk/policy-institute/assets/PolicyReview2019.pdf

56. UK Government (2022). *Policy Lab.* https://openpolicy.blog.gov.uk/

57. UK Government (2020). *Policy Lab's Government as a System toolkit.* https://openpolicy.blog.gov.uk/2020/03/06/introducing-a-government-as-a-system-toolkit/

58. UK Government (2022). *GO-Science Foresight Projects.* https://www.gov.uk/government/collections/foresight-projects

59. The Health Foundation (2019). *Shaping Health Futures Preparing for tomorrow's possibilities today.* https://www.health.org.uk/publications/reports/shaping-health-futures

60. IPPR Commission on Health and Prosperity (2023). *Healthy people, prosperous lives.* https://www.ippr.org/files/2023-04/1682577258_healthy-people-prosperous-lives-april-2023.pdf

61. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

62. Department for Levelling Up, Housing and Communities (2022). *Levelling Up the United Kingdom.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052706/Levelling_Up_WP_HRES.pdf

63. HM Treasury (2020). *Magenta Book: Central Government guidance on evaluation.* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/879438/HMT_Magenta_Book.pdf

64. Scottish Government (2022). *Implementation of minimum pricing for alcohol: guidance* https://www.gov.scot/publications/guidance-implementation-minimum-pricing-alcohol/pages/9/

65. Scottish Government. *Alcohol and drugs.* https://www.gov.scot/policies/alcohol-and-drugs/minimum-unit-pricing/

66. NIHR (2022). *NIHR Population Health Career Scientist Award.* https://www.nihr.ac.uk/documents/nihr-population-health-career-scientist-award-specification-document/30300

67. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

68. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

69. Academy of Medical Sciences (2023). *Future-proofing UK Health Research: a people-centred, coordinated approach.* https://acmedsci.ac.uk/file-download/23875189

70. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

71. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741

72. Academy of Medical Sciences (2016). *Improving the health of the public by 2040.* https://acmedsci.ac.uk/file-download/41399-5807581429f81.pdf

73. The Health Foundation & FrameWorks UK (2022). *How to talk about the building blocks of health: A communications toolkit for people working in public health.* https://www.health.org.uk/sites/default/files/upload/publications/2022/HEAJ9448-Communicators-Toolkit-220725.pdf

74. The Health Foundation & FrameWorks UK (2022). *A matter of life and death: Explaining the wider determinants of health in the UK.* https://www.health.org.uk/sites/default/files/upload/publications/2022/A%20matter%20of%20life%20and%20death_March%202022.pdf

75. Smith KE, *et al.* (2022). *Beyond the Public Health/Political Science Stalemate in Health Inequalities: Can Deliberative Forums Help? Integrating Science and Politics for Public Health.* https://doi.org/10.1007/978-3-030-98985-9_7

76. Erikainen, Boydell, *et al.* (2021). *Participatory public engagement in digital health and care: Moving beyond conventional engagement methods.* NESTA. https://www.pure.ed.ac.uk/ws/portalfiles/portal/249597691/Participatory_public_engagement_in_digital_health_and_care_EdUni.pdf

77. Strategic Coordination of Heath of the Public Research committee (2019). *Public health research principles and goals.* https://acmedsci.ac.uk/file-download/70826993

78. Office for Statistics Regulation (2021). *Improving health and social care statistics: Lessons learned from the COVID-19 pandemic.* https://osr.statisticsauthority.gov.uk/wp-content/uploads/2021/10/Improving-health-and-social-care-statistics-lessons-learned-from-the-COVID-19-pandemic.pdf

79. Academy of Medical Sciences (2016). *Improving the health of the public by 2040.* https://acmedsci.ac.uk/file-download/41399-5807581429f81.pdf

80. Academy of Medical Sciences (2021). *A healthy future – tackling climate change mitigation and human health together.* https://acmedsci.ac.uk/file-download/94272758

81. Kane M, Thornton J & Bibby J (2022). *Building public understanding of health and health inequalities.* https://www.health.org.uk/publications/long-reads/building-public-understanding-of-health-and-health-inequalities

82. Academy of Medical Sciences (2021). *People's Perspective COVID-19: Preparing for the future.* https://acmedsci.ac.uk/file-download/57914133

83. Academy of Medical Sciences (2022). *Embedding evidence in public health.* https://acmedsci.ac.uk/file-download/68285741