Working together for safe food

GEMS/Food

WORLD HEALTH ORGANIZATION
Established in 1976, the Global Environment Monitoring System – Food Contamination Monitoring and Assessment Programme, which is commonly known as GEMS/Food is the only international source of health-oriented population-based information on human exposure to potentially hazardous chemicals in food. GEMS/Food has informed governments, the Codex Alimentarius Commission and other relevant institutions, as well as the public, on levels and trends of contaminants in food, their contribution to total human exposure, and their significance with regard to public health and trade. Begun as a project in collaboration with the United Nation Environment Programme and the Food and Agriculture Organization of the United Nations, the World Health Organization now implements GEMS/Food in cooperation with its network of WHO Collaborating Centres and Participating Institutions located in nearly 70 countries around the world. In addition, linkages are maintained with the international and non-governmental organizations and other parties interested in food contamination. GEMS/Food is an important part of national and international efforts to provide assurance regarding the safety of the food supply and provides the basis – where appropriate – for remedial actions, for standards development, for industry and public education and for resource management. A major objective of the programme is to compile data on food contamination and human exposure from different countries for global synthesis, evaluation and presentation.

Public Health Importance

Food contamination monitoring is an essential tool for ensuring the safety of food supplies and managing health risks. As such, GEMS/Food provides basic information for hazard identification which establishes priorities for risk assessment. For example, if a toxicological evaluation raises a concern, a preliminary exposure assessment might suggest whether or not adverse health effects would occur in the population. If the concern is not resolved, more detailed information on actual exposure is warranted, especially for potentially vulnerable subgroups of the population, such as infants and children. GEMS/Food is involved in developing models to predict likely exposure to chemicals on food which may pose acute and chronic health risks. Based on this risk characterization, various risk management options can be considered. Once a risk management option is chosen, however, further exposure assessments are necessary to evaluate its effectiveness.

GEMS/Food Activities

On the core list, eighteen (18) priority contaminants are monitored by GEMS/Food including chemicals and metals commonly emitted during industrial processes, residues from agricultural practices, and chemical contaminants that may arise from natural sources, such as fungal contamination (see Table on right). Concentrations of the chemicals are reported in a variety of foods and in the total diet of both adults and infants and children. For certain contaminants, time series data are available although there is incomplete geographic coverage, particularly in developing countries. Recently, more detailed and extensive data on contaminants have been requested from industrialized countries. These include specific PCB congeners (No. 28, 52, 101, 118, 138, 153 and 180), dioxins (PCDDs and PCDFs), ochratoxin A, patulin, fumonisins, methyl pirimiphos, chlorpyrifos, dithiocarbamates, radionuclides (Cs-137, Sr-90, I-131, Pu-239) and nitrate/nitrite.

GEMS/Food periodically prepares exposure assessment evaluations which provide a global overview of various problems of chemicals in food. These reports have addressed issues related to the levels of contaminants in various food and in the total diet. A report on contaminants in specific foods was prepared in 1988 and another report on total dietary exposure was prepared in 1992. In addition, a number of publications are available from GEMS/Food-EURO which was established in 1992 to reflect specific priorities and needs of countries located in the WHO Region of Europe. GEMS/Food-EURO prepared an assessment of food contamination

The role of national food monitoring programmes

A national monitoring programme provides accurate data on levels and trends in food contamination which can be used as the basis for regulations and preventive interventions. As well as protecting domestic consumers, monitoring strengthens a country's position in international markets by ensuring the safety of its food exports.

National monitoring programmes can:

- determine the extent of national food contamination levels and the risk they pose to public health;
- identify foods which are likely to become contaminated, and determine the source of, or reason for, their contamination;
- point out the need for control to producers and governments, and provide guidance for regulations, if necessary;
- provide the impetus for cooperative action among government agencies responsible for health, agriculture and environmental protection, and the food and chemical manufacturing and processing industries;
- furnish monitoring data to ensure the effectiveness of existing government regulations;
- improve access to international markets by ensuring the safety of exported food;
- prevent entry of unsafe food from abroad; and
- advise other bodies carrying out food and environmental monitoring.
Levels of PCBs, PCDDs and PCDFs in Human Milk. Second round of WHO-coordinated exposure study. Environmental Health in Europe No. 3. WHO European Centre for Environment and Health, Bilthoven, Copenhagen, Nancy, Rome (1996)


"Methodology sheet for proportion of potentially hazardous chemicals monitored in food" in Indicators of Sustainable Development Framework and Methodologies. Department of Policy Coordination and Sustainable Development, United Nations, New York (1996)


For information on how to obtain copies of these publications and documents, please contact the GEMS/Food Coordinator (see back cover).

