



WHO

REGIONAL OFFICE FOR EUROPE

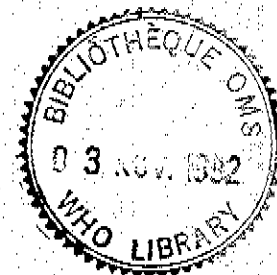
EUR/ICP/HST 149
ENGLISH ONLY
UNEDITED

42256

GEOGRAPHICAL INFORMATION SYSTEMS FOR HEALTH CARE MANAGEMENT

Report on a WHO Working Group

Helsinki
1-3 April 1992



SCHERFIGSVEJ 8
DK-2100 COPENHAGEN Ø
DENMARK

TEL.: (45) 39 17 17 17
TELEFAX: (45) 39 17 18 18
TELEX: 15348

1992

EUR/HFA TARGET 35

This activity was organized by the WHO Regional Office for Europe to promote work aimed at achieving the following target in the health for all strategy.^a

TARGET 35

HEALTH INFORMATION SUPPORT

By the year 2000, health information systems in all Member States should actively support the formulation, implementation, monitoring and evaluation of health for all policies.

Keywords

INFORMATION SYSTEMS
DELIVERY OF HEALTH CARE – organization/administration
HEALTH SERVICES – organization/administration
EUROPE

All rights in this document are reserved by the WHO Regional Office for Europe. The document may nevertheless be freely reviewed, abstracted, reproduced or translated, but not for sale or for use in conjunction with commercial purposes. Any views expressed by named authors are solely the responsibility of those authors. The Regional Office would appreciate receiving three copies of any translation.

^a *Updating of the European HFA targets.* Copenhagen, WHO Regional Office Europe, 1991 (document EUR/RC41/Inf.Doc./1 Rev.1).

CONTENTS

								Page
1.	INTRODUCTION	..	..	..	..	..	..	1
	1.1	Background	..	..	..	..	..	1
	1.2	Scope and purpose	..	..	..	..	..	1
	1.3	Issues in GIS development	..	..	..	..	..	2
	1.4	Definitions	..	..	..	..	..	3
2.	DISCUSSION	..	..	..	..	..	..	3
	2.1	Two uses of spatial information	..	..	..	..	..	3
	2.2	The role of WHO	..	..	..	..	..	4
3.	CONCLUSIONS AND RECOMMENDATIONS	..	..	..	..	..	..	5
	3.1	Data requirements and indicators	..	..	..	..	..	5
		3.1.1	Conclusions	..	..	..	..	5
		3.1.2	Recommendations	..	..	..	..	5
	3.2	Uses of GIS and methods of analysis	..	..	..	..	..	6
		3.2.1	Conclusions	..	..	..	..	6
		3.2.2	Recommendations	..	..	..	..	6
	3.3	Education and training	..	..	..	..	..	6
		3.3.1	Conclusions	..	..	..	..	6
		3.3.2	Recommendations	..	..	..	..	7
	3.4	Working demonstrations and cost benefits	..	..	..	..	..	7
		3.4.1	Conclusions	..	..	..	..	7
		3.4.2	Recommendations	..	..	..	..	7
	3.5	Dissemination and linkages	..	..	..	..	..	8
		3.5.1	Recommendations	..	..	..	..	8
3.6	Roles and networks	..	..	..	..	..	..	8
		3.6.1	Conclusions	..	..	..	..	8
		3.6.2	Recommendations	..	..	..	..	8
4.	CONCLUDING REMARKS	..	..	..	..	..	..	9

Annex 1: List of participants	..	..	..	..	..	..	10
Annex 2: List of posters, demonstrations and short presentations	..	..					15
Annex 3: Background material	..	..	..	..	..	..	17
Annex 4: Common acronyms used	..	..	..	..	..	..	18

1. INTRODUCTION

1.1 Background

In recent years there has been an increased effort in the development of GIS, particularly at the European scale. There have been several Consultations and Working Groups arranged (Annex 3) to tackle a multitude of problems, including issues on the environment, health and planning.

