

EXTERNAL SCIENTIFIC REPORT

Dietary Monitoring Tools for Risk Assessment¹

Gavrieli A, Naska A, Konstantinidi Ch, Berry R, Roe M, Harvey L, Finglas P, Glibetic M, Gurinovic M and Trichopoulou A²

On behalf of the project consortium:

The Hellenic Health Foundation, Athens, Greece; Institute of Food Research, Norwich, UK; Institute for Medical Research, Centre of Research Excellence in Nutrition and Metabolism, University of Belgrade, Serbia

KEY WORDS

dietary software, 24h recalls, food records, diet, risk assessment

DISCLAIMER

The present document has been produced and adopted by the bodies identified above as author(s). This task has been carried out exclusively by the author(s) in the context of a contract between the European Food Safety Authority and the author(s), awarded following a tender procedure. The present document is published complying with the transparency principle to which the Authority is subject. It may not be considered as an output adopted by the Authority. The European Food Safety Authority reserves its rights, view and position as regards the issues addressed and the conclusions reached in the present document, without prejudice to the rights of the authors.

¹ Question No EFSA-Q-2012-00219

² Acknowledgements: The project Consortium would like to thank George Pounis, Emmanouil Magklis, Eleni Oikonomou and Anna Frantzi for their contribution in the execution of tasks presented in this report. We also thank Maria Fragkioudaki for the project administration.

Any enquiries related to this output should be addressed to DATA@efsa.europa.eu

Suggested citation: Gavrieli A, Naska A, Berry R, Roe M, Harvey L, Finglas P, Glibetic M, Gurinovic M and Trichopoulou A, 2014. Dietary monitoring tools for risk assessment. EFSA supporting publication 2014:EN-607, 287 pp.

Available online: www.efsa.europa.eu/publications

ABSTRACT

The report details the results of the EFSA contract CFT/EFSA/DCM/2012/02, which aimed to identify and evaluate available data collection protocols and tools for capturing food consumption information, suitable for harmonised data collection in the context of the EFSA EU Menu project. The tasks undertaken and the results generated through this project are described in four sections. Section I describes a review of published and grey literature on dietary assessment tools and methods used to collect food consumption data using 24h recalls and food records primarily in Europe. Section II details the results of an online comprehensive questionnaire (CQ), which was designed to collect information relating to dietary assessment methods used by EU Member States. The information captured by the questionnaire also highlights the country-specific protocols and characteristics, which need to be fully considered when addressing potential harmonisation of dietary data collection. Eleven European Institutes replied to the questionnaire. Six out of the 11 countries (Estonia, Italy, Latvia, Portugal, Spain and Sweden) further participated in a ring-trial (RT), which is described in Section III of the report. The trial aimed to study the variation in food consumption data collected through different methodologies (e.g. different software, procedures and connected databases) in use in Europe. The two main methods included in the trial were: (a) 24h recalls and (b) food records. Section IV presents the results of the RT and summarises the critical analysis of the data accumulated through both the CQ and the RT. In general most tools used in the RT exhibited good repeatability in recording the reported quantities, as well as the characteristics of the meal occasion. However, tools did not perform similarly well regarding relative accuracy, even when a $\pm 15\%$ tolerance was accepted, and in capturing the qualitative characteristics of the food items, indicating that improvements need to be made either in the interviewers' (24h recalls) or study participants' (food records) training or in the integrated facets and related descriptors. Thorough training of the interviewers/food record keepers, harmonization and automatization of tools' procedures and update of the tools' integrated databases in order to reflect commonalities in Europe and country-specific particularities in a harmonized way would improve the comparability of the data collected in national European studies.

SUMMARY

This report details the tasks undertaken and the results generated through the EFSA contract CFT/EFSA/DCM/2012/02. The project aimed to identify and evaluate available data collection protocols and tools for capturing food consumption information for risk assessment purposes.

The report is organised in the following four sections, corresponding to the project's main objectives:

- Phase 1: Needs analysis and evaluation of the tools and data collection methods
 - To undertake a review of dietary assessment tools available primarily in Europe (reported in Section I)
 - To report on the results of the Comprehensive questionnaire (CQ), designed to collect information relating to dietary assessment methods used by European countries (Section II)
- Phase 2: Carrying out of the ring-trial (RT)
 - To present the methodology of the RT (Section III)
- Phase 3: Critical analysis, summarising and reporting of the results
 - To present the results of the RT and to summarise the outcome of the critical analysis of data accumulated through both the CQ and the RT (Section IV).

Section I describes dietary assessment tools and methods used to collect food consumption data using 24h recalls and food records primarily in Europe, but also in other parts of the world. The objective of the review was to identify existing computerised dietary intake programs and assessment tools currently used to evaluate dietary intake in all populations. The relevant nutritional tools were identified through a literature review process, using open access databases and grey literature sources. A critical analysis of the quality and usefulness of the tool/software was not among the objectives of this task.

Section II details the results of the CQ, which was designed to collect information relating to dietary assessment methods used by European countries, with the aim of describing and evaluating the assessment methods, protocols and software tools. The information captured by the questionnaire also highlights the country-specific protocols and characteristics which need to be considered when addressing potential harmonisation of dietary data collection.

The countries replying to the questionnaire included those that took part in the project RT (Estonia, Italy, Latvia, Portugal, Spain and Sweden), plus a selection of countries who had responded favourably to requests to participate (Denmark, Greece, Norway, Poland and Serbia). This report and the database of answers given by respondents represent a unique summary of information pertaining to eleven dietary assessment tools in Europe. It highlights the differences, similarities, common and unique features of the software tools and the accompanying protocols and studies. The purpose of the questionnaire was not to make any judgment on the ability of the tools, but to assimilate the variation and similarities, as well as the advantages and disadvantages that each system brings. In addition, this report can help to understand the depth of differences in the way dietary data are collected and analysed across Europe, although it also highlights that there are plenty of similarities between

methods and tools. Differences were also noticed, mainly derived from the methodology and administration of the tools.

Section III focuses on the RT, which took place on January 28-29, 2013 at EFSA premises. The trial aimed to study the variation in food consumption data collected through different methodologies (e.g. different software, procedures and connected databases) in use in Europe. The two main methods included in the trial were: (a) 24h recalls and (b) food records. The analysis of the RT data reveals the ability of the tools to accurately record the information provided and consistently repeat the reported data.

Section IV presents the findings of the RT, and critically analyzes and summarizes the results of the project. In the tender specifications, the RT results were described as part of Phase 2 (Section III). The Consortium, however, decided to present them in Section IV so that the analysis and their interpretation would directly follow and facilitate the readers in going through a substantial amount of data.

The majority of the tools participating in the RT managed to adequately record specific characteristics of the meal occasions (time, place and type of the meal consumed). Some inconsistent recordings were however observed, originating either from erroneous data entries or from limited options incorporated in the tools. The participating tools presented some variation in consistently recording the quantities of repeatedly reported items. With respect to how proximal the recorded quantities were to the pre-defined “key quantity” (relative accuracy) tools did not perform very well, indicating that improvements are necessary. Furthermore, some tools systematically overestimated or underestimated the reported quantities. Apart from the obvious possibility of a random erroneous recording, low repeatability and/or relative accuracy could be attributed to: (a) real between countries differences in standard portions and units, (b) the interviewer bias (the capacity and the adequate training of the interviewer to probe for food details during the interview) in the case of 24h recalls or responder bias in the case of food records, (c) the interviewees, who although well-trained and with clear and standardised instructions on what to report/record appeared to have misreported intakes, (d) misunderstandings between the interviewers and the interviewees, (e) incorrect entries by the people who translated the raw data into English or exported them manually to Excel/Word files, (f) properties of the tool in guiding interviewers to record details and remind them about forgotten food items and (g) tools' integrated databases.

Regarding the qualitative characteristics of the food items, tools did not perform very well in capturing them, indicating that improvements need to be made in this direction. The same sources of error identified for low repeatability and/or relative accuracy could apply for the discrepancies observed about the qualitative characteristics of the food items. Many tools adequately recorded the information on food supplement consumption and whether the interview day and diet followed was a special one. In contrast, only three tools had features to record forgotten food items and only one managed to indicate a day with no water consumption, although none of the tools recorded any water consumption during that particular day.

TABLE OF CONTENTS

Abstract	2
Summary	3
Table of contents	5
Background as provided by EFSA	6
Terms of reference as provided by EFSA	7
Introduction and Objectives	8
Section I: systematic review of dietary assessment tools available worldwide.....	9
Introduction and Objectives	9
Materials and Methods	10
Results	17
Section II: Report on the results of the "Comprehensive Questionnaire-CQ"	23
Introduction and Objectives	23
Materials and Methods	23
Results	24
1. Part 1: Overview of the tool.....	24
2. Part 2: Detailed aspects of the tool	26
Section III: The Ring-Trial (RT)	38
Introduction	38
Materials and Methods	39
1. The ring-trial preparatory phase	39
2. The ring-trial protocol	40
2.1. Data collection through 24h dietary recalls	41
2.2. Data collection through food records.....	41
3. The ring-trial database	42
4. Evaluation of the repeatability of the recorded data	42
5. Evaluation of the relative accuracy of the recorded data.....	43
6. Capturing qualitative characteristics of food items	44
7. Handling of recipes.....	46
Section IV: Critical analysis, summarising and reporting of the results	49
1. Observing the ring-trial	49
2. Duration of interviews entry.....	50
3. Picture books	51
4. Analysis of the RT data	52
5. Characteristics of the meal occasions	53
6. Repeatability of the recorded data	56
7. Relative accuracy of the recorded data	59
8. Qualitative characteristics of the reported food items	82
9. Recipes	87
10. Forgotten Foods.....	89
11. Supplements	89
12. Days with high or low consumption due to special conditions	90
13. Days with no water consumption	90
Overall summary of results	91
Conclusions and Recommendations.....	97
References	99
Appendices	106
Abbreviations	287

BACKGROUND AS PROVIDED BY EFSA

One of the main data collection priorities of the European Food Safety Authority (EFSA) in the coming years is to harmonise the collection of food consumption data in the Member States for dietary monitoring, exposure and risk assessment purposes. This task is addressed through the preparation of the so-called EU Menu Survey to be launched in full in 2013.

In the framework of EFSA's Comprehensive European Food Consumption Database (EFSA, 2011) food consumption information at a detailed level was collected in 2008-2010 from 20 countries for adults and from 12 countries for children. Although a huge step forward in improving the accuracy of EFSA's exposure assessments, because of a lack of harmonisation of the methodology used, results from individual countries will not be directly comparable.

To further improve the accuracy of EFSA's exposure assessments, an important priority is the collection of harmonised food consumption data from the Member States. This task is addressed through preparation of the first pan-European food consumption survey to be carried out in the EU called "What's on the Menu in Europe? (EU Menu)". As a starting point, and in collaboration with Member States, EFSA developed a "Guidance on the general principles for the collection of national food consumption data in the view of a pan-European dietary survey" covering (EFSA, 2009), as one of the issues, the importance of using harmonised data collection tools and procedures. In a pan-European dietary survey, data collection should be performed in a standardised way. Software should be used to collect dietary data comparable between countries. This software program should therefore ensure the highest possible level of standardisation of the interviews or other type of data collection and entry within and between countries, and increase the likelihood that, if measurement errors exist, they will apply equally in all centres.

The computerised EPIC-soft tool developed by the International Agency for Research on Cancer (IARC), is proposed, in the above mentioned Guidance, as the preferred means for harmonised collection of European food consumption data (Slimani, 1999). This tool has already been used in three countries for their national dietary surveys, namely Belgium (Temme et al, 2010) Germany and the Netherlands. The capabilities of the EPIC-soft interview method to capture food consumption data at the level of detail necessary for their use in the area of food safety and, in particular, for the assessment of dietary exposure to chemical substances (e.g. to flavourings) have been successfully tested (Crispim et al, 2010).

On the other hand, already for several decades, over 15 European countries have developed separate paper, computer or web-assisted data collection protocols, tools and data handling processes for their national dietary monitoring purposes as described by Merten et al (2010). These mostly so called in-house software have, however, rarely been used outside the country where it had been developed. Recently, an increasing number of countries have adopted new food consumption data collection methods applying either computerised interview or self-administered web-based data collection procedures (Enghardt-Barbieri H, The Swedish National Food Agency, personal communication, 2009; Kambek L, National Institute for Health Development, personal communication, 2010; Loken E, Department of Nutrition, University of Oslo, personal communication, 2010). Software already used in a national food consumption survey could be a valid alternative to EPIC-soft when applied to a pan-European dietary survey. However, this would require time and resources to develop the country specific versions of the software and to ensure the high standardisation level that can be obtained by the EPIC-soft program. There is, however, a limit to change the established data collection methodology due to the fact that change requires additional resources and may obfuscate food consumption trend analysis.

The question has been raised, whether alternative data collection tools could provide equivalent results or whether the best aspects of existing tools could provide qualities facilitating data standardisation for EFSA's dietary risk assessment processes. There is thus a need to better understand the influence of data capturing tools and procedures on the final consumption estimates.

TERMS OF REFERENCE AS PROVIDED BY EFSA

Overall objectives

The overall objectives of the different phases of the present procurement procedure are as follows:

Phase 1: Needs analysis and evaluation of the tools and data collection methods

Identify, evaluate and describe available computerised and web-based 24h recall interview data entry tools, computerised food record entry tools and protocols/procedures for capturing food consumption information in relation to the features listed in the EFSA guidance (EFSA, 2009), their completeness of diet coverage, ease of use, time needed, effectiveness and accuracy to obtain detailed and harmonised data for dietary exposure assessments of EFSA.

Phase 2: Carrying out of the ring-trial (RT)

Assess through an EFSA supported RT, based on common test cases (later RT), the importance of the influence of the tool, connected databases and standard operational procedures on the results of the data collection in relation to uncertainty and variability in general, and particularly on the equivalence of data collected or entered using different tools.

Phase 3: Critical analysis, summarising and reporting of the results

To summarise the findings and point out the most critical features of the tools and procedures that may affect their suitability for collecting data for EFSA's dietary exposure assessment needs.

This contract was awarded by EFSA to the consortium consisting of: the Hellenic Health Foundation, Athens, Greece; the Institute of Food Research, Norwich Research Park, Colney, Norwich, UK; the Institute for Medical Research, Centre of Research Excellence in Nutrition and Metabolism, University of Belgrade, Serbia, with the Hellenic Health Foundation having the leader role.

Contract title: Dietary monitoring tools for risk assessment

Contract number: CFT/EFSA/DCM/2012/02

INTRODUCTION AND OBJECTIVES

The methods to assess individuals' dietary intake traditionally rely on information reported by the subjects themselves. The methods include food records, food frequency questionnaires and 24h recalls. Each method has strengths and weaknesses related to their intended use, ease of administration and validity. There has recently been some debate about the accuracy of food frequency questionnaires in ranking the individuals according to their usual dietary intake and there is accumulating evidence that repeated open-ended quantitative 24h recalls or food records may outperform the food frequency questionnaire in assessing accurately an individual's usual intake (Schatzkin et al, 2003).

The EFSA Guidance Document compiled by the EFSA Expert Group on Food Consumption Data, recommends that surveys cover two non-consecutive days, and that the food records are used for infants and children, and the 24h recalls for adults (EFSA Journal, 2009).

The reported project aimed at:

1. identifying available computer-based or web-assisted 24h recall interview data entry tools and the related protocols/procedures for recording food consumption information
2. identifying available computerized food record entry tools and the related protocols/procedures for capturing food consumption information
3. performing a needs analysis in collaboration with EFSA/DCM Unit with respect to the collection of food consumption data for EFSA's exposure assessment purposes
4. developing a questionnaire in order to evaluate and describe at least ten identified data collection tools, protocols and procedures
5. reporting the results of a systematic review to identify available computerized data entry tools as well as the results of the evaluation described under aim 4 above
6. selecting at least six data collection methods (including tools and protocols for data collection and analysis) that could be used in a RT assessing the influence of the method on the derived results. The selected methods will include minimum four tools to collect 24h recalls and minimum two food record data entry tools
7. organizing the RT in collaboration with EFSA
8. analyzing and reporting the results of RT
9. To summarise the findings and point out the most critical features of the tools and procedures that may affect their suitability for collecting data for EFSA's dietary exposure assessment needs.

In order to address these aims, the Final Scientific Report is divided into four sections. Section I presents the systematic review of dietary assessment tools available in Europe as well as other parts of the world; Section II describes the development of the comprehensive questionnaire (CQ) and reports the derived results; Section III presents the organization and the outcome of the RT and Section IV summarizes the results of the RT and critically evaluates the conclusions of the project.

SECTION I: SYSTEMATIC REVIEW OF DIETARY ASSESSMENT TOOLS AVAILABLE WORLDWIDE

INTRODUCTION AND OBJECTIVES

The evaluation of food and nutrient intakes on a multi-country level requires harmonized and standardized data collections, which will reinforce the comparability of results. The collection of harmonized food consumption data following comparable methods and protocols is one of EFSA's primary long-term objectives. According to EFSA's guidelines on conducting dietary surveys in Europe, the collection of individual food consumption data into a centralized national database and from there into a European centralized database is necessary for assessing data quality and the extent of standardization and to allow inter-country comparisons (EFSA Journal, 2009).

In addition, the World Health Organization (WHO) Second Food and Nutrition Action plan stressed the importance of establishing national and international surveillance systems on nutritional status including monitoring and evaluating dietary intakes. Surveillance systems should be simple and sustainable, tailored to the needs of the countries according to international recommendations through common protocols, analytical tools and databases (WHO, 2007).

The collection and assessment of dietary data requires the application of an assessment tool. The number of tools available is steadily increasing all over the world. A recent publication describes methods and software used in national dietary surveys carried out in the European Union and which are included in the Comprehensive European Food Consumption Database (Merten et al, 2011). In a second review, authors described an inventory of available innovative technologies for dietary assessment and further compared them to conventional methodologies (i.e. food frequency questionnaires, food records, 24h dietary recalls) used in epidemiological studies (Illner et al, 2012). In nutrition surveillance studies, the collection of dietary data is commonly undertaken using self-reporting methodologies which include both self-administered and interviewer-administered questionnaires/methods (Illner et al, 2012). These methods range from detailed individual weighed records collected over a variable period of time (typically ranging from two to ten days) to food frequency questionnaires and dietary recalls (Wrieden et al, 2003). The use of technology to collect dietary intake data is of high importance in nutritional research and innovative technologies can overcome some of the logistical and financial barriers in conducting large scale nutritional surveys (Probst and Tapsell, 2005; Illner et al, 2012). It has been shown that nutritional tools, such as web-based or computer assisted questionnaires, recalls or diaries, are becoming increasingly common (Illner et al, 2012). Currently, a large number of nutritional tools are available, both commercially and within research institutions (in-house software), but they greatly vary in their design and features. In order to understand and assess the merits of each dietary assessment tool for use in nutritional research, it is necessary to collate and summarize the currently available relevant computerized technologies.

Objectives

One of the project's objectives was to undertake a comprehensive overview of computerized and web-based 24h recall and food record entry tools available in Europe in order to capture food consumption information. The relevant dietary tools were identified through a literature review process, using open access databases and grey literature sources. Critical analysis of the quality and usefulness of the tool/software was not an objective of this task.

