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Food composition activities in South Africa

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ABSTRACT

Researchers at the South African Medical Research Council used the *Bangkok Declaration*, Thailand, 2009, as a guideline for their food composition activities. The vision is to build a comprehensive food composition database for the country. Activities are directed at increasing the number of food items with country-specific nutrient information; encouraging research organisations, universities and the food industry to become involved in nutrient data generation and the generation of yield factors for South African dishes. The introduction of the South African Food Data System (SAFOODS) website and a symposium were major food composition activities. Educating users on the correct application of food composition data is an important endeavour. The national South African Food Data Advisory Group (SAFDAG) formed in 2008, advises and supports food composition activities at SAFOODS. In conclusion, with the support of SAFDAG, SAFOODS activities are aimed at compiling a country-specific food composition database and promoting its scientific use.

1. Introduction

To address country-specific nutritional inadequacies, perform nutrition research, promote public health and specifically nutritional well-being, information on the nutrient composition of foods is required. Food scientists play a pivotal role in chemically analysing food for its nutrient content, but this information has to be organised and compiled into user-friendly food composition databases for use by nutrition scientists, health professionals, the food industry and the general public. Food composition activities at the Nutritional Intervention Research Unit (NIRU) of the South African Medical Research Council (SAMRC) started in the 1980s. An in-house food composition database, which could be used for the analysis of dietary intake data, was required and the interest by dieticians and the universities teaching nutrition increased in such a way that the first edition of the tables was published in 1981 (Gouws & Langenhoven, 1981). Today the products, books and a dietary analysis software programme, generated from the South African Food Data System (SAFOODS), are regarded as the nutrition research tools for the country. NIRU at the SAMRC is the organisation from where food composition activities are managed, co-ordinated and driven in South Africa. Other role-players, e.g. the universities, research organisations and the food industry are all increasingly becoming involved in food composition activities in order to develop a country-specific food composition database for South Africa. The aim of this short communication is to share information on the food composition activities in South Africa and to illustrate how the researchers responsible for SAFOODS adopted the *Bangkok Declaration* formulated at the 8th International Food Data Conference (IFDC), Thailand 2009, as a motivation and guideline for their food composition activities (Bangkok Declaration, 2009).

2. The *Bangkok Declaration*

At the 8th IFDC in Thailand, 2009, the *Bangkok Declaration* was formulated and adopted by the conference participants (Bangkok Declaration, 2009). The key issues identified by the *Bangkok Declaration* were: (1) the importance of food composition for nutrition, food quality and safety; (2) the continued need for quality food composition data; (3) promoting the science of nutrition; (4) undertaking advocacy in policy and programme development; (5) integration of food composition principles in relevant activities; and (6) supporting the continued development, maintenance and updating of food composition databases.

3. The South African Food Data System (SAFOODS)

The vision with SAFOODS is to build a comprehensive food composition database to improve nutrition in South Africa. The specific objectives are: (1) to compile country-specific food composition data for South Africa; (2) increase the number of foods with country-specific nutrient information; (3) collaborate with food composition data generators, nationally and internationally; (4)

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encourage the food industry to become involved in the generation of food composition data; (5) educate the users of food composition data on the correct use of food composition data; (6) encourage the laboratories to practice good quality control of the analytical nutrient data generated.

4. Food composition activities

4.1. Generation of food composition data

One of the specific objectives of those responsible for SAFOODS is to increase the number of foods, with South African analysed nutrient data, in the food composition database. Presently, the generation of nutrient composition data of foods is not nationally funded and the costs involved in the chemical analysis of food are high. Specific strategies therefore have to be pursued to involve different role-players in the generation of country-specific food composition data.

In South Africa there are a few researchers at research councils and universities, who are involved in the chemical analysis of South African foods for nutrient content and who publish their data in international peer reviewed food composition journals (Hoffman, Kritzinger, & Ferreira, 2005; Schönfeldt, Naudé, & Boshoff, 2010; Schönfeldt, van Heerden, Sainsbury, & Gibson, 2011). The contribution of these groups to increasing the number of South African analysed foods for nutrient content is of significant importance for compiling a country-specific food composition database.