On the initiative of the World Health Organization Regional Office for Europe (WHO Europe), 29 European Countries and the Commission of the European Communities have adopted the Charter on Environment and Health (Frankfurt, December 1989). The Charter emphasizes the role of strong information systems in helping to monitor trends and measure the effectiveness of policies and decisions made with respect to both the environment and health.

Building on this foundation, WHO Europe organized a Working Group to determine the most appropriate strategy or strategies to facilitate and enhance the use of GIS in Health Care Management.

The meeting was attended by 25 experts and observers from 11 countries. The participants represented a wide range of professional disciplines including medicine, geography, health services, epidemiology and health policy/management. While a number of important agencies were not represented they are important links in the overall network. These organizations include, amongst others, the Commission of the European Communities (CEC), the Organization for Economic Cooperation and Development (OECD), the United Nations Environment Programme (UNEP) and the International Agency for Research on Cancer.

1.2 Scope and Purpose

Geographical Information Systems (GIS) are of value in the compilation and presentation of environmental and health outcome data related to the impact and use of health services at national and regional levels.

WHO Consultation on European Environment and Health Information Systems, Berlin, 21-25 November 1989.

Many individuals and organizations are increasingly looking for relevant health information and a means of visualizing the spatial distribution of health related phenomena. These include health politicians, planners and managers, as well as the public and the media. Geographic Information Systems (GIS) have proved useful tools for decision making, planning, management and dissemination of information. They show regional variation of health problems, environmental risks, use of health services and effectively pin-point abnormal patterns.

Having realized the potential of GIS for Health Care Management the Regional Office for Europe is promoting their development. The Commission for the European Communities

(CEC) has awarded WHO Europe, as the prime coordinator, a contract to develop a telematics network between the national health care administrations. The project is also involved in looking at ways of displaying data in a more informative manner, of which map based information is one. The benefits and potential of this approach has already been successfully demonstrated by other international agencies. For instance, the International Agency for Research on Cancer (IARC) extensively use map-based displays of information. In addition, many national administrations, universities, research institutions and commercial companies are interested in GIS and its potential in health related areas.

The Working Group on Geographic Information Systems for Health Care Management convened by WHO Europe and hosted by the National Agency of Health and Welfare of Finland took stock of the current situation with regard to GIS and its uses in health planning and management.

The Working Group aimed to:

- ◆ review the state of the art;
- ◆ demonstrate existing GIS for health management;
- ◆ identify development needs with regard to data, common standards, etc.; and
- ◆ to strengthen the European network of GIS already launched by WHO Europe and to agree on a common agenda for them.

The emphasis was to be on the content, relevance and the use of the information contained in a GIS rather than on the technology itself. The meeting was designed to be of interest to a wide range of health related practitioners, as well as information and telecommunication specialists. It was considered that this would be the first step in establishing important contacts and networks. This would both serve to ensure future cooperation and provide a framework for learning from the experiences of others working on the development of GIS for health management.

1.3 Issues in GIS development

The Working Group highlighted several areas of concern, where it was thought that the development of GIS for health care management would be beneficial.

The discussion focused on:

- ◆ Data issues, concerning health indicators, spatial levels of data collection and aggregation, confidentiality.
- ◆ Uses of GIS and analysis.
- ◆ Education and training.

- ◆ Demonstrations and cost benefit analysis of operational GIS in health care management.

And in particular on:

- ◆ Dissemination of GIS products and working examples of GIS. This was noted as the main route for promoting the advantages of GIS to a wider audience of expertise.
- ◆ Roles and networks which are necessary to effectively coordinate the dissemination strategy and ensure that GIS is advanced in the right direction.
- ◆ Future prospects and actions to be envisaged by WHO Europe and participating Member States.

1.4 Definitions

The Working Group concurred that while there is a great need to harmonize the terminology and vocabulary related to GIS, it is not possible to impose external standards. Words such as comprehensiveness, standardization and confidentiality were considered to be too ambiguous and open to misinterpretation.

The other area that merited reiteration was that of the definition of GIS. GIS can be seen as both an analytical **and** presentation tool, i.e. a mechanism that can convince decision makers that there is "value added" by using GIS technology.

