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APPENDIX

EURRECA nutritional planning and dietary assessment software tool: NutPlan

M Gurinović[1], A Kadvan[1], L Bucchini[2], C Matthys[3], D Torres[4], R Novaković[1], R Smith[5] and M Glibetić[1]

[1]*Department of Nutrition and Metabolism, Institute for Medical Research, University of Belgrade, Belgrade, Serbia;* [2]*Hylobates Consulting, Rome, Italy;* [3]*ILSI Europe a.i.s.b.l., Brussels, Belgium;* [4]*Biotempo—Biotechnology Consulting Lda., Guimarães, Portugal and* [5]*Minerva PRC Limited, Monxton, Hants, UK*

Background/Objectives: 'NutPlan' is developed within the EURRECA Network of Excellence (EURopean micronutrient RECommendations Aligned (http://www.eurreca.org). It is a user-friendly software programme with multiple functions: individual and group nutrition planning, recipe calculation, creating food labels, diet planning and nutrient intake assessment. This paper describes the newly developed software and its features.
Subjects/Methods: 'NutPlan' contains the following databases: foods, dish recipes, meals, menus, average menus and glossary. These databases enable diet planning and diet analysis by comparing foods, dishes, meals or menus with currently available nutritional recommendations accessible by a link to EURRECA tool Nutri-RecQuest to meet individual/group nutritional needs. The software is upgraded by inserting new items (for example, foods, dishes, meals) and for a connection to other software programmes, thus allowing more advanced calculations to be completed.
Conclusion: 'NutPlan' might be the software of choice for individual and group diet planning. It is aimed particularly at Eastern European and West Balkan countries, which currently lack dietary software. It is envisaged for use by small and medium enterprises in the food industry, as well as by health professionals, researchers and policy makers, and can be recommended for educational purposes. Given its characteristics of being upgraded to include new country-specific food data/database, it can be recognized as an important tool in nutritional capacity development in the Central Eastern European and other regions.
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Keywords: nutrition software; EURRECA; micronutrient recommendations; capacity development; NutPlan

Introduction

Planning nutritious menus for individuals and groups is a complex task that researchers have tried to computerize since the early 1960s (Eckstein, 1967), and a number of applications have been developed in recent years (Gurinovic and Kadvan, 2007; Nutrition Software Review, 2010). EURRECA nutrition software wiki (http://www.eurrecawiki.org) has been created as an open directory of nutrition software products.

As Eastern European and West Balkan countries seem to lack dietary software (Pavlovic *et al*., 2009), the EURopean micronutrients RECommendations Aligned (EURRECA)—Network of Excellence has endeavoured to develop a multilingual dietary software that unites currently available nutritional recommendations and food composition databases from various countries to result in a comprehensive tool for dietary planning and analysis.

NutPlan is designed to enable the following operations:

(a) Calculation of recipes, meals and menus for individuals or population groups, using available national or other food composition databases. These calculations will include detailed macro and micronutrient content information (with yield and retention factors included) (Bognár, 2002).
(b) Comparison of the nutritive values of foods, dish recipes, meals or menus with various national nutrient recommendations, using EURRECA Nutri-RecQuest (Cavelaars *et al*., 2010).
(c) Monitor and assess food and nutrient intake for individuals and/or population groups (under development).

Correspondence: Dr M Gurinović, Department of Nutrition and Metabolism, Institute for Medical Research, University of Belgrade, Tadeuša Košćuška 1, Belgrade 11000, Serbia.
E-mail: mirjana.gurinovic@gmail.com

(d) Create food labels and claims using the available national or other food composition databases; facilitate the development of new products or services (under development).

Target users of the newly developed tool are dietitians, food producers, nutritionists, health professionals and researchers. This software is aimed at planning both individual and group menus (for example, catering departments, hospitals, restaurants, schools, kindergartens).

