GEMS/Food Databases and Total Diet Studies

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Industrial emissions and effluents
Vehicle emission
Agricultural practices
Agricultural pest
Animal pest
Seafood
Distribution
Processing
Storage
Retail
Cooking

WHO and Chemicals in Food

WHO Constitution (1948)
Mandate to develop, establish and promote international standards with respect to food

Joint FAO/WHO Expert Committee on Food Additives (1956)
International risk assessment of chemicals in food

Joint FAO/WHO Codex Alimentarius Commission (1963)
International risk management through standards development

Recognizes Codex standards and the primacy of risk assessment as the basis for health and safety requirements for food

RISK ANALYSIS PARADIGM

Hazard Identification
Risk Assessment
Risk Characterization
Exposure Assessment
Risk Evaluation
Option Assessment
Option Implementation
Monitoring and Review
Risk Management

Risk Communication

Consumers, Industry and Other Interest Parties

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Consumers, Industry and Other Interest Parties
Objectives of GEMS/Food

- Compile data on food contamination and human exposure for global synthesis, evaluation and presentation
- Promote and support health-oriented, population-based studies on exposure to contaminants of public health significance

GEMS/Food Network

- WHO Collaborating Centres
- National Contact Points
- Participating Institutions
- Other international bodies and NGOs

Priorities of GEMS/Food

- Pesticide residues
- Heavy metals
- Industrial pollutants
- Naturally occurring toxicants

GEMS/Food Priorities

**Pesticides**

- Aldrin/dieldrin
- DDT
- Endosulfan
- Endrin
- Hexachlorocyclohexane
- Hexachlorobenzene
- Heptachlor

**Other**

- Diazinon
- Fenitrothion
- Malathion
- Parathion
- Methyl parathion
- DTC
GEMS/Food Priorities

Heavy metals
- Cadmium
- Lead
- Methylmercury
- Inorganic Arsenic

Industrial Pollutants
- Polychlorinated Biphenyls
- Dioxins
- Dibenzofurans

Naturally Occurring Toxicants
- Aflatoxins
- Patulin
- Fumonisin B₁
- Ochratoxin A
- Acrylamide

Codex Alimentarius Commission
- Codex Committee on Food Additives
- Codex Committee on Contaminants
- Joint FAO/WHO Expert Committee on Food Additives
- Joint FAO/WHO Meetings on Pesticide Residues

Exposure Assessment
Dietary Exposure = C x F
C = Concentration of food chemical
F = Amount of food consumed
**GEMS/Food Databases**

- **OPAL I** Chemical Contaminants in Foods
  - Aggregated and Individual Data
- **OPAL II** Chemical Contaminants in Total Diet

**GEMS/Food OPALs Operating Programmes for Analytical Laboratories**

- Stand alone systems based on MS-ACCESS
- Data Collection at National Level
- Provides analytical tools
- Export/Import functions
- English, French and Spanish versions

**GEMS/Food Global Configuration**

National Collections (OPAL or electronic transformation)

- WHO/HQ
- Central Database
- Literature and national reports (manual entry)

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- National Collections (OPAL or electronic transformation)
- WHO/HQ
- Central Database
- Literature and national reports (manual entry)
  - Codex, JECFA, JMPR, other users
  - WHO/SIGHT Dissemination via WWW
Contents of Database

Chemical Contaminants in Foods

Aggregated Data

- 75,000 Entries
- 47 Countries
- 503 Foods
- 238 Contaminants

Individual Data

- 55,000 Entries
- 5 Countries
- 321 Foods
- 55 Contaminants

Acrylamide Data

- 1,300 Entries
- 4 Countries
- 649 Foods

Contents of Database

Total Diet Studies

- 3,700 Entries on dietary exposure
- 29 Countries
- 200 Contaminants

GEMS/Food Database

Dissemination of Data

WHO Food Safety Home Page

- http://www.who.int/foodsafety/chem/

JIFSAN Acrylamide

- http://www.acrylamide-food.org/
Other GEMS/Food Databases

- GEMS/Food Consumption Cluster Diets

Other GEMS/Food Databases

- Persistent Organic Pollutants in Human Milk

Third WHO-Coordinated Study 2000-2002
**Other GEMS/Food Functions**

International Food Safety Authority Network (INFOSAN) Emergency

- Inventory of capabilities (analytes, matrix, LOQ, LOD, AQA, etc.)
- Linked to revised International Health Regulations

**GEMS/Food Technical Cooperation**

- Support for analytical quality assurance
- New exposure assessment methods
- Collaboration in total diet studies

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**GEMS/Food Total Diet Studies**

What are the health reasons for total diet studies?
- Protect public health from toxic chemicals in the food supply
- Provides initial assessment of potential nutritional imbalances in the diet
- Provide baseline data in case of emergency

What are the trade reasons for total diet studies?
- Provide essential component of risk analysis for trade purposes
- Informs on the acceptability of Codex standards
- Provides basis for standard setting
- Provide baseline data in case of emergency

What are the activities of total diet studies?
- Measure the average amount of selected chemicals in foods as consumed
- Estimate the amount of chemicals ingested by different age/sex groups living in a country
- Assess whether or not specific chemicals pose a risk to health.
GEMS/Food

Total Diet Studies

What are the basic steps in total diet studies?
- Purchase random samples of foods commonly consumed at the retail level
- Processing samples as for consumption
- Homogenize and analyse samples for toxic chemicals and certain nutrients
- Estimate exposure to chemicals in diet

What are the costs and benefits of total diet studies?
- Cost will typically run around US$125,000
- Study only needs to be repeated every 5 years
- Reduce burden of foodborne disease caused by chemicals and nutritional imbalances
- Offers resource allocation tool for developing capacities and further study and/or remedial action
- Promotes food exports and market stability

GEMS/Food International Workshops and Training in Total Diet Studies

First Workshop
US Food and Drug Administration, Kansas City, July 2000 and in cooperation with the Pan American Health Organization and FAO

Second Workshop
Food Standards Australia New Zealand and the New Zealand Institute for Environmental Studies and Research, Brisbane, February 2002 in cooperation with Asia Pacific Food Analysis Network and FAO

Third Workshop
National Institute for Agricultural Research (INRA) in cooperation with the French Ministry of Foreign Affairs and FAO, Paris, May 2004 (bilingual English-French)

Fourth Workshop
Institute for Nutrition and Food Safety, Chinese Centers for Disease Control and Prevention in cooperation with FAO, Beijing, October 2006
### Regional Training in Total Diet Studies

**Europe** – Brno, Czech Republic, November 2002  
**Latin America** – Buenos Aires, March 2003  

Planned:  
**Europe/Eastern Mediterranean** – Amman, 2007  
**Southeast Asia** – Jakarta, 2007

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### Countries with Total Diet Studies

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### GEMS/Food Total Diet Studies

Total diet studies are one of the most cost-effective methods for assuring the safety of the food supply from chemical hazards.

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### Thank you for your attention