

## How to find information on national food and nutrient consumption surveys across Europe: systematic literature review and questionnaires to selected country experts are both good strategies

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The present research was conducted within the framework of the EUROpean micronutrient RECommendations Aligned project. In order to identify the best practice in assessing nutrient intakes, a search strategy for collecting data from national food consumption surveys/studies in Europe was developed. Systematic literature searches were carried out on twenty-eight European and the four European Free Trade Association countries. A questionnaire was also sent to two to five experts in each country. Systematic reviews using PubMed yielded 12 703 abstracts that were reduced to 200 studies using inclusion and exclusion criteria. Similarly, a search of ministry web sites yielded 3033 hits, and subsequently reduced to nine surveys. Belgium, France, Germany, Ireland, Sweden, Spain and the United Kingdom were the countries with most data and Slovenia and Liechtenstein were those with the least. Seventy-eight expert questionnaires were obtained from all countries except for Liechtenstein, Luxembourg and Slovakia. Detailed results and references are given. A systematic search and questionnaires are equally good at identifying national surveys across countries. Literature searching provides globally accessible and objective information albeit limited, whereas the questionnaire provides information that, depending upon responders, can be more complete. A combination of both strategies is recommended.

### National nutrition surveys: Search methodology: European projects: Best practice

A specific activity of the EUROpean micronutrient RECommendations Aligned (EURRECA) project is to identify the best practice in assessing nutrient intakes with the objective of harmonising micronutrient recommendations for population groups in Europe. To achieve this end, it is important to find the existing information about those national surveys of dietary intake in as many countries as possible. Most European countries have carried out such surveys. However, the year they were conducted, the population groups included, the age categories considered, the objectives of the survey and the dietary methods used for data collection differ considerably between countries<sup>(1–21)</sup>. There are several

projects presently working on providing comparable inter-country food and nutrient intake data, namely the Data Food Networking project<sup>(10)</sup>, the European Prospective Investigation into Cancer and Nutrition project<sup>(11)</sup>, the European Food Consumption Survey Method project<sup>(12)</sup>, the European Nutrition and Health Report I (2004)<sup>(13)</sup>, the Healthy Lifestyle in Europe by Nutrition in Adolescence project<sup>(14)</sup>, the European Food Consumption Validation project<sup>(15)</sup>, the Europe Alimentation project (Coordination and Evaluation of a European Information Campaign on Diet and Nutrition)<sup>(16)</sup>, the EURODIET project (Nutrition and Diet for Healthy Lifestyles in Europe)<sup>(17)</sup>, the European Food Information

**Abbreviation:** EURRECA, European micronutrient recommendations aligned.

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Resource Network project<sup>(18)</sup>, the EURONUT (European Union's Concerted Action on Nutrition and Health) – Survey in Europe on Nutrition and the Elderly: a Concerted Action project<sup>(19)</sup>, the HECTOR project (Eating out: Habits, Determinants, and Recommendations for Consumers and the European Catering Sector)<sup>(20)</sup>, and the WHO MONICA project (Multinational Monitoring of trends and determinants in Cardiovascular disease)<sup>(21)</sup>.

The purpose of the present paper is to design a search strategy that facilitates the finding of the most representative and recent information regarding dietary data collection and nutrient intake adequacy assessment methods in twenty-eight European countries and the four European Free Trade Association countries, and present an overview of the findings. Food consumption surveys/studies carried out on representative samples of an apparently healthy population represent the first target of this search strategy.

## Methodology

The steps followed to find the information needed and to store and present the results are shown in Fig. 1. Three working directions were used to achieve desired objectives: working in cascade (vertical), in parallel and across (horizontal).

