

# The DAFNE initiative: the methodology for assessing dietary patterns across Europe using household budget survey data

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## Abstract

*Objective:* The DATA Food NETWORKING (DAFNE) initiative was conceived in the 1980s and aims at using data already collected in the context of household budget surveys (HBSs) for the assessment of dietary patterns across Europe.

*Design:* HBSs are country-representative surveys conducted, with similar methodology, at regular time intervals by the National Statistical Offices of almost all European countries. DAFNE focuses at the designation of comparable, between European countries, categories of food and socio-demographic data, and the estimation of daily per capita food availability. With food and socio-demographic data classified into common categories, comparisons of food habits between European countries become possible.

*Setting:* Fifteen European countries with one or more HBS all undertaken during the period 1981–1999.

*Subjects:* Representative population samples in 15 European countries.

*Results:* DAFNE HBS data are comparable and allow a wide range of dietary analyses. Preliminary data document differences in food habits among European countries and provide insights into the socio-demographic determinants of food preferences.

*Conclusion:* The DAFNE databank, if properly expanded and exploited, could become a valuable tool for national food and nutrition policy planning across Europe and for the identification of groups at higher risk for developing nutrition-related conditions.

**Keywords**  
Household budget surveys  
Diet  
Dietary patterns  
Survey

## Advantages of household budget surveys

Sources of data on food availability or intake range from food balance sheets (FBSs) assembled by the Food and Agriculture Organisation (FAO) to the specifically designed food consumption surveys and nutritional epidemiological investigations<sup>1,2</sup>. Data from these sources can be useful for specific purposes and their collation and editing in a single database could be a valuable undertaking. Use of information from different sources, however, each possessing its own validity attributes and methodological characteristics, raises issues of comparability that are difficult to address. The problem is complicated when explanatory factors for food intake variability are not defined with standard criteria, when expected nutritional variation by time or place is of the same order of magnitude as the presumed systematic error, or when representability is questionable or plainly absent<sup>3,4</sup>.

Household budget surveys (HBSs) collect food availability data at the household level and occupy a position

between the FBS and the specifically designed individual-based food consumption survey. HBSs are country-representative surveys, conducted at regular time intervals by the National Statistical Offices of almost all European countries<sup>5</sup>. Although they aim mainly at the estimation of price indices, HBSs also represent a unique source of dietary data and can form the basis for a database with several useful characteristics, notably: (1) international scope; (2) reliance on data collected with a similar baseline methodology that facilitates eventual comparability; (3) representability of the underlying population; (4) linkage to explanatory demographic and socio-economic factors; (5) study size large enough to generate precise estimates for inherently complex patterns; (6) regular updating; and (7) last, and clearly not least, affordability<sup>3,4,6</sup>.

## The DAFNE initiative

The use of HBS data for the assessment of nutritional information was conceived in the 1980s<sup>7,8</sup> and was granted financial support by the European Commission

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through the 'Cooperation in Science and Technology with Central and Eastern European Countries' programme, the COST 99 programme on Food Consumption and Composition Data (DAFNE I project), the 'Agriculture and Agro-Industry, including Fisheries' programme (DAFNE II project), the 'Agriculture and Fisheries – FAIR' programme (Tasks 1–3 of the FAIR-3096 project) and the Health Monitoring Programme of DG-SANCO (DAFNE III project). DAFNE is the acronym for DATA Food NETWORKing, and refers to the effort for the development of a European food databank based on HBSs. In the context of the DAFNE projects, raw data from HBSs conducted *circa* 1990 were utilised. These data use the household as the statistical unit. Fifteen European countries – namely Belgium, Croatia, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Malta, Norway, Poland, Portugal, Spain and the United Kingdom – have contributed to the DAFNE initiative. The initial objective of the DAFNE project was the creation of *comparable* categories of food and socio-demographic information, allowing intra- and inter-country comparisons of nutritional habits and identification of the socio-demographic variables that affect them<sup>3,4,9</sup>.

The feasibility studies undertaken in the context of the DAFNE project demonstrated that the prospect of using HBSs for the assessment of dietary information is realistic and the potential considerable, assuming political will, administrative support and a minimal adjustment in infrastructure<sup>3,4</sup>.

## Methodology

For selection of the most appropriate way of utilising food, socio-economic and demographic data from the HBSs, country-specific methods of HBS data collection and processing were studied and variables of interest were chosen from the HBS datasets. The efforts were subsequently directed towards the designation of comparable categories of socio-demographic variables and the development of a DAFNE food classification system<sup>3,4</sup>. This stepwise procedure (Figs 1 and 2), aiming at the estimation of per capita food availability, is briefly overviewed in the following paragraphs.

