

Health in a changing climate:  
How climate services can contribute to better health protection  
decisions.

Report from the Health working group of the conference: *Living with Climate Variability and Change*: Espoo, Finland, 17-21 July 2006.

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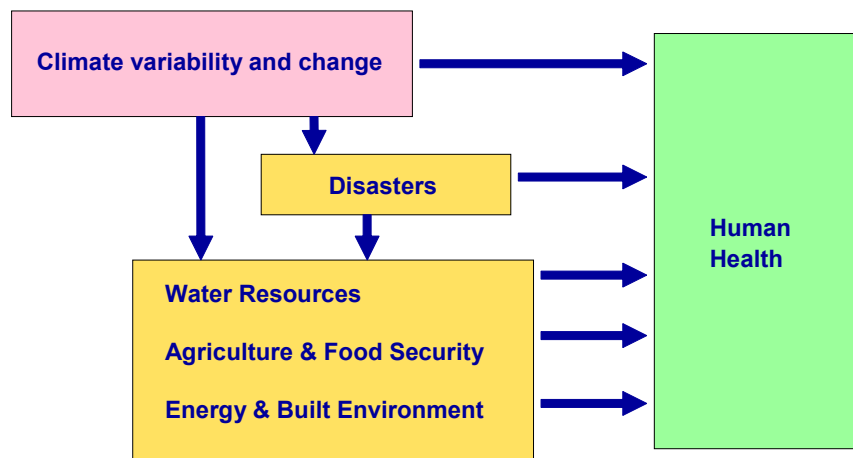
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## Introduction

Human health is an integrating theme of climate variability and change. Population health is affected by climate and particularly by climatic effects acting through natural disasters, climate-sensitive diseases and through climate-sensitive sectors such as agriculture, water, or the built environment. This results in spatial and temporal changes in a huge variety of health risks, from heatwaves to floods and landslides, to malaria and malnutrition, and more indirectly through disruption to human societies, employment and livelihoods. Health is therefore both a key climate-sensitive sector in its own right, and also provides an important justification for addressing climatic impacts on other sectors.



**Figure 1: Health as an integrating issue in climate variability and climate change. Decisions taken along all of the causal links ultimately affect health outcomes.**

The report identifies a series of central issues that underpin attempts to protect health under a variable and/or changing climate. These include, **(i)** the health sector has a clear mandate and strong sense of ownership over many health protection decisions, but only provides limited input into health-relevant decisions by other sectors; **(ii)** the sector will take up climate information most effectively through a "demand-driven approach" that is designed to increase effectiveness of their core activities; **(iii)** most decisions to control climate-sensitive diseases do not necessarily utilize climate information, but there is an important subset of decisions (e.g. spatial targeting and early warning systems) where climate information can make a valuable contribution; **(iv)** the health sector does not currently make effective use of climate information, partly due to absent or ineffective institutional partnerships and in part due to lack of an interdisciplinary knowledge base

and education system; (v) there is a need for a more stable and systematic interaction between the health and climate community to define and meet information needs; (vi) this needs to be supported by enhanced capacity building, demonstration projects and outreach activities to support health decision-makers, from householders to international policy makers.

## **Current approaches to decision making under uncertainty in the health sector.**

**The health sector, principally national ministries of health, has a clear mandate for most health protection decisions.** This includes both preventive (e.g. vaccination programmes) and curative measures. The health sector has relatively well-established operational procedures, and methods for incorporating new evidence (e.g. through epidemiological studies) in order to change standard practices. The integration of climate information into health decisions should therefore be "demand-driven", bringing about clear improvements in health protection, and contributions to wider objectives, such as the Millennium Development Goals.

**The health sector underplays its role in influencing health-relevant decisions that are taken in other sectors.** Decisions taken in other sectors, from energy production and the built environment, to water infrastructure, have very large effects on health. In many cases these have larger impacts than decisions taken within the health sector. Institutional structures and focus on immediate priorities have resulted in the health sector having low involvement in these important decisions.