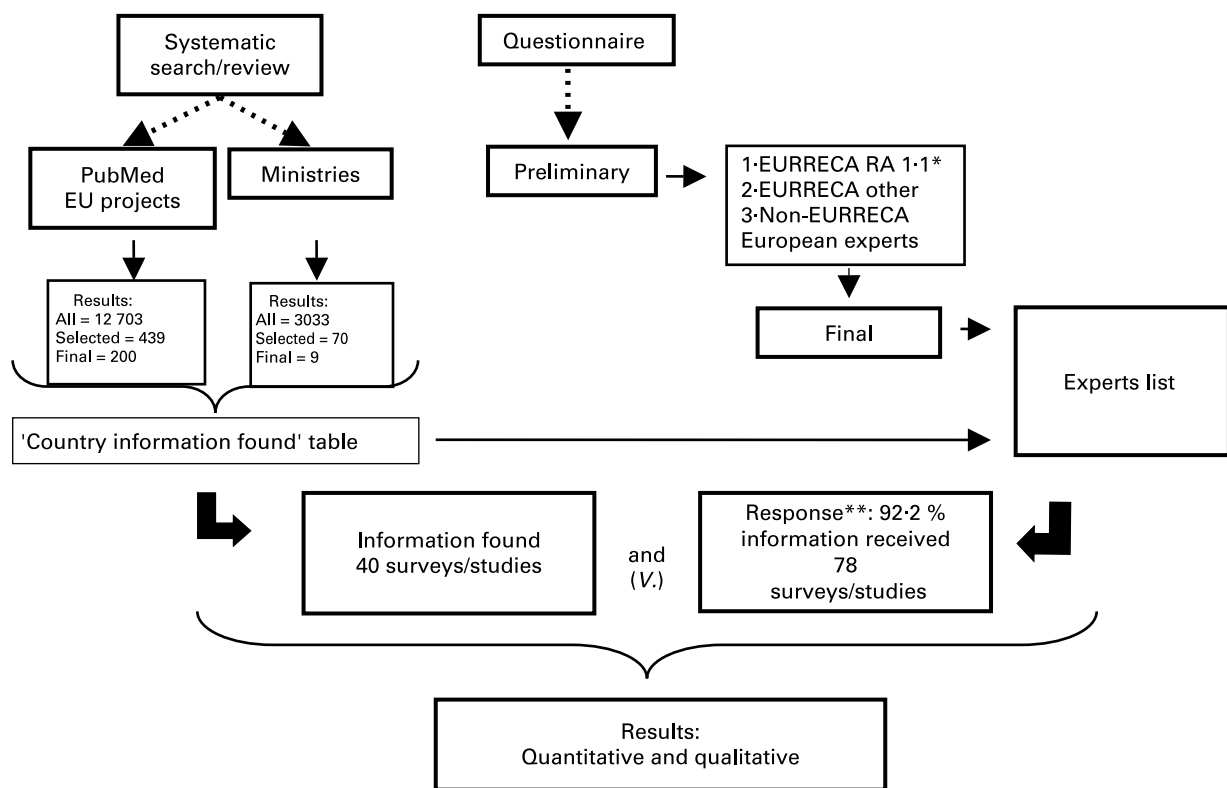
### Search strategy

The search for nutritional surveys and/or related papers on the intakes of nutrients, consumption of foods and/or food groups was carried out for the twenty-eight European

countries (Austria, Belgium, Bulgaria, the Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, The Netherlands, Malta, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden and the United Kingdom) and for the four European Free Trade Association countries (Iceland, Liechtenstein, Norway and Switzerland). As such, the total number of countries included in the search was thirty-two.

The search criteria applied included the following guidelines:

1. Limit the review to European countries (twenty-eight) and European Free Trade Association countries.
2. Identify the best studies based on external validity (in countries where there are no national data, studies with a smaller sample could be included, but they should be representative, from regions or covering large areas of a country). Convenience and local samples were not considered.
3. Limit the review to food consumption studies conducted after 1990 (in those countries not having such data, the period 1985–90 was considered) along with meeting the earlier established minimum criteria. In the case of multiple studies, the newest one meeting search criteria were selected when a similar methodology was applied.
4. Choose the highest population level (national, regional).
5. Include healthy children, adolescents, adults and elderly populations.
6. Carry out searches through PubMed, ministry websites and books/reports/journal supplements by country.



**Fig. 1.** Methodological framework: sources of information. EU, European Union; EURRECA, European micronutrient recommendations aligned. \*RA 1-1, Research Activity 1-1 of the EURRECA Network of Excellence. \*\*Per expert to whom it was sent.

7. Key words used in the search: 'national nutrition survey'; 'food and nutrition survey'; 'dietary intake'; 'food intake'; 'food habits'; 'meal habits'; 'food consumption pattern'; 'dietary habits'; 'dietary record'; 'dietary survey'; 'nutrient intake'; 'diet questionnaires'; 'diet cross-sectional study'; 'food cross-sectional studies'; 'nutrient cross-sectional studies'; 'diet evaluation'; 'food evaluation'; 'diet assessment'; 'food assessment'; 'nutrient data collection'; 'food data collection'.

*Systematic PubMed search.* In the systematic PubMed search, twenty-one key words/search terms were used, following the same order for each country. In addition, the limits 'humans' and 'from 1990' were used. No language restrictions were applied.

