DEVELOPMENT OF A HEALTH AND ENVIRONMENT GEOGRAPHIC INFORMATION SYSTEM (HEGIS) FOR POLAND

Report on a WHO Workshop

Lodz, Poland
13–15 April 1997
ABSTRACT

The participants agreed that health and environment information systems, on both national and subnational levels, are useful tools for the systemic collection, analysis and interpretation of health and environmental data. The development of a national health and environment report and the setting of priorities in the national environment and health action plan should be based on the analytical assessment of routinely collected data from existing monitoring networks as well as from ad hoc investigations. The use of a geographical information system for this purpose is desirable. The participants agreed that HEGIS should be developed as part of national environment and health action plans, to provide a framework for the coordinated collection, storage, update, analysis and display of environment and health monitoring data, and as a tool to support decision-making. It is recommended that the indicators used in HEGIS in Poland for monitoring the implementation of NEHAP be developed according to the national priorities established by the Polish State Commission for Sustainable Development and follow the recommendations on indicators developed by WHO. The most important areas of HEGIS applications at national, subnational and local levels in a national environment and health action plan comprise: (i) describing the demographic characteristics and the health of the population in urban and rural areas; (ii) analysing the spatial distribution of environmental pollution and hence identifying areas of greatest environmental health concern; and (iii) estimating the health impact of environmental pollutants.

Keywords

INFORMATION SYSTEMS
ENVIRONMENTAL HEALTH
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POLAND
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Introduction

The implementation of national environmental health action plans requires the development of information systems for the monitoring, analysing and forecasting of trends in environment and health at both national and subnational level. However, the lack of cohesive data on environment (exposure to environmental hazards) and health outcomes is one of the main problems for making decisions in respect of priority-setting and selecting the most adequate and effective preventive and control measures.

The recommendations of the Declaration on Action for Environment and Health in Europe and the Environmental Health Action Plan for Europe, adopted at the Second European Conference on Environment and Health (Helsinki, 20–22 June 1994), indicated the need for a comprehensive environmental health information system. Such a system should be capable of identifying priority issues, risk factors and trends, and it should be able to measure the impact of interventions. The Workshop on the Development of a Health and Environment Geographic Information System (HEGIS) for Poland was organized to consider the role of health and environment geographical information systems as support tools for monitoring, priority-setting and decision-making in public health. It took place at the Nofer Institute of Occupational Medicine, Lodz, Poland, on 13–15 April 1997.

The experience of the WHO European Centre for Environmental Health (WHO-ECEH) with the development of HEGIS and the first attempts to implement such a system in Poland provided the basis for the discussion.

The Workshop was attended by 18 participants (Annex 2) and chaired by Professor S. Tarkowski. Dr Jan E. Zejda was the rapporteur. Fourteen presentations (Annex 1) formed the basis for discussion.

Discussion

The discussion covered a wide spectrum of issues related to the theory and practice of health and environment monitoring systems. The participants reviewed existing monitoring schemes and made observations on the need for the development of a comprehensive system in Poland:

- to consider the contents of existing databases on environment and health in Poland;
- to revise the methods of environmental health risk assessment and of impact assessment for the decision-making process;
- to specify the information required for monitoring the implementation of the national programme for health.

In Poland, the legal basis for the functioning of the state environment monitoring system was laid down in July 1991, after Parliament had passed the State Inspectorate of Environment Protection Act. According to this Act, the Chief Inspector of Environmental Protection is considered the coordinator of the state environmental monitoring system, which is divided into national, regional and local networks.

The state environmental monitoring system includes a number of subsystems such as: air monitoring, noise and non-ionizing radiation monitoring, ground- and surface water monitoring,
soil and wastes monitoring and animated nature monitoring. The information obtained in the systems is used to assess emissions, imissions, hydrometeorological and climatic conditions and to describe natural resources and natural structures.

The present system provided a sound basis for the establishment of a nationwide system to monitor the health status of the population in relation to the environmental impact. In response to decisions made at governmental level and in line with increasing expectations (from the public, health professionals and nongovernmental organizations), the Ministry of Health and Social Welfare had initiated the plan to establish a Monitoring System for Health Hazards and Health Effects. A group of experts had worked out a preliminary programme, which was subsequently approved by the Social and Political Committee of the Council of Ministers and formed the basis of a detailed programme.

The Monitoring System for Health Hazards and Health Effects is intended to address the objectives specified in two governmental documents: the Principles of the State Ecological Policy and the National Health Programme. The system will help to obtain information concerning: (a) the extent of lifestyle-related health hazards for the monitored population; (b) the exposure of the population to hazardous agents in the air, water, soil and food in selected geographical areas and in selected administrative units; (c) health risks from exposure to environmental hazards; (d) the dynamics of the changes in the exposure of the population to environmental hazards; (e) selected demographic indices of the population monitored; and (f) distribution of selected adverse health effects caused by exposure to certain environmental hazards.