MATERIALS AND METHODS

The HHF (lead partner) performed a literature search to identify research groups in each EU Member State (MS) who have coordinated the implementation and analysis of national dietary surveys. The literature review focused on national studies including representative population samples (at least for the adult population) in which data were collected using either 24h dietary recalls or food records. A systematic search was conducted in PubMed and Google Scholar. In PubMed, the following MesH terms were used: [nutrition survey], [health survey], [nutritional assessment], [diet], [food intake], [nutrient intake], [questionnaires], [24h recall], [food frequency questionnaire] and [food records]. The search was limited to studies in EU MS and was not restricted in terms of language. As additional sources of information, the publication by Merten et al describing the characteristics of the national dietary surveys in the European Union (Merten et al, 2011), the paper by Illner and colleagues presenting innovative technologies for measuring diet in nutritional epidemiology (Illner et al, 2012), the European Nutrition and Health Report 2009 (Elmadfa et al, 2009) and the minutes of the meetings of the DCM Expert Group on Food Consumption data were used.

The state-of-the-art following the completion of the literature search, together with the outcome of the correspondence exchanged with the identified relevant researchers, is outlined in Table 1. After the initial contacts, ten EU MS, Norway and Serbia expressed their interest in either participating in the RT or in providing information through the CQ, or both. During the project's first plenary meeting (September 19-20, 2012), Table 1 was presented and discussed.

During that meeting, the project Consortium was also informed of EFSA's requirements for dietary data for risk assessment purposes, and concluded on a list of attributes a data collection method should possess in order to be included in the evaluation process. Based on these discussions, the meeting attendants developed a short screening questionnaire which would be used to screen the data collection methods that would best address EFSA's needs and select the ones that would participate in the RT. The short questionnaire is included as Appendix A.

Table 1: Outcome of the preliminary literature search on dietary tools available in EU MS and Serbia and of the exchange of correspondence

Countries	Institute	Outcome of contacts	Dietary software used in national data collections	Participate to the ring-trial	Reply to the comprehensive questionnaire	Comments/References
Austria	University of Vienna, Faculty of Life Science, Department of Nutritional Sciences	Reply received	Planning to use EPIC-SOFT	-	Yes	Personal communication with the Head of Department
Belgium	Scientific Institute of Public Health, Brussels, Belgium	Reply received	- EPIC-SOFT (2004 version) - EPIC-SOFT data entry version for food records of children (PANCAKE project)	Yes	Yes	De Vriese et al., 2005 Ocke et al, 2012
Bulgaria	National Center of Public Health and Analyses, Department "Foods and nutrition"	Reply received	No indication on the name of the tool used.	No	No	Petrova & Angelova, 2006
Cyprus	-	Not contacted	-	-	-	No national survey conducted
Czech Republic	-	Not contacted	EPIC-SOFT ^(a)	-	-	Ruprich et al., 2006
Denmark	Division of Nutrition, National Food Institute, Technical University of Denmark	Reply received	GIES	No	No	Lyhne et al., 2005
Estonia	National Institute for Health Development	Reply received	Nutridata pro	Yes	Yes	Pomerleau et al., 1999

Countries	Institute	Outcome of contacts	Dietary software used in national data collections	Participate to the ring-trial	Reply to the comprehensive questionnaire	Comments/References
Finland	National Institute for Health and Welfare	No reply	Finessi	-	-	Paturi et al., 2008 Pietinen et al., 2010 Reinivuo et al., 2010
France	AFSSA - French Food Safety Agency	No reply	-	-	-	AFSSA, 2009 Dubuisson et al., 2010
Germany	-	Not contacted	EPIC-SOFT†	-	-	Krems et al., 2006 Max Rubner-Institut, 2008
Greece	Hellenic Health Foundation (HHF)	Reply received	HHF Nutrition tool	Yes	Yes	HHF internal reports
Hungary	National Institute for Food Chain Safety, (ex-Hungarian Food Safety Office)	No reply	n/a	-	-	Rodler et al., 2005
Ireland	National Nutrition Survey Group School of Food and Nutritional Sciences, University College Cork and Tinuviel Software UK	Reply received from the group at Cork with the indication to contact Tinuviel Software UK. No reply received from Tinuviel Software UK.	Wisp-des	-	-	Kiely et al., 2001 Harrington et al., 2001
Italy	Consiglio per la Ricerca e la Sperimentazione in Agricoltura, Centro di Ricerca per gli Alimenti e la Nutrizione (Ex-INRAN)	Reply received	INRAN-DIARIO-MPS 1.0	Yes	Yes	Leclercq et al., 2009
Latvia	Assessment and Registration Agency of Food and Veterinary	Reply received	Food Consumption Information System (FCIS)	Yes	Yes	Santare et al., 2008

Countries	Institute	Outcome of contacts	Dietary software used in national data collections	Participate to the ring-trial	Reply to the comprehensive questionnaire	Comments/References
	Service					
Lithuania	-	Not contacted	n/a	-	-	National Nutrition Survey conducted in 2007. No publication available
Luxembourg	-	Not contacted	n/a	-	-	No information on national survey
Malta	-	Not contacted	n/a	-	-	No information on national survey
Norway	Norwegian Scientific Committee for Food Safety	Reply received	No indication on the name of the tool used.	No	Yes	Øverby et al, 2004 Johansson et al, 1997
Netherlands	National Institute for Public Health and the Environment (RIVM)	Reply received	EPIC-SOFT	-	-	Ocké et al., 2005
Poland	National Food and Nutrition Institute	No reply	n/a	-	-	Szponar et al., 2001 & 2003 Sekula et al., 2004
Slovenia	National Institute of Public Health	No reply	-	-	-	Gabrijeljic et al., 2009
Portugal	Associação para Investigação e Desenvolvimento da Faculdade de Medicina Lisboa	Reply received	- eAT24 (electronic Assessment Tool for 24h recall) - EPIC-SOFT 24h recall for adults (version tested in the PILOT-PANEU project)	Yes	Yes	No publication identified
Romania	-	Not contacted	-	-	-	Small-scale data collections in the context of participating in research projects

Countries	Institute	Outcome of contacts	Dietary software used in national data collections	Participate to the ring-trial	Reply to the comprehensive questionnaire	Comments/References
Serbia	Centre of Research Excellence in Nutrition and Metabolism, Institute for Medical Research, University of Belgrade	Reply received	DIET-ASSESS Programme	Yes	Yes	Gurinović et al 2011a; 2011b Mensink GB, 2013
Slovakia	Food Research Institute (VUP)	No reply	Alimenta 4.3	-	-	Advice to contact Iveta Truskova, Head of Unit, Public Health Authority of the Slovak Republic
Spain	Dept. of Nutrition, Faculty of Pharmacy, University Complutense of Madrid	Reply received	DIAL (Software for Assessing Diets and Food Calculations)	Yes	Yes	Ortega et al., 2013a Ortega et al., 2013b Gonzalez-Rodriguez et al., 2013a Gonzalez-Rodriguez et al., 2013b
Sweden	National Food Agency, Food Data Division	Reply received	Web-based food diary	Yes	Yes	Amcoff et al, 2012
UK	MRC Human Nutrition Research	Reply received	Intake 2	Yes	Yes	Henderson et al., 2002

n/a: not available

(a) Several countries reported using EPIC-SOFT as a dietary assessment tool. Among these countries, the Consortium contacted Belgium (EPIC-SOFT 2004 and EPIC-SOFT used in the EFSA-supported PANCAKE project) and Portugal (EPIC-SOFT version used in the EFSA supported PILOT-PANEU project).

In the course of the first plenary meeting, the Consortium further decided to perform a review of the literature on methods of dietary data collection available worldwide. IMR undertook to accomplish this task.

A comprehensive literature search protocol was applied. It took into account the available resources and time limitations for the task, and maximized the capacity to identify and summarize all relevant computerised data collection tools.

Selection criteria

A literature search was carried out in PubMed (Medline database) to identify studies published in English, which reported on the application of web-based, desktop application and computer-based dietary assessment tools worldwide.

Searches were conducted using the following terms: dietary intake assessment software, nutrition intake program, dietary intake nutritional tool, nutritional assessment software, diet, nutrition-assessment, dietary assessment, computerized dietary assessment, 24-HDR, food record, food composition, computer applications (Table 2).

The search was limited to papers published from 1995 to May 2013, based on the assumption that the development and application of the relevant software would be strongly influenced by the advent of World Wide Web in the mid-1990s. In addition, due to continued technological developments and the evolution of food composition databases, earlier tools which have not been included in a publication since 1995 were considered to be out of date and therefore excluded. We selected only tools which are updated and still in use. Search results were also limited to papers published in the English language as there were insufficient resources to consider translations.

Additional searches were undertaken via the Google search engine (www.google.com) and from grey literature sources/ personal communications. Combinations of the search terms used in PubMed were also used to look for further relevant tools using Google. Grey literature was searched via the Capacity Development Network in Nutrition in Central and Eastern Europe, CAPNUTRA (<http://www.agrowebcee.net/ncdn/>), covering literature from Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Former Yugoslav Republic of Macedonia, Moldova, Hungary, Poland, Republic Srpska (BIH), Romania, Serbia, Slovakia, Slovenia, Russia and Ukraine and through the web sites of relevant authorities such as the WHO, Food and Agriculture Organization, EFSA and the United Nations Children's Fund. In order to ascertain the effectiveness of the search protocol, the results were checked to ensure that all 11 of the dietary monitoring tools which have been described through the project's CQ were included in the final list. Furthermore, other project participants (experts in dietary intake assessment) reviewed the list for any obvious omissions.

Studies and documents were considered eligible if they reported on the application of a nutritional tool for dietary assessment using one of the following methods: 24h recall and food records. Only tools with application in apparently healthy, general populations were considered, with hospital settings and patient groups excluded. Tools applied in children, adolescents and elderly populations were included. The above criteria were used within the context of dietary assessment tools suitable for large scale dietary surveys.

Inclusion and exclusion criteria, as shown in Table 2, were applied to all studies and documents retrieved by the researchers.

The search results were screened on the basis of title and abstract for relevance by three independent reviewers. Initially, 10% of the results were screened by three reviewers and the results were compared for consistency. The remaining publications were screened by one reviewer. Articles that appeared to comply with the study inclusion criteria were obtained as full texts and checked in more detail for relevance. Where necessary, the discrepancies or uncertainties in abstract and study selection were discussed amongst the reviewers and a decision on inclusion or exclusion was made based on consensus.

The list of identified data collection tools (n=46) that met the inclusion criteria and are referenced in PubMed is given in Table 3. The list of identified data collection tools for dietary assessment referenced in grey literature (n=12) is given in Table 4. Detailed tables presenting additional characteristics and key features of the tools retrieved are given in Appendices B and C of this Report.

Table 2: Search strategy

Search terms	Inclusion / Exclusion criteria			Other characteristics of interest	
	Study population	Year of tool development	Method of dietary assessment	Interface of the dietary tool	Food composition database
Dietary assessment software	Inclusion: Apparently healthy:	Inclusion: from	Inclusion: 24h recall	Computer-based	Name of FCDB and its availability in the tool
Nutrition intake program	infants	1995-2013	Food record	Web-based technology	
Dietary assessment tools	(0-1 yr)			Desktop application	
Nutritional assessment software	children and adolescents (1-18 yrs)	Exclusion: before 1995	Exclusion: other dietary assessment method		
Diet					
Nutrition-assessment	adults (19-65 yrs)				
Dietary Assessment	elderly (> 65yrs)				
Software program	Pregnant and lactating women				
Computerized dietary assessment					
24-HDR					
Food record					
Computer applications					

RESULTS

This literature review identified a wide range of computerized dietary data collection tools. The literature review selection process, which resulted in the compilation and description of 61 nutritional tools is described in a flow diagram in Figure 1. Among the 58 tools, 46 were referenced in PubMed and 12 were identified through searching grey literature sources (including personal communications).

From 46 computerised data collection tools referenced in PubMed (Table 3), with respect to country of origin, 14 programs were developed in the USA, nine in the UK, five in Germany, two in Finland, the Netherlands, France and Belgium. One tool per country was identified in Sweden, Denmark, Australia, Canada, Italy, New Zealand, Slovenia, Serbia, Thailand and Brazil. One was developed by WHO. All tools were developed for dietary assessment in all life stages apart from four which were particularly addressing children (ASA24™-Kids-2012, WebDASC / Web-based Dietary Assessment Software for Children, FIRSSt2 (Food Intake Recording Software System, version 2), Food Intake Analysis System FIAS -Millennium Edition).

From 12 computerised data collection tools identified from grey literature sources (Table 4) four were developed in the USA and one tool per country was identified in Estonia, Latvia, Greece, Poland, Spain, Serbia, Australia, and South Africa. All tools were designed for dietary assessment in all life stages.

In total 186 tools were excluded at the full-text review stage. The main reasons for exclusion were duplication of already included tools or a primary function/development reason not related to the objectives of this task (e.g. meal planning in hospital food services, measurement of anthropometric data, food labelling, or weight management interventions).

Programs that were out scope of this review were also excluded: program for nutritional interventions using "Track food weights" (weighing any uneaten food), in-depth interviews with focus groups, food expenditure survey approach, unclear used method, etc.

Regarding the use of FCDBs, a variety of databases were in use across the different tools and software. In the USA, tools mainly applied the USDA FCDB, whereas European countries used either national FCDB or databases specifically designed and built-in to the software.

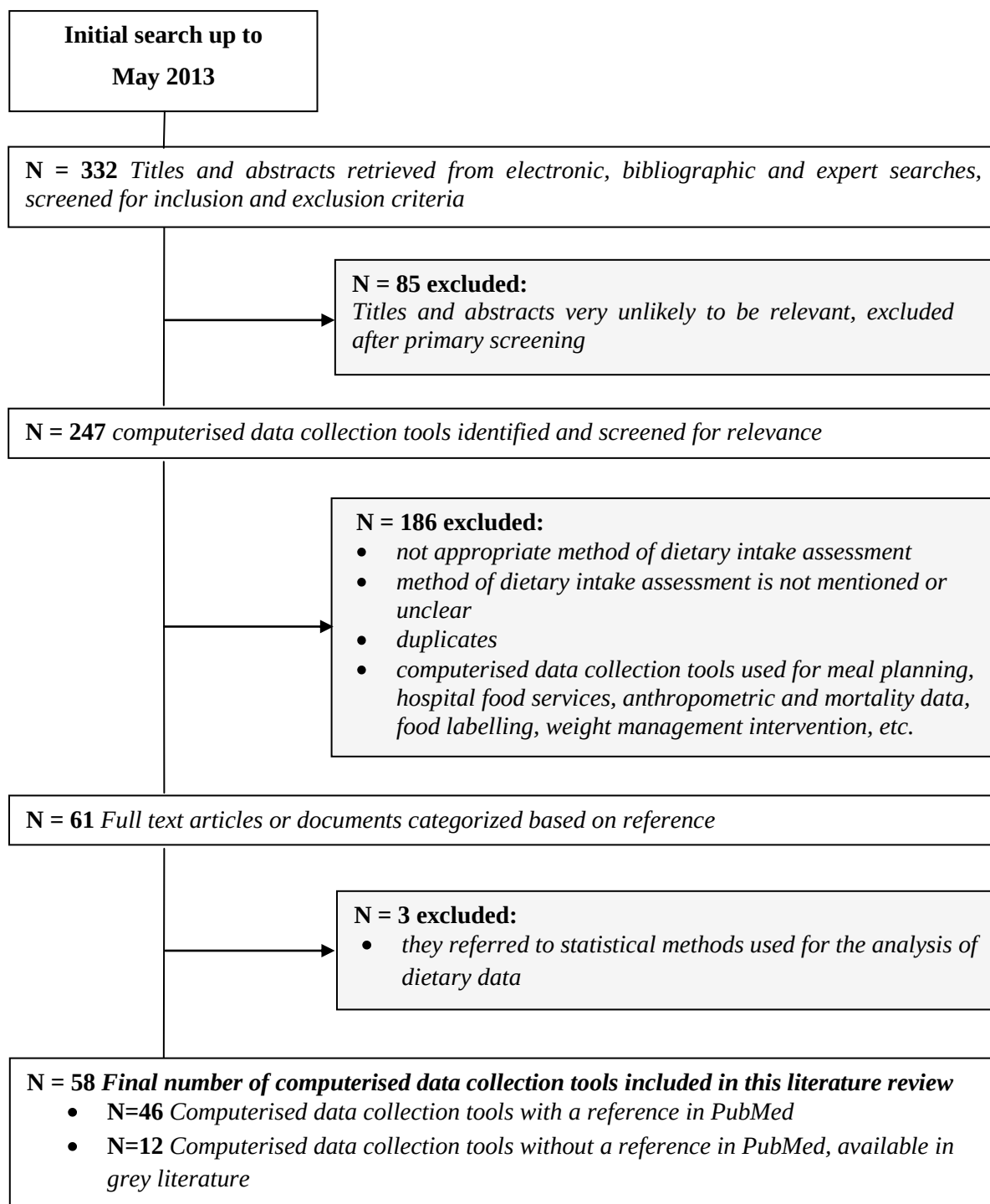


Figure 1: Flow diagram of the literature review selection process

Table 3: List of computerised data collection tools for dietary assessment purposes

Name	Dietary Intake Method ^(a)	Developer	Country	Reference
Coronary Artery Risk Development in Young Adults (CARDIA) Diet History Questionnaire (DARCC)	DH, 24-HDR, FFQ	The University of Alabama, the University of Minnesota, Northwestern University, Kaiser Permanente	USA	McDonald et al. 1991
Nutritionist Pro™	24-HDR, FFQ	Axxya Systems	USA	Mikode et al. 1994
Microdiet	FR	University of Salford Manchester	UK	Nathan et al. 1996
Nutriguide	WDP	Nutri-Science, Stuttgart	Germany	Kaur et al. 1997
GIES - General Intake Estimation System	pre-coded FD	University of Hohenheim, Stuttgart	Germany	Landig et al. 1998
EPIC-SOFT	24-HDR, FRB	International Agency for Research on Cancer (IARC) in collaboration with all national EPIC centers; Dietary Exposure Assessment Group	France	Slimani et al. 1999
Iron-FFQ	FFQ, FW	Department of Human Nutrition, University of Otago, Dunedin	New Zealand	Heath et al. 2000
COMP-EAT	24-HDR, FFQ	VIS Visual Information Systems Limited	UK	Lanigan et al. 2001
DINER	24-HDR	University of Cambridge - EPIC Norfolk	UK	Welch et al. 2001
FIRSSSt2 (Food Intake Recording Software System, version 2)	24-HDR	Baylor School of Medicine, Houston, TX	USA	Baranowski et al. 2002
AusNut	24-HDR	Food Standards Australia New Zealand's	Australia	Crowe et al. 2004
Finnish Micro Nutrica Dietary Analysis program	24-HDR	Finnish Social Insurance Institute, Turku	Finland	Vaask et al. 2004
Nutri-Cal	FR	NutriCalc	UK	Probst and Tapsell 2005
The internet Data Logger (iDL)	24-HDR	Information Service, Rollins School of Public Health, Emory University, Atlanta	USA	Lu et al. 2006
Diet and Nutrition Tool for Evaluation (DANTE)	FFQ, FD, 24-HDR - food tick list	Nutrition Epidemiology Group at the University of Leeds	UK	Cade et al. 2006