Another strategic approach to increase the number of South African analysed foods in SAFOODS is to liaise with the food industry to obtain nutrient data on the foods, chemically analysed by them for labelling purposes. This approach involves continuous liaison with the food industry to obtain their co-operation in generating information on the nutrient composition of foods. The food industry can play a significant role in generating information on the nutrient composition of foods provided that the correct sampling and analytical procedures are followed for the food products to be analysed. It is therefore essential that food composition database compilers and the food industry become partners in generating country-specific food composition data for South Africa. Access to the original nutrient composition data, supplied by the analytical food laboratories to the food suppliers, is requested instead of the summarised data prepared for labelling purposes. A collaboration agreement is signed with the food industry if they are willing to share their data for compilation purposes and for inclusion in SAFOODS and its products, e.g. printed tables and in the database of a dietary analysis software programme. Continued follow-up and liaising with the food industry are required to ensure collaboration and participation. Presently the Cereals and Cereal products, Baby Foods and Special Dietary Products food groups are in the process of being updated and the main companies supplying these products have been approached in 2011 to contribute nutrient information to SAFOODS.

4.2. Generating yield factors for South African dishes

In the recently published Condensed Food Composition Tables for South Africa, recipe calculations account for the nutrient information of 28.5% of food items, South African analysed data accounts for 36.9% of food items whilst 34.6% of the data are borrowed from the United States, United Kingdom and others (Wolmarans, Danster, Dalton, Rossouw, & Schönfeldt, 2010). Previously recipe calculations were mainly based on using cooked food items as recipe ingredients. In future it is envisaged to adopt some of the EuroFir models for the calculation of the nutrient composition of recipe-based food items that will be included in SAFOODS (Reinivuo & Laitinen, 2007). In these recipe calculation models, raw ingredients are used together with the application of yield and retention factors, to compensate for moisture and nutrient losses/gains as a result of the processing of the product and this provides a more accurate account of the nutrients. Internationally, tables are available providing valuable information on the yield and retention factors of food (Matthews & Garrison, 1975; USDA, 2007). It is, however, sometimes difficult to find a relevant yield factor for country-specific recipes. A national guidelines document is currently being compiled for generating yield factors for typical South African dishes. The idea is to collaborate with other organisations, e.g. the Agricultural Research Council and universities to generate yield factors for South African dishes which cannot be borrowed from the yield factor tables produced by other countries. The first draft guidelines were piloted in 2011, in collaboration with fourth year students from the Consumer Science Department at the University of Pretoria, South Africa. Record sheets were developed for recording the mass of single ingredient foods and foods with varying shapes for edible and inedible parts, before and after processing. Twenty-eight students were tasked to generate yield factors for baked products, e.g. cakes, breads, tarts, desserts and cookies. The students triple tested each recipe and the mean yield factor (%) was calculated by dividing the cooked mass of the recipe by the total raw ingredient mass, expressed as a percentage. Preliminary results from the pilot study were reported as a poster at the 9th IFDC, 2011, and will serve as a directive for refining the draft guideline document for the generation of yield factors for South Africa (Chetty, Wolmarans, & Du Rand, 2011).

4.3. Promoting the scientific use of food composition data

Food composition data are often used by nutrition and health professionals without a proper understanding of the scientific foundation on which this information is based. It is vital that the user should understand that not all the data in food composition databases are based on the chemical analysis of food, but that different strategies have to be applied to compile a comprehensive food composition database for a country. In addition, it is important that the user should understand the limitations of food composition data when they apply it in research projects or when it is used in the nutritional treatment of patients. One of the strategies to promote the science of food composition in the country was to publish two peer reviewed food composition related articles in the South African Journal of Clinical Nutrition. This peer reviewed journal is the official journal of the Nutrition and Dietetic Societies of South Africa and widely distributed to members ($n = 1629$) of these societies (Wolmarans & Danster, 2008; Wolmarans, Kunneke, & Laubscher, 2009).