2. DISCUSSION

2.1 Two uses of spatial information

The participants presented a number of posters, working demonstrations and short presentations. These covered a wide range of end-user experiences in health planning and management. All used spatial information, some also GIS and/or map based information (Annex 2).

From the issues and questions that were raised it became apparent that the Working Group reflected two main streams of interest:

- (i) Health planning and health care management;
- (ii) Epidemiology and environmental health issues.

Whilst both (i) and (ii) are within the overall responsibility of WHO Europe they have different priorities which do not necessarily overlap.

It was proposed that these two streams be looked separately for any further discussion. The responsibilities for the future developments of (i) and (ii) therefore were to be directed

at the most appropriate body. This course of action would be more beneficial, as it would encourage a more productive environment for research and development. At some point in the future their paths will meet, because both streams would be accessing mutual datasets and facing similar problems with respect to the use of GIS technology.

2.2 The role of WHO

Within the European region, the two WHO bodies interested in and dealing with geographic and spatial information are the Regional Office in Copenhagen and the European Centre for Environment and Health in Bilthoven. Their relative roles could be:

1. WHO Europe (Copenhagen) could coordinate the work on GIS's related to public health, health care management and planning.
2. The European Centre for Environment and Health (see Consultation on the Development of a Health and Environment Geographical Information System for the European Region, Bilthoven, 10-12 December 1990) could coordinate the work on GIS's related to epidemiology and environmental health.

WHO Europe may not always be in the best position to execute the following conclusions and recommendations directly. But they can act as a catalyst, promoting knowledge and stimulating action from the Member States.

Both bodies should encourage the development of collaborative networks of relevant institutions and individuals in the Member States in the region.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Data requirements and indicators

3.1.1 Conclusions

1. Informing Member States about requirements concerning needed data and indicators is an important task. If WHO Europe is to facilitate the promotion of relevant information and research they must know where the data can be located. In the long term they should aim to coordinate a "meta-database".
2. Each country developing GIS for health care management and planning should be encouraged to explore and document their datasets. The resulting document would ideally outline data availability, quality and usefulness in terms of health planning and management.
3. The indicators used for the Health for All evaluation are a good starting point for a common dataset. Not all the indicators will be universally available immediately, but it is hoped that a common subset of indicators can be agreed upon amongst Member States. This would ensure useful intercountry analysis and research.
4. A single European database holding both non-aggregated environmental and health data is probably not an achievable, perhaps not even desirable, goal. Rather, WHO Europe should be looking towards developing a body or network of organizations responsible for coordinating and collecting various types of data. This would serve to establish a number of databases with complementary functions which may be held by certain organizations but would be accessible European-wide.
5. For analytical purposes data will be most useful at the lowest level of aggregation. It is hoped that better data will stimulate better products, analysis and decision making.

3.1.2 Recommendations

1. WHO Europe should initiate the preparation of an inventory on available datasets. This could take the form of a database which locates and documents the details of individual Member States datasets. It would ideally cover the availability of health and environmental data, with reference to accuracy, resolution and quality.
2. European meetings on GIS for health planning should be arranged on a regular basis to discuss common issues such as: relevant indicators for planning; data exchange; data definition issues; education and training; use of appropriate methods and new techniques; etc.

3.2 Uses of GIS and methods of analysis

3.2.1 Conclusions

Whilst GIS is an important tool, its potential must be kept in perspective. At best, the role of GIS technology is as a "hypothesis generator" or a "persuasive tool", not as a "confirmation mechanism". Any important decision, in whatever field, is the sole prerogative of the person using the technology. This view should help to rationalize the technology and reduce the likelihood of its potential being abused.

3.2.2 Recommendations

1. For effective use of GIS in health planning, practitioners should seek to develop upon existing GIS systems (e.g. those used for city planning) and harness established expertise. WHO Europe should encourage the Member States to identify local GIS tools and skills. From this initial stage they can transfer, where appropriate, the GIS tools and methods of analysis into their health planning applications.
2. Any resultant GIS system established for health care management should have a user-friendly interface to allow a wider audience of expertise to be reached. The aim should be to turn data back into useful information.
3. Efforts should be made to develop additional and useful spatial epidemiological tools. For instance, time series analysis and cluster analysis are presently lacking from the standard GIS toolbox.