Dietary intake of DDT by infants from human milk

DDT complex (DDT and its degradation products) contaminates food mainly as a result of its earlier use in agriculture and public health. While DDT is now banned in most countries for agricultural uses, the persistence and fat solubility of DDT have resulted in widespread contamination of the food chain. Levels of DDT in breast milk reflect the exposure of the mother to DDT and is a good indicator of the levels of DDT in the food supply. Breast milk is also the sole food for the first few months of life and dietary intake of DDT complex by infants in some countries approaches or exceeds the WHO recommended provisional tolerable intake of 20 μg DDT/kg body weight/day.
The safe and appropriate use of agricultural chemicals, such as pesticides, can only be assured through effective food contamination monitoring programmes.

Industrial pollution and other human activities may introduce toxic chemicals into the environment and the food supply. Continuous food contamination monitoring is necessary to prevent such chemicals from reaching the consumer.

Consumers must rely on national authorities to protect them from chemical contaminants in food. Food contamination monitoring is one of the most important public health services that governments can provide.
For the book *Concern for Europe's tomorrow* published in 1995. Other publications relate to exposure to important chemical contaminants. For example, *Levels of PCBs, PCDDs and PCDFs in human milk* was published in 1996 based on the results of the second WHO-coordinated study.

**GEMS/Food and the FAO/WHO Codex Alimentarius Commission**

The FAO/WHO Codex Alimentarius Commission was established in 1962 to protect the health of the consumer and promote international trade in food. Within Codex, the management of potentially hazardous chemicals in food has been delegated to, among others, the Codex Committee on Food Additives and Contaminants (CCFAC) and the Codex Committee on Pesticide Residues (CCPR). In these Committees, risk management decisions are dependent on adequate and reliable exposure assessment. GEMS/Food has provided assistance to CCFAC and CCPR on a range of exposure assessment issues. In particular, GEMS/Food routinely provides the CCPR with exposure assessments for pesticide residues in food using calculations of Theoretical Maximum Daily Intake (TMDI) and International Estimated Daily Intake (IEDI). GEMS/Food has recently revised its internationally-recognized *Guidelines for Predicting Dietary Intakes of Pesticide Residues*.

GEMS/Food also provides information on monitoring data to assist in the establishment of Codex levels for contaminants and for pesticides which are considered environmental contaminants. In such cases, levels are often established based on the principle of maintaining levels "as low as reasonably achievable" and GEMS/Food data are essential in assuring that the levels protect public health while avoiding unnecessary trade barriers.

**Technical Cooperation**

GEMS/Food extends technical assistance and advice to its Participating Institutions in developing countries. Basic guidance has been provided in *Guidelines for Establishing or Strengthening National Food Contamination Monitoring Programmes* (see list of GEMS/Food publications). More recent advice on appropriate monitoring capabilities has been provided in cooperation with the United Nations Commission on Sustainable Development (see *Indicators of sustainable development framework and methodologies*). To assist countries in conducting studies of dietary intake of contaminants at the national level, GEMS/Food prepared *Guidelines for the study of dietary intake of chemical contaminants* which describes approaches to carrying out total diet studies, selective studies of individual foodstuffs and duplicate portion studies. Approaches for gathering food consumption data are also discussed.

GEMS/Food in collaboration with international organizations and its WHO Collaborating Centres has undertaken a series of Analytical Quality Assurance (AQA) studies to promote the reliability and comparability of analytical data. These have resulted in improvements in the analytical performance of participating laboratories. In addition, GEMS/Food in collaboration with the WHO Collaborating Centre for Pesticide Analysis and Training located at the GTZ Pesticide Service Project in Darmstadt, Germany is conducting a series of training courses in pesticide residue analysis for participants from GEMS/Food Participating Institutions in developing countries.
Countries with institutions participating in GEMS/Food
(as of November 1997)

Albania, Argentina, Australia, Austria, Bolivia, Brazil, Bulgaria, Canada, Chile, China, Costa Rica, Croatia, Cuba, Republic of Cyprus, Czech Republic, Denmark, Dominica, Egypt, Ethiopia, Fiji, Finland, France, Germany, Greece, Guatemala, Hungary, India, Islamic Republic of Iran, Ireland, Israel, Italy, Japan, Jordan, Kenya, Republic of Korea, Kuwait, Laos PDR, Republic of Lithuania, Malaysia, Malta, Mexico, Republic of Moldova, Morocco, Mozambique, Nepal, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Seychelles, Sierra Leone, Singapore, Slovak Federal Republic, Republic of Slovenia, South Africa, Spain, Sudan, Sweden, Tanzania, Thailand, Tunisia, Turkey, United Kingdom, United States of America, Uruguay, Viet Nam

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