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REVIEW

The importance of harmonizing food composition data across Europe

MB Egan[1], A Fragodt[1], MM Raats[1], C Hodgkins[1] and M Lumbers[2]

[1]*Food, Consumer Behaviour and Health Research Centre, School of Human Sciences, University of Surrey, Guildford, Surrey, UK and* [2]*School of Management, Food, Consumer Behaviour and Health Research Centre, University of Surrey, Guildford, Surrey, UK*

Objective: To examine the role of food composition data in Europe in four sectors, namely health, trade regulation and legislation, agriculture and the environment.
Results: The need for further harmonization of data across Europe is clearly identified and evidenced from a number of previous successful European collaborations.
Conclusions: Data on the nutritional composition of foods are essential for a broad spectrum of activities, including public health nutrition, research, the food industry and government policy development and implementation. With the expansion of the European Union and the concomitant increase in cross border trade and cooperation harmonizing food composition data becomes a more important issue than ever. Harmonization is not solely a technical issue, but also involves creating durable and sustainable structures to maintain the viability of the data. These are some of the issues currently being addressed by the European Food Information Resource Network of Excellence.
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Introduction

Food composition data provide detailed information on the nutritional composition of foods and are used in a variety of ways by a spectrum of users (Rand *et al*., 1987; Williamson, 2005). Data on what is actually in foods are critical for those involved in nutrition research, epidemiological studies and product development as well as government policies regarding health, nutrition and agriculture.

Many European countries have compiled their own national food composition data; however, the cost of developing and maintaining country-specific data is high and may be prohibitive for some individual countries. Nevertheless, national governments require this data to develop, implement and monitor integrated and comprehensive food and nutrition policies and assess the nutritional status of the population with food consumption surveys. Agricultural research strives to improve the food supply by developing new strains and cultivars and devising new methods of cultivation, harvesting and preservation. The food industry requires food composition data for product development, to meet food labelling requirements as well as complying with national and international standards and regulations.

In considering the role of food composition data in Europe, four main sectors can be identified. These are health, trade regulation and legislation, agriculture and the environment (Burlingame, 2004). Topics in these sectors include food-related diseases, environmental health risks, safer and environmentally friendly production methods and foodstuffs, the production of higher-quality raw materials and nutritious foods, the improvement of farming and production systems, and assessment of their safety and environmental impact.

This paper will examine the importance of food composition data in Europe in these various sectors, with a specific focus on previous European collaborations. Different sources of published and unpublished research literature were searched to locate relevant papers; reports referring to food composition data in the context of the different sectors were

Correspondence: Dr MM Raats, Food, Consumer Behaviour and Health Research Centre, School of Human Sciences, University of Surrey, Guildford, Surrey GU2 7XH, UK.
E-mail: m.raats@surrey.ac.uk
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considered relevant. Commercially available electronic databases, including Scirus, Medline, ERIC, CINAHL, Science Direct etc were searched for relevant studies published between 1990 and 2006. This paper will highlight the lessons learnt from previous efforts and the continuing need for both harmonization of food composition data and sustaining European collaboration in this area.

Harmonization of food composition data

It has been recognized in Europe for many years that substantial benefits could result from harmonizing food composition data across various countries. These benefits include improved quality, availability and compatibility of nutrient data. Further potential benefits of harmonization include access to expanded data sets, comparisons of nutrient and energy intakes at a European level, relating nutrient intakes to disease and health on a pan European scale and contributing to obtaining comparable food labels, enhancing cross-border trade. An inventory on the comparability of a number of European food composition databases showed that national food composition tables and databases are not sufficiently standardized with nutrients differing in definition, analytical methods, units and mode of expression (Deharveng *et al*., 1999). Furthermore, these can result in significant artificial differences in calculating nutrient and energy supply and intakes (Charrondière *et al*., 2002).

Harmonization of food composition data raises many complex issues. Comparison criteria are needed at a number of levels. These include the food level (number of foods covered, food classification and description systems, representativeness of nationally consumed foods), component level (coverage, identification, definition, analytical methods) and value level (missing nutrient data, documentation). Additionally, there are issues concerning data management, including compilation, software capacity, evaluation, data interchange and ownership of data (Charrondière *et al*., 2002).