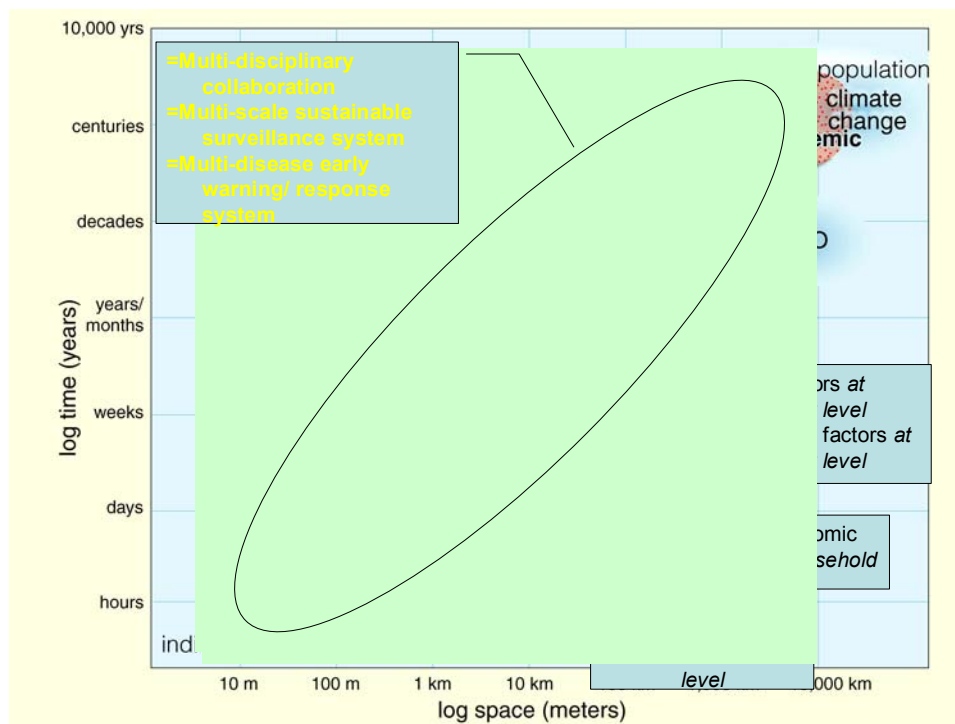
**Health sector decisions are often taken under uncertainty.** It is rarely possible to identify in advance which people are going to suffer disease at any one time. The main approaches to dealing with this uncertainty are (i) through preventive approaches at the population level (e.g. mass vaccination for infectious diseases, or widespread dissemination of health information), or (ii) through reactive approaches when the disease has occurred (i.e. treating sick people). The majority of resources within the health sector are directed to reactive responses.

**Although *climate* underpins all human health (e.g. through maintenance of food and water supplies, determining disease distributions), *climate information* is only directly relevant to some health decisions.** The fact that human health ultimately depends on a stable climate in itself provides a justification for sustained, high-quality monitoring of climate conditions. At the level of operational health planning, however, climate information has a more restricted set of uses. Even for climate-sensitive diseases, the majority of preventive approaches are implemented without reference to climate information. These include, for example, development and dissemination of improved

malaria drugs, or greater investment in water and sanitation infrastructure or in health services. The main roles for climate information in operational health decisions are:

- 1) Identification of climatically suitable or high-risk areas for particular diseases (i.e. spatial targeting based on climatology)
- 2) Early warning systems for climate-sensitive diseases that vary over time (i.e. temporal targeting based on either weather observations, or forecasts).

**Climate-based early warning and reaction is most useful within restricted, but still important, zones.** These are mainly around the margins of the disease distribution in either time or space. They are less useful either where there is low variability (e.g. hyperendemic malaria zones where transmission is high every day, of every year), or where the resilience of the health sector is either very high (i.e. where the underlying disease burden is small), or very low (i.e. there is no capacity to respond to early warnings).