MATs version 4.03	FR	Rudans Lättdata, Västerås	Sweeden	Tengvall and Ellegard 2007
INMUCAL	FR	Institute of Nutrition, Mahidol University	Thailand	Suoasynndh et al. 2009
Food Intake Analysis System FIAS -Millennium Edition	24-HDR, FR	University of Texas School of Public Health	USA	Coyle et al. 2009
DIDO (Diet in, Data out) updated in DINO (Diet in Nutrients out)	DD	MRC Human Nutrition Research, Cambridge	UK	Moore et al. 2009
Nutrilog	FR	Nutrilog	France	Garcin et al. 2009
DINERMO	FD	University of Cambridge - EPIC Norfolk	UK	Dahm et al. 2010
Finessi	24-HDR, FD	National Institute for Health and Welfare (THL)	Finland	Reinivuo et al. 2010
CANDAT	FR, FH	Godin London Incorporated	Canada	Shatenstein et al. 2010
INRAN-DIARIO 3.1	24-HDR, FR	INRAN (now CRA-NUT)	Italy	D'Addesa et al. 2010
NutPlan	24-HDR, FFQ, FR	Center of Research Excellence in Nutrition and Metabolism, IMR	Serbia	Gurinovic et. al 2010
BINS	FR	Becel institute nutrition software (BINS), Becel	Belgium	Van Biervliet et al. 2011
BILNUT	FW, 24-HDR, FR	Nutrisoft	France	Ben Slama et al. 2011
SUDAAN software (version 9.0)	24-HDR	Research Triangle Institute International, Research Triangle Park, North Carolina	USA	Hinds et al. 2011
Nutribase Clinical	24-HDR	Cybersoft Inc., Phoenix,	USA	Ramadath et al. 2011
Nubel Food planer	24-HDR, FFQ	Nubel	Belgium	Van Dongen et al. 2011
Dietplan6	24-HDR	Forestfield Software Ltd	UK	Shirazi et al. 2011
Nutrition Data System for Research (NDSR)	24-HDR, FR	University of Minesota - Nutrition Coordinating Center	USA	Ellingrod et al. 2011
NutWin	24 -HDR, FR	Universidade Federal de São Paulo (UNIFESP)	Brasil	Tinoco-Veras et al. 2011
WISP-DES	24-HDR, FR	Tinuviel Software	UK	McAfee et al. 2012
ASA24™-Kids-2012	24-HDR	The National Cancer Institute	USA	Baranowski et al. 2012
WebDASC / Web-based Dietary Assessment Software for Children	24-HDR, FD, FFQ	National Food Institute Technical University of Denmark Division of Nutrition	Denmark	Biltoft-Jensen et al. 2012

Automated Self-Administered 24h recall (ASA24)	24-HDR	The National Cancer Institute	USA	Subar et al. 2012
MyPyramid Menu Planner	24-HDR	The USDA Center for Nutrition Policy and Promotion (CNPP)	USA	Colleran and Lovelady, 2012
Nutrisurvey	DH, FFQ, FR	Dr. Juergen Erhardt, Germany	WHO	Buonomo et al. 2012
Prodi	FFQ, WDP	Nutri-Science, Stuttgart	Germany	Kobe et al. 2012
DGE-PC	FR	DGE	Germany	Staudte et al. 2012
FoodBase 2000	24-HDR	Professor Michael A Crawford PhD	USA	Nyuar et al. 2012
NDSR - Nutrition Analysis Software and Database	24-HDR	University of Minnesota, Nutrition Coordinating Center	USA	Salvo et al. 2012
Food Processor	FR, 24-HDR, FFQ	ESHA Research	USA	Zatonska et al. 2012
Optijed	24-HDR, FFQ	Institute of Public Health	Republic of Slovenia	Korosec et al. 2013
The Riksmaten tool	FR	National Food Agency, Food Data Division	Sweden	Bjermo et al. 2013

(a) Abbreviations used: Diet history (DH); 24h recall (24-HDR); Food frequency questionnaire (FFQ); Food records (FR); Weighed Dietary Protocol (WDP); Food dairy (FD); Food-Recording Booklet (FRB); Food Weighing (FW); Diet Diary (DD); Food history (FH)

Table 4: List of computerised data collection tools for dietary assessment purposes referenced in grey literature

Name	Dietary Intake Method ^(a)	Developer	Country	Reference
Automated Multiple Pass Method (AMPM) Blaise 4.7	24-HDR	The U. S. Department of Agriculture's	USA	Bethlehem, 2002
Dieta FAO	24-HDR	National Food and Nutrition Institute	Poland	Szponar et al. 2006
DietAdvice	24-HDR, FFQ	Illawarra region of NSW	Australia	Probst et al. 2007
Dine Healthy 7	FR	Dine Healthy	USA	Nobles, 2009
The Nutridata pro survey platform	24-HDR, FR, FFQ	National Institute for Health Development	Estonia	Public Health Development Plan 2009–2020
DIET-ASSESS	24 HDR, FFQ, FR	Centre of Research Excellence in Nutrition and Metabolism, IMR	Serbia	Gurinovic and Kadvan, 2011
NUT Nutrition Software	FR	Jim Jozwiak	USA	Knight, 2011
Food Consumption Information System (FCIS)	24-HDR, FR	Assessment and Registration Agency of Food and Veterinary service	Latvia	EFSA Ring trial, 2013
HHF Nutritional tool	24-HDR	Hellenic Health Foundation (HHF)	Greece	Personal communication
DIAL	FR	Alce Ingeniería S.A., Madrid	Spain	Sillero-Quintanana et al.
Food/Analyst Plus	FR	Hopkins Technology	USA	Food/Analyst PLUS CD-ROM
Food Finder	24-HDR	South African Medical Research Council (MRC)	Sout Africa	INFOODS

(a): Abbreviations used: 24h recall (24-HDR); Food frequency questionnaire (FFQ); Food records (FR)

SECTION II: REPORT ON THE RESULTS OF THE "COMPREHENSIVE QUESTIONNAIRE-CQ"

INTRODUCTION AND OBJECTIVES

This section details the results of the CQ, undertaken as part of the 'Dietary monitoring tools for risk assessment' project. The questionnaire was designed to capture information relating to a minimum of ten dietary assessment methods used by EU Member States, with the aim of describing and evaluating the assessment methods, protocols and software tools. A primary objective of the project was to understand where differences in current protocols and assessment methods can lead to variation in collected intake data, and how such variations could impact on data comparisons. The information captured by the questionnaire also highlighted the country-specific protocols and characteristics, which need to be fully considered when addressing potential standardisation of dietary data collection.

The objectives were to collect and collate information for a minimum of ten national dietary assessment tools from EU Member State countries through a comprehensive online questionnaire and to present, describe, summarise and compare the different dietary assessment methodologies, protocols and procedures used by the responding countries.

MATERIALS AND METHODS

The questionnaire was designed to capture information in four key areas: general characteristics, data collection, data management and software characteristics. The questionnaire was developed based on information reported in relevant published papers and reviews, and refined through discussion within the Consortium and with EFSA.

Prior to the project's first plenary meeting (September 19-20, 2012), the group developed the first draft of the CQ, the questions of which were selected on the basis of: (a) published reviews of data collection methods used in European studies and (b) research papers describing the characteristics of traditional and innovative dietary assessment methods. The draft was disseminated to the project partners and the EFSA/DCM Unit members for comment and editing in order to better address EFSA's requirements. The questionnaire was revised by HHF accordingly and according to the output of the project "Assessment of software for food consumption surveys to be adapted for use in developing countries" (Dop et al. 2006). The second draft was discussed during the first plenary meeting, and based on the decisions taken during that meeting, the third draft was prepared by HHF and disseminated to the Consortium for discussion during the group's first web meeting (the meetings that took place during the project's lifetime are collectively presented in Appendix D).

In brief, the group concluded that the current version covered most aspects and decided that the third version should be tested for its feasibility and clarity among colleagues of the consortium members. In particular, the third version was disseminated to HHF, IFR and IMR staff members (not involved in the questionnaire's development), who were asked to provide their feedback on the questionnaire's content and clarity. The outcome of this testing and any suggestions for amendments were discussed in the project's second plenary meeting (January 29, 2013). In addition, the group investigated the cost-efficiency of preparing the questionnaire in an electronic format that could allow online completion.

The final version of the questionnaire is provided in Appendix E. The questionnaire includes the following sections and sub-sections:

- Section A: Characteristics of national dietary surveys in which the tool has been used
 A. General Characteristics
 B. Data collection

- Section B: Characteristics of the dietary assessment tool
- A. General characteristics
 - B. Data collection
 - C. Data management
 - D. Software and IT characteristics

Once the content of the questionnaire was agreed, the information was compiled in an online survey system (FluidSurveys, 2013) and was checked and tested by the project partners. Due to the lengthy nature of the questionnaire, it was necessary to include features such as an option for the respondent to 'save and continue later', and the ability to allow multiple respondents from the same organisation to answer the same questionnaire.

The participating countries included those that had previously taken part in the project RT (Estonia, Italy, Latvia, Portugal, Spain and Sweden), plus a selection of countries who had responded favorably to requests to participate (Greece, Serbia, Norway, Poland and Denmark). The respondents were sent an email invitation that included instructions (Appendix F) and were asked to complete all parts of the questionnaire by the requested deadline. In addition, they were asked to provide a series of supporting documents/information about their tool (Appendix G). Respondents were sent follow-up reminder emails closer to the deadline.

The questionnaire responses were exported from the survey tool into an Excel spreadsheet. The results in this report were compiled from this spreadsheet and the automatic reports generated by the questionnaire tool by IFR.

RESULTS

Eleven countries (Estonia, Greece, Italy, Latvia, Norway, Poland, Portugal, Serbia, Spain, Sweden and Denmark) responded to the questionnaire, completing all relevant sections and submitting their answers through the web-based survey tool. The results have been divided into smaller sections, across worksheets, for easier navigation. Question numbering in the spreadsheet matches the final version of the questionnaire.

Due to the extensive nature of the questionnaire, the full results have not been tabulated within the report, but summary tables and figures are included in the main body of the report and the appendices, along with a written summary of each questionnaire section (below). To respect anonymity, countries have been numbered and are presented as such (i.e. Country 1, Country 2, etc).

1. Part 1: Overview of the tool

A. General characteristics (use of the tools)

The results indicate that the majority of tools have been used to collect data for national food consumption/dietary monitoring surveys, but the frequency and size of the studies varies considerably. The date of studies ranged from those that started many years ago (1985, Country 7) to those currently in progress (Country 1 2013-14, Country 2 2012-14, Country 8 2013-14). Seven countries have conducted a survey using their tool in the last five years. Nine of the eleven tools have been used for national studies, with the tools of Country 3 and Country 7 used in regional surveys. All countries, with the exception of Country 2, conducted cross-sectional data collection rather than longitudinal data collection. Study sample size ranged from 252 (Country 3) to 9000 (Country 1) (all studies of Country 7 included a total of 10,000 participants, rather than a single cohort). The study of Country 5 included the broadest age range (0-97), and five studies were conducted only in adults (Country 4, Country 6, Country 8, Country 9 and Country 10). Age was recorded continuously in most cases, with only

Countries 1 and 7 using age categories, although it was not clear whether the specific age of the individuals was also recorded. Population census and population registry were the most frequently used methods of sampling.

B. Data collection

Figure 2 shows the dietary assessment methods available within the tools, with 24h recalls the most commonly available method of assessment (also summarized in Appendix H). With the exception of Country 7, all countries using this methodology record at least two recalls per participant (although 3 days were sometimes recorded using the tool of Country 7), and all include weekend days. The majority of countries using 24h recalls also use at least one other method of dietary assessment, most commonly a food propensity questionnaire (FPQ). Where food records are used as the principal method of assessment, participants are asked to record intake for between two and seven days, and subjects are generally given instructions prior to recording their intake.

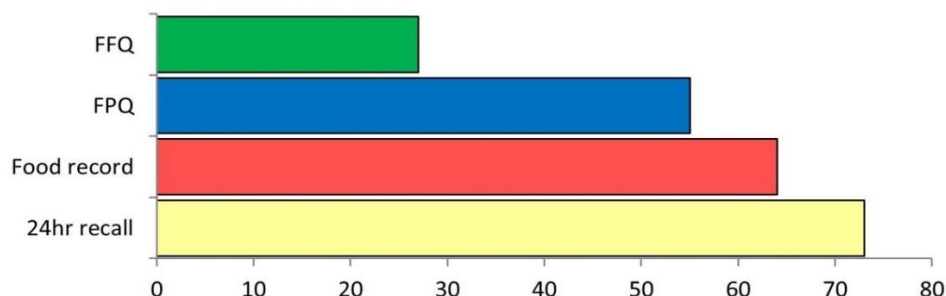


Figure 2: Dietary assessment methods (% of tools able to use the method)

Study participants are interviewed in a variety of locations, with the majority of tools used in more than one setting (Figure 3). Two tools do not require a face-to-face interaction with an interviewer, but use instead either a telephone interview (Country 10) or an online interface (Country 6). Participants are given dietary advice and feedback based on their interview/record in seven of the protocols (Countries 1, 4, 6, 7, 8, 9 and 10). Under or over-reporting, based on energy intake, are not assessed by four of the tools (Countries 1, 2, 7 and 8). Where over or under reporting is evaluated, the majority of tools use published cut-offs, with only one country (Country 6) using the doubly labeled water method.

Response		%	Count
Institute		45%	5
Hospital		9%	1
Home		73%	8
Work place		27%	3
Other*		55%	6
Total Responses			11

Figure 3: Location of dietary assessment interviews (*other includes: universities, pharmacies, healthcare centres, schools, kindergardens, community centres, online, by telephone)

2. Part 2: Detailed aspects of the tool

A. General

A1. General characteristics

The general characteristics of the software, tools and studies are summarized in Appendix I. Only one tool cannot be used to capture both 24h recalls and food records (Country 8). Three of the tools are currently in use as part of a national survey (Countries 2, 9 and 11), with seven other countries having plans to use the software for nutritional surveys between 2013 and 2017. Seven of the eleven countries maintain the software internally (within their organisation). Respondents were given the opportunity to list the three biggest advantages and disadvantages of their tool – the results are summarised in Appendix J.

A2. Languages

Language settings are only configurable by the user in two of the eleven tools (Country 1 and 3). Eight of the eleven tools are only currently available in their own national language, with the software of Country 9 also available in English, and the software of Country 1 available in English and Russian. The tool of Country 3 currently supports 15 European languages.

A3. Background of the user and training needs

The estimated minimum training period varies widely from tool to tool, from one hour (Country 2) to one month (Countries 8 and 9). It is not possible to ascertain to what degree the variation in answers was caused by differences in interpretation of the question (“How long is the estimated minimum training period for an interviewer to become an ‘independent user’ of the software/tool?”). However, the variation in responses was also influenced by the tool characteristics, with relatively short training periods stated for the web-based tools. In addition, the background of the interviewer and the type of survey they are being trained to undertake, were also described as important factors in determining how quickly someone can become an independent user. The preferred educational backgrounds for interviewers is a mix of nutrition, dietetics, other health sciences and people trained specifically as interviewers or with experience of undertaking surveys.

A4 to A6. Pilot/feasibility study of the tool, validation studies, portion size photo validation

Eight of the eleven countries reported conducting a pilot study using their dietary assessment tool, with sample sizes ranging from 30 to 800 subjects. For seven countries, the software usability was evaluated by the interviewers/users as part of the pilot study and comments and suggestions were used to inform future versions of the software. Six countries (Countries 1, 3, 6, 7, 9, 11) also conducted validation studies for their tool, although seven countries have completed validations for the portion size photos used with their software. Only six countries reported completing a validation of perception, and seven reported conducting a validation of the accuracy of reported quantities.

B. Data collection

B1. Administration

The tools of five countries can only be administered by an interviewer (Countries 3, 4, 8, 10 and 11), compared to the tool of only one country that was reported to be self-administered only (Country 2). The remaining tools either combine the two approaches (e.g. principally self-administered but also include an interview), or can use either administration approach, depending on the methodology of the study. Participants are rarely given the opportunity to view the screen in interviewer-administered protocols, with the exception of occasions in which portion photos are presented. Nine of the eleven countries use a face-to-face interview approach, with eight countries also reporting the use of telephone interviews, either as an alternative primary approach or as a method of checking queries. Interviews are reported to last about 45 minutes on average, but the range is considerably greater (20min to 2hr) (Table 5). Six of the eleven tools contain questions to explicitly define the recalled/recorded time frame. A multiple pass method is used in seven of the tools, with several employing three or four steps for recalling consumption (Table 5).

B2. Details on foods, beverages and supplement consumption and meal patterns

The tools use a variety of methods to estimate portion sizes for both 24h recalls (Figure 4) and food records (Figure 5). Food pictures and the use of weights/volumes are the two most frequently used in 24h recalls, though household measures, standard natural units and known packaging sizes are also used in six of the tools. In food records, weights and volumes are used in all tools, with the majority also using pictures, household measures, standard natural units and standard portions. The use of food models, rulers and sketches is limited in both assessment methods.

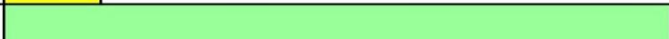
Response		%	Count
Food models		12%	1
Food pictures		88%	7
Household measures		88%	7
Standard (natural) units		88%	7
Standard portions		50%	4
Known packaging size		75%	6
Ruler		25%	2
Sketches		12%	1
Gram/Volume method		88%	7
Other		12%	1
Total Responses			8

Figure 4: Portion size estimation methods used for 24h recalls

All countries reported the availability of portion size pictures within their tool, with between one and 10 pictures per item, depending on the food. Four countries (Countries 2, 5, 8 and 10) have a set number of pictures per item, and the remainder use a varying amount for different food types. The tools of seven countries do not have pictures integrated into the software, and instead use a separate picture book. A constant difference in absolute values is used in five of the portion size photos (Countries 1, 2, 5, 7 and 10), with only one using a constant logarithmic difference (Country 8) and five countries using another system, sometimes varying by food type, but often involving 'usual' or

‘standard’ food servings and portions. Leftovers are only specifically recorded in the tools of four countries (Countries 7, 8, 9 and 10), though some respondents indicated that uneaten food is taken into consideration when estimating the portion size (i.e. subjects asked to estimate the amount consumed, not served).

Response		%	Count
Food models		12%	1
Food pictures		88%	7
Household measures		88%	7
Standard (natural) units		75%	6
Standard portions		88%	7
Known packaging size		63%	5
Ruler		25%	2
Gram/Volume method		75%	6
Weighing		38%	3
Other (please specify)		12%	1
Total Responses			8

Figure 5: Portion size estimation methods used for food records

The ability of the tools to capture information about meal preparation, food characteristics and eating occasions is summarised in Table 6. All tools can record whether the day was special in any way (e.g. birthday, religious celebration) and the time that each food is consumed. Information that is additional to the diet details, such as activities/company whilst eating and packaging type, is not widely recorded. ‘Special day’ questions are used as a means of checking over/under reporting, identifying outliers and in interpreting the overall results.

In general, water consumption is not addressed by specific questions in the tools, but instead recorded through the same process as all other food items. Some countries reported using specific probing questions to check for beverages throughout the recall period, though only one country reported a specific check for water consumption at the end of the interview (Country 8).

The list of possible pre-defined eating places is limited to only a few options for some tools (Country 4 and Country 11), whereas others have an extensive list (Country 5) or a more flexible system of selecting eating place options (Country 1). Only the tool of Country 2 does not record the place of consumption. All tools record the type of eating occasion, typically including a minimum of breakfast, lunch, dinner and snack, though the number of different pre-defined meal occasion options ranges from four to eleven.

B3. Non-dietary information

All tools include questions to record the participants’ age, height, weight and sex. Ten of the tools also include a question about special diets, such as vegetarian or gluten-free. Only seven of the tools include questions about specific life stages, such as pregnancy or lactation, and eight tools also include questions about socio-economic status. Seven of these countries reported asking about education level, with four tools also recording employment information (Countries 6, 7, 10 and 11). The tools of seven countries (Countries 1, 2, 4, 6, 7, 10 and 11) record information on physical activity, but eight of them

ask health-related questions. The health issues recorded are generally diet-related, such as celiac disease, diabetes, gastrointestinal disorders and allergies.

C. Data management

C1. Data entry / format of records

The estimated time to complete food consumption data for ten participants varies, and ranges from 100 minutes (assuming one day per participant) to three days (24h of work). The approximate volume of work for calculating energy/nutrient intake per 10 participants is generally very low, as eight of the tools include an automated calculation procedure.