While it may be technically feasible to develop internationally compatible databases, limitations include the variable analytical quality of the data, the incompatibilities and often-unknown origins of existing data. The extent and diversity of the users of food composition data is another fundamental problem in any attempt to harmonize such data. Currently, food composition tables differ in terms of the foods examined, the nutrients analysed and the data presented (Leclercq *et al*., 2001). Many also differ in their methods of gathering and handling data. Compatibility and consistency of analysis and presentation become critical issues. The key concepts for food composition databases include representativeness, completeness, a harmonized approach and documentation (Burlingame, 2004).

Over the years there have been a number of both international and regional initiatives to improve the harmonization of analytical methods, definition and mode of expression of foods and nutrients (Truswell *et al*., 1991; Greenfield and Southgate, 1992; Greenfield, 1995). INFOODS (2007) was established in 1984 with the aim of stimulating and coordinating efforts to improve the quality and availability of food analysis data worldwide (Church, 2005). INFOODS initiated the production of guidelines on the production, management and use of food composition data (Greenfield and Southgate, 1992, 2003) and has led work on food descriptor systems (Truswell *et al*., 1991). The INFOODS system is in free text and dependent on national language. The other major system used to describe foods in food composition databases is the LanguaL thesaurus, with well-defined terms and is language independent (Ireland and Møller, 2000).

Within Europe, there are a number of regional networks that include Central and Eastern European Countries Food Data Systems (CEECFOODS) and NORFOODS. CEECFOODS involves countries from Central and Eastern Europe; NORFOODS was established before INFOODS and includes Denmark, Finland, Iceland, Norway, Sweden, Greenland and the Faroe Islands. The latter network's activities include publication of national food composition tables, a glossary on food terms used in the Nordic languages and specific projects, for example, on publication of food composition data on the Internet, folate in foods and dietary calculation procedures (Becker, 2002). The EUROFOODS initiative in the 1980s aimed to improve compatibility of various European food composition tables and to encourage the development of computerized databases (West, 1985).

The EUROFOODS-Enfant Concerted Action Project, within the framework of the FLAIR (Food-Linked Agro-Industrial Research) programme extended the work to food consumption and nutrient intake. The COST Action 99 project, 'Research action on food consumption and composition data', included participants from 25 European countries and resulted in guidelines for the production, management and use of food composition data (Schlotke, 1996; Unwin and Becker, 1996; Schlotke and Møller, 2000).

Applications of food composition data

Health

Food composition data are critical to the development and implementation of nutrition and health policies in Europe. The data are used for assessing food and nutrient availability and intake in populations, evaluation of efforts to improve nutritional status, dietary assessment, research on diet and disease relationships, health education and promotion activities and assessment of risk from food borne contaminants (Harrison, 2004). With increasing consumer concerns about the impact of diet on human health, food composition data play an important role in food safety issues.

Monitoring the food and nutrient intake of populations. Across Europe, the responsibility for monitoring and documenting the availability of food and nutrients to populations

generally lies with governments. This occurs on several levels all of which require adequate food composition data. Food balance sheet data are used to compare national food supplies across countries and over time, household expenditure surveys provide a picture of nutrient availability on a household level and food consumption surveys of individuals provide the most detailed representation of population level food intake (Bloemberg and Kromhout, 1991). This assessment of the adequacy of national food supplies or of diets is an ongoing process that requires up-to-date nutrient data that best represent national food supplies, as in the case of sodium/salt levels and food fortification.

Over the years, there have been a number of European projects addressing issues of food and nutrient availability across countries. SENECA – Survey Europe on Nutrition in the Elderly: a Concerted Action – was initiated in 1988 (Haveman-Nies *et al*., 2002).This was a multicentre, longitudinal study on nutrition and health in the elderly undertaken in 12 European countries. Data on nutrient and food intake, dietary habits, dietary awareness, nutritional and health status and lifestyle were collected from 2586 elderly subjects according to a strictly standardized methodology. A major aim of this project was to study the relations between diet, nutritional status, health and performance.