**Figure 2:** Climate-sensitive diseases vary across wide temporal and spatial scales. Non-climatic vulnerability factors are shown in boxes on the right. Interventions to reduce health impacts are shown in the box on the top left (adapted from presentation by Dr. Zhou Xiaonong).

## Constraints on using climate information to support health decisions

**The health sector has a low recognition of the importance of climate variability and change.** While most health professionals will acknowledge some links between climate

and health, they tend not to have a strong appreciation either of the essential role of a stable climate in underpinning health, or of how climate and weather information can improve their day-to-day operational decisions. Exceptions are (i) the El Niño phenomenon, which is well studied, relatively predictable and triggers preventive action, and (ii) systems that are beginning to be put into place as a response to catastrophic climate events in specific regions, such as the heat-health early warning systems that are being developed and implemented in Europe, partly as a response to the deaths in the 2003 summer heatwave.

**Until now, the health sector has expressed only low level demand for climate information.** This is due to failure to appreciate the operational value of climate information, and ignorance of the kinds of services that be supplied by the climate community. In contrast, the climate community has been more pro-active in approaching the health sector, but often with limited understanding of the kinds of information that are required to support health decisions.

**Interdisciplinary work remains weak.** Most collaborations between the health and climate sector are on an *ad hoc*, project-by-project basis. There is a lack of active official partnerships between health services and met. services. Of the 24 (out of a total of 52) countries within the WHO- European region who responded to a recent survey, only 2 reported active partnerships between health and meteorological agencies.

**There is little understanding of the kinds of information that have most impact on health decision-makers.** It is not clear, for example, the extent to which decision-makers respond to accurate quantification of likely deaths or disease cases arising from climate threats (e.g. numbers of deaths in a cyclone), or are willing to respond to less precise or qualitative assessment of a wider range of impacts, such as possibility of infectious disease outbreaks and damage to health infrastructure.

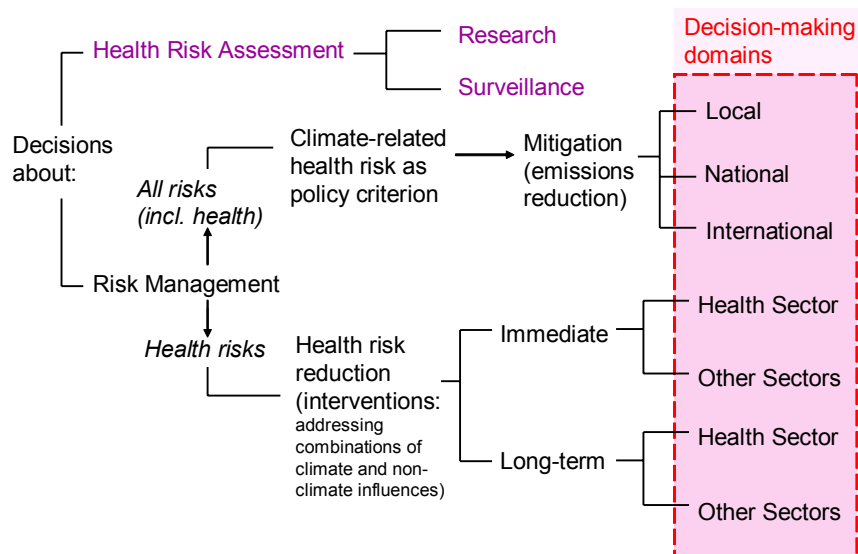
**Methods for prioritization of health responses are weak.** Climate variability and climate change bring a very wide range of health threats. However, demands on health services already outstrip available resources, especially in developing countries. Health services are therefore faced with tough choices as to the resources they should direct to responding to or preventing climate-based threats, as opposed to other health priorities, and which climatic threats they should address first. There is therefore a need for a better understanding of the effectiveness of alternative interventions, as well as their economic efficiency and equity implications.