In eight of the eleven countries, interviewers are able to make notes in the software (Table 5), and in several instances there are multiple types of notes, relating to the general recall/record, recipes or specific foods. Standardized pathways are built in to seven of the tools (Countries 1, 3, 5, 7, 8, 9 and 11), guiding the interviewers through the data entry (Table 5). The level of standardization is quite varied, however, with some tools limiting data entry within certain fields, or having limiting steps that prevent finalisation unless completed. Others have more controlled guidance through the interview, with the software dictating the follow-on questions once a food type is selected.

C2. Recipe handling

The tools of ten countries are able to handle recipes and composite foods, typically through an integrated recipe list/database, all of which can be expanded (both by modifying existing recipes and building new ones from scratch). However, seven of the tools do not specifically record the type of recipe (e.g. homemade, recorded by Countries 1, 3, 7 and 8). All eleven countries reported the ability of their tool to break down composite dishes into single ingredients.

C3. Food classification

Figure 6 shows the food classification systems used by the included tools. Two countries (Countries 2 and 9) use multiple classification systems, with the majority of countries using internal systems (“other”). The tools of six countries include facets and their related descriptors (Countries 1, 2, 3, 6, 8 and 9), which are detailed in Figure 7. The most commonly used facet/descriptor system is FoodEx2.

Response		%	Count
LanguaL		9%	1
FoodEx		18%	2
FoodEx2		36%	4
EFG		9%	1
Other		82%	9
Total Responses			11

Figure 6: Food classification systems used in the dietary assessment tools

Response		%	Count
LanguaL		43%	3
FoodEx		14%	1
FoodEx2		71%	5
EFG		29%	2
Other		43%	3
Total Responses			7

Figure 7: Food facet/descriptor systems used in the dietary assessment tools

C4. Databases

C4.1 Databases integrated into the tool (built-in databases)

Table 6 summarises the databases integrated into the dietary assessment tools. All tools include a standard recipes database, with the number of recipes ranging from 106 to 1200. Only one tool (Country 8) does not currently have an integrated food composition database. Other common integrations include databases related to portion size, with eight tools including these facilities. Six tools include nutritional supplement databases, with the number of different supplements included ranging from 23 to 1200. Seven of the tools include a yield factors database; three at the ingredient level (Countries 6, 8 and 9), two at the recipe level (Countries 1 and 10) and one with both levels available (Country 11) – no further information was given by Country 7. Retention factor databases are incorporated into six tools (Countries 1, 6, 7, 9, 10 and 11), all at the ingredient level, though the tools of Countries 9 and 11 also have retention factors available at the recipe level.

C4.2 Food composition database

Figure 8 shows the sources of data included in the food composition databases (FCDB) for the responding countries. Only Countries 2 and 10 have FCDBs limited to only one data source (National), with the majority of other tools including a combination of national, international, analytical and literature data. ‘Other’ sources of data include food labels, industry data and imputed values or calculated recipes. Respondents found it difficult to approximate the proportion of data from these different sources in their FCDB, but national and international sources appear to be the greatest contributors to the overall content. International recipes are included in the database for seven of the eleven tools, with six also reporting the ability of the software to use FCDBs from other countries (Countries 1, 2, 4, 6, 9 and 11). All FCDBs have been updated in the last 4 years, with the exception of the dataset of Country 7, which was last updated in 2005.

Response		%	Count
National data		100%	11
International data		82%	9
Analytical data		55%	6
Literature data		55%	6
Other		36%	4
Total Responses			11

Figure 8: Sources of FCDB data

C4.3 Conversions – Algorithms – RACs

Only four countries reported the availability of a pre-defined algorithm to convert food quantities to 'as consumed' (Countries 1, 7, 8 and 11), and three also reported an integrated conversion model to estimate Raw Agricultural Commodities (RACs) from foods (Countries 6, 7 and 10).

C4.4 Database flexibility

All respondents indicated that they are able to add new foods, recipes and nutritional supplements to their tool. Only tools from Countries 1, 3 and 11 are unable to add new information to their food composition databases directly. Nine countries indicated that their protocols only allow certain members of staff to make additions to the software databases. Six tools allow the import of databases related to standard portion sizes, household measures and nutrient requirements (Countries 2, 3, 6, 9, 10 and 11). Four tools also have the ability to import other databases, or partial datasets (Countries 2, 6, 9 and 10). Only Country 7 reported the ability of interviewers to add facets/descriptors during the interview, although some tools are already built around set classification/description systems, and others do not use facets at all. The majority of countries (eight) are able to store and export the databases in standardized commonly used formats from their software, and ten reported the ability to store and export intake data in such formats.

C5. Standard operating procedures and specific quality controls

C5.1 General

Only six countries reported the known existence of any Standard Operating Procedures for the software/protocols (Countries 1, 5, 6, 9, 10 and 11), and field-specific help is only available for four of the tools (Countries 1, 6, 10 and 11). Eight of the eleven respondents also indicated that protocols/instructions are available for editing the collected data. For self-administered tools, participant guidelines are available in seven of the countries (Countries 1, 2, 5, 6, 7, 9 and 11). All tools with a self-administered methodology reported that members of the research team are available to communicate with the participant during the recording period.

C5.2 Data entry

Table 5 summarises the availability of quality controls (QCs) within the software and during interviews for all of the tools. Real-time QCs within the software are slightly more widespread than

non-real time QCs. Five countries reported probing questions within their tools and protocol (Countries 1, 3, 8, 9 and 10), though the majority are able to clarify issues with participants during or after the interview, where applicable.

C5.3 Databases

Four tools include checks within the software for any missing values within the FCDBs (Countries 1, 3, 4 and 5), and five also include checks for consistency within the foods, such as ensuring the sum of the proximates equals 100g (Countries 1, 3, 4, 7 and 10). Additional checks mentioned by respondents include using EuroFIR standard protocols and conducting manual checks using pre-determined reports generated by the software. The standardised maintenance and updating procedures for databases, mentioned by respondents, include a range of activities from using EuroFIR protocols and standardised internal Standard Operating Procedures (SOPs), to external IT maintenance.

C6. Output – Reports

All tools can provide more than one type of output for the data collected, with the majority capable of many different reports (Figure 9). RACs are the least widely available, but 80% or more of tools are able to provide outputs as foods, food groups, energy, macro and micro nutrients. Most tools are able to express information on an individual level, with a sizeable proportion also able to categorize by group. Many of the tools have a considerable number of different outputs, but common options include non-dietary information (e.g. anthropometric) or by day or eating occasion.

Nine of the tools are able to directly import data into one of the commonly used statistical packages (SPSS, SAS, STATA). Five of the tools (45%) have the capacity to directly compare intake values with current nutrient recommendations (Countries 1, 4, 6, 7 and 9). Most countries reported the ability of researchers to both see numerous reports on screen and to print them, and stated that, in general, these reports were available within a few minutes of data entry. However, the interviewer only has access to the outputs in four of the countries (Countries 3, 4, 7 and 9), which may reflect the different roles of interviewers/researchers for the included tools.

Response		%	Count
Foods		100%	11
Food groups		100%	11
RACs		36%	4
Energy		91%	10
Macro-nutrients		91%	10
Micro-nutrients		82%	9
Other		55%	6
Total Responses			11

Figure 9: Types of output provided by the tools

C7. Exporting

With the exception of the tools of Countries 5 and 8, all are able to export data in an electronic format, suitable for a spreadsheet, at an individual level. All tools, with the exception of Country's 8 tool, are also able to export data in a suitable electronic format at the food item level. The most commonly reported electronic export formats were XLS, CSV, RTF, DBF and XML.

D. Software characteristics – Database management – IT aspects³

D1. General information on software & D2. System requirements

The majority of tools appear to be developed and supported in-house, i.e. by the institutes/centres using them, and have been updated in the last two years, although some were initially released over ten years ago (Countries 5, 7 and 10). Due to the continuous update of tools, the majority appear to be compatible with most operating systems and require modest specifications by current computing standards. Many current tools also require an internet connection, and to be compatible with commonly used web browsers. Some of the key answers relating to general information about the software and system requirements are summarized in Appendix K.

D3. Programming language⁴

The included tools have been written in a variety of programming languages: Coldfusion 9 (Country 5), Delphy 7 (Country 4), C# 4.0 (Countries 6 and 8), MS Dynamics AX ASPX (Country 2), Microsoft Visual Fox 9 (Country 9), Pacal/.NET/ASP (Country 11) and PHP (Country 1). Five countries (Countries 4, 6, 8, 9 and 11) reported that the software was developed within their own institution. Countries with software that was not developed in-house, remain in close contact with the developers. Eight countries confirmed that they have access to the source code, with only Country 3 unable to access it. Only one country (Country 6) was able to confirm the presence of an open Application Programming Interface (API) within the software. Three countries (Countries 2, 4 and 8) reported the use of open source code.

D4. Architecture and technology & D5. Databases⁵

Three countries (Countries 2, 4 and 6) confirmed that their software is based on 3-Tier architecture. No countries reported that the software supports failover, three that the software is scalable (Countries 6, 8 and 9), and two that an automated bulk upload interface is available (Countries 5 and 6). Six applications are web-based, and three client-server based. For the web-based applications, two are W3C compliant (Countries 2 and 6), two work under https (Countries 1 and 8), and all (apart from Country 11 that did not give a response) reported compatibility with most of the major web-browsers (Firefox, Internet Explorer, Chrome), though Safari was less frequently mentioned. For client-server applications, two are available in offline mode (Countries 1 and 4).

Only one tool (Country 10) is able to store data in an ORACLE database, with four using My SQL (Countries 1, 2, 5 and 9), four SQL (Countries 3, 6, 8 and 11) and one Firebird (Country 4). No countries reported the ability of the software to use ORACLE Real Application Clusters, or to use any form of database clustering. Countries 6 and 8 reported the availability of ADO.Net connectors, and Country 9 ODBC.

³ Note: the questions in section D were not always answered completely as they required an IT specialist's input.

⁴ Country 7 & Country 10 did not answer questions in this section

⁵ Country 7 & Country 10 did not answer the majority of questions in these sections

D6. Virtual environment & D7. Security⁶

Five countries (Countries 1, 2, 5, 6 and 9) stated that their software officially supports the virtual environment, and the same countries, with the exception of Country 9, reported that their software is VMWare compliant. No tools were reported to be VMotion compliant.

The software is protected against code injection in six of the tools (Countries 1, 2, 5, 6, 8 and 9), with the same countries, with the exception of Country 9, reporting that their software is protected against SQL injection. Only three countries (Countries 2, 5 and 8) reported that their software is protected against cross-site scripting. Countries 2 and 6 reported MS Active Directory authentication in their software, whilst Countries 2 and 5 confirmed the presence of user profiling options, such as group policies. Only Country 6 reported a system with a front end that is deployable separately from a back end part.

⁶ Country 7 & Country 10 did not answer questions in these sections, and Country 3 and Country 11 answered 'Not known' to all questions

Table 5: Summary of features integrated into the tools

Country		Databases integrated in to the tool													Quality controls integrated in to the tool																	
															Real-time QCs						Non-real time QCs											
	TOTAL	Food Composition	Portion size photos	Standard portion sizes	Standard recipes	Nutritional supplements	Supplement composition	Yield factors	Brand names	Estimated energy requirements	Retention factors	Density coefficients	Raw-to-cooked coefficients	Standard (natural) units	Household measures	Nutrient requirements	Incomplete fields	Inconsistent entries	Suspicious answers	Missing information	Extreme values	Incomplete fields	Inconsistent entries	Suspicious answers	Missing information	Extreme values	Are there probing questions?	Is a multiple pass method used?	Are forgotten items asked about?	Does the tool guide the interviewer through a standard pathway?	Can the interviewer make notes in the software?	What is the duration from the beginning of the interview to an available food consumption output? (a)
Country 1	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	1-1.5h
Country 2	3	✓	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓	✓	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✓	30-60m
Country 3	9	✗	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	n/k (b)	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	40m
Country 4	11	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓	✓	✗	✓	25-30m
Country 5	9	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	n/ k (b)	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	N/A
Country 6	12	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓						✗	✗	✗		✗	N/A

Table 6: Summary of the ability of each tool to capture information about the meal characteristics and eating occasion

Country	Additions	Food characteristics						Packaging	Meal preparation			Recall day	Eating occasion				Supplements					
	Salt	Herbs & spices	Organic	Fortified	Brand	Producer	Area of origin	Type	Material	Cooking	Heating	Place	Special day	Usual intake ^(a)	Time	Place	Type	Activities ^(b)	Company ^(c)	Consumption	Brand	Active compounds
Country 1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓
Country 2					✓	✓	✓			✓	✓	✓	✓		✓		✓			✓	✓	✓
Country 3		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓			✓		✓
Country 4	✓	✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓				✓	
Country 5				✓	✓								✓	✓	✓	✓	✓			✓	✓	
Country 6		✓						✓	✓	✓			✓		✓	✓	✓			✓	✓	✓
Country 7	✓			✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
Country 8	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Country 9	✓	✓	✓	✓	✓					✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	
Country 10	✓	✓		✓						✓	✓		✓		✓	✓	✓			✓	✓	
Country 11		✓								✓	✓	✓	✓	✓	✓	✓ ^(d)	✓		✓	✓	✓	✓
TOTAL	6	8	5	8	8	4	4	4	6	10	8	6	11	6	11	10	11	2	3	10	10	6
% of tools	55%	73%	45%	73%	73%	36%	36%	36%	55%	91%	73%	55%	100%	55%	100%	91%	100%	18%	27%	91%	91%	55%

(a): Is there a question on whether the reported intakes were more, less or the same as usual intakes?

(b): Were other activities undertaken at the same time as the meal was eaten, such as watching television, reading, playing computer games etc?

(c): Was the meal eaten alone or with company?

(d): No response given but assumed to be 'yes' as respondent answered follow-up question giving the list of possible eating places

SECTION III: THE RING-TRIAL (RT)

INTRODUCTION

The RT took place on January 28-29, 2013 (Month 6) at EFSA premises. The trial aimed to study the variation in food consumption data collected through different methodologies (e.g. different software, procedures and connected databases) in use in Europe. The two methods included in the trial were: (a) 24h recalls and (b) food records.

The organization and planning of the content of the RT data collection was the responsibility of the EFSA/DCM Unit. Particularly, the DCM Unit was responsible for:

- setting up and compiling the detailed content of ten different consumption days to be reported as 24h recalls or food records in all needed languages of the tools participating in the RT (foods, food descriptors, portion sizes and other relevant information)
- planning the details of the standardized interviews and scheduling the RT data collection
- developing the protocol of the RT
- providing the trained interviewees for the interviews
- providing technical assistance in setting up the interviewing facilities at EFSA

In setting-up the RT, the Consortium:

- contacted research teams in Europe involved in the undertaking of national dietary surveys
- selected the software that fulfilled the criteria for inclusion in the RT (based on the short questionnaire described in Section I)
- established the legal ground for the participation of European Institutes that accepted to provide data collection software which met the criteria set
- prepared the RT observer's form to be used during the trial by the Consortium members acting as observers
- disseminated parts A and C of the observer's forms to the participating Institutes. Replies were asked to be received prior to the RT and served as background information for the observers.
- reviewed the RT protocol

The short screening questionnaire was disseminated to all research groups who expressed their interest in participating in the RT. Replies received are included as Appendix L.

Ten research groups from the following countries (namely: Belgium, Italy, Greece, Portugal, Sweden, United Kingdom, Serbia, Estonia, Latvia and Spain) expressed their interest in participating, and their corresponding data collection methods were suitable for addressing EFSA's requirements for food consumption data and fulfilled the criteria for inclusion in the RT. Several of these tools could be used for collecting either 24h recalls or food records.

In the process of organising the RT, Belgium, Greece, Serbia and United Kingdom had to disengage themselves from the trial due to either practical reasons or conflict of interests.

The six countries and softwares that participated in the RT are listed in alphabetical order in Table 7 below. The corresponding dietary assessment methods are listed in Appendices B and C. Briefly, three countries participated with the 24h-recall method, two countries with the food records method and one country with both methods administered by the same tool. Similarly to the presentation of results from the CQ, tools have been numbered and are presented as such, i.e. Tool 1 up to Tool 7 since in one out of the six softwares both methods were applied for.

Table 7: Countries and their data collection software participating in the RT

Countries	Name of the software
Estonia	Nutridata pro
Italy	INRAN-DIARIO-MPS 1.0
Latvia	Food Consumption Information System (FCIS)
Portugal	EPIC-SOFT 24h recall for adults
Spain	DIAL (Software for Assessing Diets and Food Calculations)
Sweden	Web-based food diary

MATERIALS AND METHODS

1. The ring-trial preparatory phase

The EFSA/DCM Unit compiled ten consumption days to be reported as 24h recalls or food records by four fictitious individuals with different socio-demographic and anthropometric backgrounds: one male (reporting three consumption days) and three females (reporting the remaining seven days). Prior to the RT, the software providers were asked to deliver the tool related picture books and list of household measures, together with the quantities behind each quantification mean (portion size key). They also had to inform the EFSA/DCM Unit on questions that were going to be asked during the interview as supplementary to the dietary data (e.g. age, height, weight). The interviewees were given explicit instructions on how to answer each of these questions.

The 10 consumption days included 72 meal occasions in which 113 distinct items (including dietary supplements) were consumed. The selection of each food item was either random or on the basis of foods commonly consumed in the different countries participating in the RT. From these 113 items, 61 were reported as being consumed only once and the remaining 52 were reported in repetition (i.e. being consumed several times within the same day or during the 10-day period). Repetitions ranged from two to seven times during the 10-day period (21 items (19%) were reported as being consumed five times and 14 (12%) were reported as being consumed three times). In total, intakes of 256 foods, beverages and supplements were reported. Details on portion sizes and food descriptors were also included.

In relation to the dietary intakes of the fictitious individuals (interviewees), seven out of the ten days were defined as usual days. On one day, the female interviewee attended a wedding at which she had a buffet dinner. On another day, one of the women reported being on a special diet because of hypertension and on another day, the same woman reported a low intake consisting mostly of liquids because of gastroenteritis.

In parallel to the preparations of the EFSA/DCM Unit, the Consortium agreed on a list of issues that should be addressed during the RT. These issues referred to:

- practical details of the interview
- extent of information collected
- food quantification methods used
- the interviewer's personal opinion
- the interviewee's feedback

These issues were included in the "Observer's form", which was prepared by HHF and discussed within the Consortium during the January 2013 web meeting (on the organisation of the RT) (Appendix M). In brief, the Observer's form consists of the following parts:

- (a) Part 1 - Before the Interview: It includes questions that were asked to each participant before the trial.
- (b) Part 2 - During the interview: This part was filled in during the interview and allowed structured and unstructured observations and comments.
- (c) Part 3 - After the interview: It includes questions related to post-interview issues like the output files generated by the tools and technical characteristics of the software used.
- (d) Tool-specific part: Some additional questions were asked for some tools, addressing issues that came up from the replies received to the short screening questionnaires.

The form further included a selection of questions from the CQ, which the group considered essential and as such needed to be asked at an early stage, i.e. before or during the RT and certainly before the dissemination of the CQ.

The form was designed to assure a uniform recording of methodological characteristics essential to understand sources of variations in the recorded intakes. The form also included open fields where each observer was allowed to keep personal notes. An excerpt of the observer's form was disseminated to all software providers and they were asked to send their replies prior to the RT. These replies together with the short screening questionnaires completed by the RT participants in the selection phase were disseminated to all observers in order to serve as supportive material.

Members of the Consortium observed the interviews. The aim of this exercise was to gain a first impression of how the tools operate and which additional practices are employed; to follow procedures that may have an impact on results; and to gain insight that could be used in finalizing the CQ.