Food consumption data from a modified dietary history were converted into nutrient data by using country-specific food composition tables. Researchers reported difficulties in comparing food intake data based on classifying the foods according to the Eurocode system. Eurocode-2 classifies foods according to groups and subgroups that are useful in dietary studies (Unwin and Møller, 1998). A difficulty arises in defining logical rules for assigning a food item to a specific main group, particularly for mixed foods. Researchers also found a 9% difference between energy and nutrient intakes calculated from local databases as compared with the Dutch database that was used as a reference (de Groot *et al*., 1992).

The principal difficulties in organizing and collecting data for the development, implementation and monitoring of food-based dietary guidelines were highlighted in a workshop jointly organized by the International Life Sciences Institute (ILSI) Europe and the Food and Agriculture Organization (FAO) in 2004. Participants identified problems with a lack of reliable food consumption data (individual intake, particular groups), inadequate food composition data, comparability of data, use of old data, lack of consistency of methods and confusion of terms used. Key recommendations from participants included the need for high-quality food intake data, collected on an individual basis and harmonizing different kinds of data sets, including food consumption data and data from food retailers.

A thorough understanding of the relation between food, food patterns and nutrient intakes in the population is required in the development of food-based dietary guidelines (Sandstrom, 2001). Food composition databases that are both comprehensive and representative of available foods have been described as an essential basic tool in developing food-based dietary guidelines (Leclercq *et al*., 2001). The latter cited the main drawbacks of current European food composition databases, as partial coverage of foods and nutrients, variability of analytical data, lack of accuracy in food descriptions and the lack of harmonization in the expression of nutrients.

EuroDiet (Nutrition and Diet for Healthy Lifestyles in Europe) was set up with the aim of developing and implementing European dietary guidelines (Kafatos and Codrington, 1999). The project specified population goals for nutrients and some foods consistent with the prevention of major public health problems. Translating population goals into food-based dietary guidelines for individuals was deemed most appropriate at national and regional level, with the benefit of European Union (EU) level action seen in the harmonization of monitoring and surveillance systems for evaluating effective health impacts.

As part of the European Health Monitoring Programme, the European Food Consumption Survey method (EFCOSUM) project was carried out by 14 member states as well as nine other European countries (Brussaard *et al*., 2002). The project aimed to define a method for collecting comparable food consumption data in Europe as well as attempting to make existing data comparable. Previous work provided comparable data from household budget surveys in a subset of European countries (DAFNE project, Trichopoulou *et al*., 1996) and EPIC, (European Prospective Investigation into Cancer and Nutrition), had developed methods for collecting individual dietary data specially focused on cancer and on adults. Consideration was given to available nation-wide food consumption surveys with nutrient intake data at the individual level.

An important conclusion from EFCOSUM was that it is not possible at the present time to make existing food consumption data comparable at the nutrient level. Furthermore, with respect to food classification systems, the available systems and food composition databases had been tailored for specific purposes at the national level. The EFCOSUM group recommended waiting for the EPIC Nutrient Database (ENDB), that was being developed as part of the EPIC project, as a starting point for making intake data comparable among countries at the nutrient level (Ireland *et al*., 2002; Verger *et al*., 2002).

The first comparative analysis of diet and nutrition information available at national, household and individual level was conducted by the WHO-CINDI (Countrywide Integrated Noncommunicable Disease Intervention) collaborative project (Serra-Majem *et al*., 2003). The study objective was to determine to what extent data on food consumption and nutrient intake, collected in a non-uniform way, could be harmonized and pooled for international and national comparison. Results suggested that estimations from these three sources of dietary data are difficult to compare, because they are measuring different levels of dietary information.

Only a few other projects have attempted to combine and analyse already existing data from European epidemiological studies (ERICA research group, 1988; Trichopoulou *et al*., 1996). In a study of dietary intake and nutritional status of children and adolescents in Europe, comparisons between countries were deemed difficult and inaccurate. This was attributed to the different dietary studies relying on food composition tables that differed in definitions, analytical methods, units and modes of expression (Lambert *et al*., 2004).

Diet–disease interrelationships. Nutritional epidemiology investigates the relationship between food and disease in populations and requires an accurate estimation of nutritional intake. Food composition data play a vital role, being used to estimate nutrient intakes and forming the basis of dietary recommendations. However, the use of national food composition databases in multicentre studies can be a source of errors as data are often not comparable.

At a global level changes in both diets and lifestyles are resulting in significant changes in the nutritional status of populations. One negative consequence is the increase in diet-related diseases such as obesity, type II diabetes, cardiovascular disease and various forms of cancer.