NutPlan was developed by the Institute for Medical Research, Department of Nutrition and Metabolism, University of Belgrade. The first version of the software design has been ready since the autumn of 2009, with an updated version to be finalized by the end of 2010.

Methods and results

Design

The software is designed in Microsoft Visual Fox as a local application for Microsoft platforms (Windows, XP and Vista). It connects through an open database connection with the internet database to download the EURRECA Current Nutrient Recommendations (Cavelaars *et al.*, 2010). See Figure 1 for an overview of the software design.

NutPlan structure

The main structure is based on interlinked modules. These modules—in the order of importance—are the following: (1) module for foods database (2) calculation modules for dishes, meals, menus; (3) calculation module for average menus; (4) glossary module; and (5) module for data entry.

The *module for foods database (1)* is the backbone of the system. Collated databases (i–vii) and forms are the basis for the calculation modules.

Basically all databases in this software are open, that is, flexible for adding new data, modification or for the deletion of existing data.

The different databases are listed below:

(i) Food composition databases.
(ii) Nutrient recommendations databases (for example, Nutri-RecQuest).
(iii) Retention factors for every micronutrient depending on the cooking method at the food group level.
(iv) Dish, meal and menu groups.
(v) Cooking processes for creating recipes, meals and menus.
(vi) Special conditions (person or group with planned diets, specific age groups, pregnant women, others).
(vii) List of micronutrients and nutrients.

The current food composition database (i) includes 1100 food items from the Balkan region, with the nutrient composition of these foods for up to 46 nutrients (Figure 2).

Every food item has basic components (total energy, fatty acids, macro and micronutrients) and includes other descriptors, such as food name, original (brand) food name; food group and subgroup; unit; origin (vegetable or animal); bar code; country of origin; producer; additional remarks; a labelling section for printing labels with product name, code and description for internal use.

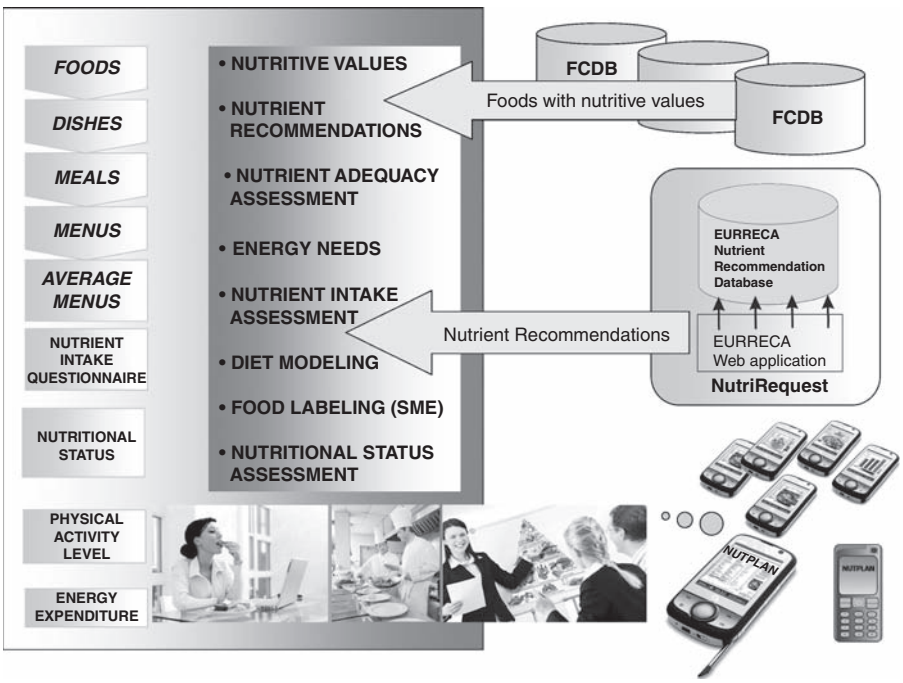

Figure 1 Main design of the EURRECA Nutrition software tool.