2. The ring-trial protocol

For the RT data collection workshop, the software providers were instructed to be prepared to repeat as closely as possible the data collection protocols that are routinely applied in their national settings. Trained and experienced interviewers from the Institutes providing 24h recall software attended the workshop. In the case of food records, the communication between the interviewees and the respective Institute, when needed, was organised by telephone or internet contact according to the procedures usually applied during data collections in the respective countries.

The dietary interviews and food record keeping were carried out in the languages of the method with native speaking interviewees, with the sole exception of the interviews undertaken through one dietary assessment tool, which were carried out with a non-native speaking interviewee. In this case, the food lists were translated by a native-speaking person and communicated in the national language. The interview questions and the clarifications provided, however, were in English.

The members of the project consortium acted as observers of the data collection methods. In particular, two or three of the Consortium representatives (of the ten present at the data collection workshop) followed each interview and kept notes without interrupting the procedure. In order to avoid differential modifications in the application of each country's method, clarifications were asked and additional remarks were made after the conclusion of the RT.

All participants and the Consortium members signed a confidentiality agreement concerning the RT data before the data collection started.

2.1. Data collection through 24h dietary recalls

Each country participating in the RT provided a trained interviewer with his/her own computer which included the data collection software. Interviewers were advised to have at their disposal all the materials commonly used during the 24h recall interview. A printer was also available.

Ten face-to-face 24h recall interviews were undertaken on January 28 and 29 according to a detailed schedule agreed at the beginning of the data collection workshop. Each interviewer was instructed to fully respect the usual protocol of the dietary recall method and simulate as closely as possible a normal survey situation. Interviewers were also asked to skip questions totally irrelevant to the collection of dietary data. The 24h recall interviewees had been instructed and trained by EFSA to report the dietary intakes and related information they had available for the ten consumption days EFSA had prepared. Interviewees were provided with printed copies of these data. Based on the details included in each consumption day, interviewees were instructed: (a) to reply to questions made by the interviewers; (b) highlight in the printed copies the replies provided and (c) circle details that were not asked by the interviewers.

After each interview, a short break was scheduled to increase the quality of the interviews. A longer break was generally recommended after 3-4 interviews.

At the end of each interview, the interviewer was asked to provide the software's immediate output (on paper or on a memory stick). If an output print-out or a file of the food entries could not be made available at the end of the data collection, the participating countries were asked to send the raw uncleaned data file with results at the food entry level to EFSA within 10 days of the data collection workshop. If outputs were in national languages, the interviewer was responsible for providing the project Consortium and EFSA with their translations. Any other outputs routinely produced at the end of each interview were also provided by the participating countries to EFSA and subsequently to the project Consortium.

2.2. Data collection through food records

Countries using food records as data collection methods had provided the food record form and supportive material (e.g. guidelines on how to fill in the diary, picture book etc.) one week before the RT.

EFSA provided food record keepers (interviewees), who filled in the food records for 10 days in the local language and in accordance to the specific food record keeping instructions provided by the participating

organisation. In order to simulate the real data collection situation, the interviewee had previously attended a training session if the data collection protocol required so.

The food record keepers filled in the 10-day food records and returned them to the participating organisation starting on the morning of January 28 and continued submitting them during the two RT days. The food record keepers were advised to provide as many details as possible on the reported eating occasions without any restriction and they were instructed to write down everything that EFSA had planned for each consumption day. In the case of one tool (Tool 7), seven instead of 10-day records were provided. In another case, the data collection protocol required that the survey personnel contact the record keeper in order to discuss the food records and clarify ambiguous or incomplete entries. These checks were performed during the RT through telephone calls that were also monitored by members of the Consortium (observers).

At the end of the food record data collection, the participating Institutes sent to EFSA the raw uncleaned data file with results at the food entry level within 10 days of the data collection. Upon receiving all the RT raw data from all the participants, EFSA sent them to the Consortium. When the food records were entered and further processed, more advanced reports were provided to EFSA and subsequently to the project Consortium.

3. The ring-trial database

Upon conclusion of the RT, participants sent raw data files to EFSA/DCM Unit who made them available to the members of the Consortium. The list of files the Consortium received can be found in Appendix N. For reasons of confidentiality and in order to assure standardized procedures of data processing, the members of the project Consortium acquired access to the data only after all the files had been delivered to the EFSA/DCM Unit.

Outputs were provided in different formats. Based on the files received, the HHF team designed a database to organize in a common format the data provided by EFSA and expected of being recorded (“input data”) as well as the data each country generated after the conclusion of the RT (“output data”). A description of the database is provided in Appendix O. The design of the database was discussed between the members of the Consortium in a web-meeting (March 27, 2013). After the design of the database was agreed, members of the HHF team proceeded to the data entry. During the process, a series of clarifications were requested from EFSA and the countries participating in the RT and in some cases updated versions of the aforementioned files had to be sent again. Upon its completion, the database was checked by two members of the HHF staff, who had not been originally involved in the data entry. A third check to assure the correct data entry was performed after the submission of the project’s second Scientific Interim Report. This third check aimed to correct erroneous entries, to apply clarifications received after the submission of the second interim report, and to amend the database so as to accommodate comments made to that report.

Upon completion of the initial data entry, a fraction of the database was disseminated among the Consortium members and was discussed in terms of functionality and ease of use during the data analysis. During these discussions, the Consortium members also discussed issues related to the possible analysis of the generated data. Repeatability and relative accuracy of the recorded data was decided to be assessed.

4. Evaluation of the repeatability of the recorded data

Repeatability refers to the consistency of the measurements between more than one administration of a specific item (food or beverage) at different times, realizing that conditions are never identical on repeated administrations (Willett, 1998).

In this analysis, we evaluated the repeatability of recorded quantities, irrespective to whether the description of the corresponding item was fully or partially captured. For the assessment of repeatability, food items which were expected of being reported more than once and were described by EFSA with exactly the same name, characteristics and reported unit/quantity were chosen. Thirty-seven items fulfilled these criteria and were selected to be included in this analysis. Although the number of repetitions ranged from 2-7, based on the number of items corresponding to each number of repetitions, the project partners decided to include in this analysis items that have been repeated either 3, 5 or 11 times; the latter case only included one medium glass of any type of water (tap, still mineral, carbonated). With respect to coffee, all three types (i.e. instant, filtered, espresso) were evaluated as black coffee (no added sugar, milk or cream). One item (orange juice consumed in Day 10) was excluded from the analysis, as inconsistent instructions were provided to interviewee/food record keeper reporting to Tools 1 and 7. Table 8 presents the number of food items considered in this analysis per number of repetitions.

Table 8: Number of food items considered in this analysis per number of times these items were repeatedly reported

Number of repetitions	Number of food items
3	15
5	21
11	1

For the evaluation of repeatability, means and standard deviations (SDs) were calculated. In addition, percent repeatability "p" was computed as $pi = (ki/ni) \cdot 100$

where i = the number of food items included in the analysis: 1, ..., 37

ki = the number of times the most frequently recorded quantity appeared

ni = the total number of recordings, for item i

Calculations were repeated after accepting a $\pm 10\%$ difference between the recorded quantities. For instance, two reports of the same amount of grapes recorded as 180 g in one occasion and 181g in another occasion were considered as materially the same. In the case where all the recordings of a repeatedly reported item were different from each other and outside the $\pm 10\%$ tolerance, the repeatability index was considered to be 0%. For reasons of comparability of the results, in the case of Tool 7 which recorded only 7 out of the 10 consumption days, repeatability was assessed only in the case of food items that had the same number of repetitions with the other tools.

5. Evaluation of the relative accuracy of the recorded data

Relative accuracy refers to the extent by which the recorded quantities of each tool actually correspond to EFSA's key quantities.

Relative accuracy was estimated in 104 items with their key and recorded quantity being expressed in grams. The repeatedly reported items were evaluated as distinct recordings, increasing thus the number of items to 206 (e.g. five repetitions were treated as five distinct values). Asparagus, bread (1 medium slice), Brussels sprouts, cappuccino, chewing gum, coffee cream, fish oil capsules, honey, ice cream, marshmallows, milk added in coffee, multi-vitamin tablet, rice, meat balls, olives, aspartame and vitamin B were excluded from the analysis since the unit of measurement was not grams. Caviar cream as recorded by Tool 4 (Day 6), one large glass of orange juice as recorded by Tools 1 and 7 (Day 10) were

also excluded from the analysis as incorrect instructions were provided to the interviewees/food record keeper and consequently a value distant from the key quantity was recorded by the tools. Lastly, all three types of coffee (i.e. espresso, instant and filtered), were excluded since sugar and/or milk/cream was added by the interviewers/food record keepers, while no specific quantity was expected of being reported, making thus direct comparisons difficult.

In order to reduce the variation introduced by the different quantification methods, food items have been grouped under three categories in accordance to the method used for reporting the quantity consumed. In particular, items were grouped in: (a) items reported through their exact weight; (b) items reported through portions and (c) items reported through units. The categorization which was performed by HHF personnel and was approved by the EFSA/DCM Unit is presented in Appendices P-R. In particular, Appendix P presents the items quantified through their exact weight, Appendix Q those that were quantified through portions and Appendix R those that were quantified through units. The deviation of the recorded quantity from the key quantity was calculated as:

$$\% \text{ deviation} = [(quantity \text{ recorded} - key \text{ quantity}) / key \text{ quantity}] \times 100$$

Then a total percentage per tool was calculated with and without a tolerance of $\pm 10\%$, $\pm 15\%$ and $\pm 20\%$.

Boxplots were generated to present the variation of recorded quantities within all tools combined and the deviations from the corresponding key quantities. For the preparation of the plots, the reported items were classified under food groups, based on instructions received by EFSA. In the case of repeatedly reported items, mean values were used.

Furthermore, we calculated the sum of quantities of solid foods reported during each one of the 10 days and the sum of the corresponding key quantities and further estimated the deviation between the two sums.

In addition, non parametric tests were used, as the distribution of the reported intakes was right-skewed and remained skewed after log transformation. To assess relative accuracy, we first estimated Spearman's rank correlation coefficients between the key (expected) and recorded quantity per item included in this analysis and separately for each tool. Then, a Spearman's rank correlation coefficient was computed for each tool according to the quantification method the items were grouped. To evaluate matched pairs (key vs. recorded quantity), we further applied sign tests, per item and group of quantification method, as previously described.

6. Capturing qualitative characteristics of food items

During the RT, interviewees and food record keepers were instructed to provide additional details on characteristics of items consumed. In this section, the qualitative characteristics accompanying the reported items along with characteristics indicated in the name of the food item (e.g. raw-salted salmon) were evaluated.

In total, 573 characteristics were identified and classified in 23 categories-facets. Twenty-one of these categories are based on the FoodEx2 system of facets and two (i.e. *brand name* and *further description*) were generated in order to evaluate characteristics which were reported but did not match a particular facet. The 23 categories-facets are presented in Table 9.

In order to evaluate the extent that characteristics were captured by each tool, each characteristic was assigned a grade depending on whether it was adequately recorded by the tool or not. Three grades were used (1, 2 and 3) and their interpretation is described in Table 10.

Table 9: Categories-Facets under which qualitative characteristics were grouped

Categories - Facets	
1. Source	13. Treatment modifying structure/nature
2. Raw source of derivatives	14. Cooking-method
3. Ingredients	15. Preservation-technique
4. Physical state	16. Packaging-format
5. Flavor-note	17. Packaging-material
6. Fat-content	18. Production-method
7. Sweetening-agent	19. Preparation-production-place
8. Fortification-agent	20. Target-consumer
9. Qualitative-info	21. Intended-use
10. Alcohol-content	22. Brand name
11. Dough-Mass	23. Further description
12. Process-technology	

Table 10: Interpretation of grades assigned through the comparison of the qualitative characteristics recorded by the tools to those expected of being reported

Grade	Meaning	Description	Examples
1	Captured	The tool managed to capture the food item/characteristic provided by the interviewee/food record keeper exactly or described it adequately enough for someone to understand.	1) Interviewee/food record keeper: tap water Tool: tap water 2) Interviewee/food record keeper: rice biscuit Tool: puffed rice cake
		The tool did not record a food item/characteristic that interviewee/food record keeper mentioned. However, the characteristic not recorded captures the food in its 'default' state.	1) Interviewee/food record keeper: milk, not fortified Tool: milk, without mentioning anything about fortification 2) Interviewee/food record keeper: coffee, no sugar added Tool: coffee, without mentioning anything about sugar
2	Partially captured	The tool managed to capture the food item/characteristic provided by Interviewee/food record keeper partly or described it inadequately for someone to fully follow the specific food item/characteristic.	1) Interviewee/food record keeper: Mixed dried fruits and nuts Tool: mixed dried fruits 2) Interviewee/food record keeper: rolls Tool: yeast dough cooked
3	Existed but not captured at all	The tool did not capture the characteristic provided by Interviewee/food record keeper at all or recorded it incorrectly.	1) Interviewee/food record keeper: skimmed milk Tool: full fat milk

7. Handling of recipes

This section describes the evaluation of all mixed dishes, including recipes and dishes with more than one ingredient, which were indicated by EFSA as recipes. In some cases, mixed dishes were not indicated as recipes by EFSA, but were reported only by name (e.g. meat loaf). Although, no specific ingredients were available for these dishes, some tools handled them as recipes and broke them down into specific ingredients. The assessment of these mixed dishes was performed either by evaluating how well the name of the mixed dish was captured by the tool, irrespective of the ingredients recorded, or by assessing whether the recorded ingredients adequately described the dish if no name was provided.

The items that were indicated by EFSA as recipes were grouped into two categories: a) those that the person consumed when eating out (e.g. at a restaurant), and b) those that the person prepared (home-made). As expected, the details of the recipe depended on the occasion (eating out or home-made). In the first case, only the ingredients easily identified by the person were reported and no quantities of recipe ingredients were provided. Some indicative examples of these dishes are beef stew, pasta with seafood and vegetable soup. In the second case, the person reported exactly the recipe ingredients along with their quantities, e.g. risotto with chicken and spinach, minestrone soup, scrambled eggs.

The evaluation of the recorded recipes was performed through:

- calculating the percentage of the recipe ingredients that were captured by the tools. If some ingredients recorded by the tools were not the same as the anticipated ones even if they belonged to the same food group, they were considered as not captured, e.g. turnip (tool) instead of parsnip (EFSA).
- calculating the percentage of the main recipe ingredients and added lipids that were captured, partially captured or not captured at all by the tools (assignment of grades 1, 2 and 3).
- calculating the percentage of the qualitative characteristics of the main ingredients that were captured, partially captured, not captured at all by the tools (assignment of grades 1, 2 and 3).

Main ingredients were defined on the basis of the following criteria:

- ingredients that were the main contributors to the final weight of the recipe (the case of eggs and onion for scrambled eggs),
- ingredients characterizing the name of the recipe e.g. rice, chicken and spinach for risotto with chicken and spinach or
- all ingredients, excluding herbs for seasoning and/or ingredients added in small portions (e.g. garlic), e.g. rosemary, oregano, garlic were not considered as main ingredients of fish casserole.

Table 11 presents the recipes evaluated and their ingredients with an indication of main ingredients and added lipids. The added lipids included oil (as a generic term), olive oil, rapeseed oil and butter. These lipids were identified either from the recipe's detailed list of ingredients or by being reported as secondary food item to a main one e.g. mixed salad (main item), olive oil (secondary item). In addition two food items were consumed with added fat and were also included in this analysis. These were: bread with butter and broccoli with rapeseed oil.

There were 41 qualitative characteristics of the main ingredients that were grouped under 11 categories derived either from the FoodEx 2 system of facets (10 out of 11 categories) or by creating a new category entitled "further description" for the aggregation of the characteristics not matching a particular facet. The list of these categories-facets is presented in Table 12.

Table 11: Description of recipes included in the analysis

Day	Recipe name	List of ingredients	Main Ingredients	Added lipids
1	beef stew	beef, tomato juice, carrots, onions, oil n.s.	beef, tomato juice, carrots, onions	Oil
1	mixed salad	lettuce, rucola	lettuce, rucola	Olive oil
1	mixed nuts and dried fruits	peanuts, walnuts, almonds, raisins	peanuts, walnuts, almonds, raisins	-
2	risotto	900 ml chicken stock, 50 g butter, 1 tsp olive oil extra virgin, 1 onion chopped, 1 garlic clove crushed, 300 g arborio rice, 150 ml dry white wine, 225 g baby spinach leaves, 280 g cooked flamegrilled chicken, 2 tsp mascarpone cheese, 2 tsp fresh parsley chopped, 50 g Parmesan cheese	chicken, spinach, rice	Olive oil, butter
3	pasta	penne, seafood n.s.	pasta, seafood	-
3	mixed salad	tomatoes, carrots, cucumber, onion, lettuce, rucola, balsamic vinegar, black pepper	tomatoes, carrots, cucumber, onion, lettuce, rucola	Rapeseed oil
3	chops	2 pork chops, 1 tsp black pepper, 1/4 tsp crushed red pepper, 1 tsp mint leaves, 1/4 tsp onion powder, 1/4 tsp cumin, 1/2 tsp paprika, 1/2 tsp dried parsley, 1/2 tsp dried rosemary, 1/2 tsp salt	chops	-
5	Hamburger	bun (white, wheat), minced meat pork and beef, cheese, mayonnaise, lettuce, tomatoes	bun, meat	-
5	Puree	carrots, apples, mangoes	carrots, apples, mangoes	-
5	risotto	900 ml chicken stock, 50 g butter, 1 tsp olive oil extra virgin, 1 onion chopped, 1 garlic clove crushed, 300 g arborio rice, 150 ml dry white wine, 225 g baby spinach leaves, 280 g cooked flamegrilled chicken, 2 tsp mascarpone cheese, 2 tsp fresh parsley chopped, 50 g Parmesan cheese	chicken, spinach, rice	Olive oil, butter
6	Eggs	2 eggs, 25 ml milk, 1/2 tbsp butter, 40 g onion, salt	eggs, onion	butter
6	caprese salad	fresh mozzarella, tomatoes, basil, olive oil, balsamic vinaigrette	mozzarella, tomatoes, olive oil	Olive oil
6	vegetable soup	carrots, celery, parsnip, parsley	carrots, celery, parsnip, parsley	-
6	waldorf's salad	apples, celery, walnuts, lettuce	apples, celery, walnuts, lettuce	-
6	Quiche	spinach, cheese	spinach, cheese	-
6	Vegetables	cucumber, carrots, Brussels sprouts	cucumber, carrots, Brussels sprouts	-
6	mixed green salad	lettuce, rucola, lemon juice, olive oil, pepper	lettuce, rucola, olive oil	Olive oil
7	Pie	1 commercial dough, 1/2 cup unsalted butter, 3 tbsp all-purpose flour, 1/4 cup water, 1 cup fructose, 8 apples, peeled, cored and sliced	dough, butter, flour, fructose, apples	Butter

Day	Recipe name	List of ingredients	Main Ingredients	Added lipids
7	fish casserole	swordfish, tuna, tomatoes, celery, garlic, carrot, onion, rosemary, oregano	swordfish, tuna, tomatoes, celery, carrot, onion	-
7	Minestrone	2 tbsp olive oil, 1 small onion, 3 cloves garlic, 1 carrot, 1 celery, 1 zucchini, 1 cup fresh green beans, 400 g cans diced tomatoes, 4 cups vegetable broth, 2 cups water, 1 cup whole wheat elbow macaroni, 1/2 tbsp dried oregano, 1tbsp dried basil, salt, pepper	olive oil, onion, carrot, celery, zucchini, green beans, tomatoes, broth, water, macaroni	Olive oil
8	soup/broth	1l tap water, 2 dices vegetable stock cubes, 4 large celery stalks, 2 medium carrots, 2 medium onions, 2 medium parsnip, 2 large leeks	water, stock, celery, carrots, onions, parsnip, leeks	-
9	Puree	carrots, apples, mangoes	carrots, apples, mangoes	-
9	pasta	penne, seafood n.s.	pasta, seafood n.s.,	-
9	tofu salad	Tofu (soy "cheese"), tomato, broccoli, cucumber, leek, soy sauce, sesame seeds	Tofu (soy "cheese"), tomato, broccoli, cucumber, leek, soy sauce	-
9	mixed nuts and dried fruits	peanuts, walnuts, almonds, raisins	peanuts, walnuts, almonds, raisins	-
10	Puree	carrots, apples, mangoes	carrots, apples, mangoes	-
10	vegetable soup	carrots, celery, parsnip, parsley	carrots, celery, parsnip, parsley	-
10	risotto	900 ml chicken stock, 50 g butter, 1 tsp olive oil extra virgin, 1 onion chopped, 1 garlic clove crushed, 300 g arborio rice, 150 ml dry white wine, 225 g baby spinach leaves, 280 g cooked flamegrilled chicken, 2 tsp mascarpone cheese, 2 tsp fresh parsley chopped, 50 g Parmesan cheese	chicken, spinach, rice	Olive oil

Abbreviations: ns: not specified; tsp: teaspoon; tbsp: tablespoon

Table 12: Categories-facets under which the qualitative characteristics of the recipe's main ingredients were grouped

Categories - Facets
1. Source
2. Part Nature
3. Raw source of derivatives
4. Physical state
5. Part consumed-analyzed
6. Treatment modifying structure/nature
7. Cooking method
8. Preservation technique
9. Preparation production place
10. Indented use
11. Further description

SECTION IV: CRITICAL ANALYSIS, SUMMARISING AND REPORTING OF THE RESULTS

1. Observing the ring-trial

This section summarises the notes Observers kept during the RT and which were discussed in a half-day meeting which took place on the second day of the trial. During this meeting, the partners exchanged views on the interviews they observed and had a preliminary discussion on how to analyse the generated data. A summary of observations is given below and the final forms produced are included as Appendix S.