**Health sector decisions reflect short-term rather than long term priorities.** This is partly because other health issues (e.g. the HIV pandemic) are considered to be more certain and more urgent than health threats arising from climate variability and change. This results in a "fire-brigade" approach that deals only with the most immediate issues. Planning decisions are often taken without a long-term view. For example, health facilities destroyed in natural disasters are often rebuilt in the same site, 20% of health care facilities in Europe are situated in disaster-prone areas (EEA), and health facilities are often highly energy inefficient, with high carbon dioxide emissions.

## Recommendations for improved decision-making approaches.

**Recognize the wide range of decisions that can help to protect health in a changing climate.** Decisions that relate to maintaining a stable climate (i.e. relating to greenhouse gas emissions) should take account of the health risks that are likely to result from climate change, and the potential health co-benefits of actions to reduce climate change, e.g. through reductions in air pollution. There are also multiple interventions that can protect health from climate variability and change that is now occurring, ranging from immediate (e.g. heat-health warning systems), and long term interventions (e.g. investment in disease surveillance systems), that can occur both within and outside the health sector.

### Climate & Health: Decision-Making Under Uncertainty



**Figure 4: An overview of the kinds of decisions that can contribute to protecting health under a changing climate.**

**Give priority to "no regrets" interventions.** At least in the early stages of development of using climate information to inform health decisions, it is important to ensure that the actions that are taken will still bring some benefits even if the assumptions on which they

are based are later shown to be inaccurate. Examples include strengthening basic disease surveillance systems during the development of a, more sophisticated, climate-based early warning system.

**Place greater emphasis on assessing economic implications.** Decision-making, particularly at the national level, is largely driven by economic considerations. Yet there is little appreciation of the impacts of climate change and climate variability on economic development, either through health or through other sectors. Greater involvement of economists in comprehensive studies of climate impacts, and assessment of the economic benefits of decisions that take account of climate information, should lead to greater uptake by decision-makers.

**Pay greater attention to prioritizing interventions, and making best use of scarce resources.** Even for "no regrets" options, it is important to recognize that resources are limited, that there is an opportunity cost if the best option is not selected, and that intervention effectiveness should be maximized. Available tools include; **(i)** Economic approaches such as cost-effectiveness, cost-benefit and equity analyses to aid prioritization; **(ii)** Sharing of core health and climate information across countries and sectors, to increase efficiency; **(iii)** Tailoring of climate information to local conditions and specific decision-needs, to increase effectiveness; **(iv)** Use of seasonal forecasts and climate change projections to give maximum warning of likely changes in disease patterns; **(v)** Use of "simulation" of health threats caused by climate variability, to test the effectiveness of warnings and action plans; **(vi)** Integration of indigenous knowledge and methods of climate forecasting and reaction, to add information and improve take-up by affected communities.

**Recognize that reliable and high quality surveillance systems are a pre-condition for disease prevention.** Disease surveillance systems are essential in themselves, as the most reliable means of detecting changes in disease patterns. They also provide the data that is necessary to develop "add-on" climate-based early warning systems, which can in turn improve lead times for operational responses, and fill gaps in health surveillance data. The existence of disease surveillance systems is an important part of the justification for developing more sophisticated systems that integrate risk factor information, including meteorological information, into predictive early-warning systems.