A first selection was carried out with all the abstracts obtained per country applying the following exclusion criteria:

1. Papers evaluating the association between nutritional status and illness or any other health problem.
2. Papers about tobacco or drug consumption.
3. Papers that evaluated pesticides, food contaminants and food additives.
4. Papers that evaluated the nutritional status of a population exclusively through biochemical parameters or alternatively only provided reference values.
5. Those addressing nutrition education and interventions or conducting a needs assessment.
6. Papers on patients undergoing surgical procedures or those who were hospitalised.
7. Studies that evaluated the relationship between food and biological variables or that exclusively measured biological, anthropometric, socio-demographic or functional variables, as well as those related to the utilisation of health services in nutrition studies.
8. Papers that described statistical models or sampling techniques.
9. Papers not having an abstract.

A second stage of selection was carried out in a step-wise manner as follows:

Firstly, applying exclusion criteria to abstract titles and secondly to the contents of selected abstracts.

The final abstracts list was used to obtain surveys and related papers through (in this order) PubMed, on-line library of the University of Barcelona. All results, surveys, reports or papers were stored separately in files for each country.

*Ministry website search.* A similar search was carried out in parallel through the websites of ministries (departments of health and food and agriculture) of each country, following the same search criteria as for the PubMed search. In this case, the list of key words/search terms was reduced to thirteen: 'national nutrition survey'; 'national nutrition report'; 'food and nutrition survey'; 'food and nutrition report'; 'food consumption survey'; 'food consumption report'; 'food habits'; 'food report', 'food consumption patterns'; 'dietary survey'; 'dietary report'; 'diet evaluation'; 'diet assessment'. In ministries of health and food and agriculture websites, the term 'in humans' was added.

The selection of hits from the 'ministries websites' search was carried out doing a pre-selection of all initial results. This pre-selection consisted of keeping only those relevant

to food consumption surveys. Subsequently, the same exclusion criteria used for the PubMed search was applied. Finally, only those that complied with the five first search criteria were selected.

*European projects.* Twelve European projects were reviewed and all relevant information on food consumption surveys in the participating countries extracted. Key contacts were also extracted for completion of the Experts list (see section down mentioned later).

#### *Questionnaire criteria and design*

A questionnaire was designed including forty-nine questions with the objective of obtaining the greatest amount of information in parallel with the systematic search. In addition, the questionnaire was designed to complete study data that were missing due to survey inaccessibility (based on language problems or because studies were not published, etc.). The questionnaire also aimed at obtaining the contact details of the responsible person(s) for the surveys, with the aim of enlisting their assistance in the completion of the missing information. In order to complete a questionnaire on a particular survey, the survey needed to meet the following priority criteria:

1. Be the most recent.
2. Be the most representative of the country's population or of part of it: i.e. ideally at the national (country) population level; if not available, at the regional/province/department/county/population level.
3. Be conducted after 1990 (in the case that the only available survey had been conducted between 1985 and 1990, exceptions could be made and it could be considered).
4. Have the highest external validity: i.e. the survey results were generalisable to the larger population. External validity is low when surveys using human participants have small samples and/or are obtained from a single geographic location.

#### *Questionnaire development*

The questionnaire was initially designed to have an online format, but due to logistic inconveniences, it was decided that it would be distributed electronically by email as a result from consensus reached by members of EURRECA's Research Activity 1-1 (Intake Methods), other EURRECA partners, and members of the European Health and Nutrition Report II<sup>(13)</sup>, who were sent a preliminary version to review. The response of this massive mailing was tracked, correspondence exchanged, and comments/suggestions were considered and incorporated into the design of a final questionnaire, which was sent to two to five expert contacts from each of the thirty-two countries.

#### *Experts list*

An Experts list was compiled, which was obtained from internal contact lists and from external and public sites (PubMed, ministry websites, etc.). The list included thirty-two countries as agreed upon by consensus with relevant EURRECA partners. The response of the experts was tracked

and filed; for those countries who did not respond, 'reminder' messages were sent and the response was also monitored. A follow-up message was also sent to clarify doubts related to questionnaire responses for certain countries (i.e. some questionnaires received had no answers to certain questions or contradictory answers, and as a result, it was necessary to obtain further clarification, especially regarding questions on nutrient intake adequacy). Additional 'reminder' messages were sent to the four remaining non-responding countries; however, these efforts were fruitless.