Part 1 - Before the Interview

Two of the tools participating in the trial were web-based only; two were computer-based only; and the remaining two were both web- and computer-based. Four tools were available in the country's language only and two were available in two or more languages. The interviewers reported a wide range of expertise, ranging from beginners to professionals. The educational background of four out of six interviewers was related to medical sciences; one interviewer was a chemical engineer and the last one did not reply to that question.

Part 2 - During the interview

In four out of the six tools, the observers identified predefined meal occasions. For the remaining two no comment was made by the observers in relation to this issue. With respect to how dietary intakes were quantified food pictures were used in all cases (24h recalls and food records). In addition, household measures, standard (natural) units, pre-defined packaging sizes, standard portions as well as quantification through weight/volume were used in some cases. In two dietary assessment tools a ruler was used, in one sketches and photos of cups, plates, bowls etc with fill lines and another one used food models.

All four interviewers who performed the 24h recalls asked, either always or occasionally, information about the amount of food leftover; the use of salt; the type of milk and fat spread consumed; the consumption of water and beverages during and between meals; the addition of sugar to the coffee and tea; whether a special diet was followed; the time and place of each eating occasion; the place of food preparation; the brand name of foods and beverages consumed; cooking procedures; intake of dietary supplements; as well as the height, weight, age and gender of the interviewee.

The observers reported that it was particularly difficult to follow the two persons who did the data entry in the case of records. In one case, very few notes were kept on specific aspects on the process during the data entry. In the second case, some insight was gained through following the discussion between the interviewee and a representative of the tool providing organisation, during which the latter was asking clarifications about the reported intakes.

The observers further noted that food composition databases were integrated in five out of six tools. Five softwares provided functions to allow the interviewer to handle recipes and composite foods.

The observers did not note any questions related to the use of pepper and herbs; the person's engagement in activities while eating (e.g. watching TV, using the computer); and the active compound of dietary supplements. It should be noted, however, that following interviews conducted in different European languages, none of which was the mother tongue of any of the observers, limited the quality of the observation process.

Part 3 - After the interview

An issue that could compromise the comparability of the generated results is how ‘composite foods’ are reported. Are they reported as ‘foods as eaten’ (e.g. mashed potatoes) or as “disaggregated ingredients” (e.g. potatoes, water, milk, fat, salt etc., in the case of mashed potatoes)? It could also be the case that a software provides food consumption values in terms of quantities of raw items (irrespective of whether the food was consumed raw or cooked); including or not including the non-edible part (irrespective of whether the participant consumed or did not consume the non-edible part). For this reason, the software providers were asked to describe how the dietary intake data are expressed in the software’s output. Various and often ambiguous replies were received. The majority of providers associated their answers to reporting recipe ingredients and replied that the items were reported either as raw or as consumed, depending on whether they were ingredients of a recipe. In one case, the respondent indicated that dietary intakes were reported in terms of raw foods. The Consortium concluded that further clarifications are needed and the issue will be re-visited when analysing the replies to the CQ and the RT data files.

With respect to the interviewers access to the outputs, in three cases the interviewers had access to files providing information on food items consumed as well as to the corresponding energy and macro-nutrient intakes. Two of those outputs also provided information on the micro-nutrient content of the food consumed and one of the two provided further information on food groups, raw agricultural commodities and the food portions/servings consumed in relation to certain food groups. In one case, after the interview is completed the interviewer has access to energy, macro and micro-nutrient intake data. In the remaining two methods, interviewers have no access to the outputs. The possibility of under-reporting was evaluated in four tools. Lastly, five out of six tools produced outputs that could be directly imported by one of the commonly used statistical packages.

2. Duration of interviews entry

Table 13 presents the time (min) taken to accomplish each interview, as recorded by the interviewees on the foodlists, the software in its output and by the observers in the observer's forms. Interviewees recorded this information only for two out of the four tools (Tool 1 and Tool 4) participating in the RT with 24h recalls. In three occasions (Tools 1, 2 and 3) time was provided in the software's output. The time recorded in the output of Tool 1 corresponds to the start time of the interview, taking into account time zone differences. In the case of Tool 2, the recorded time referred to the time the interview started taking, also, into account time zone differences. Regarding Tool 3, time was recorded from the print screen option used for the creation of the outputs. Since, however, we cannot be certain on how strictly the pre-defined intervals were respected, we cannot reach any firm conclusion on the duration of the procedure. In the course of the analysis, the software providers were contacted and clarifications were sought regarding the ability of each tool to record the interview/data entry time. Interestingly, the providers of Tool 3 replied positively, but the information was not available in the outputs.

Table 13: Duration of the interviews, as recorded by the interviewees, the software and the observers

	Tool 1		Tool 2		Tool 3		Tool 4
	Recorded duration by the Interviewee	Recorded start time by the Interviewee	Recorded start time by the software	Recorded date by the software	Recorded end time by the software	Recorded duration by the Interviewee	
Day 1	70 min	10.20	10:26:23	28/01/2013	15.32	43 min	
Day 2	65 min	11.15	11:20:29	28/01/2013	16.29	40 min	
Day 3	59 min	11.55	11:58:22	28/01/2013	17.21	55 min	
Day 4	70 min	14.15	14:17:12	28/01/2013	11.04	54 min	
Day 5	50 min	-	14:51:54	28/01/2013	12.05	56 min	
Day 6	80 min	15.30	15:29:46	28/01/2013	14.50	75 min	
Day 7	90 min	9.15	9:16:59	29/01/2013	10.22	-	
Day 8	35 min	9.55	9:55:14	29/01/2013	10.56	40 min	
Day 9	60 min	10.30	10:34:50	29/01/2013	11.42	45 min	
Day 10	50 min	11.00	11:00:41	29/01/2013	12.32	50 min	
Average	~63 (62.9 min)	No data available		No data available		~51 (50.89 min)	
Observers	50-70 min	35-50 min		40-50 min		45-55 min	

The time recorded varied between and within tools but no comparison can be made since duration was not always recorded for all tools. According to the observers' notes the duration of the interviews varied between 35 to 70 minutes, with the most frequent duration being 50 minutes.

3. Picture books

All tools used food pictures to record portion sizes. Picture books were prepared with varying methods. For instance, the method of constant weight differences between adjacent pictures was used for the preparation of the picture books of Tools 1, 2, 5 and 7. Print-out copies of the picture books of all tools were available although in the case of Tool 6 pictures were integrated in the system and were displayed on the screen, as well. The quantities behind the pictures were visible to the participant in the case of Tools 2 and 4. Table 14 further summarises some characteristics of the food pictures used. The total number of pictures and the number of pictures per item varied between and within tools. A print-out of the picture book of Tool 6 was also provided and included a limited (n=25) number of items comparing to the number of items included in the electronic version.

Table 14: Summary of characteristics of the picture books used by each tool

Tool	Total number of pictures in the picture book	Number of pictures per item in the picture book
Tool 1 (24h recalls)	60	3-8
Tool 2 (24h recalls)	144	2-6
Tool 3 (24h recalls)	85	4-6
Tool 4 (24h recalls)	144	1-3
Tool 5 (Records)	62	1-4
Tool 6 (Records)	25, in the print-out version 318, in the electronic version	1-7
Tool 7 (Records)	60	3-8

4. Analysis of the RT data

This section describes the results of the comparisons made between the “input” and the “output” data and aims to present how well each tool recorded the data reported and to which extent repeated intakes were consistently captured by the participating tools.

As indicated in previous sections, the analysis of the RT data aimed at assessing:

1. how well the tools recorded characteristics of the meal occasions
2. the repeatability of measurements
3. the tools’ relative accuracy and
4. the extent through which qualitative characteristics of the items consumed (e.g. fat content, packaging material) were taken in by each tool.

The analysis further aimed at understanding how the tools:

5. recorded the reported recipes
6. handled foods, usually forgotten in dietary recalls (e.g. water intake or consumption of soft drinks between meals)
7. recorded the intake of dietary supplements
8. handled days in which no water consumption was reported and
9. identified days of unusual intakes due to special conditions (e.g. traveling)

The overall aim was to compare the harmonised and fully standardized data provided by the interviewees/food record keepers to those generated through the dietary assessment tools.

5. Characteristics of the meal occasions

Three characteristics of meal occasions were compared: (a) the time of the meal, (b) the type of the meal and (c) the place of the meal. Tables 15-20 present results for each of the above.

Tables 15 and 16 provide information regarding the distribution of accurate and inaccurate recordings in relation to the time of the meal occasion. In general, tools adequately captured the time of the meal occasion. Some inaccurate recordings were noted and originated either from limitations of the tool or erroneous recordings by the interviewers or food record keepers. On four occasions, the exact time of the meal was not recorded due to the tool's inability to record specific meal timings. In particular, three tools could not record 10 minutes past the hour (as well as some multiples of 10) i.e. XX:10, XX:20, XX:40 whereas one tool could not capture quarter hours.

Table 15: Distribution (% , n) of recordings regarding the time of the meal, N=72

Tool	Percentages and number (in parenthesis) of accurate recordings	Percentages and number (in parenthesis) of inaccurate recordings		
		Tool derived	Interviewer/ Food record keeper derived ^(a)	
			% (n) of inaccurate recordings	% (n) of no recordings
Tool 1 (24h recall)	86.1 (62)	5.6 (4)	8.3 (6)	-
Tool 2 (24h recall)	87.5 (63)	-	5.6 (4)	6.9 (5)
Tool 3 (24h recall)	95.8 (69)	-	2.8 (2)	1.4 (1)
Tool 4 (24h recall)	79.2 (57)	-	-	20.8 (15)
Tool 5 (Records)	70.9 (51)	20.8 (15)	8.3 (6)	-
Tool 6 (Records)	94.4 (68)	5.6 (4)	-	-
Tool 7 (Records)^(b)	88.7 (47)	5.6 (3)	3.8 (2)	1.9 (1)

(a): Including inconsistencies introduced by the interviewer (in the case of 24hs) or by the food record keeper (in the case of food records),

(b); Total number of recordings, N=53.

Table 16: Indicative examples of inaccurate recordings of time of the meal

Day 7: Sunday	Time (EFSA)	Time (Recorded)	Source of inconsistency
Before breakfast	7:45	8:00	Tool
Snack	10:00	9:00	Interviewer
Dinner	19:15	19:20	Tool
After dinner	22:00	21:30 & 22:00	Interviewer

In Tables 17 and 18 the distribution of accurate and inaccurate recordings in relation to the type of the meal is presented. The options available in some tools as well as errors introduced by the interviewers were responsible for inaccuracies observed. For instance, a meal described as “before breakfast” was recorded as “breakfast” or as “unclassified” or as “other eating” or as “snack between meal”. In addition, different snacks of the day were similarly recorded as “other eating” or as “unclassified”. In some of these cases, any differentiation between different meal types was not feasible, indicating the limited options available by some of the tools regarding the type of meal consumed.

Table 17: Distribution (% , n) of recordings regarding the type of meal, N=72.

Tool	Percentages and number (in parenthesis) of accurate recordings	Percentages and number (in parenthesis) of inaccurate recordings			
		Tool Derived		Interviewer/Food record keeper Derived ^(a)	
		% (n) of recordings capturing a different type of meal ^(b)	% (n) of recordings capturing the meal type in a generic way ^(c)	% (n) of inaccurate recordings	% (n) of no recordings
Tool 1 (24h recall)	91.7 (66)	-	-	8.3 (6)	-
Tool 2 (24h recall)	90.3 (65)	-	2.8 (2)	-	6.9 (5)
Tool 3 (24h recall)	95.8 (69)	-	-	2.8 (2)	1.4 (1)
Tool 4 (24h recall)	90.3 (65)	-	5.5 (4)	2.8 (2)	1.4 (1)
Tool 5 (Records)	91.7 (66)	8.3 (6)	-	-	-
Tool 6 (Records)	41.7 (30)	-	58.3 (42)	-	-
Tool 7 (Records)^(d)	86.8 (46)	-	-	11.3 (6)	1.9 (1)

(a): Including inconsistencies introduced through the data entry in case of food records;

(b): “Before breakfast” was recorded as “Breakfast”;

(c): The meal was captured through the generic “unclassified” or “other eating” or “snack between meals” options;

(d): Total number of recordings, N=53.

Table 18: Indicative examples of inaccurate recordings of meal type

Tool	Day	Time	Type of meal (EFSA)	Type of meal (Recorded)	Source of error
Tool 3 (24h recall)	M2	8:15	Breakfast	Before breakfast	Interviewer
	M2	9:15	Snack	Breakfast	Interviewer
	W2	4:30	Before Breakfast	-	Interviewer
Tool 4 (24h recall)	M1	7:00	Before Breakfast	Unclassified	Tool
Tool 5 (Records)	M1	7:00	Before Breakfast	Breakfast	Tool

Tables 19 and 20 present the distribution of accurate and inaccurate recordings in relation to the place of the meal. The majority of the tools adequately captured the place of the meal occasion. In one tool only three options were available: "home", "out of home" and "unclassified" which limited its ability to capture various eating places. In addition, "work canteen" and "outside/in park" were the meal places not recorded consistently by most of the tools. In one case (Tool 2), there was no provision to capture this information. Lastly, it appears that errors had also been introduced by the interviewers/food record keepers.

Table 19: Distribution (n, %) of recordings regarding the place of the meal occasion, N=72.

Tool ^(a)	Percentages and number (in parenthesis) of accurate recordings	Percentages and number (in parenthesis) of inaccurate recordings			
		Tool derived		Interviewer/Food record keeper Derived ^(b)	
		% (n) of recordings allowing no differentiation between different eating places	% (n) of recordings capturing the eating place but not exactly	% (n) of inconsistent recordings	% (n) of no recordings
Tool 1 (24h recall)	80.5 (58)	15.3 (11)	-	4.2 (3)	-
Tool 3 (24h recall)	94.4 (68)	1.4 (1)	-	4.2 (3)	1.4 (1)
Tool 4 (24h recall)	50.0 (36)	36.1 (26)	-	9.7 (7)	4.2 (3)
Tool 5 (Records)	97.2 (70)	-	-	2.8 (2)	-
Tool 6 (Records)	80.5 (58)	16.7 (12)	2.8 (2)	-	-
Tool 7 (Records) ^(c)	84.9 (45)	15.1 (8)	-	-	-

(a): Tool 2 had no provision to record information about the place of meal consumption;

(b): Including inaccuracies introduced through the data entry in case of food records;

(c): Total number of recordings, N=53.

Table 20: Indicative examples of recordings of place of the meal occasion^(a)

Eating Place (EFSA)	Tool 1 (24h recall)	Tool 3 (24h recall)	Tool 4 (24h recall)	Tool 5 (Records)	Tool 6 (Records)	Tool 7 (Records)
Work canteen	Work (1)	Other restaurant/hotel (4)	Out of home (5)	Canteen	Coffee room/canteen (6)	Work (7)
Work	Work (1)	Work, school	Out of home (5)	Work	Coffee room/canteen (6)	Work (7)
Restaurant	Catering facility (2)	Other restaurant/hotel (4)	Out of home (5)	At restaurant/eating house	Restaurant/bar/cafe	Catering facility (8)
Bar	Catering facility (2)	Cafe/bar/pastry shop/snack bar	Out of home (5)	Bar/coffee shop/bakery shop	Restaurant/bar/cafe	Catering facility (8)
Outside/in park	Other (3)	Outdoor (street/market/park/beach, etc)	Out of home (5)	On the way ^(b)	Other place ^(c)	Other (9)
At friend's house	Other (3)	Friends/family	Out of home (5)	At friend's or relative's home	At home with family/friends	Other (9)

(a): Same numbers indicate that the places could not be differentiated;

(b): The option "Picnic/Outdoor" was also available;

(c): The place recorded just allows differentiation from other eating places, but does not provide specific information on the place of the meal.

6. Repeatability of the recorded data

Tables 21 and 22 summarise results on the repeatability of measurements. Table 21 presents the distribution of food items per number of repetitions and tool that had either 100% or 0% repeatability with and without the $\pm 10\%$ tolerance. An index of 0% means that all quantities of a repeatedly reported item were different, even after considering the $\pm 10\%$ tolerance. Items with missing recordings in the output data were not included in this analysis. In the case of 24h recalls, the interviewer using Tool 4 recorded consistently most of the items with 3 repetitions and the interviewers using Tools 2 and 3 most of the items with 5 repetitions. In the case of food records, the food record keeper using Tool 7 recorded consistently most of the items with 3 repetitions while the food record keeper using Tool 5 most of the items with 5 repetitions.

Table 21: Distribution % (n) of items with 100% or 0% repeatability given or not a 10% tolerance

Tool	Number of repetitions ^(a)	% (n) of items with 100% repeatability without a 10% tolerance	% (n) of items with 100% repeatability with a 10% tolerance	% (n) of items with 0% repeatability with a 10% tolerance
Tool 1 (24h recalls)	3 ^(b)	27 (3)	27 (3)	27 (3)
	5 ^(c)	30 (6)	40 (8)	0 (0)
Tool 2 (24h recalls)	11	0 (0)	0 (0)	0 (0)
	3 ^(b)	55 (6)	55 (6)	9 (1)
	5 ^(c)	60 (12)	60 (12)	0 (0)
Tool 3 (24h recalls)	11	0 (0)	0 (0)	0 (0)
	3 ^(d)	67 (8)	67 (8)	0 (0)
	5 ^(c)	60 (12)	70 (14)	0 (0)
Tool 4 (24h recalls)	11	0 (0)	0 (0)	0 (0)
	3 ^(e)	86 (12)	86 (12)	0 (0)
	5	43 (9)	57 (12)	0 (0)
Tool 5 (Records)	11	0 (0)	0 (0)	0 (0)
	3	60 (9)	60 (9)	0 (0)
	5	90 (19)	90 (19)	0 (0)
Tool 6 (Records)	11	0 (0)	0 (0)	0 (0)
	3 ^(d)	42 (5)	42 (5)	0 (0)
	5	52 (11)	52 (11)	0 (0)
Tool 7 (Records)	11	0 (0)	0 (0)	0 (0)
	3 ^(f)	71 (5)	71 (5)	0 (0)
	5 ^(g)	80 (4)	80 (4)	0 (0)
	-	-	-	-

(a): The maximum number of items per repetition is the following:

3 repetitions: 15 items

5 repetitions: 21 items

11 repetitions: 1 item (a medium glass of water)

If recordings were missing from the output data, the item was excluded from the analysis.