Figure 2 Screen prints of modules for foods, dish recipes and menus.

The second module is the *calculation of dishes, meals and menus module (2)*. The aim of this module is to calculate the nutrient composition of different dishes, meals and menus. The possibilities of the different submodules are listed below:

(a) The dish option allows the calculation of the composition by combining single food products and includes details of the cooking process, retention and yield factors.
(b) The meal option allows the calculation of the composition by combining single food products and dishes.
(c) The menu option allows the calculation of the composition by combining meals, dishes or single foods. This submodule can be used for nutrition planning on a daily basis.

Each new dish, meal and menu can be stored in the dish, meal and menu groups database (see above iv) and the programme offers the following lists to report:

(1) Nutritive value of the calculated dish, meal, menu, average menu.
(2) The list of all ingredients with amount and percentage contribution between food groups for macronutrients (energy, protein, fat and carbohydrates).
(3) Food label calculation per food item/dish/meal/menu.
(4) The nutrient adequacy of planned dishes, meals and menus in correlation to nutrient recommendations.

Other features of the *calculation module* are the possibilities to estimate the average meal and menu and to compare the planned dietary intake with nutritional recommendations.

For comparison with recommendations, Nutplan is linked with Nutri-RecQuest (Cavelaars *et al.*, 2010), which allows the user to contrast the values of every dish, meal or menu with the recommended nutrient values given by various countries and institutions. This provides the liberty to the users to change their diets regarding these foods and manage their nutrition intake much more effectively.

The third module is the *calculation for average menus (3)*. This module allows the calculation of the average nutrition values over an identified period of time in order to achieve a well-balanced nutrition diet on a larger scale. 'Average menu' calculations are created by adding single menus together to create a more complex one that reflects a prolonged diet. Extra features include calculation of the table of micronutrients, distribution of energy and fats, identification of the amount of food required, together with an option to calculate the size of portions for a specified number of persons. The additional option 'Amount of Needed Food' can be used for estimating the quantity of foods required to make an exact amount of the chosen dish.

The fourth module is the *data glossary module (4)*. All settings can be found in the 'Glossary' section of the programme. This section contains few subcategories of different terms and subjects, which need to be defined in order to use them while using all available programme features. Once a specific term is defined, it instantly appears in all the programme's combo-box menus and options.

The last module is the *data entry module (5)*. Two types of data entry could be distinguished.

The first data entry option is related to food items. New food items and their composition and descriptors can be added. The new food items will be integrated in the food composition database (first database) of the glossary module (fourth module).

The second data entry option allows to code dietary intake data. The dietary entry module is closely linked with the calculation module that allows the assessment of nutritional intake for individuals or groups. Different entry modules enable various nutritional assessment methods to be used and open up additional possibilities.

Discussion

'NutPlan' is developed within the EURRECA Network of Excellence. However, it is aimed to become a sustainable tool outside this network by, for example, harmonization with EuroFIR food composition databases (http://www.eurofir.net), Nutri-RecQuest database (Cavelaars *et al.*, 2010) and other applications.

The World Health Organization Second European Action Plan for Food and Nutrition Policy, 2007–2012 claims that combating micronutrient deficiency is one of its major objectives, together with the promotion of healthy nutrition, food labelling and nutrient intake monitoring and evaluation. This software can become an important tool in developing nutritional capacity in Central and Eastern Europe, as well as in other regions, to help these countries address the identified key nutritional issues.

Outside of the Central Eastern European region, NutPlan can be adapted into different languages to support the implementation of national action plans, nutritional assessment and monitoring of trends. In addition, if a food price category is applied, this tool can be used for planning the low-cost healthy diets of vulnerable low-income groups.

NutPlan allows to choose between different food composition databases. The current version uses food database, but it can be linked to other country-specific food databases and gives the food database features in the language of the specified country. At present, it is tested by a EURRECA partner from Portugal and will be further evaluated by others, including research institutions from the UNU/SCN Network for Capacity Development in Nutrition in Central and Eastern Europe (http://www.srbnutrition.info/?page = Network).