### *Study of the HBS data collection methodology*

In the context of the DAFNE initiative, HBS data from the 15 European countries indicated above were used. Samples in all cases were country-representative. In order to capture seasonal variability, sample collection was distributed evenly throughout the year. All countries collected socio-demographic data on the households, as well as data on the quantities and/or the monetary values of purchased food items. Whenever food purchases were recorded only in monetary values, the use of retail prices per unit weight was used for the conversion of values to

quantities. Details on the methodology of HBS data collection are given in other publications<sup>3,4</sup>.

### *Establishment of comparability of socio-demographic data among countries*

Although several socio-demographic characteristics are recorded in the HBS and many of them were included in the final roster of variables to be studied (Fig. 1), it was decided to initially focus on locality (degree of urbanisation of the area where the household was situated), education and occupation of household head, as well as on household composition. These variables were used for characterisation of the socio-economic status of the household.

#### *Locality*

Three categories of locality were formed on the basis of data collected in most HBSs: urban, semi-urban and rural. Various criteria were used in the different countries (from the number of inhabitants to the prevailing occupation (agricultural versus industrial) to the number of electors) and they were all applied in an attempt to depict population density and lifestyle pattern. Two exceptions were made, based on the available HBS data: in Ireland, households were defined as either urban or rural (that is, without the semi-urban category), while in Luxembourg it was not possible to use the traditional trichotomy. Although questions have been raised as to whether the three locality categories actually reflect different living conditions in the participating countries, it has been generally agreed upon that these categories correspond, more or less, to differences in access to facilities such as supermarkets as well as to health information messages.

