

## Chapter 30

# Nutritional Monitoring and Advising Information System for Healthcare Support

**Vitor Basto Fernandes**

*IPLeiria – Instituto Politécnico de Leiria, Portugal*

**João Varajão**

*Universidade de Trás-os-Montes e Alto Douro, Portugal*

### ABSTRACT

*In the last decade, developed and developing countries have unsuccessfully been fighting the so called new world syndrome or the epidemic of 21st century. Nutritional misbehaviors in so called developed countries are causing significant social and economic damages, reflected in considerable growth of chronic diseases, morbidity and death. The phenomenon has been traditionally felt in aged populations, but a significant increase has also been detected more recently in young populations. This chapter presents a proposal to tackle these serious problems related to nutrition by the means of information and communication technology tools. NutriMe is presented as a new nutritional monitoring and advising system to help individuals to monitor and correct their behaviors. NutriMe is also proposed as the main component for a public national observatory on nutritional profiles for public health and medical analysis purposes.*

### INTRODUCTION

Several economical, social and cultural factors that took place in the last decades in developed countries have strongly influenced human diseases profiles. Among those factors, globalization and urban prevalent lifestyles are worth to mention. One of the reflexes turning out from those changes is related to nutritional (mis)behaviors (Lopes et al., 2006).

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Although other reflexes are also subject of research (e.g. smoking, pollution, etc.), nutrition is referred as one of the most important factors.

The extent of many harmful reflexes (e.g. morbidity and mortality) caused by incorrect nutritional behaviors on health, have been estimated in several studies. World Health Organization (WHO) reports that 80% of cardiovascular disease cases, 90% of diabetes mellitus type 2 and 33% of all types of cancer could have been prevented by adopting healthier lifestyles, which includes correct nutri-

tion, regular physical activity and non-smoking (WHO, 2006a, 2006b). WHO also states that: “A change in dietary habits, physical activity and tobacco control, have a major impact in reducing the rates of these chronic diseases, often in a relatively short time”. The wide and general statements and recommendation issued by WHO are also supported by several scientific specific and detailed studies, like in (Silva, 2008; Wadden et al., 2005).

The outcome of several years of research about nutritional reflexes on health/diseases, lead to a present common sense assumption that proper nutritional monitoring and advise is need, must be continuous, rigorous and customized for each individual, according to biological, medical and life style parameters (Lopes et al., 2006). The high rate of death caused by circulatory system disorders and the significant negative reflexes this type of disorders have in people’s daily regular life, made the treatment and specially prevention of them one of the national health care systems highest priority and most challenging tasks (Oliveira, 2008).

As prevalent modern nutritional misbehaviors and sedentary lifestyles become common in developed countries, there is a clear need for individual nutritional control in order to prevent the growth trend of nutritional caused diseases.

In this context, nutritional control aims the pervasive gathering and monitoring of individuals food intake, data management, health reflexes assessment, alarming and reporting for the sake of individual health care promotion and protection. The results on people’s health from such a system would be certainly very positive.

Nutritional monitoring and advising is not only important in an individual point of view for individual behaviors correction, but also in a global point of view, essential for global policy definitions and for nutritional education planning.

Although there are several computer based systems proposed for individual diets control, they typically require manual data entry and suffer from

low user acceptance and participation. Computer systems requiring excessive participation and interaction in daily routines are not suitable for general acceptance and become more intrusive than user friendly. On the other hand, the mentioned proposed systems target is the individual scope, they lack important features related to overall population monitoring and evaluation like general trends and group clustering and health care profiling.

A computer based system tackling ubiquitous nutritional information gathering and making it available for individual and global analysis purposes would be highly advantageous when compared to known current systems. Some relevant features developed for such a new system would be: in an individual point of view, warning of misbehaviors and customized correction advising; in a national/global point of view, nutritional policy definitions, education planning and nutritional caused diseases tracking.

In this chapter we propose an architecture and a functional solution for an information system designed to tackle the presented issues: the NutriMe system, which intends to promote healthy nutritional behaviors by the means of ubiquitous nutritional monitoring in an individual and population basis (reporting individual and population nutritional warnings). In addition, it is intended to provide detailed individual nutritional advising (suggesting detailed meals according to nutritional principles and user preferences), global behavior synthesis, risk evaluation and classification using data mining techniques. Individual and public interest (e.g. health, economic) of this kind of systems are worth to mention. They constituted our first interest and justified work and research on this topic.

NutriMe new differentiating features are related to the strategies, technologies and mechanisms for collecting data, distributed data processing, distributed and cooperative knowledge extraction based on information systems integration principles, involving end users, food suppliers,

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