In May 2010 the first ever comprehensive SAFOODS website (http://safoods.mrc.ac.za) was introduced in South Africa with the aim of promoting the scientific knowledge regarding food composition data and the correct application of these data in the country. The contents of the website are mainly aimed at nutritional professionals, but the information is also of value to the general public. The intention with the website is twofold: (1) to have a website where South Africans could have access to information on the nutrient composition of foods, and (2) to encourage a scientific approach to the generation of high quality data on the nutrient content of food. The latter is especially important within the South African context as the first draft labelling legislation for food came into effect in March 2011 and the food industry is allowed to make use of food composition data from SAFOODS for labelling purposes under certain conditions, e.g. labelling of single ingredient agricultural commodities (e.g. individual fresh fruit and vegetables,

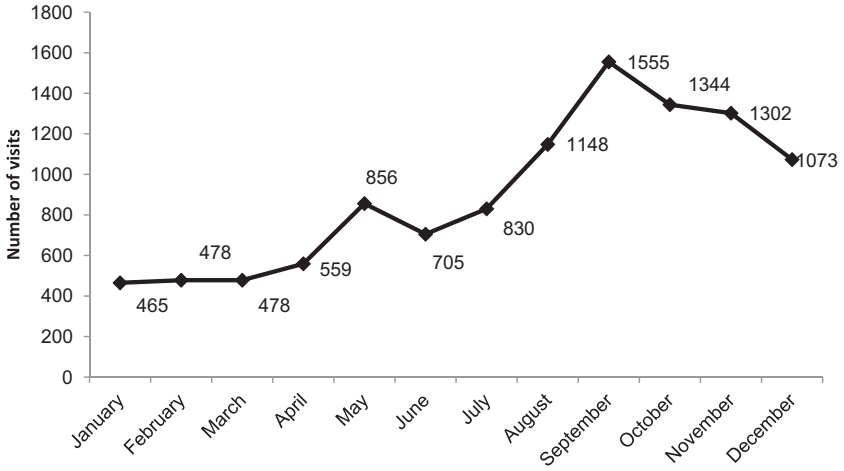

Fig. 1. Visits to specific SAFOODS website pages, January–December 2011.

unprocessed meat). The website contains guidelines for proper sampling procedures, information on the correct choice of methods for nutrient analysis and links to South African analytical food laboratories. A link to the INFOODS website is also available, with access to the publication and relevant sampling chapter in the book of Greenfield and Southgate (2003), providing detailed information regarding the correct sampling of food for nutrient analysis.

Other information available on the website includes: a list of the publications on food composition written by mainly South African scientists; a shortened version of the food composition database, with access to information on energy and macronutrients; information and order forms for products generated from SAFOODS, e.g. the printed food composition tables and the dietary analysis software programme FoodFinder3. A communication platform has been created with the introduction of the website, where clients can contact compilation staff with specific food composition related enquiries.

The visits to the website increased from 465 in January 2011 to more than a thousand since August 2011 (Fig. 1) and the web pages most frequently visited are the ones containing the shortened version of the food composition database, information on the products generated from SAFOODS and information on labelling (Fig. 2).

All of the above are strategies to create a better awareness and understanding in South Africa of the scientific basis on which the nutrient composition of food rests.

4.4. User education

Several activities have been undertaken to educate users on the appropriate use of food composition data. Presentations at national and international congresses were used as vehicles for creating awareness of and promoting food composition activities. Pamphlets, printed food composition tables and demonstrations of the dietary analysis software programme FoodFinder3 formed part of food composition research translation at SAFOODS exhibitions at nutrition and food science related congresses.

Teaching undergraduate and post-graduate students on the correct use of food composition data have been an important strategy undertaken by SAFOODS staff to promote the science of food composition. Dietetic, nutrition and food science students received lectures on the principles of generating food composition data and on how food composition databases are compiled. Important issues that were also addressed were the advantages and limitations of food composition data as well as the correct application of these data.