In a study of the distribution of cardiovascular disease risk factors in Europe, the Europe Alimentation (EURALIM) project determined the extent to which European dietary data collected in disparate surveys could be used to make meaningful comparisons (Beer-Borst *et al*., 2000a). Seven independent population-based surveys from six European countries were included in the study. Dietary assessment methods were found to vary substantially across surveys and direct comparisons of dietary measures across the studies were eventually deemed inappropriate due to the extent of methodological heterogeneity, with only within-population comparisons being considered valid (Beer-Borst *et al*., 2000b).

The study highlighted a number of limitations, including the fact that standardized methodologies for health and dietary assessments are likely to be expensive and time consuming. Some requirements to reduce the variability in comparative dietary analyses were recommended; these included a European food composition table, a common concept of portion size estimation, as well as common European dietary recommendations and guidelines.

The multicentre prospective cohort study EPIC is the largest study of diet and health ever undertaken. It is investigating the relationship between nutrition and various lifestyle factors and the aetiology of cancer and other chronic diseases (Riboli and Kaaks, 1997). The study, carried out in over half a million men and women aged 30–75 from 10 European countries (Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom), included an in-depth study of the compatibility of food composition tables for all nutrients. The tables were compared from the point of view of availability, definition, analytical methods and mode of expression of the nutrients of interest. The key issues to emerge were missing values, (partial or limited coverage of foods and nutrients), variability of analytical data, accuracy of description of foods and differences in the description of nutrients.

The conclusion from a critical evaluation of the existing food composition databases and nutrient databases available in the European countries involved indicated that further work was needed to standardize the databases (Deharveng *et al*., 1999). Within the EPIC project an *ad hoc* approach was developed to standardize databases. New matrices were built using information collected in the study to overcome the difficulty of reducing the systematic differences between food lists in the national datasets (Slimani *et al*., 2000).

Growing rates of obesity across Europe increase the risk of serious diet-related chronic diseases. The European Economic and Social Committee on Obesity in Europe drew up and adopted an opinion on *Obesity in Europe – role and responsibilities of civil society partners* (OJEU, 2006) in which is emphasized the role of governments, non-governmental organizations (NGOs) and industry. In relation to diet, consistent, coherent and clear messages are needed on all aspects of nutrition, food security (accessibility, availability and affordability of healthy food), and food safety. National circumstances will determine priorities and there are great variations in and between different countries.

Support is needed in the form of an appropriate infrastructure, implementation programmes, monitoring, evaluation and continuing research. Strategies need to be based on the best available scientific research and evidence. Recommendations to the food industry included providing consumers with adequate and understandable product and nutrition information; issuing simple consistent food labels and evidence-based health claims and providing information on food composition to national authorities.

Areas for action were identified and include targeting society with nutritional education, encompassing the issue of the overall nutritional value of foodstuffs. The resulting Obesity Check campaign (European Economic and Social Committee on Obesity in Europe, 2006) focused on a simple message demonstrating to the European public a need to eat healthily and take more physical exercise.

Food safety and food quality. As enlargement of the EU progresses and trade between all countries in the region expands to meet the ever-increasing demands of consumers, food producers are presented with challenges that cannot be easily met in isolation. Food control systems in countries have evolved in response to different local problems, but food quality and safety issues are complex and extend beyond national boundaries. This provides an impetus for harmonizing these systems. Two major drivers in this process have been the globalization of the world economy and the increasingly common nature of food safety problems faced by countries.

Important issues in food safety and quality in Europe were discussed at the Pan-European Conference on Food Safety and Quality in Budapest, 2002 FAO/WHO, 2002. Particular attention was given to identifying opportunities for harmonizing food safety policies, cooperating in developing policy and science and improving information and communication systems on food safety and quality. The three key areas were policy, cooperation and strategy. The participants recognized that collaboration and harmonization should be improved in a number of aspects of food safety to improve public health protection and to facilitate trade. Benefits would include the efficient delivery of safe quality food and the effective operation of competitive markets within the European region.

A further overview of the different approaches to food quality occurred at the Twenty-fourth FAO regional conference for Europe (2004). It was agreed that food quality was not only limited to food safety, but also included nutritional and added value characteristics such as forms of production and production areas. The role of food composition data was highlighted by the request for FAO's assistance, with a focus on the fundamental need to assess food composition.