(b): total number of food items with 3 repetitions n=11

(c): total number of food items with 5 repetitions n=20

(d): total number of food items with 3 repetitions n=12

(e): total number of food items with 3 repetitions n=14

(f): total number of food items with 3 repetitions n=7

(g): total number of food items with 5 repetitions n=5

The repeatability indices ranged from 40% (rye bread, white bread, cola light, biscuits for toddlers and butter in case of Tool 1; butter in case of Tool 3; white bread in case of Tool 4; "milk, not specified", in case of Tool 5) to 100%. Table 22 displays by tool and number of repetitions (3, 5 or 11) specific items that were recorded with 100% repeatability (without a $\pm 10\%$ tolerance) and those with a repeatability index above 80% (given $\pm 10\%$ tolerance). The 80% cut-off was selected ad hoc in order to identify items that had generally been adequately captured each time they had been reported. Green tea and beer were the only items that were consistently recorded by all tools.

Table 22: Items with 100% and more than 80% repeatability given or not a 10% tolerance

Tool	Number of repetitions	Items with 100% repeatability without a 10% tolerance	Items with $\geq 80\%$ repeatability with a 10% tolerance
Tool 1 (24h recalls)	3	Green tea, fish oil capsules, water (small glass)	Green tea, fish oil capsules, water (small glass)
	5	Chocolate biscuit (filled), filtered coffee, crackers, instant coffee, espresso coffee, beer	Cream (ns), soft drink, banana, chocolate biscuit (filled), grapes, filtered coffee, crackers, instant coffee, espresso coffee, beer
Tool 2 (24h recalls)	3	Margarine (2tsp), green tea, fish oil capsules, multi-vitamin tablets, rolls, sponge cake	Margarine (2tsp), green tea, fish oil capsules, multi-vitamin tablets, rolls, sponge cake
	5	Rye bread, banana, chocolate biscuit (filled), roasted potatoes, water (small plastic cup), grapes, filtered coffee, water (large plastic cup), cola light, espresso coffee, beer, white wine	Rye bread, banana, white bread, chocolate biscuit (filled), roasted potatoes, water (small plastic cup), grapes, filtered coffee, water (large plastic cup), cola light, instant coffee, espresso coffee, beer, white wine, biscuits for toddlers
Tool 3 (24h recalls)	3	Margarine (2tsp), risotto with chicken and spinach, water (large glass), pizza with cheese and mushrooms, green tea, fish oil capsules, organic puree for toddlers, multi-vitamin tablet	Margarine (2tsp), risotto with chicken and spinach, water (large glass), pizza with cheese and mushrooms, green tea, fish oil capsules, organic puree for toddlers, multi-vitamin tablet
	5	Cream (ns), soft drink, banana, orange juice (large glass), water (small plastic cup), filtered coffee, crackers, cola light, instant coffee, espresso coffee, beer, white wine	Cream(ns), soft drink, banana, chocolate biscuit (filled), roasted potatoes, orange juice (large glass), water (small plastic cup), grapes, filtered coffee, water (large plastic cup), crackers, cola light, instant coffee, espresso coffee, beer, white wine
	11	-	water (medium glass)
Tool 4 (24h recalls)	3	Margarine (2tsp), risotto with chicken and spinach, water (large glass), pizza with cheese and mushrooms, green tea, ice cream, fish oil capsules, organic puree for toddlers, multi-vitamin tablet, rolls, ham, sponge cake	Margarine (2tsp), risotto with chicken and spinach, water (large glass), pizza with cheese and mushrooms, green tea, ice cream, fish oil capsules, organic puree for toddlers, multi-vitamin tablet, rolls, ham, sponge cake
	5	Cream (ns), soft drink, banana, chocolate biscuit (filled), orange juice (large glass), grapes, crackers, beer, white wine	Cream (ns), soft drink, banana, chocolate biscuit (filled), roasted potatoes, orange juice (large glass), , water (small plastic cup), grapes, crackers, instant coffee, cola light, espresso coffee, beer, white wine, biscuits for toddlers, butter
	11	-	Water (medium glass)
Tool 5 (Records)	3	Margarine (2tsp), water (large glass), pizza with cheese and mushrooms, green tea, ice cream, organic puree for toddlers, sponge cake, rice, vitamin B	Margarine (2tsp), water (large glass), pizza with cheese and mushrooms, green tea, ice cream, organic puree for toddlers, sponge cake, rice, vitamin B
	5	Rye bread, soft drink, banana, white bread, chocolate biscuit (filled), roasted potatoes, orange juice (large glass), water	Rye bread, cream (ns), soft drink, banana, white bread, chocolate biscuit (filled), roasted potatoes, orange juice

		(small plastic cup), grapes, filtered coffee, water (large plastic cup), crackers, cola light, instant coffee, espresso coffee, beer, white wine, biscuits for toddlers, butter	(large glass), water (small plastic cup), grapes, filtered coffee, water (large plastic cup), crackers, cola light, instant coffee, espresso coffee, beer, white wine, biscuits for toddlers, butter
	11	-	water (medium glass)
Tool 6 (Records)	3	Margarine (2ts), green tea, ice cream, rice, water (small glass)	Margarine (2ts), green tea, ice cream, rice, water (small glass)
	5	Rye bread, banana, white bread, roasted potatoes, water (small plastic cup), grapes, crackers, cola light, beer, white wine, biscuits for toddlers	Rye bread, soft drink, banana, white bread, chocolate biscuit (filled), roasted potatoes, milk (ns), water (small plastic cup), grapes, crackers, cola light, instant coffee, espresso coffee, beer, white wine, biscuits for toddlers, butter
	11	-	water (medium glass)
Tool 7 ^(a) (Records)	3	Pizza with cheese and mushrooms, green tea, ice cream, ham, water (small glass)	Pizza with cheese and mushrooms, green tea, ice cream, ham, water (small glass)
	5	Banana, chocolate biscuit (filled), crackers, biscuits for toddlers	Banana, chocolate biscuit (filled), crackers, biscuits for toddlers

Abbreviations: ns: not specified; tsp: teaspoon

(a): risotto with chicken and spinach, fish oil capsule, organic puree for toddlers, multi-vitamin tablet, rolls, sponge cake, rice, vitamin B, rye bread, cream (ns), soft drink, white bread, roasted potatoes, orange juice (large glass), milk (ns), grapes, filtered coffee, water (large plastic cup), cola light, instant coffee, espresso coffee, beer, white wine, butter, water (medium glass) were not included in the analysis due to smaller number of repetitions.

7. Relative accuracy of the recorded data

The tables included in Appendices P-R allow direct comparisons between the key quantities expected of being recorded (“input data”) and the quantities finally recorded by the tools (“output data”). The first columns provide information about the day, number of repetitions, food item, key quantity, quantity to be reported and characteristics of the food items, respectively. In the case that the key quantity was described through a range of quantities, the average value was calculated and is displayed instead. The remaining columns present per tool: (a) whether the interviewee/food record keeper quantified his/her intake through a picture or not (YES/NO), (b) the quantity recorded and (c) the percent deviation from the key quantity calculated as:

$$\% \text{ deviation} = [(quantity \text{ recorded} - key \text{ quantity}) / key \text{ quantity}] \times 100$$

In interpreting the calculating deviations, one should bear in mind that differences were in some cases expected since it was not possible to select the exact same portion to the anticipated one using a country’s picture book.

Table 23 presents per tool the percentage of food items with a recorded quantity equal to the key quantity without and after accepting a $\pm 10\%$, 15% and 20% deviation among them.

Table 23: Percentage of food items with a recorded quantity equal to the key quantity without any tolerance and after accepting a $\pm 10\%$, 15% and 20% deviation among them

Tool	Total number of food items	% items with recorded quantity equal to key quantity without any tolerance	% items with recorded quantity equal to key quantity with $\pm 10\%$ tolerance	% items with recorded quantity equal to key quantity with $\pm 15\%$ tolerance	% items with recorded quantity equal to key quantity with $\pm 20\%$ tolerance
Tool 1 (24h recalls)	192	16	31	41	50
Tool 2 (24h recalls)	197	38	54	59	62
Tool 3 (24h recalls)	198	18	38	45	54
Tool 4 (24h recalls)	199	24	37	45	55
Tool 5 (Records)	205	21	30	34	38
Tool 6 (Records)	204	22	31	33	44
Tool 7 (Records)	125	33	50	59	62

Irrespective of the level of tolerance, Tool 2 in the case of 24h recalls and Tool 7 in the case of food records were those systematically presenting the higher relative accuracy, while Tool 1 (24h recalls) and Tools 5 and 6 (food records) were those systematically presenting the lower relative accuracy. In general, the percentage of items recorded accurately by the tools was generally low.

Table 24 is based on items with recorded values which were $\pm 10\%$ distant from the key quantity and presents the percentage of these items that were captured or were not captured through the use of food pictures. In almost all cases, the use of pictures allowed more accurate recordings.

Table 24: Percentage of items recorded and not recorded through food pictures. The recorded quantities of these items were $\pm 10\%$ of the key quantity

Tool	Percentage (%) of items recorded through pictures (n/n _{total})	Percentage (%) of items not recorded through pictures % (n/n _{total})
Tool 1 (24h recalls)	52 (37/71)	18 (21/119)
Tool 2 (24h recalls)	63 (55/88)	47 (51/109)
Tool 3 (24h recalls)	47 (34/72)	33 (42/126)
Tool 4 (24h recalls)	37 (32/87)	38 (42/112)
Tool 5 (Records) ^(a)	-	-
Tool 6 (Records)	37 (19/52)	30 (45/152)
Tool 7 (Records)	78 (38/49)	32 (24/76)

(a): Tool 5 recorded all items, except from two, by using pictures and no calculations were performed.

Spearman correlation coefficients between the key and recorded quantities over all food items are presented by tool in Table 25. All tools had a significant correlation coefficient, indicating that the recorded quantity is strongly and positively correlated with the key quantity in all tools. This was also the

case when the Spearman correlation coefficients were calculated by the types of quantification methods previously indicated (Table 26), although when items were quantified through their “exact weight” correlation coefficients were somewhat reduced.

Table 25: Spearman’s rank correlation coefficients between recorded quantities and key quantities over all food items

Tool	Spearman correlation coefficient (ρ)	p-value
Tool 1 (24h recalls)	+ 0.91	<0.001
Tool 2 (24h recalls)	+ 0.93	<0.001
Tool 3 (24h recalls)	+ 0.91	<0.001
Tool 4 (24h recalls)	+ 0.93	<0.001
Tool 5 (Records)	+ 0.94	<0.001
Tool 6 (Records)	+ 0.90	<0.001
Tool 7 (Records)	+ 0.95	<0.001

Table 26: Spearman’s rank correlation coefficients between recorded quantities and key quantities by food quantification method

Spearman correlation coefficient (ρ)				
Tool	Food items reported by units	Food items reported by exact weight	Food items reported by portions	p-value
Tool 1 (24h recalls)	+ 0.92	+ 0.85	+ 0.92	< 0.001
Tool 2 (24h recalls)	+ 0.91	+ 0.89	+ 0.98	< 0.001
Tool 3 (24h recalls)	+ 0.86	+ 0.91	+ 0.88	< 0.001
Tool 4 (24h recalls)	+ 0.91	+ 0.90	+ 0.86	< 0.001
Tool 5 (Records)	+ 0.93	+ 0.90	+ 0.94	< 0.001
Tool 6 (Records)	+ 0.87	+ 0.85	+ 0.94	< 0.001
Tool 7 (Records)	+ 0.94	+ 0.92	+ 0.89	< 0.001

The sign test can assess whether food items are systematically over or underestimated by each tool, while it cannot estimate the size of difference between the recorded quantity and its matched key quantity. It counts the number of pairs of which the recorded quantity is larger, smaller or equal to its matched key quantity and then tests whether the null hypothesis is true or not without taking into account the pairs of which the recorded quantity equals the key quantity. The null hypothesis is that the possibility the recorded quantity to be greater than the key quantity, i.e. be overestimated, is equal to the possibility the recorded quantity to be smaller than the key quantity, i.e. be underestimated. The alternative hypothesis is that the possibility the recorded quantity to be overestimated is different from the possibility the recorded quantity to be underestimated.

Table 27 presents by quantification method and tool the number of pairs that were either overestimated or underestimated along with their corresponding p-value. The statistically significant p-values ($p \leq 0.05$) indicate that the possibility the recorded quantity to be overestimated (recorded quantity > key quantity) is different from the possibility the recorded quantity to be underestimated (recorded quantity < key quantity). Based on the estimated p-values, Tools 2 and 3 (24h recalls) systematically overestimated food items reported through portions. In the case of food records, Tool 7 systematically overestimated items

reported through exact weight, while Tool 5 systematically underestimated the food items that were reported through exact weight and portions. This was also the case for food items quantified through their exact weight in Tool 6 and through units in Tool 7.

Table 27: P-values^(a) and number of pairs generated by the sign test with recorded quantity larger or smaller than the matched key quantity by tool and quantification method^(b)

Tool	Food items reported by units			Food items reported by exact weight			Food items reported by portions		
	RQ>KQ	RQ<KQ	p-value	RQ>KQ	RQ<KQ	p-value	RQ>KQ	RQ<KQ	P-value
Tool 1 (24h recalls)	26	30	0.689	46	31	0.110	14	15	1.000
Tool 2 (24h recalls)	23	21	0.880	29	31	0.897	15	3	0.008
Tool 3 (24h recalls)	22	26	0.666	41	45	0.747	21	8	0.024
Tool 4 (24h recalls)	28	23	0.576	41	34	0.489	15	11	0.557
Tool 5 (Records)	22	24	0.883	24	61	<0.001	8	23	0.011
Tool 6 (Records)	20	27	0.382	24	61	<0.001	19	9	0.087
Tool 7 (Records)	11	25	0.029	23	9	0.020	6	10	0.455

RQ: recorded quantity; KQ: key quantity

(a): P-value ≤ 0.05 indicates that the recorded quantities are statistically different from the matched key quantities at a significance level of 5%.

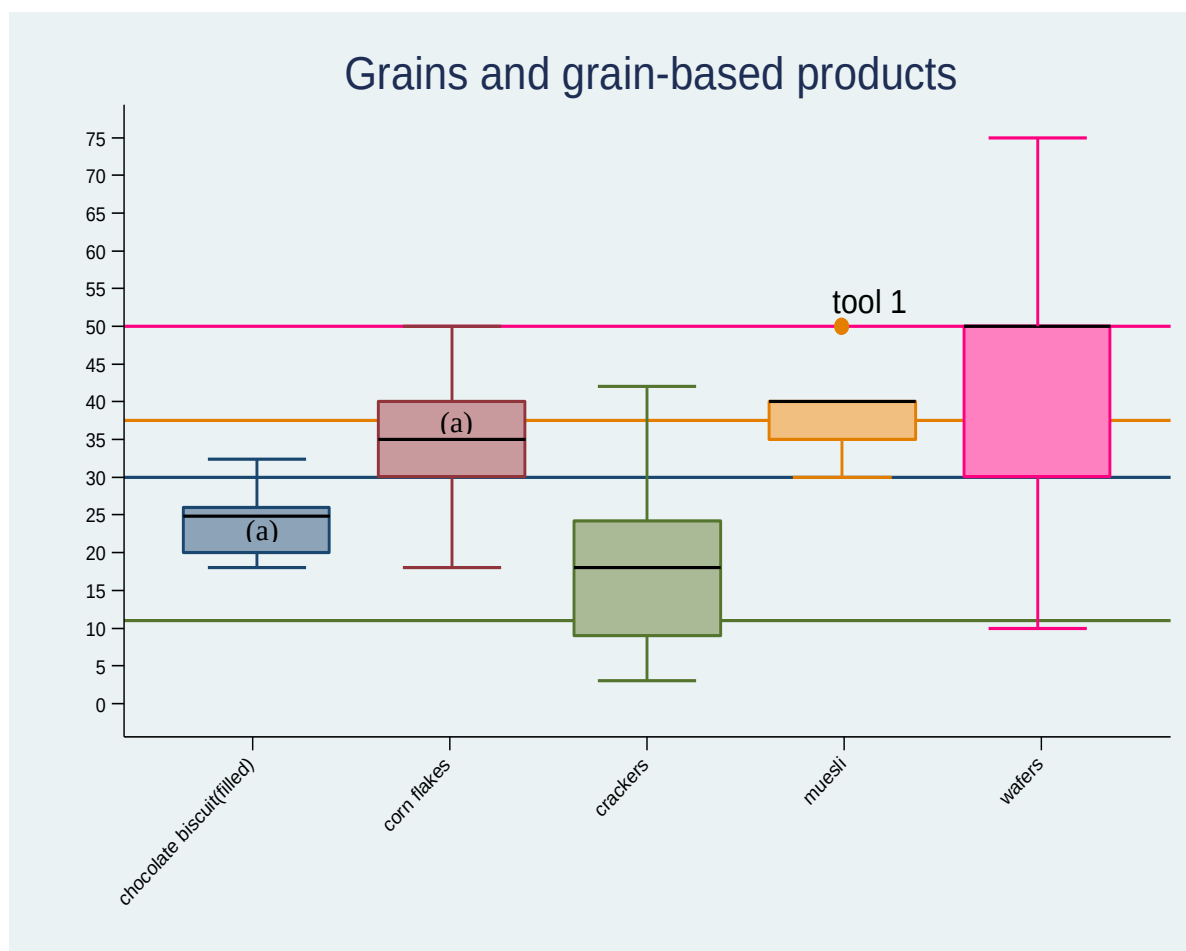
(b): P-value <0.05 in the sign test, if most pairs have recorded quantity larger than the matched key quantity, then the consumed quantities are systematically overestimated. If most pairs have recorded quantity smaller than the matched key quantity, then the consumed quantities are systematically underestimated

The sum of the recorded quantities of solid foods for each day, along with the sum of the corresponding key quantities are presented in Table 28. The majority of tools reached close to the sum of solid foods consumed on Day 8, which was the day with small amounts of solid foods consumed as the “participant” reported suffering of gastroenteritis. Interestingly, all tools overestimated consumption on Day 8 and all underestimated the intake of solid foods on Days 9 and 10. Accepting a ± 50 g deviation from the total key quantity, all tools adequately recorded solid foods in one or more occasions (indicated in bold) with Tool 3 performing best in the case of 24h recalls and all three tools participating with food records (Tools 5, 6 and 7) performing equally.

