Executive summary

There is increasing awareness that climate change will have important health consequences. Many EU Member States have observed shifts in communicable disease transmissions that may be partially attributable to climate change. Future climatic changes may further influence the transmission of communicable diseases in Europe.

The European Commission’s White Paper on Adapting to Climate Change advocates the need for pan-European action. ECDC is developing a toolkit to assist national vulnerability assessments and adaptation strategies. Vulnerability assessments are important for evaluating a nation’s key vulnerabilities, and for explaining the risks to those that will be affected. All adaptation strategies should be based upon sound science and ensure health benefits irrespective of the future magnitude of climate change.

1 Introduction

Climate change, largely a consequence of fossil fuel combustion, has led to numerous environmental impacts, including a significant increase in worldwide mean surface temperatures. Many scientists now believe that climatic changes are happening towards the upper boundary of IPCC (Intergovernmental Panel on Climate Change) projections¹. Due to the biogeographic diversity of Europe, different regions have very different vulnerabilities (Figure 1).

There are many potential public health impacts due to climate change, including shifting transmission ranges of communicable diseases: many infectious agents, vector organisms, non-human reservoir species and pathogen replication rates are particularly sensitive to climatic conditions. Numerous theories have been developed in recent years to explain the relationship between climate change and infectious diseases, including higher proliferation rates at higher temperatures, extended transmission season, changes in ecological balances and climate-related


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migration of vectors, reservoir hosts or human populations. For example, hotter and longer summers, warmer winters and/or increased annual rainfalls could enable disease-carrying organisms such as ticks or mosquitoes to shift their habitats, potentially introducing diseases to areas previously unfamiliar with them.

Recognising the importance of addressing climate change, the European Commission published a white paper on Adapting to Climate Change, which outlined a European framework for action, emphasising the need for action at the EU level and the need for collaboration across EU Member States. The European Commission’s Directorate-General for Health and Consumers (DG SANCO) published a staff paper on the health aspects from climate change, noting calls for the development of tools for anticipating, preventing and responding to potential threats from climate change.

ECDC has taken a proactive approach to climate change, launching several comprehensive risk assessments and developing a toolkit to facilitate national assessments of health vulnerabilities to climate change and the development of national adaptation strategies. This meeting was organised to further discuss how ECDC and EU Member States can work together to confront climate change.

**Figure 1. Key vulnerabilities of European systems and sectors to climate change during the 21st century for the main biogeographic regions of Europe (EEA, 2004a).**

Atlantic
- increased coastal erosion and flooding
- stressing of marine bio-systems and habitat loss
- increased tourism pressure on coasts
- greater winter storm risk and vulnerability of transport to winds

Boreal
- waterlogging
- eutrophication of lakes and wetlands
- increased coastal flooding and erosion
- increased winter storm risk
- reduced ski season

Tundra
- thawing of permafrost
- decreased tundra area
- increased coastal erosion and flooding

Mediterranean
- reduced water availability
- increased drought
- severe biodiversity losses
- increased forest fires
- reduced summer tourism
- reduced suitable cropping areas
- increased energy demand in summer
- reduced hydropower
- increased land loss in estuaries and deltas
- increased salinity and eutrophication of coastal waters
- increased health effects of heatwaves

Mountains
- glaciers disappearing
- reduced snow cover period
- upward shift of tree line
- severe biodiversity losses
- increased rock fall

Steppe
- decreased crop yield
- increased soil erosion
- increased sea-level rise with positive North Atlantic oscillation
- increased salinity of inland seas

Central
- increased frequency and magnitude of winter floods
- increased variability of crop yields
- increased health effects of heatwaves
- severe fires in drained peatland

Boreal
- waterlogging
- eutrophication of lakes and wetlands
- increased coastal flooding and erosion
- increased winter storm risk
- reduced ski season

Graphics: ECDC

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2 Meeting objectives

In order to coordinate pan-European activities, ECDC established an Expert Group on Climate Change. Each EU Member State, as well as candidate country, was invited to nominate a participant (see Annex for a list of participants).