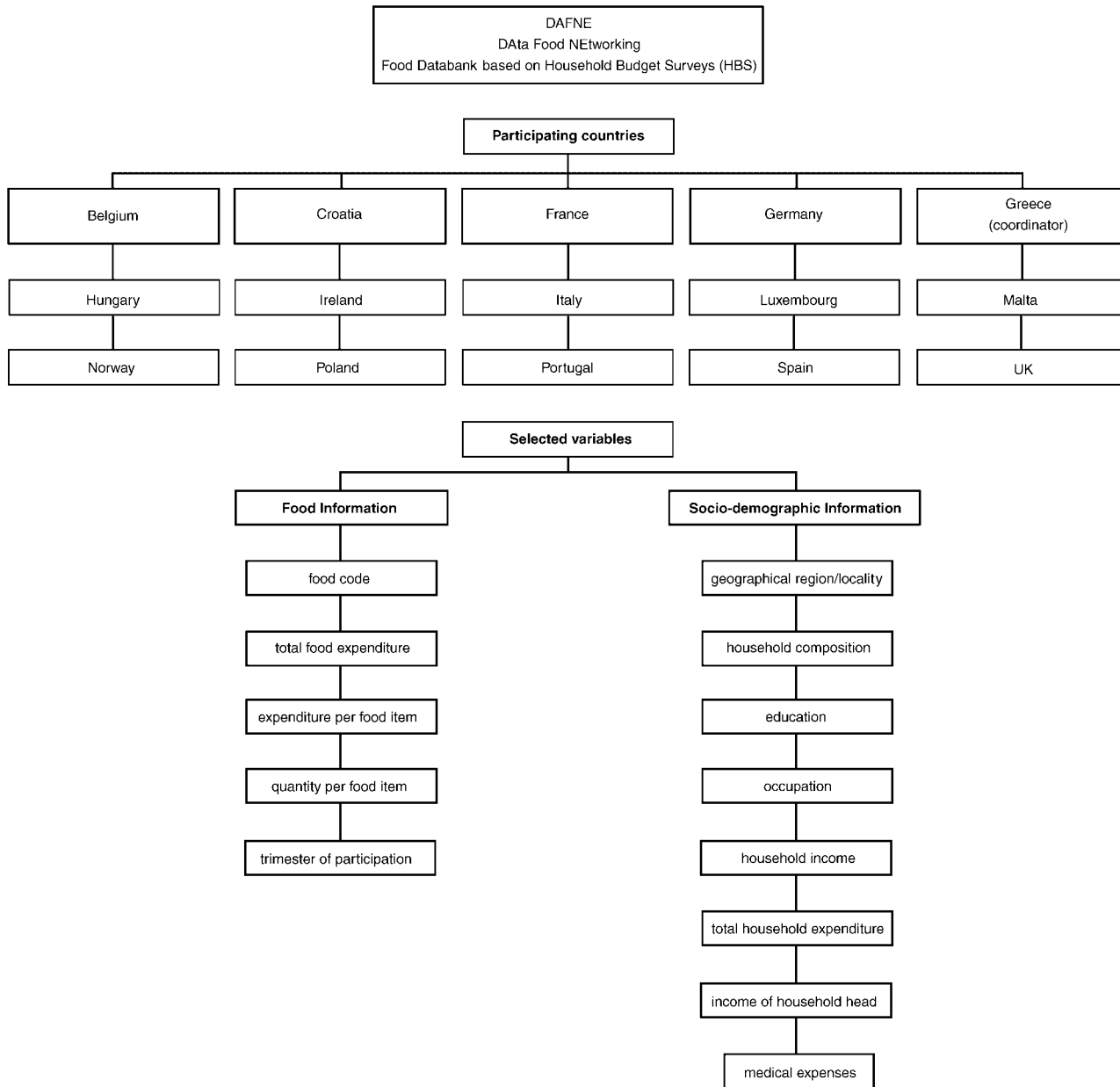
#### *Education of household head*

Concerning education, Germany, Ireland and the UK do not routinely collect such data in the context of their HBSs. With respect to the remaining countries, although differences in their educational systems do exist, their data on education level of household head could be classified under five comparable categories: (1) illiterate/elementary education not completed, (2) elementary education completed, (3) secondary education not completed, (4) secondary education completed and (5) college/university education.

#### *Occupation of household head*

In the context of the DAFNE initiative, several efforts have been made – and are still ongoing – to harmonise HBS data on occupation. Occupation reflects a number of characteristics including education, income and physical activity. If properly harmonised, it can provide a suitable basis for comparison of dietary practices.

In a DAFNE workshop held specifically in order to deal with the issue of occupation, it became apparent that schemes used for the classification by occupation were

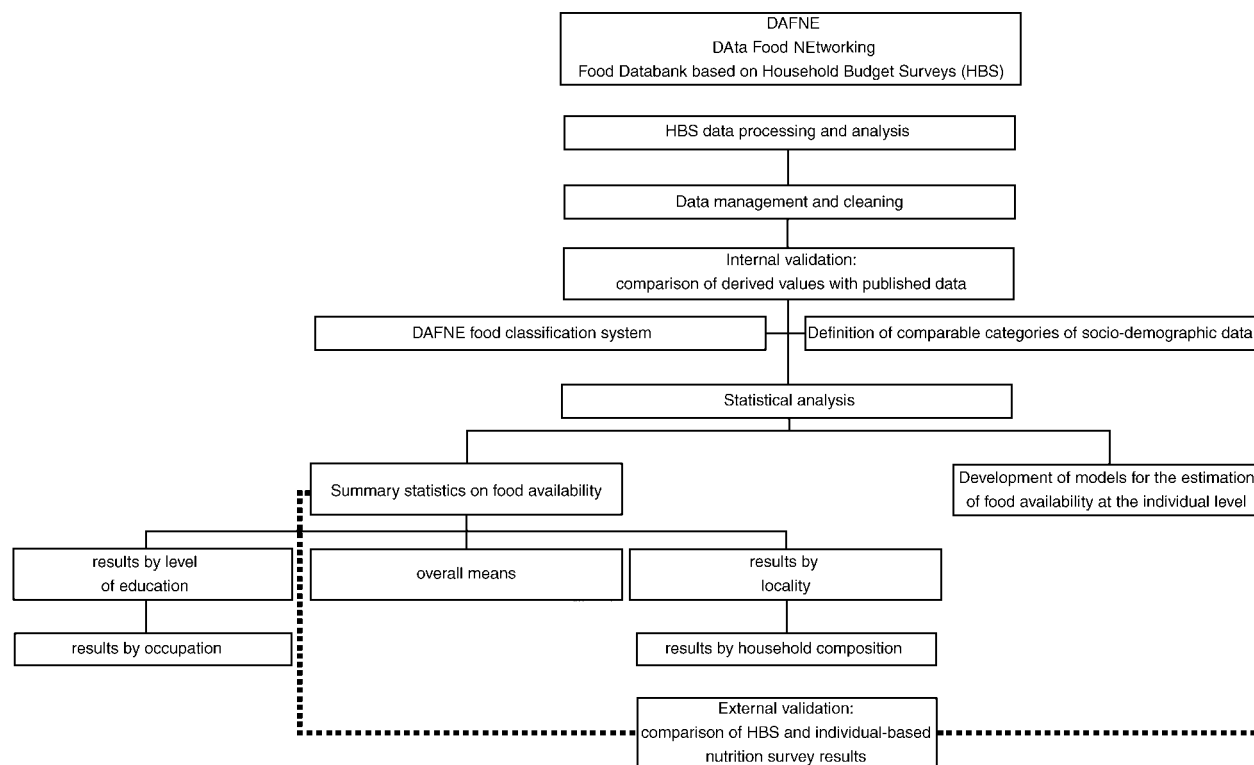


**Fig. 1** List of countries that provided national HBS data in the context of the DAFNE I and II projects, and variables selected to be studied

