Met Office

Science Health Strategy

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Weather and Climate Science Health Strategy

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This strategy sets the priorities and purpose for the consolidation of the scientific health activities that are carried out within the Science Programme and highlights specific areas of responsibility within the Science Health Programme. It also establishes a governance structure, clearly delimiting the different roles and responsibilities. Such a strategy will be a fundamental pillar of, and embedded into, the joint Science-Government Services Strategy for human health. It is driven by the requirements of our stakeholders, is fully aligned to the Science, Government Services, International strategies and Met Office's 2019 corporate plan and will be reviewed tri-annually.

Summary

This Strategy sets out the direction for health research and its pull-through into pertinent products and services, responding to increasing demands for scientific expertise in weather and climate by the health sector and its stakeholders. It is fully driven by their requirements and is aligned to Government Services and the Met Office's corporate objectives.

Our mission is to undertake, integrate, add value and translate weather and climate research for **environmental public health** (including tracking) in order to inform and support interventions, prevention, adaptation and mitigation actions by the health sector.

This strategy strongly supports Government priorities, by focusing on those of the Department Of Health (and its executive agency, Public Health England), the Cabinet Office (owners of the National Risk Register), the Sustainable Development Goals and the Global Framework for Climate Services and it can only be delivered in partnership with external collaborators.

Fulfilling the mission and vision set out in this strategy requires six key developments:

1. Rebalancing, enhancing and focusing the coordination of health research

There have been numerous internal health research initiatives in recent years but they have been small-scale, fragmented and inefficient. Hence, we recommend forming a Health Science Team (initially, a virtual team) to provide strategic coordination as well as a focal point for all relevant health-related activities across Science, integrating short-term results with a long-term focus.

At present, our health services (such as heat and cold alerts, air quality, pollen, the Medical and Environmental Data Mash-up Infrastructure (MEDMI) platform, etc.) do not tend to capitalise on previous, and current, investments (e.g. provided by the National Institute for Health Research (NIHR), the Medical Research Council, the Natural Environment Research Council, etc.). This virtual team will address and accelerate this impasse.

2. Harnessing Met Office data and scientific expertise for public good

Our ability to link datasets across environments (e.g. meteorological, environmental, clinical, etc.) and time scales (e.g. from weather to climate) has the power to transform the health sector's capabilities to understand and address the full spectrum of the determinants of health and the approach to evaluation of the impacts of prevention and early interventions, both on individuals and at population-level. The timescales of interest expand from operational to seasonal, decadal and climate.

3. Engaging nationally and globally

Our primary geographical focus will be the UK but given that many of the drivers of future health are global, we will also adopt a global perspective aligned to the UK's interests abroad.

Engagement with the Farr Institute, UK Biobank, SAIL (Welsh Government Health and Care), the Economic and Social Research Council (ESRC) Data Research Administrative Centres and the Centre for Longitudinal Studies (CLS) will contribute to the Government's vision of positioning the UK as a world leader in health informatics research through scientific discovery.

4. Partnerships

This strategy is fully partner-driven and aligned to Government priorities within the health sector. As such, it is underpinned by mature collaborations with key research, policy and operational partners.

In the UK, these are Public Health England, the NIHR (the research arm of the Department of Health and Social Care), the European Centre of Environment and Human Health (ECEHH) along with the health data centres referred to previously (particularly, the Farr Institute and ESRC). We will also leverage capacity from the Universities via, and aligned to, our Academic Partnerships strategy. Internationally, mature collaborations exist with the joint World Meteorological Organization (WMO)-World Health Organization (WHO) and the National Oceanic and Atmospheric Administration (NOAA).

5. Sustainability

Solid opportunities for substantial funding include:

- The NIHR Health Protection Research Units (HPRU), and the UK Prevention Research Partnership, which have an exclusive UK and a multi-year (5 and 10 years, respectively) focus.
- The Wellcome Trust.
- European Horizon 2020.
- The Department for International Development (DfID)
- The Belmont Forum.

