MONITORING AND ASSESSMENT OF DIETARY EXPOSURE TO POTENTIALLY HAZARDOUS SUBSTANCES

WORLD HEALTH ORGANIZATION
Regional Office for Europe
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TARGET 22

FOOD QUALITY AND SAFETY

By the year 2000, health risks due to microorganisms or their toxins, to chemicals and to radioactivity in food should have been significantly reduced in all Member States.

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MONITORING AND ASSESSMENT OF DIETARY EXPOSURE TO POTENTIALLY HAZARDOUS SUBSTANCES

Report on a Meeting of the National Contact Points
of the WHO European Programme
(GEMS/Food-EURO)

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ABSTRACT

The first meeting of the National Contact Points of the WHO European programme on Monitoring and Assessment of Dietary Exposure to Potentially Hazardous Substances (GEMS/Food-EURO), which is the European component of the global GEMS/Food programme, was called to review the preparatory work for implementing the food contamination monitoring and assessment component of the programme. The participants emphasized the need for clarification of the specific roles and responsibilities of the different institutions and agencies involved in this area, so as to prevent duplication of efforts and coordinate international activities. They also discussed the need for comparative data and a standardized procedure for reporting information. The participants proposed a list of contaminants to be investigated further, and concluded that although there should be a general list, the food pairs and contaminants to be assessed and monitored should reflect the country's own priorities with respect to health, the environment and trade.

Keywords

FOOD CONTAMINATION -- prevent/control
DRINKING WATER
HAZARDOUS SUBSTANCES
ENVIRONMENTAL MONITORING -- methods

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INTRODUCTION

National authorities have the responsibility and obligation to ensure that potentially toxic chemicals are not present in food and drinking-water at levels that may adversely affect the health of consumers, as well as food trade and food safety. The monitoring and control of food is not only essential for consumer protection but, at the same time, could be used to assess public health risks arising from the presence of potentially toxic chemicals in food.

To assist Member States of the WHO European Region to develop, strengthen and improve programmes for the effective and efficient monitoring and assessment of dietary exposure to potentially toxic chemicals, the WHO Regional Office for Europe organized consultations to recommend the most appropriate approach in the development of a European programme on the basis of the GEMS/Food programme, which is the food contamination monitoring and assessment component of the Global Environment Monitoring Systems (GEMS). Based on comprehensive analysis of current practices and feasible options, the consultations recommended that the Regional Office should establish a WHO European Programme for Monitoring and Assessment of Dietary Exposure to Potentially Hazardous Substances (GEMS/Food-EURO).

The first meeting of the National Contact Points, which was held in Berlin from 18 to 20 November 1992, was called to review the preparatory work for implementing the food contamination monitoring and assessment component of the programme. The participants were also to decide on the specific roles and responsibilities of different institutions and agencies, select food/contaminant pairs that should be further studied and discuss procedures for managing data and assessing findings. An additional aim was to assess dietary exposure to potentially hazardous substances on the basis of data made available by the global GEMS/Food programme and through the recently begun Regional Office activity "Concern for Europe's Tomorrow."

The 33 participants, including members of the Steering Committee of the programme and National Contact Points

nominated by their respective governments, represented 20 European countries (Annex 1). They were joined by representatives from the Food and Agricultural Organization of the United Nations (FAO), the Council of Europe, the European Office of the International Life Science Institute, and the Codex Committees on Pesticide Residues and Food Additives and Contaminants. The participants were welcomed on behalf of the German Government by Professor K. Gerigk and Professor A. Somogyi. The Meeting was then opened by Dr P. Weigert, who presented an outline of the history of GEMS/Food-EURO and highlighted the necessity of establishing a work programme with emphasis on the particular needs and requirements of the participating countries. The meeting was co-chaired by Professor Somogyi and Dr J. Bell. Dr M. Sammut acted as Rapporteur.