not adequately reflecting comparable characteristics of the different population groups. Some schemes identified population subgroups according to employment status (employee/employer/assistant) without making clear distinctions between the type and level of skill associated with particular occupations. Other schemes focused on training or social status. It was suggested that the scheme to be adopted by DAFNE should be based on five principles likely to influence food choice. These were, in descending order of likely influence: type and level of skills, education, status, culture and income. The final scheme included 10 major occupation groups, as defined by the International Labour Office. However, the scheme proved to be impractical when attempts were made to

transform data per household to data per person using complex statistical modelling.

A much simpler scheme is currently being tested. According to this, occupation is classified into four major categories: (1) manual, (2) non-manual, (3) retired and (4) not working, including students, housewives, unemployed and invalid persons. The last composite category obviously presents several problems, as it comprises individuals with different activity levels and varying incomes. Ways of disaggregating it are still being considered. Regarding retired persons, it has been suggested that they should be divided into retired – previously manual and retired – previously non-manual.



**Fig. 2** The HBS data processing and analysis in the context of the DAFNE initiative

### *Household composition*

Although not frequently considered in dietary analyses, household composition can have a substantial influence on nutritional choices and practices. With children defined as being up to 17 years old, adults being between 18 and 64 years of age and individuals more than 65 years old considered as elderly, and with an intended distinction between single and other households, eight categories were formed: (1) single adult households, (2) households of two adult residents, (3) households of one adult resident and children (single parent), (4) households of two adult residents and children, (5) households of adult and elderly residents, (6) households of children, adult and elderly residents, (7) single elderly households and (8) households of two elderly residents. Since both the size and the age structure of the households are likely to affect food choices, this classification of household composition should be used in conjunction with the number of household members.

### **The DAFNE food classification system**

The development of a food classification system that would allow international comparisons of dietary patterns was the very essence of the DAFNE initiative and a central element in the development of an HBS-based European food databank<sup>3,4</sup>.

Several issues had to be considered. The most prominent among them referred to the fact that the

level of detail in which HBS food data are recorded varies among countries, ranging from very detailed records to more aggregated ones. In the Belgian HBS, for instance, bread is classified under 17 different codes, while in the Greek HBS there is only one such code. With food data recorded at various detail levels, it became necessary to aggregate food items to the lowest (i.e. less detailed) level of information. In those cases, however, in which more than one food item was recorded under one food code and the national representatives were in a position to define the proportional contribution of each food item in the code, the codes were correspondingly split. Such information had to be derived from other sources, such as the industry, market shares and national dietary surveys.

On the other hand, to allow aggregation of subgroups or specific food items into major food groups, conversion factors had to be employed. For instance, to estimate overall milk availability, condensed milk and milk powder had to be multiplied by 2.2 and 8, respectively, in order to be transformed into fresh milk equivalents. These equivalents could then be added to fresh milk. Similarly, density factors were used to transform mass to volume whenever grams (as in vegetable fats) had to be added to millilitres (as in vegetable oils), in order to estimate overall availability of a major food group (as in lipids of vegetable origin).

The end result of this process was the development of the DAFNE food classification system (Table 1), which

**Table 1** The DAFNE food classification system

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CEREALS AND CEREAL PRODUCTS
Bread and rolls
Rice and cereals
Flour
Pasta
Cereal and bakery products (grains, flour and pasta excluded)
MEAT AND MEAT PRODUCTS
RED MEAT
Pork meat (fresh and frozen)
Beef, veal and calf meat (fresh and frozen)
Red meat, other than pork or veal (fresh and frozen)
POULTRY (fresh and frozen)
OFFALS (fresh and frozen)
CANNED MEAT AND MEAT PRODUCTS
MEAT DISHES
FISH AND SEAFOOD
Fish (fresh, frozen and processed)
Seafood
Fish dishes
MILK AND MILK PRODUCTS
Milk
Cheese
Milk products (milk and cheese excluded)
EGGS
TOTAL ADDED LIPIDS
LIPIDS OF ANIMAL ORIGIN
Butter
Animal fat (butter excluded)
LIPIDS OF VEGETABLE ORIGIN
Vegetable fat
Margarine
Vegetable fat (margarine excluded)
Vegetable oils
Olive oil
Other seed oils
POTATOES AND OTHER STARCHY ROOTS
PULSES
VEGETABLES
FRESH VEGETABLES
Green leafy vegetables
Cabbage
Tomatoes
Carrots
Onions and garlic
Other fresh vegetables
PROCESSED VEGETABLES
NUTS
FRUITS
FRESH FRUITS
Apples
Citrus
Bananas
Grapes
Plums
Berries
Apricots and peaches
Cherries and sour cherries
Pears
Other fresh fruits
PROCESSED FRUITS
SUGAR AND SUGAR PRODUCTS
Sugar
Sugar products
NON-ALCOHOLIC BEVERAGES
STIMULANTS
Coffee
Tea and infusions
Cocoa
MINERAL WATER
SOFT DRINKS
ALCOHOLIC BEVERAGES
Wine
Beer
Spirits

