



Environment and Health Research for Europe



World Health Organization
Regional Office for Europe

Background Document to the Third Ministerial Conference
on Environment & Health

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Executive summary

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The European Science Foundation acts as a catalyst for the development of science by bringing together leading scientists and funding agencies to debate, plan and implement pan-European initiatives.

At the Second European Conference on Environment and Health, held in Helsinki in 1994, European ministers of health and the environment identified high-priority areas for research and recommended that the European Science Foundation (ESF) should work with the World Health Organisation's Regional Office for Europe (WHO-EURO) and the European Commission (EC) to identify future environment and health research needs.

A programme of scientific consultation was accordingly launched and, using a systematic approach, further research required to support the goals in the Helsinki Declaration on Action for Environment and Health in Europe was identified. At a multidisciplinary ESF update meeting, 45 leading scientists evaluated more than 80 detailed research recommendations and drew up a shortlist of 24 priority issues. Subsequently, policy-makers, scientists and representatives of non-governmental organisations and industry discussed this shortlist at a joint EC/ESF/WHO-EURO "consensus conference" and emphasised the need to understand better the relative risks and impacts of environmental hazards, in order to direct resources towards problems as efficiently as possible. The outcome of that conference is reported in this document.

Based on the accompanying document *An environment for better health*⁽¹⁾, priorities were identified using both scientific and policy criteria. The consensus conference highlighted three sets of strategic and specific research needs:

Overarching needs

- Environment and health indicators;
- Health and environment geographical information systems.

Cross-cutting issues

- Risk assessment;
- The environmental contribution to social variations in health;
- Cognitive functions as mediators of environmental effects on health.

Specific research areas

- Air quality;
- Water quality and drinking-water;
- Environmental effects on cognitive functions;
- Children and unintentional injuries;
- Climate change and stratospheric ozone depletion.

In order to carry out the proposed programme, the consensus conference recommends that environment and health research should be integrated and coordinated throughout Europe and considers that the creation of EC/ESF/WHO-EURO collaboration would facilitate integration and coordination of the proposed research and the interfaces between research and policy-making. A joint effort, consisting of both international and national activities, is needed to implement research programmes on the topics selected in a cost-effective manner, thus limiting the use of financial resources and ensuring an efficient and effective approach both to the prevention and to the reduction of health impacts from environmental factors in Europe.

⁽¹⁾ Kroes, R. ed. *An environment for better health*. Integrated report of the ESF Environment and Health Programme, Strasbourg, European Science Foundation

Introduction

Background

1. At the Second European Conference on Environment and Health, held in Helsinki in 1994, European ministers of health and the environment identified seven broad priority areas where action was required to reduce the impact of environmental degradation on health. These ranged from contaminated food and water to ambient and indoor air pollution, the working environment, urban health, and death and injuries from accidents. The resulting Helsinki Declaration on Action for Environment and Health in Europe recommended that the European Science Foundation (ESF) should work with the World Health Organisation's Regional Office for Europe (WHO-EURO) and the European Commission (EC) to identify future research needs in these areas.

Programme of scientific consultation

2. In line with the recommendations of the Helsinki Declaration, ESF launched a programme of scientific consultation. The programme was developed in close liaison with WHO-EURO and EC. Over 150 scientists from some 20 European countries and a wide range of disciplines, from neurobiology and toxicology to epidemiology and the social sciences, worked together in a series of workshops and field studies on pinpointing areas where further research is required to support the Declaration's goals. At a multidisciplinary ESF update meeting in June 1998, 45 leading scientists examined more than 80 detailed recommendations for further research and drew up a shortlist of 24 priority research issues. These science-driven recommendations were subsequently discussed at a joint EC/ESF/WHO-EURO "consensus conference", attended by policy-makers, scientists, and representatives of non-governmental organisations and industry in October 1998. That conference emphasised the need to

understand more fully the relative risks and impacts of environmental hazards. Without this knowledge, there is a danger that legislation could misdirect resources towards problems that have little real effect on health. The outcome of the conference (a final list of 17 priority research issues and a general recommendation for implementation) is reported in this document.

3. The scope of the initiative reflects the WHO working definition of "environment and health". This definition identifies environment and health as comprising those aspects of human wellbeing, health and disease that are determined by factors in the environment. It also relates to the theory and practice of assessing and controlling factors in the environment that can potentially affect health and/or well-being.

Selection criteria

4. The ESF Task Force on Environment and Health (ENHE) focused on those priority areas identified in the Helsinki Declaration where collaborative European research is needed and can make a difference, thereby supporting sustainability. In addition, new policy priorities, which have emerged since then, were taken into account. The identification and prioritisation of research fields and specific needs was made using criteria relevant to both science and policy.