DISCUSSION

The participants discussed the way in which GEMS/Food-EURO works, based on details presented in a background paper. Representatives of FAO, the GEMS programme at the United Nations Environment Programme (UNEP) and WHO headquarters expressed the interest of their respective organizations in such programmes as GEMS/Food-EURO, which could serve as a model for other regional initiatives in the area of food safety. They also stressed the importance of coordination between GEMS/Food-EURO and similar European programmes, particularly those established by the European Community (EC).

The participants emphasized the need for a programme that was cost effective and that would minimize duplication of efforts and reflect the actual needs of the European countries. The Board of the global GEMS/Food programme had agreed not to include microbiological contaminants at this stage. Although the Regional Office's programme was to reflect the needs of participating countries, it should also be viewed within the general framework of the global GEMS/Food programme.

Several participants expressed concern about the efficient flow of data where a number of ministries were involved in food safety and in particular where the health ministry or department of health did NOT have an overall coordinative role. National Contact Points were asked to send an organigram of the ministries that have responsibility for various aspects of food safety and quality to the Rome Division of the WHO European Centre for Environment and Health so that it could examine ways to improve the channels of communication.

General guidelines were established for the selection of food/contaminant pairs based on criteria related to health, trade and the environment. It was agreed that although food/contaminant pairs were to be selected for further investigation, no country was to be bound by a rigid framework but would carry out work based on actual needs.

The Meeting proceeded to review the contaminants proposed to be investigated.

(a) *Pesticide residues.* The participants noted the importance of pesticide residue analysis; however, as different pesticides vary in importance from one country to another, they advised against creating a definitive list of pesticides to be monitored. Countries participating in this component of the programme were to inform the Rome Division of the background leading to the choice of pesticides and commodities analysed.

(b) *Heavy metals.* The metals of primary interest remain lead, cadmium, mercury and tin. Other elements such as arsenic, however, could be of interest to specific countries. The importance of the speciation toxicity in the case of mercury and arsenic was highlighted.

(c) *Aflatoxins.* The assessment of aflatoxins is still important in a number of countries. It appeared, however, that other mycotoxins could also be particularly important. Ochratoxin A seems to be quite widespread and where possible should be included in food monitoring programmes. Other mycotoxins such as ergot in rye and

patulin in fruit were of importance in certain circumstances. The same approach as that adopted for pesticides should be followed.

(d) *Industrial contaminants.* Polychlorinated biphenyls (PCBs) were considered the most important chemicals to be monitored. Where possible, specific congeners such as 28, 53, 101, 138, 153, 180 should be analysed and assessed. The possibility of monitoring dioxins was considered but, due to analytical difficulties in obtaining reliable results, dioxins should not be included at this stage of the programme.

(e) *Radionuclides.* The participants expressed their desire to include radionuclides, particularly Cs137, I131 and possibly Sr90. Analyses of such contaminants are possibly more important from a trade aspect. Countries already carrying out such analyses were requested to submit data but no new initiatives should be taken in this area.

(f) *Nitrates.* The monitoring of nitrates in food and drinking-water was considered important. However, samples such as meat where nitrate/nitrite is an additive should not be analysed. When drinking-water is analysed, the geographical locations should be well marked.

(g) *Veterinary drugs.* The monitoring of veterinary drug residues is already being requested of EC countries and, considering the importance of these materials in international trade, the participants felt that veterinary drug residues should be included in the monitoring programme. However, the same approach will be adopted as that recommended for pesticides.

Sampling plans and procedures

The participants considered a paper prepared by the Federal Health Office in Germany on sampling plans and procedures and discussed the various approaches that could be adopted in producing representative samples. Most countries have been using a mixed

approach for sampling, ranging from follow-up of violations of existing guidelines and maximum residue levels to random sampling. It was concluded that an effective sampling plan should take into account the population, food production, trade and transportation. Countries could use the plan which best suits them as long as reports include details of the plan, for example areas selected, seasons and other important geographical variables. Sampling after violations have already been committed, however, should be avoided so as not to bias the results.