All relevant information found on food consumption from surveys, their related papers and other studies per country was included in the 'Country information found' table. This table, which summarises the outcomes of the search, comprises a total of forty-eight fields (columns) by country included (rows). The fields to be completed per country were as follows: study name; realisation period; financing body; organisation conducting study; year of publication; authors; publication type and references; language; scope or level of study; periodicity; study population; study's main objective; study type; representativeness; initial sample population; sampling methods; participation/response rate (%); sex (*n*); age groups (*n*); dietary survey methods; survey method for data collection; vitamin and mineral supplements; dietary supplement use; food portions estimation; prepared foods/meals and recipes; databases for data collection; data format for analysis; food codification; food composition table used; functional and fortified foods included; physical activity evaluation/assessment; nutrient data adjusted by; food groups; results; reference nutrient intakes used; nutritional adequacy assessment methods; anthropometry; biochemistry; source of information. Although the majority of surveys/papers used to complete the table were found through PubMed, some of them were obtained through other sources such as available data from European projects or other EURRECA partners.

Once the table was completed with the available/accessible information for a particular country (paying special attention to the dietary data collection and nutritional adequacy assessment methods as a main objective), it was sent together with the questionnaire to the country experts.

The surveys/studies contained in the 'Country information found' table were then compared with the surveys/studies received as completed questionnaires and duplicates were excluded.

## Results

### Search results

**Systematic PubMed search.** This search strategy resulted in the identification of 12 703 abstracts. Review of titles and application of exclusion criteria resulted in 439 selected abstracts. Applying exclusion criteria to full abstracts led to a total selection of 200 final abstracts as shown in Fig. 2.

According to these results, the countries with no data available/accessible through PubMed were Slovenia and Liechtenstein, the countries with the least information were Serbia, Estonia, Bulgaria (with one result) and Cyprus, Latvia, Luxembourg; Malta, Portugal and Slovakia (with two results). By contrast, countries such as Belgium, France, Germany,

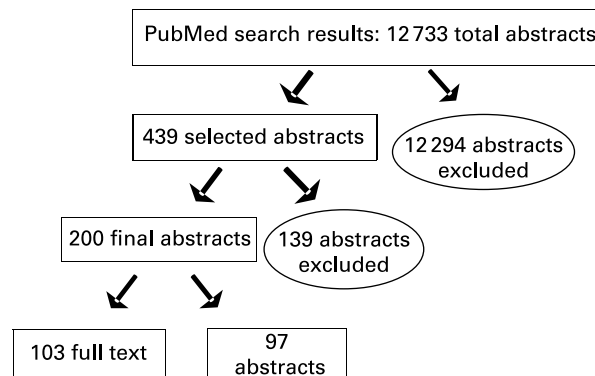


Fig. 2. Selection process applied to PubMed papers.

Ireland, Sweden, Spain and the United Kingdom had the highest amount of available/accessible data (with approximately twelve to fifteen results).

**Ministry website search.** This search identified 3033 results. Pre-selection consisted of keeping only those relevant to food consumption surveys. Subsequently, the same exclusion criteria used for the PubMed search was applied and resulted in seventy hits. Finally, only those that complied with the first five search criteria were selected, resulting in a total final selection of nine results.

### Questionnaire results

**Expert's response.** The questionnaire was sent to two to five expert contacts from each of the thirty-two countries. A total of eleven countries responded within a month; seventeen other countries responded after the reminder message and four countries did never respond.

**Response rate.** The majority of countries (twenty-seven out of thirty-two) sent a completed questionnaire, obtaining a total of seventy-eight questionnaires, in other words, a response rate of 92.2%. Eleven countries answered after the first email sent, seventeen countries after the 'reminder' email and no response was ever obtained from countries such as Liechtenstein, Luxembourg and Slovakia. A final table containing 118 surveys/studies (forty plus seventy-eight) from all countries was compiled.

Table 1 summarises data extracted from a database designed for the storage of all results for each keyword per country.

## Discussion

The present review process has involved the combination of several strategies converging into the same objective: to identify available information on food consumption and nutrient intake from each of the twenty-eight European and four European Free Trade Association countries considered. In order to establish recommendations for future reviews of this nature, a previous evaluation of the strengths and limitations of each strategy followed is useful.

The combination of a lack of consensus for protocols on conducting grey literature systematic searches (mainly Google) and the complexity of limiting the extent of irrelevant results led to the elimination of this method as part of the search strategy. Consequently, the search was limited to