Trade: regulation and legislation

Food safety and quality are important parameters in supporting both national and international trade. In 2002, European countries carried out more than 50% of world food trade with more than 85% of this by countries of the EU. But 70% of trade of the EU is internal, between EU members. The EU has expanded and continuing European integration and improvement of food safety and quality is required for participation in international food trade.

Different systems for legislating and controlling trade in safe foods exist and effective cooperation requires the harmonization of legislation and controls. Important tools to achieve these targets are cooperation in policy development and identification of common research priorities. Science provides the foundation for risk analysis, but risk management and risk communication need further inputs for effective strategies and harmonized policies for risk reduction.

While governments are responsible for national policies the need and benefit for coordinated actions and policies in Europe is evident, especially to ensure continued trade between and within certain markets. The assessment of risks based on sound science is critical to the development and implementation of such harmonized policies. Decisions relating to the nutrient content of the food supply affect whole populations. These include decisions on imports and exports, on agricultural subsidies related to food, on enrichment and fortification of foods, on legal definitions for foods that can be marketed. All depend on the availability of food composition data for the existing food supply.

The first priority for regulators and legislators is ensuring the safety of the food supply; health promotion and sustainability are secondary features. With increasing long-distance distribution of primary and processed food products, across both national boundaries and globally, setting safety and quality standards become the remit of international agencies such as the Codex Alimentarius Commission. The Codex Alimentarius is a collection of internationally adopted food standards, codes of practice, guidelines and recommendations, created for the purpose of protecting the health of consumers and ensuring fair practices in the food trade. Codex standards cover all the main foods as well as those materials used in the further processing of food products necessary for achieving the principal objectives of the code. Codex provisions concern the hygienic and nutritional quality of food, including microbiological norms, food additives, pesticide and veterinary drug residues, contaminants, labelling and presentation, and methods of sampling and risk analysis. There is a clear and well-defined need for food composition data here.

The labelling of foodstuffs enables consumers to get comprehensive information on the content and the composition of food products. Labelling helps consumers make informed choices about their food purchases and consumption. To meet consumer's needs, labels must be accurate, informative and easy to understand. Underpinning these criteria is the need for comparable, reliable and accurate food composition data.

The Codex Committee on Food Labelling draws up internationally agreed standards and codes of practice and these include a general standard for the labelling of prepackaged foods, general guidelines on claims and guidelines on nutrition labelling. These standards and guidelines on food labelling have been collated and republished in a compact format to facilitate use by governments, regulatory authorities, food industry, retailers and consumers (2005).

Current EU legislation (Council Directive 90/496/EEC) allows for voluntary nutrition labelling, with one exception. It is compulsory to list the nutrients in a food if any 'nutrition claims' are made – that is to say, if any representation or advertising about that food deliberately states or implies that it has particular nutritional properties. If food manufacturers or retailers choose to label nutrients voluntarily, they must follow certain rules for doing so. In the UK, the Joint Health Claims Initiative offers pre-market advice and a Code of Practice for the food industry, enforcers and consumers, to ensure that health claims on foods are both scientifically truthful and legally acceptable.

Difficulties in understanding the information on a label and the way it is presented, have lead the European Commission to start a revision of the nutrition-labelling directive. In the UK, the Food Standards Agency has agreed recommendations for a consistent approach to front of pack labelling, signposting. This will provide customers at a glance with information on the nutritional content of foods. In the 2003/04 EU work programme on labelling and

nutrition, there were four key initiatives: food labelling evaluation, nutrition and health claims, nutrition labelling and addition of nutrients to foods. The overall objectives are to achieve a high level of consumer protection, to improve the free movement of goods within the internal market, to increase legal security for economic operators and to ensure fair competition in the area of foods.

Agriculture

The EU is a key producer of food in the world market having a strong share of the world production of cereals, potatoes, sugar beets, citrus fruit and wine. Primary agriculture is no longer a major economic sector in the EU, and efficient European agricultural policies have ensured that most European populations have a secure food supply. There is a demand from consumers for higher quality products, more convenience products and more variety in foods. Issues for the agricultural sector include food safety and security, production sustainability, molecular and traditional breeding, feed composition and animal performance and environmental sustainability.