Scientific criteria

- Exposures hazardous to physical and mental health and/or wellbeing;
- Assessment of the associated risks;
- Mechanisms of cause and effect;
- Feasibility, multidisciplinary and timeliness;
- European added value.

Policy criteria

- European added value;
- Policy relevance;
- Social and economic benefits;
- Environmental impact;
- Costs.

Excluded areas

5. Certain areas which are admittedly causes of concern were discussed and subsequently excluded. This is not to minimise the importance of these issues, but it was the judgement of the participants in the consensus conference that the areas to which it has accorded the highest priority are those that will yield quality data and in which there are major policy and health needs.

6. The principal reasons for exclusion were:

- (a) a recognition that, while there are some research needs which are of major importance for Europe, the necessary work will be carried out more effectively in single laboratories or countries;
- (b) the fact that certain important areas of research (e.g. endocrine disrupters) are well supported and covered by other current national and international research activities;
- (c) the view that some areas of research (e.g. hazard identification, diet and smoking, engineering, and implementation) are important but outside the scope of this initiative. The participants in the consensus conference recognised the importance of these areas for pro-active and preventive action, however, and urged that they should be the focus of complementary research activities.

7. The ENHE Task Force wishes to emphasise that there are a number of other important research objectives which would merit support by international and national research funding bodies. These are itemised in the accompanying document *An environment for better health*.

8. Furthermore, the Task Force recognises that it is prudent, in a rapidly changing world, to maintain a watching brief on emerging environmental threats and on new research opportunities, such as the area of antimicrobial resistance.

Research needs

9. The consensus conference highlighted a number of strategic and specific research needs, with emphasis on those areas where there was an opportunity to be pro-active. Three sets of priorities for future research were identified:

Overarching needs

- Environment and health indicators;
- Health and environment geographical information systems.

Cross-cutting issues

- Risk assessment;
- The environmental contribution to social variations in health;
- Cognitive functions as mediators of environmental effects on health.

Specific research areas

- Air quality;
- Water quality and drinking-water;
- Environmental effects on cognitive functions;
- Children and unintentional injuries;
- Climate change and stratospheric ozone depletion.

10. All the above areas have a direct or an indirect relation with the priority issues of the Helsinki Declaration. In addition, the relevance of these priority areas for the countries of central and eastern Europe (CCEE) and the newly independent states (NIS) has been confirmed at a special workshop. The consensus conference emphasised, however, that there is a particular need to develop research skills and capacities within these countries.

11. These areas fit flawlessly into and are complementary to the research-related activities being carried out as part of WHO-EURO's programme. In a similar way, they correspond with areas described in the objectives and priorities in the Fifth Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (1998-2002), and in particular the scope of the key action on "Environment and Health" in the "Quality of life and management of living resources" part of the framework programme.

12. Many of the research topics listed here relate to actions to be considered at other sessions of the London Conference (e.g. the water protocol, children, and transport). The proposed research will contribute to the development and effective implementation of national environment and health action plans (NEHAPs) in several Member States.

Implementation

13. The identification of a number of high-priority research needs, contributing to the elaboration of a proposal for “Environment and Health Research for Europe”, has resulted from a close working relationship between EC, ESF and WHO-EURO. The continuation of this constructive partnership will provide a secure foundation for the effective implementation of this ambitious proposal.

Recommendation

It is recommended that ministers of health and ministers of the environment recognise the need for research of the highest reliability and quality as a tool for decision-making, and encourage and support EC, ESF and WHO-EURO and, where relevant, other international organisations, in developing their collaboration to this end. Such collaboration between these partners would facilitate pan-European consultation and coordinated action on environment and health research. It is also recommended that the appropriate national bodies should be encouraged to implement the research proposed in this document.

14. This interdisciplinary collaboration between these partners would also have an important role to play in maintaining a watching brief on emerging environmental threats and on new scientific opportunities arising from research. The consensus conference recommended that ministers should endorse the development of this collaboration, in order to promote this proposed collaborative European research on environment and health.

Collaboration between these partners would establish and facilitate interfaces between research and policy-making, if appropriate in partnership with other groups such as the Organisation for Economic Co-operation and Development, industry and non-governmental organisations. It would also balance “top-down” and “bottom-up” approaches in priority-setting in the future and promote interdisciplinary approaches.

Overarching needs

15. The EC/ESF/WHO consensus conference has identified a number of generic needs which are central to all research approaches. These include the need to:

- (a)** develop a meaningful set of environment and health indicators to be used to monitor, compare and prioritise environment and health benefits;
- (b)** improve the comparability of environment and health data, develop better indicators and improve methods of data analysis (through, for example, Health and Environment Geographical Information Systems – HEGIS).