Tapping into this funding, would align and support our national capability remit whilst sustaining and underpinning the Met Office capabilities that are transferable to other countries, in line with our International Strategy and the UK's interests abroad.

6. Transparent governance

The formation of a Health Steering Group will provide strategic direction, review the value of our research and collaborations, and contribute to the decision processes that prioritise current and future activities. The Steering group will include national and international experts, assist our horizon scanning and advise on how to build and evolve the mechanisms to measure the value added to our stakeholders.

In summary, this strategy ensures our alignment with UK Government priorities, delivers tangible value to Government and consolidates our position as one of its primary assets.

Failing to do this means that the Met Office will no longer play a key role enabling, and contributing towards, national sustainability for the health sector, leaving a void in equipping Government's preparedness and resilience to weather and climate risks. A detrimental impact on the Met Office reputation is also envisaged.

Context - Why we need a Science Health Strategy

Over the years, efforts to develop a coherent long-term programme of research activity in the area of health have been hampered by the fragmentation of effort and lack of an overall strategic lead tasked with taking a strategic view across all relevant work. Clear focus and direction are pressing matters now, as there exists multiple and substantial opportunities to consolidate, evolve and develop our health related activities (science and services) across timescales.

If we fail to address these issues, it is likely that the lack of direction and individual research priorities will prevail, perpetuating a situation of no critical mass that reactively pursues low levels of funding from multiple projects with small impact and little to no legacy.

Furthermore, opportunities to capitalise on Met Office capabilities relevant to Government and commercial stakeholders will be missed, scientific achievements will have low or no connection to pull-through which will impinge on our national and international reputation and influence. For these reasons, health research would benefit from a joined-up approach.

A strategy for health research and services will integrate short-term results with a long-term focus. It will be fully aligned, and deliver, to the UK Government's interests, at home and overseas; to the Met Office Corporate Plan's vision for protection, prosperity and wellbeing, and the Science Strategy's ambition of delivering science with impact.

Our vision for the future

Met Office: For the Met Office to be recognised as a strategic asset of UK Government by providing trusted weather and climate services and advice. Through this, we will help Government mitigate risks to life and infrastructure, stimulate and support economic growth, operate efficiently, become a more resilient nation and protect the UK's interests at home and abroad through better use of weather and climate information.

Health Programme: For the Met Office to be acknowledged as a strategic asset and as the partner of choice on climate, weather and health by providing trusted and valued weather and climate products, services and advice to UK Government. Through this programme, and working with partners to deliver research and services, we will identify and address national, and global, health priorities that will provide greatest impact.

Science focus

Our mission is to undertake, integrate, add value and translate weather and climate research for **environmental public health** (including tracking) in order to inform and support interventions, prevention, adaptation and mitigation actions by the health sector. This contributes to the vision of saving lives and livelihoods, enabling the UK to become a more resilient nation that is better prepared for weather and climate risks; thereby reducing the burden of disease potentially increasing the number of years people live.

Our initial science focus will be supporting research directly related to **non-communicable diseases or NCDs** (mainly cardiovascular diseases, chronic respiratory diseases, obesity, diabetes and mental health). These are not only the world's biggest killers but, more importantly, deaths associated to NCDs are largely preventable by means of effective interventions that tackle the risk factors, including weather and climate. **Communicable diseases** (such as infectious diseases) will be prioritised in line with UK Government requirements.

Our primary **geographical focus** will be the UK but given that many of the drivers of future health are global, we will also take a global perspective aligned to, and driven by, the UK's interests abroad.

Based on the recent WMO-WHO-Met Office Health Workshop (June 2016), our Science Strategy, our International Strategy and past experience of where collaboration can give the best value as well as accessing future funding opportunities, **the science health programme will prioritise the following areas**, in ranking order:

1. Heat and cold services.
2. Air quality - aerosols and allergens.
3. Infectious diseases, subject to priorities of the UK Government.