Food processors and food retailers have met these demands in a number of ways by setting up quality control systems for the whole food supply and have developed special cultivation requirements for supplying farmers. One such example is EUREP – Euro-Retailer Produce Working group. Farmers supplying participating retailers will have to apply the EUREP Good Agriculture practice; a protocol that offers a harmonization for fresh produce throughout Europe.

Major structural changes have taken place in the European agricultural food sector over recent years. All firms participating in a production and distribution chain for agriculture and food products – farmers, processors, wholesalers and retailers – increasingly work together to set up quality monitoring and control systems throughout the chain. A result of this concentration and internationalization among food retailers is that domestic quality requirements will also be applied in other EU countries (Brouwer and Bijman, 2001).

Agricultural research and development, which has generated astounding increases in food production, is vital to assuring food security in the coming decades (IFPRI, Annual report 1997). Ensuring the future security of adequate food supplies is not only a question of simply maintaining agricultural productivity, but it also has to be the one of continuing to improve this productivity; particularly through research and innovation. FAO estimates that food production must increase by more than 75% in the next 50 years. In addition, urbanization and ever-changing lifestyles will intensify demand for a more diverse range of food products. Consequently, agricultural production will need to increase to strengthen food security.

Plant genomics and biotechnology are revolutionizing both plant science and agriculture by providing tools for the improvement of plant properties relevant to sustainable agricultural production, animal and human nutrition. Safety assessments of foods derived through biotechnology often require an estimate of dietary exposure and/or nutritional consequences of such foods. Monitoring programmes are dependant upon the availability of accurate consumption data. Exposure assessments include both deterministic and probabilistic estimates of intakes using food supply data, individual dietary surveys, household surveys or total diet studies (Hlywka *et al*., 2003).

Food and feed crop composition studies are considered an essential part of the safety assessment of new crop varieties, including those developed using biotechnology. Such information is used to assess both similarities and differences in important nutrients and antinutrients. In addition, accurate information on the composition of crop materials and their variability is important for many food commodities, whose processing and desired properties such as flavour and texture depend on composition parameters.

In May 2003, ILSI released an online comprehensive Crop Composition database (www.cropcomposition.org) that provides up-to-date information on the natural variability in composition of conventional crops. The database is a compilation of data on the nutrients, antinutrients and secondary metabolites for maize and soybean samples obtained from controlled field trials, in multiple world-wide locations over a 6-year period (Ridley *et al*., 2004). This database complements existing food and nutrient databases and is of interest in the areas of plant biology, food science and animal nutrition.

Environment

Environmental issues abound and include diminishing crop biodiversity, development of genetically modified organisms and climate change. Environmental issues have an effect on food production and the nutrient content of foods and policies have developed in parallel, as farming methods evolve that are sustainable in the long term.

The Commission on Genetic Resources for Food and Agriculture highlighted nutrient composition data as an important area in the cross-cutting initiative on biodiversity for food and nutrition (FAO, 2005). The nutrient content of foods can be affected by cultivar type, although cultivar-specific differences have received little attention to date. Species and varietal differences in nutrient composition can be significant and cultivar-specific food composition and consumption data is critical to providing an evidence base for other activities relating to nutrition and biodiversity. The conservation of European biodiversity is one of the objectives of the EU Strategy for Sustainable Development (2001) and food composition data has an important role in valuing biodiversity.

The greater drive to protect consumer health, coupled with globalization of the food supply is leading to an increased demand for assessments of exposure to food chemicals and improvements in the methods used to carry

out these assessments (Kroes *et al*., 2002). Exposure assessment of food chemical intake requires reliable estimates of long-term or habitual food consumption. These include food additives, pesticide residues, environmental contaminants, mycotoxins, novel food ingredients, packaging-material migrants, flavouring substances (Lowik, 1996; Lambe, 2002).

Results of exposure assessments are used to make judgements about risks to human health and to assess compliance with legislation. They may also provide a means of revealing sources of contamination and assessing the effectiveness of current strategies for minimizing the risk from contamination in the food supply. The most commonly used approach is that of modelling dietary exposure by combining estimates of food consumption with estimates of chemical concentration (Pennington, 2004). The most refined techniques available were used within the EU Monte Carlo project to estimate the intake of food additives, pesticide residues and nutrients (Leclercq *et al*., 2003). The most commonly used and appropriate source of food consumption data for exposure assessments is food consumption surveys of individuals. To estimate, the nutrient intake will require food composition data.