3.3 Education and training

This section covers a range of personnel, from those involved in the development of GIS applications to the eventual user. All groups should have basic knowledge of the principles of GIS and potential problems. This will ensure a greater use and accuracy of the overall system and the data contained within it.

In the first stages numerate and computer literate personnel would be targeted for education and training. This would reduce the onus on the development of a suitable training programme.

3.3.1 Conclusions

1. Demonstrations of good working systems and end-user experiences are the best way of expressing this message in order to convince the decision makers of the potential of GIS in health.
2. The development and implementation of GIS both nationally and locally will require a large number of professionals to be trained to be able to use GIS.

3. Education and training costs money. There is an increasing demand from the Member States to promote and provide this service, but little money to support the need.
4. The major question at this point is who needs to be trained in GIS? The answer depends on the GIS application used. Feedback from the Member States may prove the most useful way of identifying key personnel.

3.3.2 Recommendations

1. Education and training should cover a number of issues, e.g. the awareness and understanding of mapped data, emphasizing how maps can be effective as well as defective; interpretation of the product, including the GIS itself and any output produced; and ensuring that maps do not become a substitute for data and statistics but rather complement them.
2. WHO Europe, together with relevant collaborating centres, should promote training as and when it is necessary.
3. National and regional levels of the health management can identify the personnel benefiting from the proposed training.

3.4 Working demonstrations and cost benefits

The host of this Working Group, Finland, showed an example of GIS and map based information in public health management using hospital discharge statistics. Demonstrating that GIS can provide additional information and innovative ways of presenting data. The Finnish model was considered a good example for other nations and organizations.

3.4.1 Conclusions

1. Presentations and demonstration packages are effective "persuasion tools". They are essential for emphasizing the "value added" by GIS, particularly to the potential funders of its development.
2. Demonstrations of operational GIS applications are an ideal platform for highlighting key users, products, and the future needs of the system.

3.4.2 Recommendations

1. As a "European Health Information Centre", WHO Europe should have ready access to relevant information and operational GIS's concerning the state of the environment, public health and technological developments, including developments in time-series analysis, monitoring and forecasting.

2. The costs and benefits of using GIS in a health care planning context need to be studied.

3.5 Dissemination and linkages

3.5.1 Recommendations

1. The Regional Office for Europe should encourage the development of GIS at the national and sub-national level. This may be achieved via a communication medium such as a *GIS and health newsletter*.
2. Existing mediums for dissemination could also be used. For instance, there are many well read magazines, including GIS Europe and GIS and Mapping Awareness.
3. The key to the future lies in the development of mechanisms that are self-renewing both in terms of the technology and the subject. As better tools become available they must be publicized.

3.6 Roles and networks

3.6.1 Conclusions

Networking is a neglected area. Another set of meetings need to be arranged to answer questions concerning: how best to coordinate a Europe-wide GIS for health care management (including Eastern Europe)? and: How can we help to establish a GIS system which will meet a wide range of user needs?

3.6.2 Recommendations

1. WHO Europe should aim at organizing a series of meetings on specific topics for specific audiences.
2. Stronger links with bodies interested in GIS's should be established to further spread the GIS message. They include:
 - ◆ International Association of Cartography
 - ◆ Comité Européenne de la Normalisation
 - ◆ Commission of the European Communities (through Eurostat)
 - ◆ Coordination of Environmental Information (CORINE)

4. CONCLUDING REMARKS

The development of a Europe-wide GIS for health care management and planning is probably not feasible. Many of the recommendations in this report will have to be implemented at the local level.

The result of

- ◆ this Working Group meeting on GIS for Health Care Management;
- ◆ the Consultation on Environmental Health Information Systems in the European Region, Berlin (West), 21-25 November 1988;
- ◆ the Consultation on Data Requirements and Methods for Analyzing Spatial Patterns of Disease in small Areas, Rome, 22-24 October 1990; and
- ◆ the Consultation on the Development of a Health and Environment Geographical Information System for the European Region, Bilthoven, 10-12 December 1990;

has been to set out a number of specific issues for discussion. They are a starting point for the development in geo-coded referencing of data, technological development and increase of awareness and dissemination of GIS related applications.