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allows the categorisation of food data into 56 detailed subgroups. These subgroups can be aggregated at various levels ending up at 14 main food groups.

Internet access to the comparable between-countries food groups and subgroups, as well as the country-specific food items classified under these subgroups and groups for 10 of the 15 DAFNE countries, can be accomplished through the DafneSoft software program,\* at [www.nut.uoa.gr](http://www.nut.uoa.gr).

### ***Calculation of the average per capita food availability and derivation of availability distributions among consumers***

For each of the DAFNE countries, food availability per household was retrieved and food availability per capita per day was calculated through division of this availability by the product of the referent time period and the mean household size. Whenever necessary, and in order to accommodate the sampling scheme, a weighting factor was incorporated in the formula. The overall average availability per day per person of comparable food items or groups, as well as the average (per day, per person) availability for households belonging to different localities and educational levels, were calculated (Fig. 2). In addition to calculating average availability on the basis of information collected from all households<sup>9</sup>, data from consuming households only were also analysed. Based on the latter data, distribution and cumulative distribution functions of the availability of food items or food groups were estimated<sup>3,4</sup>.

Data on daily per capita food availability – overall, as well as by education of household head and locality – can be downloaded from [www.nut.uoa.gr](http://www.nut.uoa.gr) through DafneSoft. In DafneSoft food availability estimates are presented not only for the comparable between-countries food groups, but also for the detailed food items recorded in each country. For Greece, for which data from two consecutive HBSs were made available early in the project, trends in food availability from 1987 to 1994 can be assessed.

### **Comment**

It has long been recognised that FAO food balance sheet data are a valuable resource for assessing trends of food availability over time, but are less satisfactory when it comes to between and within country comparisons. On the other hand, individual nutrition surveys, apart from being expensive and labour-intensive, are frequently undertaken with different methodologies in different population segments and only in a minority of European countries<sup>1,2</sup>.

Despite their limitations<sup>5,8</sup>, multipurpose Household Budget Surveys provide a valuable resource for the

\*The new version of DafneSoft will include data from the 15 participating countries.

conduct of a wide range of nutritional analyses. They also constitute an affordable alternative to specially designed individual-based nutrition surveys for most Mediterranean and Central/Eastern European countries. HBS data could help highlight issues such as differences in dietary patterns<sup>9–11</sup>, high-risk population groups on account of their nutritional habits<sup>12</sup>, relationships between diet and morbidity/mortality data<sup>13</sup> and dietary intakes of additives and contaminants. Nutritional HBS data could be a valuable tool for many purposes, including nutrition and agricultural planning and marketing strategies.

The ultimate objective of DAFNE is the creation of a pan-European databank based on household budget surveys. The DAFNE collaborators have focused on the formation of *comparable* data with respect to food and socio-demographic information, so as to allow intra- and inter-country comparisons of nutritional habits. DAFNE data firmly document differences in food habits among European countries<sup>9–11</sup>. The disparity has both qualitative and quantitative aspects. Moreover, the distribution patterns of food availability provide insights into the socio-economic determinants of food preferences as conditioned by market forces.

With nutrition being of paramount importance in disease prevention and health promotion, the DAFNE databank, properly expanded and utilised, could also become a valuable tool for the identification of groups at high disease risk and for the rational planning of national food and nutrition policy in Europe.

### Acknowledgements

The DAFNE initiative has been supported by the European Commission, in the context of the 'Cooperation in Science and Technology with Central and Eastern European Countries', the 'Agriculture and Agro-Industry, including Fisheries – AIR', the 'Agriculture and Fisheries – FAIR' and the 'COST Action 99 – Food Consumption and Composition Data' Programmes, and the Health Monitoring Program of DG-SANCO.

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