The First Meeting of the ECDC Expert Group on Climate Change had the following objectives:

- to facilitate dialogue between Member States and ECDC on the consequences of climate change for communicable disease control;
- to communicate the current state of the art regarding climate change and its impact on health and communicable disease spread; and
- to obtain initial feedback on a toolkit for adaptation that ECDC has been developing.

3 Addressing climate change in the EU

a) Climate-sensitive diseases

There is a great variation in the climatic and socio-economic contexts influencing disease transmission across European nations, and thus the threat from climate change is not uniform. An important message from the meeting is that climate change is a threat multiplier: it may generate new threats, but its primary impact will likely be through the ways that it exacerbates existing threats. It will likely alter factors such as the geographical range of disease spread and the seasonality of diseases.

Indeed, much has been written about climate change and its potential impacts on disease transmission\(^7,6\). A few examples were discussed in detail during the meeting. In Sweden and the Czech Republic, tick-borne encephalitis was highlighted as a disease that has expanded in past decades. Lyme disease, another tick-borne disease, is likely to be impacted by climatic changes, given the importance of climate in many stages of its life cycle. In Kosovo, it was noted that outbreaks of CCHF (Crimean-Congo haemorrhagic fever) often correlate to an early onset of spring.

Numerous food- and waterborne diseases (FWD) are also affected by climate; it is well observed that salmonella incidence rates increase with increasing temperature, for example\(^7\). Preliminary data from an ECDC risk assessment of the impact of climate change on FWD suggest that climate has an impact on several aspects of disease transmission. The full assessment is scheduled for publication in 2010.

b) Vulnerability assessments & adaptation strategies

Health systems can avoid, prepare for, or respond to the impacts of climate change by reducing climate change-related vulnerabilities through a wide range of preventive measures, including health behaviours, clinical procedures, or technical/structural measures.

ECDC aims to assist Member States in this process through the development of a standardised adaptation toolkit with objective indicators, which should facilitate adaptation assessments as well as the prioritisation of adaptation options. Such a tool could then be used by a team of experts to provide a status report of the adaptation capacity in the country.

There is demand for these toolkits to facilitate vulnerability assessments and adaptation strategies. Many participants of the meeting stated that they will be planning vulnerability assessments in the coming years. Important considerations emerging from discussions during this meeting include that a variety of key stakeholders should be included in the processes, that multidisciplinary teams need to be assembled, and that baseline data

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needs to be obtained from a variety of sources. Many different adaptation options are possible, but any adaptation strategy should be predicated on the premise that any implemented measures should involve 'no regrets' decisions that ensure health benefits irrespective of the ultimate magnitude of climate change. Furthermore, regional and cultural contexts must be considered and accounted for in any adaptation strategy.

It is imperative that efforts to assess and adapt to the threat posed by climate change are not duplicated, but iterative. Much can be learned from previous assessments, such as exhaustive assessments conducted by Sweden\textsuperscript{10} and Canada\textsuperscript{11}, or more streamlined but nonetheless highly effective assessments such as one conducted by Portugal\textsuperscript{12}.

c) Knowledge gaps

Participants at the workshop discussed at length the issue of attribution: can increased incidence of communicable disease be attributed to climate change? This is an extremely difficult question to resolve. It is clear that climate is but one of many drivers of communicable disease spread, and it is difficult to disentangle the impact of climate vis-à-vis other factors. However, most projected climate changes have yet to occur, meaning that the relative importance of climate change as a disease driver may currently be underestimated.

Finally, there remains a paucity of data to work with. One potential way of overcoming the data gap is to link epidemiologic data with the extensive climatic data that exists in the European Union. ECDC has proposed the European Environment and Epidemiologic (E3) network as one solution to this idea (Figure 2).

\textbf{Figure 2. The European Environment and Epidemiology (E3) network.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{The European Environment and Epidemiology (E3) network.}
\end{figure}

\textsuperscript{10} \url{http://www.sweden.gov.se/sb/d/574/a/96002}
\textsuperscript{11} \url{http://www.hc-sc.gc.ca/ewh-semt/climat/eval/index-eng.php#guide}
4. Conclusions

Climate change is a multidimensional issue and addressing it requires expertise from many disciplines. Moreover, it is an issue complicated by great uncertainty. Consequently, communicating climate change and its impact on health is highly difficult. However, it is well established that certain degrees of climate change will be unavoidable. Given the sensitivity that many diseases have to climatic factors, it is widely anticipated that climate change will lead to shifts in the transmission ranges of communicable diseases.