Sample preparation, methods of analysis

As much work had already been carried out in this area, particularly by Codex Alimentarius and the EC, it was agreed that the EEC directives on the methods to be used for detecting residues of substances having a hormonal action and of substances having a thyrostatic action (87/410/EEC) and on the reference methods and the list of national reference laboratories for detecting residues (89/610/EEC), could be used as a starting point. Where possible, however, results should be reported in such a way as to be corrected by the recovery factor of the specific method.

Analytical quality assurance

The participants recognized the importance of instituting an analytical quality assurance (AQA) programme. Global and regional AQA programmes such as those of GEMS/Food and FAO, due to start in 1993, could serve as a basis for the GEMS/Food-EURO programme. To harmonize as much as possible the various AQA programmes a subcommittee of GEMS/Food-EURO on AQA should be established.

Countries participating in GEMS/Food-EURO should carry out both internal and external AQA on a regular basis. The analytical quality of all reported data should be adequately assured.

The collection and handling of data

The participants acknowledged the responsibility of the National Contact Points to send data to the Rome Division on an annual basis, who will in turn forward the data to GEMS/Food (WHO headquarters) in an agreed format.

The use of harmonized computerized data reporting was to be encouraged. A data entry and handling programme for this purpose, based on a shareware PC software (EPI Info) will be made available to all interested National Contact Points on request.

The use of standard statistical parameters such as mean, median and percentiles as well as the significance of limits of detection and determination were also discussed. Yearly reports should include full details of the data reduction or manipulation techniques used, zero results should be defined and abnormally high levels should not be eliminated. Data filtration by computerized methods should be avoided as this is likely to produce erroneous results.

Evaluation and assessment of results

Regular evaluation of the data submitted was considered a vital feedback mechanism to participating countries. Before publication, however, processed data should be sent to the respective countries for final review and possible updating.

The evaluation of results should take into consideration food consumption data and, if substantial initiatives of other United Nations agencies exist in this area, efforts should be taken not to duplicate but to utilize existing information as much as possible.

Setting-up of a Coordinating Centre for GEMS/Food-EURO

The meeting discussed the possibility of establishing a Coordinating Centre to assist the Regional Office in the implementation of GEMS/Food-EURO. Such a centre would fulfil four basic functions: secretarial work, data management, information outreach, and technical cooperation.

The Centre would assist in the promotion of the whole programme and act as a clearing-house for information exchange. By establishing a close working relationship with international agencies involved directly or indirectly in food safety, the Coordinating Centre would keep up to date with what is going on in this area and help reduce duplication. The Meeting accepted the importance of such a centre and showed its appreciation of the offer of the German Federal Health Office to host it. The cost of the Centre will be borne by the host institute; other participating countries would not have any financial responsibility for the Centre.

Administration of the programme

The Meeting was informed that GEMS/Food-EURO was to be managed by a Steering Committee that had been established by the Regional Office. The Committee includes representatives of France, Germany, Italy, Poland and the United Kingdom, as well as of WHO headquarters, UNEP and FAO. The membership of this committee must be reconfirmed every two years. In addition, observer status will be given to EC Directorates-General III, V and VI (Industry, Employment, Industrial Relations and Social Affairs, and Agriculture, respectively), Codex Alimentarius and other international organizations as necessary.

The Meeting endorsed the concept of setting up a number of technical subcommittees on analytical quality assurance, data management, assessment and evaluation, and veterinary drug residues. The possibility of setting up subcommittees in other areas as and when required was also discussed.

The subcommittees and their members are:

Analytical Quality Assurance	Host:	United Kingdom (Ministry of Agriculture, Fisheries and Food)
	Members:	Bulgaria Poland FAO

Data Management	Host:	Germany (Federal Health Office)
	Members:	Netherlands (to be confirmed)
Assessment and Evaluation	Host:	United Kingdom (Ministry of Agriculture, Fisheries and Food, Food Science Division I)
	Members:	Sweden Croatia Monitoring and Assessment Research Centre (MARC), London
Veterinary Drugs	Host:	France
	Members:	Netherlands Croatia Slovenia

Other countries could be invited to join any subcommittee at a later stage.