The importance of sustaining European collaboration

Food composition data are an essential resource, used in such diverse areas as nutrition research, health promotion, clinical research, food trade, agriculture and the development of food and nutrition policies. Historically, food composition databases have been compiled as national activities to satisfy local requirements. However, the growing need for compatible food composition data in various sectors across Europe has led to numerous collaborations over the past 25 years (Church, 2005). These have resulted in progress towards harmonized data sets, but ultimately have proved difficult to sustain. Issues such as the globalization of food trade and the importance of large multicentre nutritional epidemiological studies on diet and chronic diseases have added a further impetus. The EPIC study, for example, has drawn on the wealth of experience of INFOODS, EUROFOODS, COST and NORFOODS (Slimani *et al*., 2000). Recommendations on food, food component description systems and data interchange are valuable in enabling the EPIC food composition databases to be comparable between the EPIC countries and compatible with other data management systems. Furthermore, the ENDB project represents a first attempt at standardizing nutrient databases across a number of European countries (Slimani *et al*., 2007).

The importance of continuing and sustaining European collaboration has been recognized at the highest level. Evidence lies in the European Commission funding of initiatives that support ongoing collaboration. One is the development of European Technology Platforms (ETPs) to promote innovation in Europe. ETPs provide a framework for stakeholders, led by industry, to define research and development priorities on a number of strategically important issues. The aim is to address technological challenges that can potentially contribute to a number of key policy objectives that are essential for Europe's future competitiveness.

Further collaboration is evident in the funding of a number of Networks of Excellence (NoE), such as the European Nutrigenomics Organization (NuGO) that links genomics, nutrition and health research (Astley and Elliott, 2004).

The European Policy framework for food and nutrition encompasses such diverse components as education, consumer protection, food labelling, food composition and agricultural policy. Successful policy development and implementation relies on data that are accessible, accurate, consistent and reliable to provide the basis of an evidence-based approach (Margetts *et al*., 2001). Development and implementation of such policies are underpinned by structures such as the European Network for Public Health Nutrition; established to coordinate public health nutrition, education, training and research across Europe (Sjöström *et al*., 1999).

Previous collaborative work has highlighted the need for a comprehensive European food composition database; however, the development of such a resource has been hindered by a number of issues. Previous work has underlined the difficulties in harmonizing data at a number of levels. Methodological difficulties relating to the compilation process include limitations of national analytical data, lack of information on the data sources, definitions, food sampling and calculating missing values (Slimani *et al*., 2000). Crucially, there has been a lack of permanent structures to support the development and maintenance of food composition data and poor communication between national database compilers, stakeholders and users.

The development of sustainable food composition databases is the aim of the EuroFIR (European Food Information Resource Network) project; another 5-year Network of Excellence funded by the European Commission. EuroFIR aims to develop an integrated, comprehensive and validated databank or food information resource, which will provide a single authoritative source of food composition data in Europe for nutrients and newly emerging bioactive compounds with potential health benefits. Good quality comparable national food composition data will provide the basis for such a resource, and therefore continued development of national, sector or project-related databases should ideally be aligned with EuroFIR's overall objectives. Ultimately, national compilers and users across the various sectors may have different and sometimes conflicting requirements of food composition data, but the establishment of effective communication and collaboration is essential. Initiatives relating to food and nutrition, such as the WHO Second Action Plan for food and nutrition policy, require food composition data that is fit for purpose and

their success depends on the commitment of individual countries and relevant organizations.

Other objectives of EuroFIR include providing new data especially for traditional and ethnic foods, establishing a European training programme, identifying accredited analytical laboratories, establishing sustainable structures for compilers as well as a framework for consultations with various stakeholders and users. Dissemination and exploitation of knowledge must also be a consideration. EuroFIR's outputs must continue to exist, be maintained and further developed beyond the initial funding support by the EU to ensure that the EuroFIR Food Information Resource, including the databank, remains viable and 'the point of reference' with respect to food composition information in Europe.

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