The spectrum of objectives involves, to a great extent, the collection and processing of data in a systematic, standardized way. HEGIS, based on geographical information systems (GIS), offers the means to satisfy this requirement. This defined the framework for the Workshop discussion. The topics included experience and examples in particular of: (a) collecting suitable digital regional European maps; (b) geo-referencing the monitored health and environmental data; and (c) problems regarding the linkage of environmental data to the health status of the population. Among the points raised by the participants the following issues required more detailed discussion:

- computer hardware and software
- availability of reliable data
- quality assurance and quality control
- countrywide comparability and compatibility of the data collected
- exchange of information between all organizational levels

Participants discussed the advantages and limitations of geographical information systems used in studies of environment and health at different levels of data aggregation, and considered the selection of the core set of indicators according to their epidemiological perspective. This discussion led to the formulation of recommendations on further development and harmonization of the existing demographic, health and environment databases in Poland. It helped to identify a procedure for submitting the core set of indicators for HEGIS to the Bilthoven Division of the European Centre for Environment and Health (ECEH).

The specific discussion focused on the benefits and limitations of the HEGIS application in environment and health, illustrated by the experience of WHO-ECEH Bilthoven, Poland and other countries. The participants underlined the fact that effective environment and health management decisions depend on the availability of qualitative and quantitative information on
the exposure of the population to environmental hazards. Modern computer technologies make analysis of spatial and temporal associations between environmental pollution and health outcomes possible. The application of a GIS for environmental health programmes facilitates the management, analysis and display of data. They concluded that the important contribution of HEGIS includes exploratory data analysis and the preparation of information for decision-making. However, there were some general problems, some of the most important being the lack of appropriate data on exposure and health, the cost of population-wide data collection, and problems related to the interpretation of the results of the statistical analyses of health and environment data. These problems require proper attention at the planning stage, firm commitments from decision-makers concerning long-term financing, and a transparent methodology used throughout all phases of the implementation of GIS.

Conclusions and recommendations

Participants made a number of recommendations and conclusions, as follows.

1. The implementation of the national environmental health action plan (NEHAP) requires the development of an appropriate information system for monitoring, analysing and forecasting trends in environment and health at national, sub-national and local levels. In this respect a HEGIS, as promoted by WHO-ECEH, is recommended as a useful tool to facilitate the linkage and management of environment and health data relevant to the NEHAP objectives.

2. The national health and environment report and the setting of priorities in the NEHAP should be based on the analytical assessment of data collected routinely from existing monitoring networks, as well as from ad hoc investigations. The use of GIS for this purpose is desirable.

3. HEGIS should be developed as part of the NEHAP in order to provide a framework for the coordinated collection, storage, update, analysis and display of environment and health monitoring data, and as a support tool for decision-making.

4. The basic requirement is that HEGIS should allow integration and analysis of data necessary for environmental health impact assessment. Specific analytical capabilities which meet local needs should be developed later.

5. Both small- and large-scale analyses of health and environment data in the NEHAP can be appropriate. The level of data aggregation will depend on the objective and on the end-point being monitored. The collected data should be stored in disaggregated form.

6. The most important areas of HEGIS application at national, subnational and local level in the NEHAP comprise: (i) the description of demographic characteristics and health of the population in urban and rural areas; (ii) the spatial distribution analysis of environmental pollution and thus the identification of areas of greatest environmental health concern, and (iii) the estimate of the health impact of environmental pollutants.

7. The quality of the data is paramount for a reliable interpretation of geographical analyses. A quality assurance and quality control mechanism for health and environment data should be established. Discussion with the providers of the information and feedback of the results obtained to them should help to improve the consistency and validity of the data.
8. Environmental health impact and risk assessment of recognized environmental hazards should be based on exposure–response relationships established in well conducted epidemiological investigations and the application of these to the estimated exposure profile of the population.

9. The indicators used in HEGIS for monitoring the implementation of the NEHAP at national level should be developed according to the national priorities established by the State Commission for Sustainable Development. They will follow the recommendations on indicators developed by WHO-ECEH (see Development of a national health and environment geographic information system for countries in central and eastern Europe: report of a WHO Consultation. Copenhagen, WHO Regional Office for Europe, 1996, and Health-related air quality indicators and their application in health impact assessment in HEGIS: report of a WHO Consultation. Copenhagen, WHO Regional Office for Europe, 1997).

10. In Poland there are monitoring systems for both environmental and health data. To support the successful implementation of the NEHAP it is important to strengthen the collaboration and exchange of information between the institutions in the Ministry of Health and Social Welfare and the Ministry of Environment, Water Management and Forestry, and the Main Statistical Office responsible for these systems. A mechanism should be established at governmental level that has access to all relevant sources of data.

11. WHO-ECEH Bilthoven is asked to assist in the development of national HEGIS for countries of central and eastern Europe, as support for the development of the NEHAP. They are specifically requested to assist with training, advice and the facilitation of information exchange.
Annex 1

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