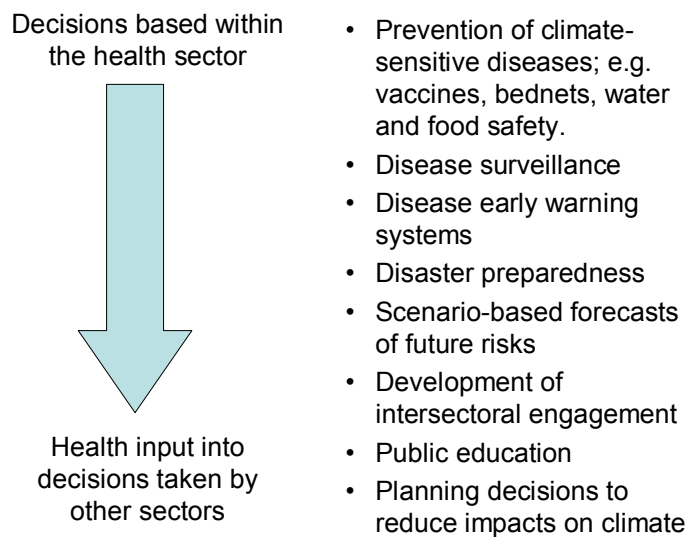
**Support climate-based early warning systems with effective action plans.** Early warning systems without effective action plans are a waste of resources. The MétéoFrance heat-health warning system is an example of an apparently well-designed system, with clear demarcation of roles and responsibilities of key actors, pre-prepared interventions such as public health information messages, and well-developed mechanisms for information dissemination, sustained over time.

**Carry out continuous and iterative evaluation of the effectiveness of early warning systems.** This should take into account the accuracy of the warning, in terms of both failure to warn of real threats and false alarms, the effectiveness of the response that is

implemented, and of the costs of the system. It should include feedback from the operational sector back into the research community.

**Analyse, refine and replicate successful models of interdisciplinary decision-making.**

Successful models include the task force organized by the Pan-American Health Organization to plan responses to El Niño events. This leads to actions such as the early release of emergency funds when it is apparent that a strong El Niño event is likely to occur. The approach is facilitated by the fact that El Niño is quasi-periodic, and exerts a strong effect in the region. This in turn justifies long-term support from international agencies to maintain the task force.



**Figure 3. Areas where the health sector can contribute to protecting health under a changing climate**

### **Recommendations for research and development**

**Generate support for evidence-based decisions.** The health sector traditionally requires a relatively high level of proof to justify a change in practice. It is therefore essential to generate high quality studies that describe the links between climate and health, and that address how this can be taken through to changes in operational practice.

**Place greater emphasis on understanding climate effects on health in the context of other influences.** Many early studies placed an undue emphasis on testing the influence of climate as opposed to other influences, through an either/or approach. More recent

studies integrate climate with non-climate influences, such as changes in population immunity levels or other characteristics of vulnerability, leading to increased credibility within the health community, and better explanatory and/or predictive power.

**Promote interdisciplinary collaboration in research between the health and climate sectors.** There are multiple examples of health experts carrying out climatological studies (e.g. studies of climate trends in areas that have experienced disease increases), and climate experts carrying out health research (e.g. developing early warning models for infectious disease). Each community has a responsibility to recognize the complexity of the other sector, to seek specialist input, resulting in publications authored by teams with both sets of expertise.

**Develop more stable and systematic interactions between the health and climate communities.** While the health sector asks for a demand-driven approach, they often have very little idea of exactly what their true needs are, and whether they can realistically be met by the climate sector. There is a need for sustained coordination and development of an interdisciplinary knowledge base between the health and climate sectors in order to create and develop an effective demand for climate information and to improve health sector decision-making through better use of climate information. This could potentially occur through an international commission or working group on health in a variable and changing climate, led by the health sector in close partnership with the climate community.

Although the nature of this group requires further definition, it should involve international agencies working on health and on climate (e.g. WHO, WMO), and could also include collaborating centres with specific experience of applying climate information in affected sectors (e.g. African Centre for Meteorological Applications for Development, IGAD Climate Prediction And Applications Centre, Centro Internacional para la Investigación del Fenómeno el Niño, Regional Climate Centers, etc), operational personnel from the health and climate sectors (primarily from National Ministries of Health) from particularly vulnerable countries, and experts in research on links between climate and health. A group such as this could carry out systematic reviews of requirements for climate information in health planning, as well as review current availability and gaps in provision of data and models, and needs for interdisciplinary research. This would provide a firm basis for developing "best-practice" guidelines, with supporting data and information that is appropriately packaged and disseminated for health end-users and climate service providers, supported by demonstration projects. This interaction should be mirrored at the national level, for example through development units within meteorological services, or specified collaborating centres. In planning this improved coordination and knowledge development, it is important to ensure that the efforts clearly add value to both health and climate communities, and that inefficient or redundant bureaucratic structures or mechanisms are strictly avoided.