WHO Europe could adopt a promotional role, acting as a catalyst and stimulating the relevant groups into tackling fundamental technical and specific issues. Meetings should therefore be held more frequently to ensure development and provision of tools, as and when they become available. They could often be organized in connection with other gatherings of expertise including international conferences on GIS and relevant topics.

ANNEX 1

LIST OF PARTICIPANTS

Temporary Advisers

Dr Per-Erik Asard
Chief Physicist
Department of Hospital Physics
Danderyd Hospital
S-18288 Danderyd
Sweden

Dr Anna Cross (rapporteur)
Research Associate
c/o Centre for Urban and Regional Development Studies
The University
Newcastle upon Tyne NE1 7RU
United Kingdom

Dr Colin Cryer
Deputy Director
Information Services
South East Institute of Public Health
Broomhill House
David Salomon's Estate
Broomhill Road
Turnbridge Wells, Kent TN3 OXT
United Kingdom

Mr Anthony Fitzgerald
Lecturer in Medical Statistics
Department of Public Health
United Medical and Dental School
St Thomas's Campus
Lampet Place Road
London SE1 7EH
United Kingdom

Dr Bengt Haglund
Centre for Primary Care Research
Uppsala University Hospital
S-75185 Uppsala
Sweden

Dr Eero Hokkanen
Deputy Director General
National Agency for Welfare and Health
Siltassaarencatu 18
SF-00530 Helsinki
Finland

Dr Ilmo T. Keskimäki
National Public Health Institute
Health Services Research Unit
Elimäenkatu 25 A
SF-00510 Helsinki
Finland

Dr M. Löytönen
Department of Geography
University of Helsinki
Hallituskata 11
SF-00100 Helsinki
Finland

Ms Mette Madsen
Deputy Director
The Danish Institute for Clinical Epidemiology
25, Svanemöllevej
DK-2100 Copenhagen
Denmark

Dr Marco Maroni
Director
International Centre for Pesticide Safety (ICPS)
Via Magenta 25
I-20020 Busto Garolfo (Milano)
Italy

Mr Petri Mikkola
Laakso Hospital
Lääkärintäti 8
SF-00250 Helsinki
Finland

Dr Jouko Paloheimo
Director of Development
Helsinki City Health Department
Siltasaarenkatu 13
SF-00100 Helsinki
Finland

Mr Simo Pelanteri
KT - Data Central
Asiakkaankatu 8
Helsinki
Finland

Dr Kari Poikolainen
Senior Researcher
National Public Health Institute
Mannerheimintie 166
SF-00300 Helsinki
Finland

Professor Dietrich P. Pretschner
Direktor des Instituts für Medizinische Informatik
Universität Hildesheim
Marienburger Platz 22
D-3200 Hildesheim
Federal Republic of Germany

Mr Eero Pukkala
Chief of Data Processing
Finnish Cancer Registry
Liisankatu 21 B
SF-00170 Helsinki
Finland

Dr V. Rissanen
Head of Development and Research
Non-Operative Specialities
National Agency for Welfare and Health
Siltasaarenkatu 18
SF-00530 Helsinki
Finland

Dr Massimo Rumor
Director
City Information System
Commune di Padova
I-35122 Padua
Italy

Professor Henk Scholten
Geographical Information Systems (ISC)
National Institute of Public Health and
Environmental Protection
P.O. Box 1
NL-3720 BA Bilthoven
Netherlands

Mr Inkeri Sippo-Tujunen
Laakso Hospital
Lääkärintie 8
SF-00250 Helsinki
Finland

Professor T. Valkonen
Department of Sociology
University of Helsinki
Hämeentie 68 B
SF-00550 Helsinki
Finland

Dr E. Vauramo
Chief Physicist
Helsinki City Health Department
Siltasaarenkatu 13
SF-00531 Helsinki
Finland

Professor Melanie Vrijens
Health Sciences
Faculty of Medicine
Free University of Brussels
Laarbeeklaan 103
B-1090 Brussels
Belgium

Dr Nochito Yamaguchi
Head, Cancer Information and Biometry Section
Epidemiology Division
National Cancer Center Research Institute
Tsukiji 5-chome
Chouku, Tokyo 104
Japan