16. The expected results will yield a more accurate assessment of different environmental health impacts with respect to severity, social impact, economic consequences and costs involved in prevention, treatment and remediation.

Cross-cutting issues

17. The EC/ESF/WHO consensus conference has identified a number of cross-cutting issues which are pertinent to all specific research areas.

Risk assessment

18. The risks, real and perceived, posed by agents in the environment cut across most of the priority research areas identified. Methods and systems to quantify these risks are urgently needed, if policy-makers are to arrive at informed cost-effect analyses and to predict future risks. One of the aims should be to assess the specific susceptibility of individuals and populations to environment and health risks.

Recommended research tasks

- (a) Improve methodologies for exposure and effect assessment;
- (b) Further develop quantitative chemical risk characterisation based on experimental and human data;
- (c) Develop methods to assess the oral and respiratory allergenicity of agents;
- (d) Develop methods for the identification of genetic or non-genetic susceptibility.

Benefits

- (a) Reliable estimates of risks to health from exposure to environmental agents.

Environmental contribution to social variations in health

19. Socio-economic inequalities in health (mortality and morbidity) exist in all countries. There are differences in life expectancy of 5 to 10 years between those at the top and those at the bottom of the social scale. There is mounting evidence that these divides are widening. Many factors contribute to these inequalities, including environmental, educational, social, economic, behavioural and cultural ones. The proposed research task focuses on the specific role of environmental exposures in determining these inequalities.

Recommended research task

- (a) Investigate to what extent the link between socio-economic status and health is mediated by environmental factors.

Benefits

- (a) Identification of vulnerable groups, to enable cost-effective strategies to be drawn up;
- (b) Better integration of environment and health into sectoral policies.

Cognitive functions as mediators of environmental effects on health

20. Cognition and beliefs can themselves influence health outcomes. Symptoms of disease and distress are common and possibly increasing. Beliefs that these symptoms are caused by the environment are also widespread, both as underlying beliefs and in response to specific environmental incidents. How people perceive environmental influences (e.g. by over- or under-emphasising their importance) can also have major social and health impacts.

Recommended research tasks

- (a) Identify psychological and psychobiological mechanisms of symptom formation and determine the prevalence, impact and outcomes of health beliefs concerning unexplained symptoms and environmental syndromes;
- (b) Evaluate existing and identify best strategies of risk management for environmental incidents, to limit their psychosocial impact.

Benefits

- (a) By better understanding the complex interactions between the environment, health beliefs, behaviour, cognitive function and health, it should be possible to target resources in a more rational and cost-effective manner.

Specific research areas

Air quality

Ambient air

21. Amongst air pollutants, inhalable and especially respirable particles from anthropogenic sources cause the greatest concern for public health. However, there are considerable uncertainties about the magnitude of their impact on human health, especially their contribution to the risk of chronic disease and mortality in comparison to that of other non-particle pollutants. Further information is required about the characteristics of the particles or air pollution mix that present the most serious risk.

Recommended research tasks

- (a) Identify mechanisms of effects related to short-term and long-term exposure to particles and air pollution mix, considering their physical and chemical characterisation and source apportionment;
- (b) Improve understanding of the effects of long-term exposure to particulate matter and air pollution mix.

Benefits

- (a) Determination of the long-term impact of air particulates and air pollution mix on health;
- (b) Identification of the critical component and size of particulate pollution;
- (c) Identification and quantification of the most important pollution source(s).

Indoor air

22. On average, people spend around 95% of their time indoors, and most of this time is spent in their homes.

23. In addition to the impact of ambient air pollution on indoor air quality, there are a number of pollution sources which are specific to the indoor environment. These include tobacco smoke, combustion appliances, furniture and building materials.

24. Biological indoor pollution sources, e.g. dust mites, pets and moulds, possibly present the biggest threat, but this is the least researched area.

Recommended research task

- (a) Determine the role of biological contaminants in indoor environments in the causation and exacerbation of allergies (including asthma) and other disorders.

Benefits

- (a) Better understanding of the role of biological contaminants in the increased incidence of allergies (including asthma) and other disorders.

Water quality and drinking-water

25. There are three types of water pollutant: microbiological, chemical and physical. Although chemical pollution is recognised as being of concern (see section on risk assessment above), exposure to microbiological agents poses the greatest threat to health. The risk of infection from waterborne pathogens, including protozoa and viruses, is likely to increase as polluted and/or limited groundwater resources lead to a shift towards extracting drinking-water from surface water, which is more vulnerable to contamination. Poor hygiene in regions suffering economic and political instability is exacerbating these microbial threats.