**Facilitate access to climate data.** The health sector feels that there have been several negative experiences in their interactions to date with some meteorological services. This is partly due to national policies, in some cases, that restrict access to or charge for the

basic observational data that is often most useful for health decisions, while facilitating access to products such as seasonal climate forecasts that are more sophisticated, but are often less relevant. The health sector recognises, however, that National Meteorological and Hydrological Services climate experts are trained in the intricacies of use and analysis of climate data, and that their advice and collaboration in the use of the climate data would add value to the process and results, and further agreed that in the long run, the best way to ensure more open access to climate data would be to demonstrate to decision-makers at national levels that the collaboration produces proven results of socio-economic benefit to the relevant communities.

**Support international training in climate-health interactions.** There are many examples of high quality training programmes and materials for training health experts on climate issues, and vice versa. These include, for example, training modules developed by WHO and WMO, IRI, Oulu University, the London School of Hygiene and Tropical Medicine, and the Australian National University. However, these exist as isolated short courses. These could be assembled into a single comprehensive course that could be taught by international or regional institutions.

**Support national and community level capacity building.** There is a need for greater basic capacity at the operational level, and within the specific communities that actually suffer health impacts from climate change. At the sub-national operational level, capacity-building could be structured around training programmes around shared interests in statistics from both the climate and health sector, e.g. through projects such as Intersect. This could take a tiered approach that begins with basic descriptive statistics, with more advanced modules on analysis of satellite images etc. At the community level, it could include modules within secondary school teaching programmes, using meteorological and health data as a basis for teaching basic mathematics and statistics, e.g. through description of seasonal disease patterns.

## **Methods of presenting and disseminating information and approaches**

**It is important to recognize the broad range of decision-makers, from households to national policy makers.** It is essential to have a clear vision of the main stakeholders throughout the decision chain leading to health protection, so that information and decision-support approaches can be accurately targeted. This would avoid wasted effort or actual harm - e.g. through disseminating inaccurate risk information to the general population, without accompanying information on effective responses.

**"Two-step processes" may improve effective communication.** Scientists and health practitioners often have poor skills in developing and communicating risk messages.

Professional communication experts could be used to develop information, and training courses, targeted to specific audiences. This could include introductory training of journalists and of disaster response agencies (e.g. IFRC volunteers), particularly in developing countries.

**Describe and disseminate "success stories".** There are a limited number of good examples of how climate information has been incorporated into health and other development decisions. These include the use of basic climatology for spatial targeting of disease interventions, and the use of real-time observations, short term and seasonal forecast to support to heat-health warning systems in North America and Europe, and Malaria Early Warning Systems in southern Africa. These should be more widely disseminated.

**Use communication methods that reach populations directly.** National Governments are at times unable, and occasionally ineffective in disseminating climate risk information to the population. There is therefore a role for direct contact from health and climate agencies and NGOs through radio, TV, web etc. Successful examples include ACMAD's use of rural radio (RANET) to support food distribution during drought crises.

**Use innovative, locally appropriate methods for communication.** Good examples include a Finnish model that includes an initial e-mailing and SMS of basic risk information to targeted institutions such as rescue authorities, with directions to more detailed information on the internet, leading to a snowball effect with increasing pick-up by the public. Methods need to be appropriate to local conditions. In developing countries with poor communication infrastructure, the most effective communication means may be through NGOs, story telling, and information messages through schools.