Other Organizations

International Cartographic Association:

Mr Jean-Philippe Grelot
Secrétaire Général et Trésorier
Association Cartographique Internationale
136 bis rue de Grenelle
F-75700 Paris
France

Organisation for Economic Cooperation and Development (OECD):

Mr J.-P. Poullier
Director
Social Affairs, Personnel and Education
2, rue André-Pascal
F-75775 Paris Cédex 16
France

International Epidemiological Association:

Dr Arpo Aromaa
Research Institute for Social Security
The Social Insurance Institution
Höläämötie 1 B
P.O. Box 78
SF-00381 Helsinki
Finland

World Health Organization

Headquarters

Dr Isabelle Nuttall
Schistosomiasis and other Trematode Infections
Division of Control of Tropical Diseases

Regional Office for Europe

Dr Richard M. Stern

Manager, Environmental Health Information

European Centre for Environment and Health, Bilthoven

Dr Hannu Vuori

Regional Adviser for Health Care Policies and Research

ANNEX 2**List of posters, demonstrations and short presentations**

Name:	Title:
POSTERS	
Mr Anthony Fitzgerald	EC Atlas of Avoidable Death
Mr Eero Pukkala	Examples of Finnish cancer maps
Mr Massimo Rumor	The territorial and environmental system of Padova. Towards a GIS for health and the environment - report after one year's work on the data model
Professor Melanie Vrijens	Medical geography of cancer and diseases of the circulatory system in the counties of Antwerp and Sint-Niklaas, Belgium (1969-1975)
Dr Naohito Yamaguchi	Cancer information network in Japan
DEMONSTRATIONS	
Dr Richard Stern	A GIS for health and environment (HEGIS)
Professor Henk Scholten	Development of GIS for health management
Dr Hannu Vuori	WHO's Health for All database
Mr Petri Mikkola	3-dimensional demonstration of coordinate maps and the impact on population
Dr E. Vauramo	Helsinki City System

Name:

Title:

SHORT PRESENTATIONS

Mr Jean-Philippe Grelot	The activities of the International Cartographic Association in the area of GIS
Dr Massimo Rumor	The GIS of the City of Padova - results and projects
Professor D. P. Pretschner	Knowledge based synthesizers for the interpretation of medical images
Dr Colin Cryer	Health profiles for locality planning - needs assessment
Mr Petri Mikkola	Coordinate maps and statistical phenomena
Dr V. Rissanen	Socio-economic aspects of the hospital discharge register
Professor Melanie Vrijens	Geographical distribution of cancer mortality of heart diseases at the municipality level in Belgium, correlations and cluster analysis of these
Dr Kari Poikolainen	Maps showing Avoidable Death
Professor Tapani Valkonen	Explanation of geographic differences in mortality
Dr Markku Löytönen	Monitoring and forecasting communicable diseases using GIS

ANNEX 3

Background material

Consultation on Environmental Health Information Systems in the European Region. Summary Report on a Consultation, Berlin (West), 21-25 November 1988. EUR/ICP/CEH 074 A(S).

Data Requirements and Methods for analysing spatial patterns of disease in small areas. Report on a WHO Consultation, Rome, 22-24 October 1990. EUR/ICP/CEH 087/A.

Development of a Health Environment Geographical Information System for the European Region. Report on a WHO Consultation, Bilthoven, 10-12 December 1990. EUR/ICP/CEH 090/A.

ANNEX 4

Common acronyms used

WHO	World Health Organization
GIS	Geographical Information Systems
CEC	Commission of the European Communities
CORINE	Coordination of Environmental Information
RIVM	National Institute of Public Health and Environment Protection
EGIS	Environment GIS
HGIS	Health GIS
HEGIS	Health and Environment GIS
ESF	European Science Foundation
HFA	Health for All
AIM	Advanced Informatics in Medicine
ENS	European Nervous System
IARC	International Agency for Research on Cancer
CEN	Comité Européenne de la Normalisation
ECEH	European Centre for Environmental Health
UNEP	United Nations Environment Programme
OECD	Organisation for Economic Cooperation and Development