**Table 1.** Number and selection of abstracts found through PubMed, ministries and questionnaires

Country	PubMed results				
	Total abstracts	Selected abstracts	Final abstracts	Ministries	Questionnaires
Austria	126	12	4 <sup>(23-26)</sup>	0	1 <sup>(27)</sup>
Belgium	292	18	12 <sup>(28-39)</sup>	0	1 <sup>(40)</sup>
Bulgaria	39	1	1 <sup>(41)</sup>	0	1 <sup>(42)</sup>
Cyprus	14	4	2 <sup>(43,44)</sup>	0	3 <sup>(45-47)</sup>
Czech Republic	88	11	8 <sup>(48-55)</sup>	0	1 <sup>(56)</sup>
Denmark	595	41	8 <sup>(57-64)</sup>	0	1 <sup>(65)</sup>
Estonia	45	7	1 <sup>(66)</sup>	0	1 <sup>(67)</sup>
Finland	704	21	7 <sup>(68-74)</sup>	1 <sup>(75)</sup>	1 <sup>(76)</sup>
France	836	56	12 <sup>(77-88)</sup>	0	2 <sup>(89,90)</sup>
Germany	902	39	13 <sup>(91-103)</sup>	0	1 <sup>(104)</sup>
Greece	369	21	9 <sup>(105-113)</sup>	0	5 <sup>(114-118)</sup>
Hungary	174	7	6 <sup>(119-124)</sup>	0	5 <sup>(125-129)</sup>
Iceland	88	5	5 <sup>(130-134)</sup>	0	1 <sup>(135)</sup>
Ireland	295	26	13 <sup>(136-148)</sup>	2 <sup>(149,150)</sup>	1 <sup>(151)</sup>
Italy	1209	17	9 <sup>(152-160)</sup>	0	2 <sup>(161,162)</sup>
Latvia	16	4	2 <sup>(163,164)</sup>	0	1 <sup>(165)</sup>
Liechtenstein	3	0	0	0	0
Lithuania	57	10	7 <sup>(166-172)</sup>	0	1 <sup>(173)</sup>
Luxembourg	11	2	2 <sup>(174,175)</sup>	0	0
Malta	17	2	2 <sup>(176,177)</sup>	0	1 <sup>(178)</sup>
Netherlands	846	25	8 <sup>(179-186)</sup>	2 <sup>(187,188)</sup>	1 <sup>(189)</sup>
Norway	498	16	5 <sup>(190-194)</sup>	0	7 <sup>(195-201)</sup>
Poland	572	16	9 <sup>(202-210)</sup>	0	4 <sup>(211-214)</sup>
Portugal	110	4	2 <sup>(215,216)</sup>	0	4 <sup>(217-220)</sup>
Romania	50	4	4 <sup>(221-224)</sup>	0	2 <sup>(225,226)</sup>
Serbia	149	1	1 <sup>(227)</sup>	0	5 <sup>(228-232)</sup>
Slovakia	42	2	2 <sup>(233,234)</sup>	0	0
Slovenia	20	0	0	0	1 <sup>(235)</sup>
Spain	1014	31	15 <sup>(236-250)</sup>	0	8 <sup>(251-258)</sup>
Sweden	989	13	12 <sup>(259-269)</sup>	0	3 <sup>(270-272)</sup>
Switzerland	297	7	5 <sup>(273-277)</sup>	2 <sup>(278,279)</sup>	2 <sup>(280,281)</sup>
United Kingdom	2236	16	14 <sup>(282-295)</sup>	2 <sup>(296,297)</sup>	10 <sup>(298-307)</sup>
Total	12 733	439	200	9	78

PubMed and ministry websites. In order to complete the missing information essential for the task, a questionnaire was sent to the country experts.

Examples of the challenges in undertaking this kind of review include, among others, the diversity of languages, incomplete information in the abstracts, difficulty in obtaining full papers as well as delays in questionnaire responses, probably due to the length of the questionnaire. Although assistance from project researchers and external experts resolved part of these problems, generally, such inconveniences reinforce the need for consensus on the methodology to be followed, in order to limit the barriers to an effective process that tend to occur at the organisational stage.

In regard to the positive aspects of the work carried out, it can be said that the literature review provided an extensive overview of the available information coming from four different sources (PubMed, ministry websites, books/reports, European projects and congresses/expert meetings); it also confirmed the importance of consensus and training from the outset of the task. Regarding the questionnaire, it was found to be an excellent and straightforward tool for obtaining expert information, as most of the questions were answered, which thus facilitated data analysis<sup>(22)</sup> and enhanced the strengthening of networks at the European level.

In conclusion, the systematic search (PubMed in particular) and the questionnaire completed by experts are the two strategies that yielded the most satisfactory results, and which can

also be compared among countries. PubMed provided objective, globally accessible, although possibly limited information (i.e. only abstracts and not full papers are available). The expert-completed questionnaire provided more concrete straightforward information, which was however, based on the expert's knowledge or willingness to collaborate, and thus subject to certain limitations<sup>(22)</sup>. These two approaches are useful, although both could be improved. As such, a combination of these two strategies is therefore recommended.

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