Despite a wider number of relevant, and unique, science capabilities (from rainfall-driven flooding to plant and animal health modelling, urban meteorology to existing collaborative activities), the choice to initially limit our remit to heat/cold and air quality services is driven by:

- The corporate priority in the coming 3 years to limit growth;
- The need to consolidate current health research activities;
- The stage of development and maturity of capabilities and
- The need to ensure the long-term sustainability of the programme.

Hence, our focus will be to capitalise on the current number of collaborations and to increase value by ensuring we build projects and activities that are of the highest value to the Met Office, and by ensuring these activities are well managed and supported.

We will tri-annually review the development and maturity of relevant science capabilities across Met Office Science functions, assessing their potential for pull-through into future health products and services, in line with the review of our strategic health priorities and those of our stakeholders and funders.

Research activities to be undertaken include:

- Maintenance, evaluation and evolution (pull-through) of current weather and climate health services for the UK and selected ODA countries.
- Evaluation and development of new health-related products, services and research capabilities, from hours to seasons to centuries, including the co-development of Early Warning Systems.
- Pull-through of decision-making tools (e.g. DECIDER), the National Hazards Partnership and future climate projections.
- Co-development of meteorologically-based, added-value products for health, such as indices and metrics.
- Evaluation of extreme events.
- Detection and attribution of health variability and impacts.
- Synthesis and translation of scientific outputs into evidence usable by the health sector, such as risk assessments.
- Capacity building, including knowledge transfer activities (such as training) through the co-development of courses and activities, creating opportunities to transfer knowledge to other Met Office functions (including the College), that will enhance the Met Office reputation, such as obtaining National Treasure status.
- Data integration, manipulation, management, visualisation tools (e.g. MEDMI) and quality assurance of past, present and future weather, climate and medical data as collaborative co-development in partnership with the Informatics Lab, the Service Hub team and external partners (e.g. Public Health England).
- Technical developments to improve the usability and efficiency of data generated by our modelling systems.
- Improving our modelling capabilities by providing feedback on the models' performance on specific health-related research.
- Review the evolution and maturity of scientific capabilities that have potential to be pulled-through into novel services. For example, the components of the Environmental Prediction System (EPS) and Earth System models including atmosphere, ocean, ice, land, and biogeochemistry relating to plant and animal health, and communicable diseases.
- Review the validity of this strategy, particularly, within the view to expand the health services with the Planetary Health and the One Health agendas (now One Planet) in mind.
- Integration of all the above activities under one Met Office Health Programme.

Our stakeholders

This Science Health strategy aligns with, and supports, **UK Government priorities** with particular focus on the **National Risk Register (NRR), Sustainable Development Goals (SDGs) and Global Framework for Climate Services (GFCS).**

- **NRR:** The Government's (Cabinet Office) National Risk Assessment is intended to capture the range of emergencies that might have a major impact on all, or significant parts of, the UK. These are events that could result in significant harm to human welfare, damage to property, essential services or disruption to everyday life. The risks cover three broad categories: natural events, major accidents and malicious attacks. High on the list are: heat waves, cold, poor air quality and infectious diseases.
- **GFCS:** Health is one of four priority areas.
- **SDGs:** Whilst goal 3 is specific to health (ensure healthy lives and promote well-being for all at all ages), almost none of the SGDs are attainable without first addressing health issues.

Internationally, health is also a key element of the three international agenda setting agreements:

- The Sendai Framework for Disaster Risk Reduction (the main objective of this framework is the reduction of disaster risk in terms of loss of lives, livelihoods and health).
- The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement committing countries to strengthen adaptation including plans to protect human health from the worst impacts of climate change, such as air pollution, heat waves, floods and droughts, water resources and food security.
- The Sustainable Development Goals (a key target is to 'Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks').

