F O O D S A F E T Y

GEMS FOOD

REPORT OF THE WHO WORKING GROUP ON DATA REPORTING FOR HAZARDS OCCURRING IN FOOD (HOF)

25 January 2010

World Health Organization

WHO Library Cataloguing-in-Publication Data

GEMS/Food programme: report of the WHO working group on data reporting for hazards occurring in food (HOF).

1.Food analysis - standards. 2.Food contamination - analysis. 3.Diet. 4.Diet surveys. 5.Data collection - methods. I.World Health Organization. Dept. of Food Safety, Zoonoses and Foodborne Diseases.

ISBN 978 92 4 150068 5 (NLM classification: QU 146)

CONTENT

1. BACKGROUND

The GEMS/Food programme consists of three main areas of activity:

- Data collection for hazard occurrence, food composition and food consumption and sharing information for accurate international risk assessments.
- Training and capacity building at national and regional level for chemical exposure assessment based on Total Diet Studies.
- Development and to dissemination of guidelines and recommendations for exposure assessment methodologies.

WHO is in the process of updating its database format and data reporting procedures to ensure that:

- all information considered essential for estimating dietary exposure is captured;
- the information is accessible in a format that will allow data from different Member States to be compared and combined for the purpose of risk assessment;
- food composition/chemical occurrence data can be combined with available food consumption data for estimating dietary exposure; and
- the database will accommodate both aggregated and individual analytical results.

WHO also wants to anticipate future data needs for conducting risk assessment including:

- the ability to better quantify acute risks of exposure;
- the use of probabilistic approach for chronic exposure assessment which requires the full distribution of occurrence data instead of just mean/median and upper percentile;
- the ability to conduct a risk/benefit analysis, which requires information on nutrient intakes; and
- the possibility of including in the database information on microbiological hazards in foods.

WHO asked the Working Group (WG) members to provide advice on:

- the type of information that is required to accomplish the goals above; and
- ways to reduce the work load of those responsible for reporting/entering the data, including the staff of both Member countries and WHO.

Using the current GEMS/Food database structure as a starting point, the WG members identified the data fields that each considered to be essential information, and provided comments on field formats and content. They also provided comments on current data submission procedures and suggested ways to improve and enhance the process.

2. TERMS OF REFERENCE FOR THE WORKING GROUP

The basis for estimating the dietary exposure to food hazards is to combine data on food consumption with levels of occurrence of the hazards in the corresponding food categories. The GEMS/Food programme aims to support the dietary exposure assessment procedure by way of a network of national/regional institutions that collect data and then report the data to the WHO GEMS Food database. The GEMS/Food database includes data on food consumed all around the world and aggregated in 13 diets. The current database also compiles levels of occurrence for chemical contaminants.

a. Data needs for food composition and chemical/microbiological occurrence

Crucial issues in assessing food safety for both the risk assessor and the risk manager are, on the one hand to have access to available data on food composition and chemical occurrence (and food consumption?) and on the other hand to share their own information with partners in other Member States. This information should be available and accessible in a format allowing comparison and combination of data from different Member States for the risk assessment purpose.

The overall objective of collecting data on hazard occurrence and food consumption in a shared format is to support the exposure assessment process. Because data collection requires long term programming to prepare hosting specific formats, it is necessary to anticipate the future changes and evolutions of the whole risk assessment process.

The main evolutions which can be expected in the next years are: (1) A better quantification of the acute risk both for chemical and microbiological hazards. (2) A probabilistic approach for chronic exposure assessment. The full distribution of occurrence data should be needed instead of the central tendency and high percentiles of the distribution. Considering the whole distribution will imply the use of statistical modelling in certain occasions in particular to deal with non-quantifiable analytical results (results below the LODs). (3) A risk/benefit evaluation including a balance between the exposure to hazard and possible benefits of nutrients intake. Therefore a database on nutrient composition of food should be developed or shared with other WHO departments as recommended by the FAO/WHO technical workshop on nutrient risk assessment (Rome, 2-6 May 2005).

b. Terms of reference for the working group

The working group should advise WHO on the most appropriate format for data reporting in the GEMS/Food database taking into consideration

- The current and future needs for exposure assessment, in particular those listed in paragraph 3 above.
- The existing food classification systems and in particular the Codex Alimentarius classifications (Appendices 1 & 2).
- The optimal level of food classification/aggregation to allow combining data on chemical occurrence and nutrient composition with food consumption data? (and/or data reported by different Member States?).
- The feasibility in term of workload for data providers.

- The possibility for reporting both chemical and microbiological hazards.

The working group should recommend the information that should be reported and propose draft-templates for data submission by Member States. These templates should be tested in some Member States with the help of the WHO Collaborating Centres. The web-system for reporting as well as the management tools for the databases should follow the rules of the current WHO IT system and in particular should allow exchanges between WHO departments.