In the near future, NutPlan will be upgraded to include nutrient intake methods such as 24 h recall, food frequency questionnaire and food record aimed for analysis of the nutritional status.

If a legislative proposal for mandatory nutrition labelling is approved, as foreseen in the European Commission's proposed regulation on the provision of food information to consumers (European Commission, 2008), this tool will also help food companies, particularly those that are small and medium enterprises and/or are located in Eastern Europe, to develop and produce food labels.

In this context, and in line with EURRECA's aims, the inclusion of micronutrients in food labels will provide more information to consumers on vitamins and minerals, allowing them to make more informed choices.

Conclusion

The first version of the software design is finalized and the updated form will be available by the end of 2010. The nutritional research institutions and private companies that are experienced in using nutritional software are already involved in testing 'NutPlan' to generate customized versions with more featured options.

'NutPlan' stands out among the nutritional software programmes currently available, as it is flexible for editing and can incorporate existing harmonized food composition databases ensuring more complex applications that are able to respond to evolving demands for nutritional information and regulation. This software is an important tool in nutritional capacity development for the national action plans in the Central Eastern European and in other regions, which facilitate the use of micronutrient recommendations.

Conflict of interest

L Bucchini has received consulting fees and has equity/stock ownership in Hylobates Consulting, has received grant support from EURRECA and an EC funded grant. He has also consulted for small/medium companies in the food supplement sector. The remaining authors have declared no financial interests.

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References

Bognár A (2002). Tables on weight yield of food and retention factors of food constituents for the calculation of nutrient composition of cooked foods (dishes) Bundesforschungsanstalt für Ernährung, Karlsruhe.

Cavelaars AEJM, Kadvan A, Doets EL, Tepšić J, Novaković R, Dhonukshe-Rutten R *et al.* (2010). Nutri-RecQuest: a web-based search engine on current micronutrient recommendations. *Eur J Clin Nutr* **64**(Suppl 2): S43–S47

Eckstein EF. (1967). Menu planning by computer: the random approach. *J Am Diet Assoc* **51**, 529–533.

European Commission (2008). *Proposal for a Regulation of the European Parliament and of the Council on the Provision of Food Information to Consumers*. European Commission: Brussels.

European Food Information Resource Network (EuroFIR). http://www.eurofir.net (accessed 11 January 2010).

European Micronutrient Recommendations Aligned (EURRECA). http://www.eurreca.org (accessed 11 January 2010).

European Micronutrient Recommendations Aligned Wiki (EURRECA Wiki). http://www.eurrecawiki.org (accessed 11 January 2010).

Gurinovic M, Kadvan A (2007). 'Nutrition plan'-NUTPLAN, Software for planning individual and collective nutrition with nutrition recommendations, 1996 and new versions in 2005, 2007 (Copyright No. 426, A-171/02 CIP 613.2.001.681.31 and ISBN 86-901825-1-9).

Nutrition Software Review. http://nutrition-software-review.toptenreviews.com/ (accessed 7 January 2010).

Pavlovic M, Pepping F, Michal D, Biro L, Szabolcs P, Dimitrovska Z *et al*. (2009). Turning Dilemmas into opportunities: a UNU/SCN Capacity Development Network in Public Nutrition in Central and Eastern Europe. *Public Health Nutr* **12**, 1046–1051.

Second WHO European Action Plan for Food and Nutrition Policy (2007–2012). Copenhagen, WHO Regional Office for Europe, 2007 (EUR/RC57/10. http://www.euro.who.int/Document/E91153.pdf, accessed 6 November 2009).

United Nations University/UN System Standing Committee on Nutrition, Network for Capacity Development in Nutrition in Central and Eastern Europe (NCDN-CEE). http://www.srbnutrition.info/?page=Network and http://typo3.gak.hu/index.php?id=76 (accessed 11 January 2010).