Our UK stakeholders include: the Cabinet Office, the Foreign and Commonwealth Office, Public Health England, the Medical Research Council, the UK Health Forum, the Wellcome Trust, the National Institute for Health Research (NIHR) and its Health Protection Research Units (HPRU), the European Centre for Environment and Human Health (ECEHH), the London School of Hygiene and Tropical Medicine (LSHTM), the Farr Institute, UK Biobank, SAIL (Welsh Government Health and Care), the ESRC Data Research Administrative Centres and the Centre for Longitudinal Studies (CLS).

Priority international stakeholders are the WMO-WHO and NOAA.

Our capabilities, skills and resources

Relevant scientific capabilities and skills exist across weather and climate science, from operational services to research-related activities and services. Some of these capabilities have been built over years with support from funders in the health sector, such as the operational heat and cold alerts (funded by Public Health England) and the MEDMI database (funded by NERC and the Medical Research Council), whereas others are operating on best endeavours (e.g. pollen network) or have not yet been fully exploited (e.g. Natural Hazards Partnership).

Equally important are the collaborative partnerships which underpin and drive any good Science to Services programme. This requires effort in relationship management, work to understand and deliver both our and our partner's, plus commitment to the joint activities. They come at a cost and therefore it is important to understand the value of our partnerships to the Science Programme and the Met Office overall and ensure we focus our effort on the most important.

It is essential to recognise this value does not exclusively refer to monetary terms. It also encompasses the ability to influence decision-making with key stakeholders, genuinely earned organisational reputation, greater credibility and enhancement of our contribution to national capability.

Future potential opportunities for funding exist, which could provide significant support to consolidate and integrate several areas of Met Office science and expertise. These funding streams are:

1. UKPRP (£100k pa for 3 years in FY18/19; £4-7 million for 5 years in FY1819; £4-7 million for 5 years in FY1920). Which has an exclusive UK focus.
2. NIHR HPRUs, which have an exclusive UK focus.
3. The Wellcome Trust.
4. European Horizon 2020.
5. The Belmont Forum.
6. The Department for International Development (DfID)

Tapping into this funding, not only aligns and supports our national capability remit but also sustains and underpins Met Office capabilities that are transferable to other countries, in line with our International Strategy and the UK's interests abroad.

However, given the fragmentation of effort in health research, the focus will be to increase value by ensuring projects and activities of the highest value are build, and that these activities are well managed and supported. A list of practical first steps, and recommendations, with these objectives in mind, is given below.

Practical first steps

1. To form a **Health Science Team** to provide a focal point for all relevant work across Science. Initially the team would be virtual and would comprise all the health work streams funded by health projects.

The Health Science Team would be led by the current Strategic Head of Health Science Integration, who will also provide leadership and greater strategic coordination of the Health science work, its delivery and the health research funding. This would fit well with her current role at Exeter University's European Centre for Environment and Human Health.

2. To define a **Programme of Work (PoW)** that integrates short-term results with the long-term focus, coordinates the direction and resources of the Health Science Team and establishes clear, specific objectives, Key Performance Indicators (KPIs), roles and responsibilities.

The PoW is to be agreed with the Chief Scientist, the Government Services Director, the Government Services Health Lead and the Health Science Team.

Suggested priorities include:

- The evaluation of the pollen network to specifically include a feasibility and value assessment study.
- The evaluation of the MEDMI platform, which would also benefit from a feasibility and value assessment study.
- Scoping science **knowledge transfer mechanisms** from the Health Science Team to the Met Office College, which creates and distributes knowledge thereby ensuring its availability for future users (i.e. National Treasure status).
- Develop **a road map for strategic partnerships**, after assessing the value the relationships bring and the appropriate decision-making processes to prioritise them.