3. PROJECT SCOPE

The consensus of the WG was that the project scope was far-reaching and perhaps ambitious given the short timeframe for providing comments and preparing this report. It was suggested that the long-term goals of redesigning a data system might best be achieved by taking a stepwise approach. There was general agreement that the project should focus initially on making some modifications to the current data format, by addressing issues regarding food description and classifications, and by streamlining the data submission process. Expanding the database to include other types of information (e.g. microbiological and nutrient data) and database capabilities (e.g. calculating exposures) could be phased in over time. Nevertheless, recognizing the importance of the overall goal of designing a more inclusive data system, the WG has provided recommendations on both the immediate and longer-range goals and components of such a system.

One WG member suggested that a logical starting point for reviewing the database content was to understand and consider how the GEMS/Food data have been used in the past and will likely be used in the short-term. This would provide some guidance as to the level of complexity required of the database and to determine whether specific information would be critical or non-critical.

If the GEMS/Food database has been used primarily as a source of occurrence data to assist with dietary exposure assessments conducted by JECFA and by JMPR, the exposure assessments that are undertaken for this purpose are often simple and do not require complex data sets. Estimating dietary exposure requires linking the GEMS/Food occurrence data to food consumption data. When the JECFA or JMPR assessments are conducted using occurrence data from different countries or regions, often the only consumption data available have been the WHO Cluster Diets (previously the Regional Diets), which would not allow sophisticated modeling techniques to be undertaken. In that case, the data capture requirements for hazard concentration data should be commensurate with the consumption data to be used in the assessment.

Note that consideration of food consumption data in relation to the GEMS/Food system was not part of the Terms of Reference for this WG, as this topic is being reviewed by a separate Working Group. Nevertheless, several comments related to food consumption data have been included in this report particularly in relation to food classification systems since this is the means for linking occurrence data and food consumption data for estimating dietary exposure.

More specific comments and suggestions follow.

4. HARDWARE, SOFTWARE & FILE FORMAT CONSIDERATIONS

a. File/data transfer format

There were several comments supporting the use of a standard file format such as XML or Excel. FSANZ is considering using the XML standard as its data transfer format. It was mentioned (though not confirmed) that the European food composition network, EuroFir, is also planning to use XML. Adopting XML would allow WHO to create an XML Schema specifying what data is required in GEMS/Food. This is conceptually similar to creating a template spreadsheet for data upload, but is much more robust. The data transfer isn't affected by spreadsheet formatting and data providers (as well as WHO) can use software to automatically check that the data submission conforms to the schema's validation rules (i.e. any within field or referential integrity [between field) constraints such as field length or data type). Briefly, some of the advantages of adopting XML are:

- It is becoming a universal data exchange format in other fields.
- It is well supported by nearly all mainstream operating systems, databases and related software (e.g. laboratory management systems).
- It is more robust and flexible than delimited files or spreadsheets.
- XML Schemas allow organisations to clearly specify how they wish to receive data.
- An XML file can be validated against a schema automatically.
- Once a process to output or input XML data has been setup or coded, it can be used repeatedly, facilitating more frequent automatic data exchanges.
- The technology reduces manual work at both ends, saving a large amount of time and reducing the chance that errors will be introduced to a dataset.
- XML files are text based and are human-readable if necessary.

Excel is also a good option for this application and offers some advantages over XML. Excel is widely available, and a spreadsheet template can be packaged with functionalities whereas XML is a plain text file that requires software to provide the functionalities. Excel would enable data submission by countries that do not have the technical expertise or support necessary for using XML.

b. Desk-top versus web-based application

One major drawback of the current OPAL system is that it must be locally installed on the data provider's computer. This is often problematic for several reasons:

- Administrative rights are often required to install software.
- There may be installation problem related to the operating system.

- The update procedure is complicated.

A better solution would be to create a centrally updatable, web-based application with an OPAL type front-end. An application (OPAL or similar) could still be used in areas where internet access is limited or if the user prefers to install the system locally.

If a web application is developed, it must be able to work on different web browsers (e.g. Firefox, Internet Explorer, Safari).

A web application would also require that consideration be given to appropriate security levels. Different levels of security can be created for specific users (e.g. reader, uploader, administrator, etc.) who will have access only to the appropriate features. Also, the system should not have features commonly blocked by security systems, such as pop-ups.

c. Other system capabilities

Other system features that would be very useful to the end user include:

- access to standardized calculation instruments; and
- report generation capability to obtain standardized output to be used for communication of results.

5. HARDWARE DATABASE CONTENT – CURRENT AND FUTURE

The Working Group was asked to respond to the following three questions related to database content, considering both current and future need:

1. In the current GEMS/Food database, which fields at do you consider critical (essential) versus non-critical (good to have but not essential)?

2. What are the recommended properties of each data field (e.g. text versus numeric, length of field, controlled language/text versus free form text)?