Chemical contamination in foods and dietary exposure to potentially hazardous substances

The participants were introduced to WHO's "Concern for Europe's Tomorrow", which has a component on food safety. The data generated by both the CET programme and the GEMS/Food programme will form the initial basis for the GEMS/Food-EURO database. The information should chiefly cover European countries but data from areas outside Europe may be useful for comparison purposes.

The present situation of human exposure to contaminants dealt with in the global programme was reviewed. While it was recognized that data from food/contaminant pairs could provide valuable information on the intake of certain contaminants, such data may result in a fragmented picture. Evaluation of status and trends for various contaminants becomes more complex when data from different countries generated in different years on a wide

variety of foods are assessed. The examination of national and regional foods will allow new problems to be addressed.

The concept of whole dietary exposure is vital for risk assessment. The structure of dietary intake studies tends to vary between countries, and efforts should be made to standardize such studies. Comparative dietary exposure surveys should form the basis for establishing priorities for health care. Priority should be given to the special needs of high-risk groups such as children and pregnant women.

Other routes of exposure could be of importance; in a final analysis an integrated approach may be necessary to assess risks to human health.

CONCLUSIONS AND RECOMMENDATIONS

1. Efforts should be made to foster mutual cooperation between countries participating in GEMS/Food-EURO, with the aim of strengthening national capabilities to monitor and assess food contamination. Such assessments would be used as a basis for determining necessary action.

2. GEMS/Food-EURO should be useful for the assessment and evaluation of dietary exposure to potentially hazardous substances, enabling national authorities to ensure that potentially hazardous substances are not present in food and drinking-water at levels that may adversely affect the health of consumers, the food trade and food safety.

3. The reporting of data and results should be harmonized. Initially, however, countries that are not able to fulfil such requirements may report data and results as they become available. In such cases, the structure developed by WHO should be followed.

4. As a first step, food/contaminant pairs should be selected for study so as to closely reflect each country's priorities with

respect to health, the environment and trade. As a general basis, the contaminants and food pairs of the global GEMS/Food programme should be adopted. However, each country should select parameters of greatest national importance. In addition to the contaminants included in the global programme, radionuclides, nitrates and veterinary drug residues should also be considered.

5. The reporting of results should be accompanied by as much information as possible (sampling plans, sample preparation, analytical quality assurance, data handling, presentation of data).

6. Countries that have adequate monitoring and assessment capabilities should be encouraged to work in close collaboration with the Rome Division in order to transfer know-how to countries in need of such assistance.

7. A Coordinating Centre should be established to assist the Regional Office in the implementation and maintenance of GEMS/Food-EURO.

8. The data, after being processed by the Coordinating Centre, should be reported back to the National Contact Point of the originating country for review.

9. As recommended by the Steering Committee, technical subcommittees were established on analytical quality assurance, data management, assessment and evaluation, and veterinary drug residues.

10. The Steering Committee should endeavour to ensure that action be taken to minimize duplication of effort at both national and international levels with regard to similar existing programmes, and that adequate cooperation be assured between GEMS/Food-EURO and similar programmes of other international organiza-

tions, such as WHO headquarters, FAO, UNDP, UNEP, ILSI, Codex Committees, EC and the Council of Europe.

11. The assessment and evaluation of final reports should be carried out by the Steering Committee, including processing referrals made by national authorities.

12. The Regional Office should negotiate with the EC so that information can be easily transferred between the EC and GEMS/Food-EURO to avoid approaching Member States twice for the same data.

The participants noted with satisfaction the generous offer of the Federal Health Office in Berlin to host the Coordinating Centre of GEMS/Food-EURO.

Annex 1

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