A Prospect of Environmental Health Information System for Industrial Complex Areas in Korea

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Abstract

A prospect of environmental health information system was proposed for managing residents health of industrial complex area, which might imply the health effects by environmental pollution. From reviewing other environmental or health information system and making case database for past research, the direction and approach plans suggested construction of database and its structure for surveillance of health effects from an environmental pollution by environmental epidemiology in Korea. Results showed future requirement for developed algorithm which supports decision maker in environmental health policy and administration process.

Introduction

The amount of environmental exposure and monitoring data existing today in the area of environment and health fields surpasses by far what a single researcher or policy expert can encompass. Industrial complex populations health survey undertaken by Korean Ministry of Environment (MOE) from 1980 to 2002 reveals a lot of data and information for environmental health management and policy. To accommodate these data for transferring to knowledge base, computerized information system is suggested to solution of large warehouse based decision support system. In this transitional research, MOE health survey data is collected with standardized code and related articles are reviewed for planning for environmental health information system for using decision supportive tools.

Materials and Method

The health survey data executed by MOE are collected from paper data sheet, data diskette, questionnaire and all of related material produced between 1980 and 2001. All of research material related data and information are categorized by years and survey contents. With constructed coding system, database are made to form of excel data format. Article

searching tools are internet based search engines such as Medline, Science Direct etc. Review article keywords consist of information system, health and environment.

Results and Discussion

The example of coding data contents is presented (Table 1). Database consists of participants physical information, diet status, environmental exposure and some of biomarkers. All of coding data are typed into MS excel spread sheet (results not shown).

Decision making is one of the most important activities for environmental health management/policy. Research about decision support systems has been proposed to help people effectively solve these kinds of problems. World Wide Web applications have grown very rapidly and have made a significant impact on computer systems (Chen et al., 1999). Bedard et al. (2002) provides a new category of decision-support tools that builds on todays Geographic Information Systems (GIS) and On-Line Analytical Processing (OLAP) technologies to facilitate Geographic Knowledge Discovery. It is also suggested that spatial OLAP could be applied in the field of environmental health.

Table 1. Database example of health surveillance on an industrial complex, 2001

Contents	Descriptions	
General	Date of Birth(age), address, education, income, duration of settlement, family status, source of drinking water, fuel of air conditioning, smoking status, occupation, pregnancy, drug etc.	
Questionnaire	Eye, skin, respiratory, Gastrointestinal, circulatory, fatigue, nervous, hearing system	
	Reference	from 1986
Body status	Height, weight	
Blood pressure	High&low blood pressure	
Lung function test	FVC, FEV 1.0%, FEV 1.0, PEFR, V25, V25/HT, INDEX(FEV 1.0/VCR), FEV 1.0%-pre, V25/HT-pre, (F)%FVC, (F) FEV 1.0%, (F)V25/HT	
Lung function test for elementary school students	PEFR for 4 weeks, Symptoms, time activity patterns	
Diagnosis	17 disease criteria including normal	
Diagnosis	17 disease criteria including normal	
Chest X-ray test	Normal, tuberculosis, other chest disease etc.	
Blood test	RBC, WBC, plates, hematocrit etc.	
Urine test	pH, urinary protein, sugar, ketone etc.	
Hepatitis & Liver Function	antigen, antibody, SGOT, SGPT	
	Reference	from 1987
Air pollution & Disease registry	Population, air pollution, health insurance data etc.	
Environmental exposure	Air pollution measurement data & hazardous chemicals emissions VOCs, NO2, PM10, PM2.5 etc.	
Personal exposure	VOCs, NO2, PM10, PM2.5 etc.	
Metabolites	VOCs(BTX) & PAH(Pyrene) metabolites, heavy metals Urinary tt-muconic acid, hippuric acid, methyl hippuric acid, 1-OHPG, Blood lead, urinary cadmium & arsenic	

Lee et al. (1997) propose a model using knowledge base expert system that adaptively predicts the hourly concentrations of nitrogen dioxide in the central urban area of Seoul, Korea. Ware et al. (2001) show that appropriate techniques can empower users to create models that compete with classifiers built by state-of-the-art learning algorithms, machine learning approach. Michalski et al. (1999) presents results from an experiment to compare the above method of knowledge acquisition with a method based on inductive learning. In these trends, we could be stimulated to apply various information technologies into environmental health research based management and policy fields.

Conclusion

It is growing concern with knowledge base policy and administration of environmental health fields which have made large database in many related area including air/water pollution, exposure analysis, health indices, socioeconomic statistics etc. In these study, it is presented that accumulated past data of MOE health survey could be transferred coding database for information proposed in collaborated, longitudinal, decision supportive purpose. However, paper review shows that application of resent information technologies including decision support system, expert system, machine learning approach, Geographic Information Systems (GIS) and On-Line Analytical Processing (OLAP) technologies etc. require proper data format and structure strategic planning of past and producing environmental health information system.

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