Recommended research tasks

- (a) Identify the sources of waterborne pathogens and determine their impact on health, paying particular attention to the role of recently recognised pathogens, including protozoa and viruses;
- (b) Develop quantitative methods for risk characterisation for infectious agents.

Benefits

- (a) Accurate estimates of the disease burden from low-level microbial contamination of drinking- and recreational water, leading to better control measures.

Environmental effects on cognitive functions

26. The chemical and physical environments can interfere with cognitive functions in several ways. Exposure to chemical substances such as metals and organic solvents can damage the central nervous system and impair mental functions. Physical factors that affect cognitive function include noise, heat, cold, vibration and light. These can be a particular problem in schools and the workplace, impairing learning and memory.

Recommended research task

- (a) Evaluate to what extent chemical and physical agents contribute to impaired mental and cognitive functions.

Benefits

- (a) Understand the adverse effects of physical and chemical agents in mental and cognitive functions.

Children and unintentional injuries

27. Accidents represent the greatest risk of death, the commonest reason for hospital attendance, and a potent source of short- and long-term morbidity in childhood. Accidents or unintentional injury are the cause of 30% of total childhood mortality in the European Union (EU); ranking of the Member States by age-specific injury mortality rates indicates wide variation. The most frequent causes of death due to injury are transport accidents, drowning, fire and flames, and falls. Patterns of injury can be identified that reflect children's ages, the environments in which they live and the activities in which they are engaged. Injuries are strongly concentrated among those who are already socially most deprived. Our epidemiological understanding of the scale, nature, causes and consequences of childhood injuries and poisonings is constrained by the current lack of appropriate routine national morbidity data. Little Europe-wide research has been undertaken either on child injury prevention or on the economic gain that

can be achieved by appropriate intervention.

Recommended research task

- (a) Evaluate interventions to identify the most effective strategies for preventing unintentional injuries to children

Benefits

- (a) Reduction in unintentional injury and related death of children

Climate change and stratospheric ozone depletion

28. Industrial and other human activities may have a significant impact on Earth's biophysical systems. Two of the best-known impacts are the accumulation of greenhouse gases (notably CO₂) in the lower atmosphere, and stratospheric ozone depletion. Owing to the global scale and the long time frame of these changes, the potential health risks are diverse and often complex. Stratospheric ozone depletion will cause ultraviolet (UV) radiation-induced disorders, including skin cancers, cataracts and possibly immune suppression. Global warming along with a likely increase in climate variability will increase the frequency of severe weather events such as heat waves and floods, leading to injuries, altered rates of heat- and cold-related illnesses and deaths. The indirect health impact of climatic change is potentially more wide-reaching.

29. Two broad categories of research will be required: empirical studies into the relationships between variations in climate/UV radiation and health outcomes; and integrated mathematical modelling to estimate future impacts on health.

Recommended research task

- (a) Improve the epidemiological and mechanistic science base and develop predictive methods for assessing the future health risks of human-induced climate change and increased exposure to UV radiation.

Benefits

- (a) Clarification of the range of health impacts caused by change in climate and increased exposure to ambient UV radiation;
- (b) Early warning of any emerging health problems associated with climate change and ambient UV radiation.

Conclusion

30. The set of topics presented above represents an ambitious but feasible proposal for pan-European research. A joint effort, consisting of both international and national activities, is needed to implement this research proposal in a cost-effective manner, thus limiting the use of financial resources and ensuring an efficient and effective approach to the prevention and reduction of health impacts of environmental factors in Europe.

Further reading

For further information on the Environment and Health (ENHE) programme including individual workshop reports, the programme's integrated report and earlier discussion documents consult the ENHE web pages at www.esf.org/enhe

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Extract from the Declaration of the Third Ministerial Conference on Environment and Health

Environment and health research for Europe

27. We welcome the proposals made in the document *Environment and health research for Europe*, prepared by the European Science Foundation (ESF) in liaison with EC and WHO. We will use it as one of the bases for a pan-European, integrated and coordinated effort for research in the priority areas identified in this Declaration.

28. We recognise our need for research of the highest reliability and quality as a tool for decision-making, and we will encourage and support EC, ESF and WHO and, where relevant, other international organisations in developing their collaboration to this end. Such collaboration would facilitate pan-European consultation and coordinated action on environment and health research. We will encourage our appropriate national bodies to implement the research proposed in the above-mentioned document.

29. We recognise that policies and individuals' behaviour do not take sufficiently into account the link between the environment and health. We call upon researchers to investigate this gap and to develop methods aimed at overcoming it.