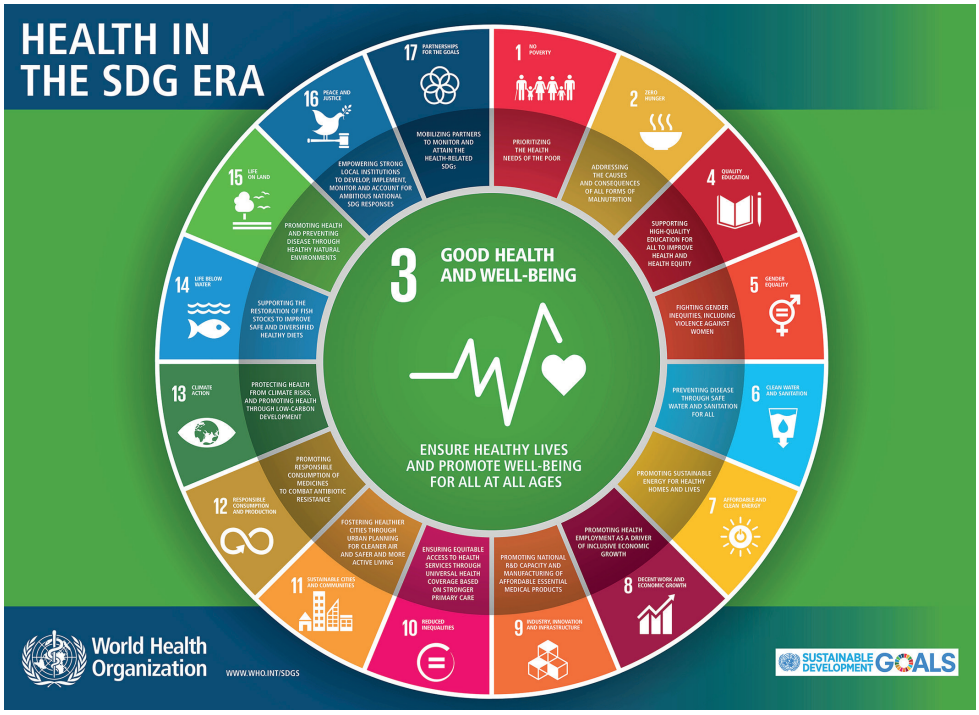
3. The formation of a **Health Steering Group** that will review the value of the research and collaborations, provide strategic direction and contribute to the decision-making processes. Such group will also advise on how to build and evolve the mechanisms to measure the value to our stakeholders as well as sustainability.

Preliminary roles and responsibilities

- The Head of the Health Science Team will **co-develop the joint Science-Government Services Strategy**, in close alignment with the equivalent work in Government Services, aimed at pulling through weather and climate science into services embedding this Science Health Strategy.
- The Head of the Health Science Team would be **responsible for coordination and oversight** of all Met Office health related research programmes of work and would be the **focal point** for scientific, stakeholder and partnerships activities across all Science.
- It is anticipated that others involved in health-related work would remain in their current teams, but where possible they would be commissioned to deliver the work through the new team.
- The Head of the Health Science Team would be ultimately **accountable** for delivery of the whole programme.
- Ideally, the funding for all of the health work should be allocated to the Health Science Team, with its Head commissioning delivery through other teams where required – this would encourage the creation of a **virtual team** under the Head's leadership.

Value of the Science Health Strategy

The main driver of the Science Strategy is a continued drive to providing more skilful and reliable predictions of weather and climate and better constraints of projections of climate change. The Health Science Strategy is underpinned by these scientific predictions and projections; its main driver is a continued pull-through of aligned science capabilities that would underpin the evolution of current and future health products or services.



The benefits of the Science Health Strategy include:

- Delivery of capability that allows the Met Office to thrive as a National Met Service, enhances its value as a national asset and supports UK growth.
- Enhancement of the scientific reputation of the Met Office and the UK.
- Improving our services and contributing to our vision of building a more resilient nation better prepared for weather and climate risk; enabling us to provide early warnings of, for example, extended cold spells and heat waves, assisting the health services to be better prepared.
- Gaining funding that contributes to the development of services and contributes to the improvement of our underpinning capability.
- Generating profits that can be reinvested in Met Office science and services.
- Enhanced national and international reputation and influence.