5. Formation of a national body

The formation of a national representative group, the South African Food Data Advisory Group (SAFDAG) in 2008, was a major step towards bringing together the important role-players from

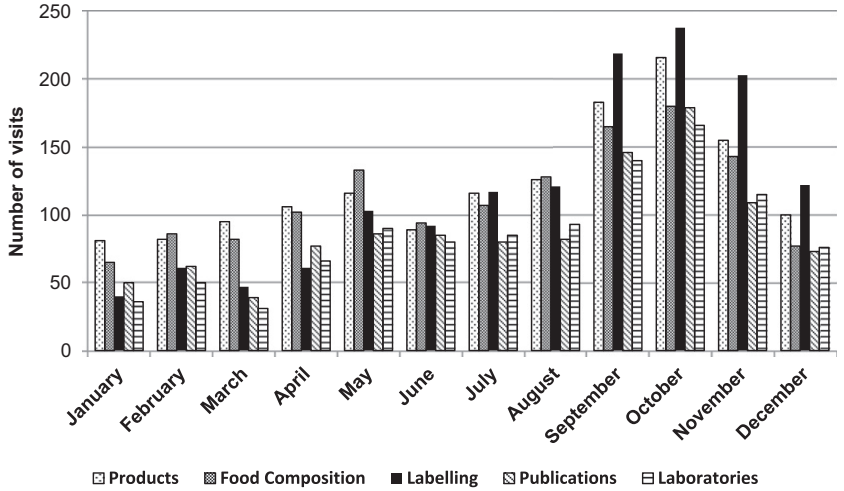

Fig. 2. Total number of visits to the SAFOODS website, 2011.

the National Department of Health (Directorate: Food Control), research organisations, and academia to advance food composition activities in the country. Since 2008, workshops and meetings were held annually to do strategic planning for the generation of information on the nutrient composition of foods consumed in South Africa and to identify user needs. The secretariat of SAFDAG is housed at NIRU, MRC and there are seven working groups, each with a chairperson, representing the different role-players, e.g. universities, research councils and others. Annual activities are planned and in 2011 the main event was a one day symposium on food composition attended by 90 registered participants and 10 speakers. The majority of registered participants were dieticians ($n = 51$) while the other participants consisted of food technologists/scientists ($n = 10$), scientists ($n = 9$), Environmental Health Practitioners ($n = 9$) who monitor food labelling, food laboratory personnel ($n = 7$), medical doctors ($n = 2$), one pharmacist and one administrative person. Topics of the symposium presentations were chosen to inform the participants about SAFOODS activities and food composition in general, but others were specifically aimed at conveying scientific information regarding the generation of food composition data, e.g. analyses of food for glycaemic carbohydrate; the analysis of dietary fibre; methodology for determining total lipids vs total fat; and the applicable methodology for folate and folic acid analysis. Symposium presentations are available on the SAFOODS website (SAFOODS, 2011).

6. Milestones in 2010

In April 2010 the Condensed Food Composition Tables for South Africa (2010) was published. This book includes information from the 1991 MRC Food Composition Tables as well as updated information from the fruit, vegetables, milk and milk products, eggs and meat and meat products food groups (Kruger, Sayed, Langenhoven, & Holing, 1998; Langenhoven, Kruger, Gouws, & Faber, 1991; Sayed, Frans, & Schönfeldt, 1999). Another highlight in the South African food composition arena was the introduction of the SAFOODS website in May 2010.

7. Summary and conclusion

Food composition activities have grown immensely in South Africa since its early start in the 1980s. Many of the activities were aimed at informing and educating the South African nutrition and food industry community about the scientific basis on which the generation of food composition data is based and to encourage the correct use of this information. The generation and compilation of food composition data for South Africa remain a challenge and several strategies have therefore been introduced to increase the number of food items in SAFOODS with country-specific nutrient information.

In conclusion, SAFOODS with the support of SAFDAG met several food composition objectives identified by the Bangkok Declaration (2009) for food composition and in future more will be done to ensure that food composition activities remain sustainable and that the vision of compiling a country-specific food composition database for South Africa is realised.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.foodchem.2012.10.064.

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