Public health organisations and institutions need to begin to address climate change. In the near term, the key barriers to doing so will relate to lack of awareness, lack of funding, and lack of data. The ECDC toolkit for conducting vulnerability assessments and adaptation strategies is being designed to help overcome these barriers and facilitate the development of strategies that offer numerous co-benefits to public health.
Annex 1. Workshop agenda

Monday, September 7, 2009

08:30–9:00 Registration and Introduction
  08:30–09:00 Registration and coffee
  09:00–09:10 Opening
Zsuzsanna Jakab, Director, ECDC
  09:10–09:20 Introduction to the workshop
Johan Giesecke, Scientific Advice Unit, ECDC

09:20–12:00 Session 1: Climate change and health
Chair: Jan Semenza Scientific Advice Unit, ECDC
  09:20–09:50 Health threats from climate change
Tony McMichael, Australian National University
  09:50–10:20 Public health response to climate change
Howard Frumkin, NCEH and ATSDR, CDC
  10:20–10:50 Coffee break
  10:50–11:20 IPCC Perspective on climate change and communicable diseases
Kristie L. Ebi, IPCC WGII Technical Support Unit
  11:20–11:40 The EC White Paper on climate change
Per Kulling, European Commission, Health Threats Unit -SANCO C/3
  11:40–12:00 Plenary discussion

12:00–13:00 Lunch

13:00–17:30 Session 2: Climate-sensitive diseases
Chair: Elisabet Lindgren, Karolinska Institutet
  13:00–13:30 Vector-borne diseases: EDEN Project
Guy Hendricks, Avia-GIS
  13:30–14:00 Vector-borne diseases: Lyme disease in Europe
Agustin Estrada-Pena, Universidad de Zaragoza
  14:00–14:40 Impact of climate change on food- and waterborne diseases: ECDC risk assessment
Thomas Kistemann, University of Bonn
Ana Maria de Roda Husman, RIVM
  14:40–15:10 Panel discussion on climate-sensitive diseases
  15:10–15:15 Intro to group work
Jan Semenza

15:15–15:30 Coffee Break

15:30–17:30 Group Discussion: Perspectives
Group A – Chair: Bohumir Kriz
Group B – Chair: Johanna Takkinen
Group C – Chair: Thomas Kistemann
Tuesday, September 8, 2009

09:00–12:00  Session 3: Vulnerability Assessments
Chair: Kristie L. Ebi, IPCC WGII Technical Support Unit

09:00–09:30  Assessing vulnerabilities: Canadian experience
Peter Berry, Health Canada

09:30–10:00  Assessing vulnerabilities: Portuguese experience
Elsa Casimiro, Portugal

10:00–10:30  Introducing the ECDC Vulnerability Assessment Tool-kit
Elisabet Lindgren, Karolinska Institutet

10:30–11:00  Coffee break

11:00–12:00  Group Discussion: Applying Vulnerability Assessments
Group A – Chair: Elisabet Lindgren
Group B – Chair: Kristie L. Ebi

12:00–13:00  Lunch

13:00–15:30  Session 4: Adaptation Assessments and Strategies

13:00–13:30  The European Environment and Epidemiology Network
Jan Semenza, ECDC

13:30–14:00  Introducing the ECDC Adaptation Tool-Kit
Kristie L. Ebi, IPCC WGII Technical Support Unit

14:00–15:00  Group Discussion: Developing Adaptation Strategies
Group A – Chair: Elisabet Lindgren
Group B – Chair: Kristie L. Ebi

15:00–15:30  Plenary Discussion: Conclusions from Group Discussions

15:30–15:45  Conclusions and Next Steps
Jonathan Suk, Jan Semenza, ECDC

15:45  Coffee Break and Adjournment
## Annex 2. List of participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Country</th>
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<tbody>
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Participants of the meeting at ECDC, September 2009.