Table 28: Summations of consumed quantities and of key quantities of solid foods recorded by each tool per day

Days	Tool 1 (24h recalls)	Tool 2 (24h recalls)	Tool 3 (24h recalls)	Tool 4 (24h recalls)	Tool 5 (Records)	Tool 6 (Records)	Tool 7 (Records)	Sum of key quantities
1	1316	1325	1209	1576	1238	1121	1304	1391
2	547	1241	826	695	715	743	1022	866
3	1476	1655	1316	1372	1494	1058	1512	1631
4	1423	1470	1232	1299	1273	1147	-	1489
5	1213	1490	1357	1239	1017	1070	-	1310
6	2692	2265	2511	3520	2656	1938	-	2555
7	1006	965	1338	1360	961	1283	1281	1394
8	296	345	358	386	296	293	283	280
9	1555	1820	1558	1866	1478	1456	1565	1898
10	841	1195	1241	1106	917	1089	1092	1271

Results have also been graphically illustrated through boxplots (Figures 10-23). Although, data collected through the 24h recall and the food record methods are not directly comparable due to differences in the applied RT protocols, boxplots have been created providing joined information on the quantities recorded as compared to the key quantities. Key quantities are indicated as horizontal lines in the graphs with the color of their corresponding boxplot. The lower line of each box represents the 25th percentile, the upper line the 75th percentile and the black line the median value. Outliers are presented as dots on the graphs and the tools that recorded the outliers are indicated. Descriptive statistics of each food item presented in the boxplots, along with the corresponding key quantities, the deviation between the minimum and maximum recorded quantities and any outliers observed can be found in the table included as Appendix T to this report. Deviation among the minimum and maximum recorded quantity was computed as $\%dev = [(maximum\ value - minimum\ value) / minimum\ value] * 100$. Outliers were excluded from this calculation. As outliers were defined the values lying 1.5 times the interquartile range above the upper quartile or below the lower quartile. For the food items with a median value equal to the key quantity, half of the remaining values are higher than the corresponding key quantity and the other half lower than the corresponding key quantity. If the median value is equal to both the key quantity and the minimum or maximum recorded quantity, this means that half of the remaining values are equal to the key quantity.



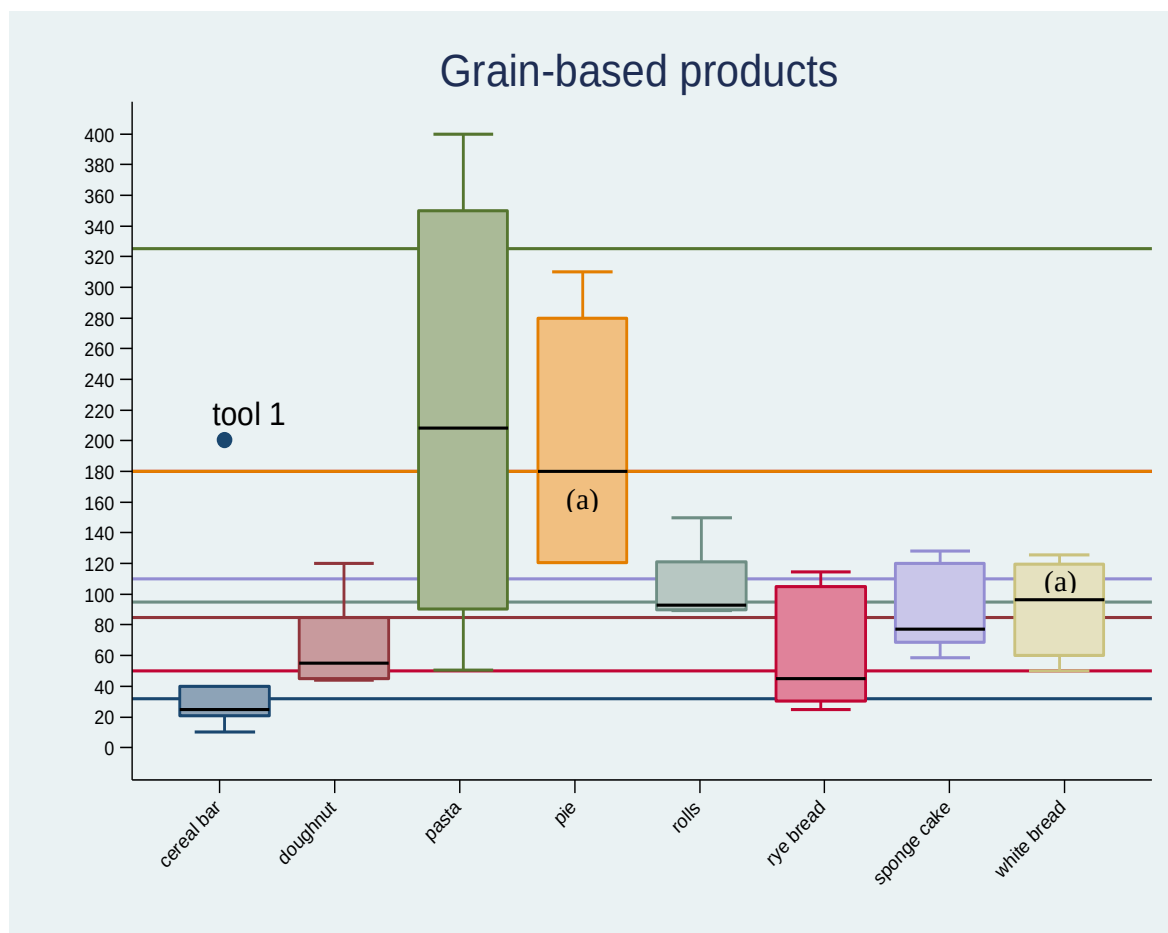
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are indicated.

(a) Both corn flakes and chocolate biscuit (filled) have the same key quantity.

Figure 10: Boxplots presenting variance in the recorded quantities – Grains and grain-based products



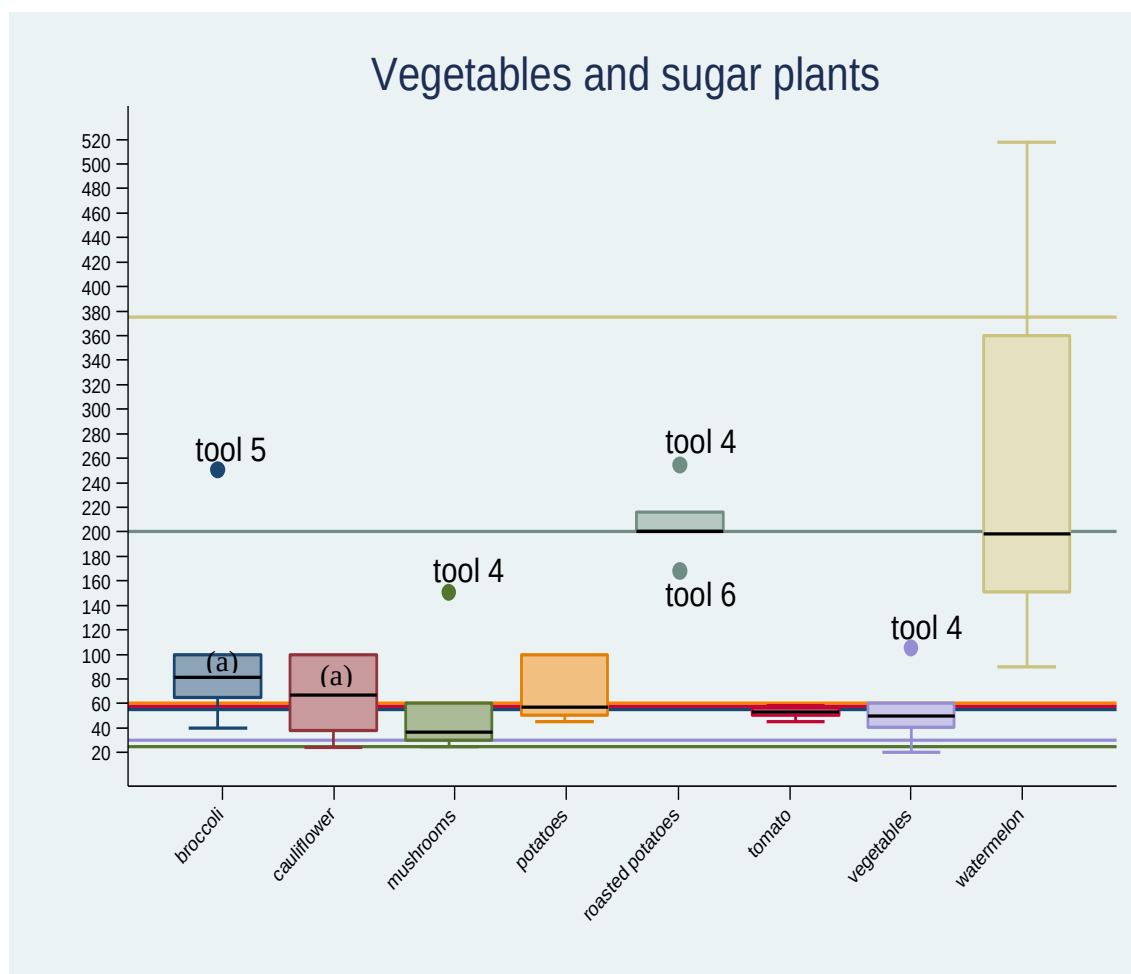
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both pie and white bread have the same key quantity.

Figure 11: Boxplots presenting variance in the recorded quantities – Grain-based products



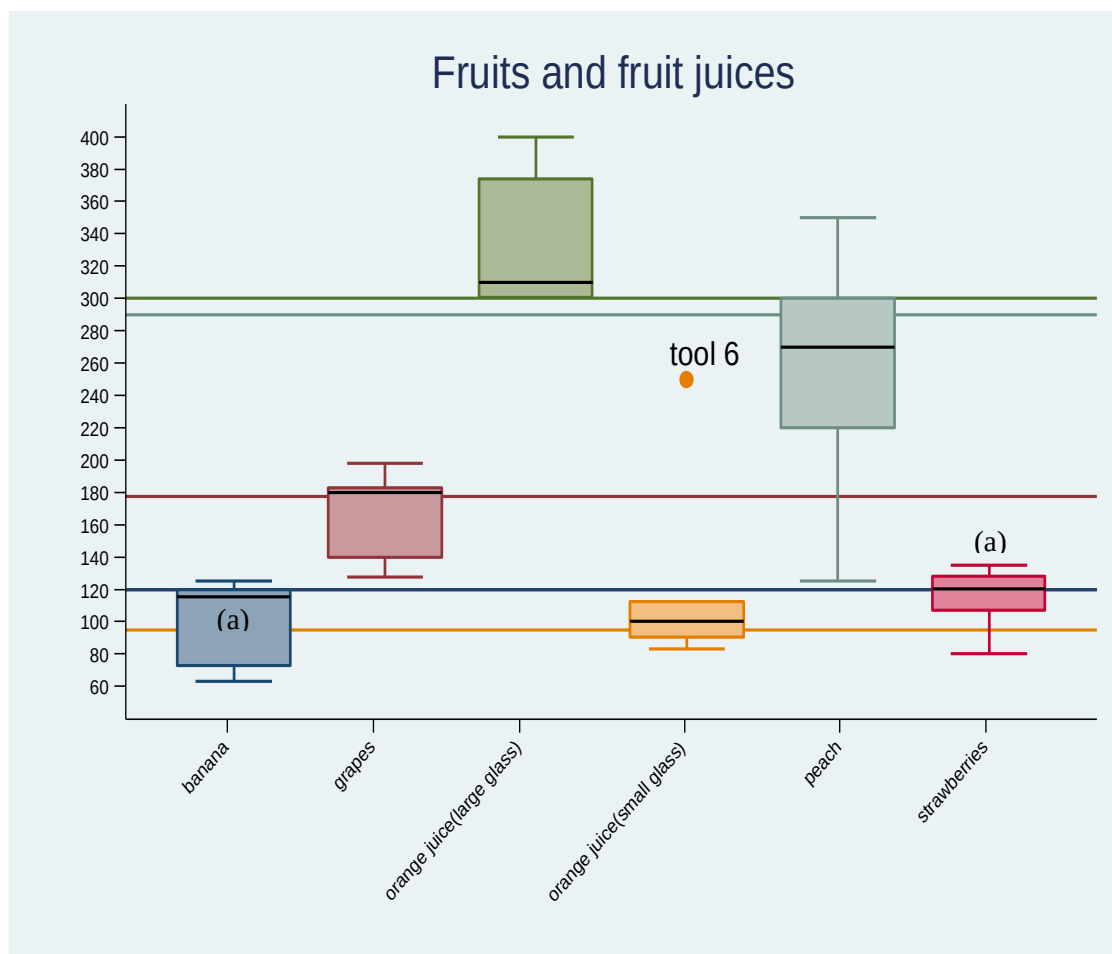
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both broccoli and cauliflower have the same key quantity.

Figure 12: Boxplots presenting variance in the recorded quantities – Vegetables and sugar plants



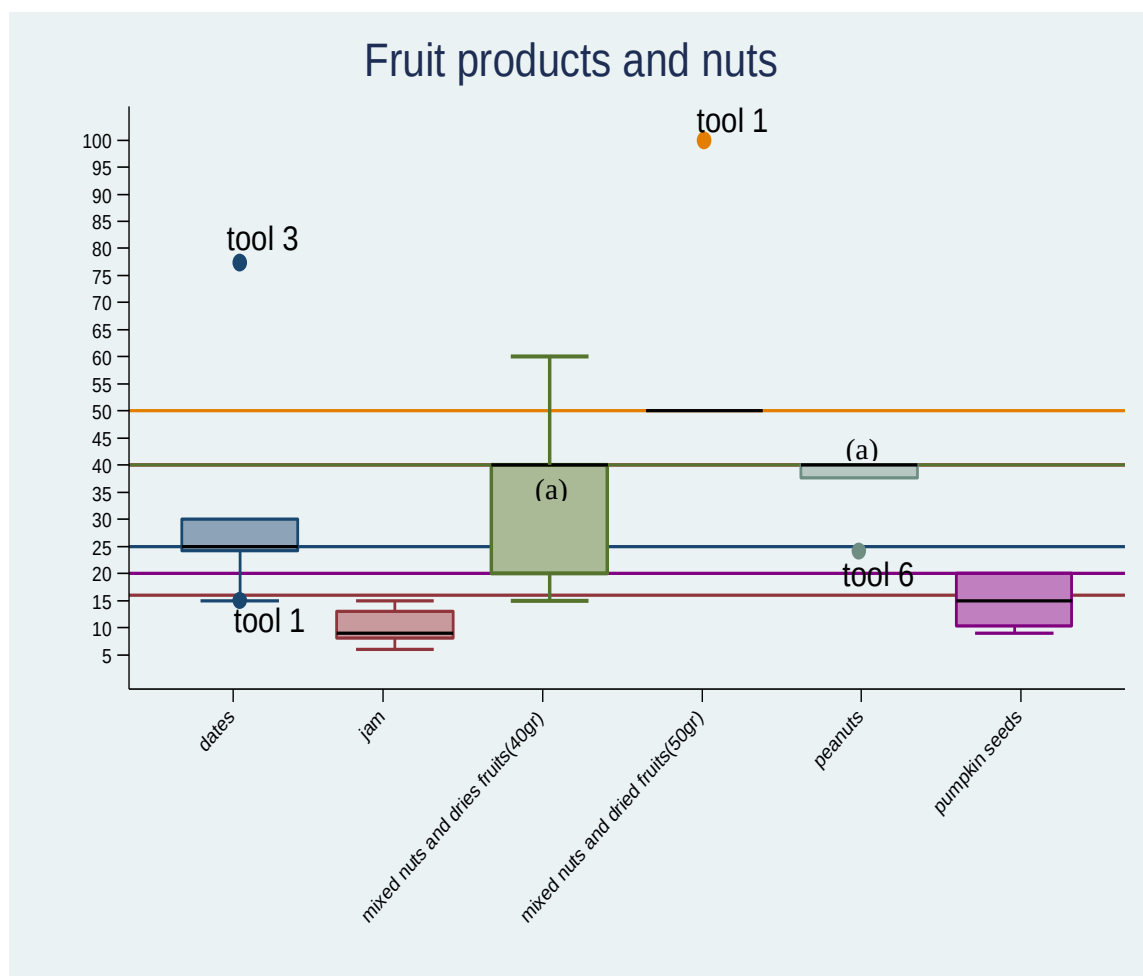
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both strawberries and banana have the same key quantity.

Figure 13: Boxplots presenting variance in the recorded quantities – Fruits and fruit juices



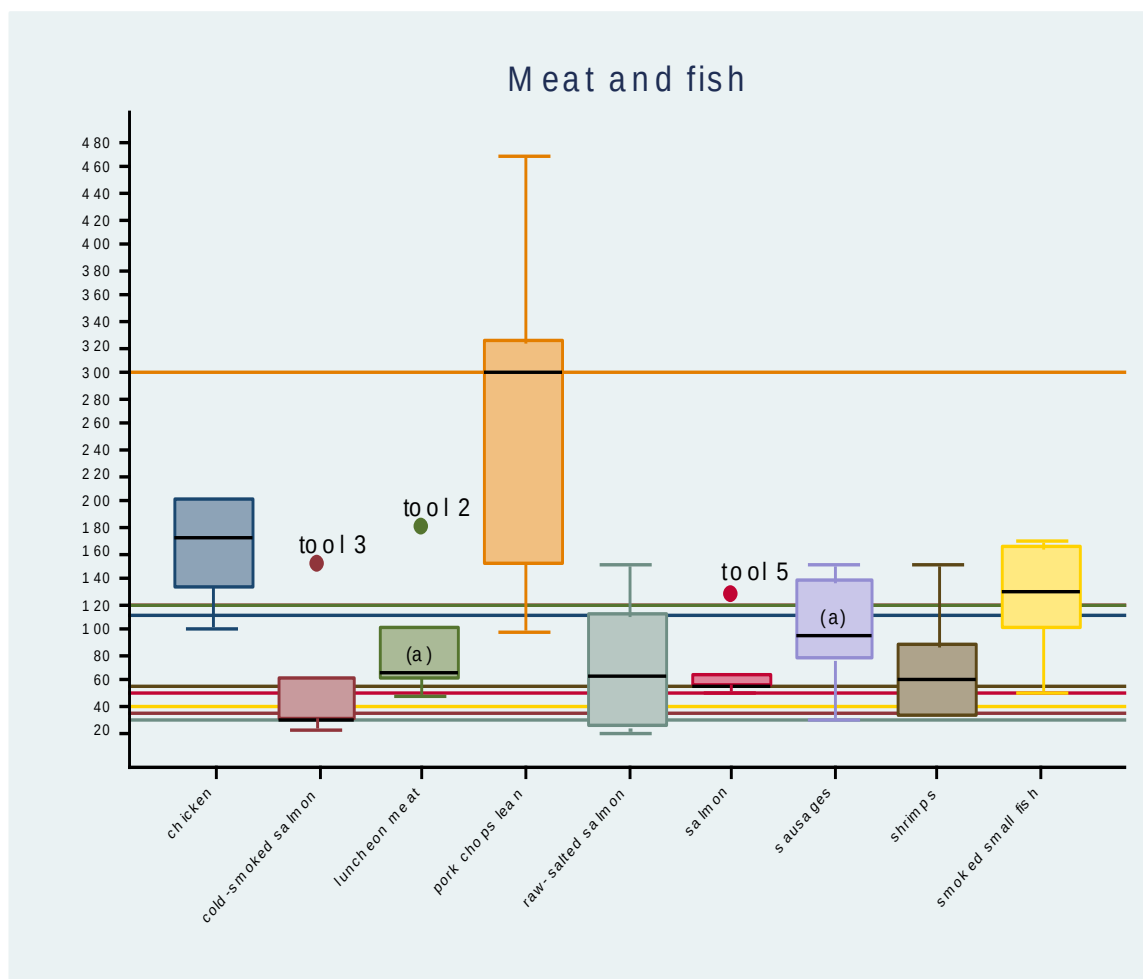
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both peanuts and mixed nuts and dried fruits(40gr) have the same key quantity.

Figure 14: Boxplots presenting variance in the recorded quantities – Fruit products and nuts



The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box. Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both luncheon meat and sausages have the same key quantity.

Figure 15: Boxplots presenting variance in the recorded quantities – Meat and fish



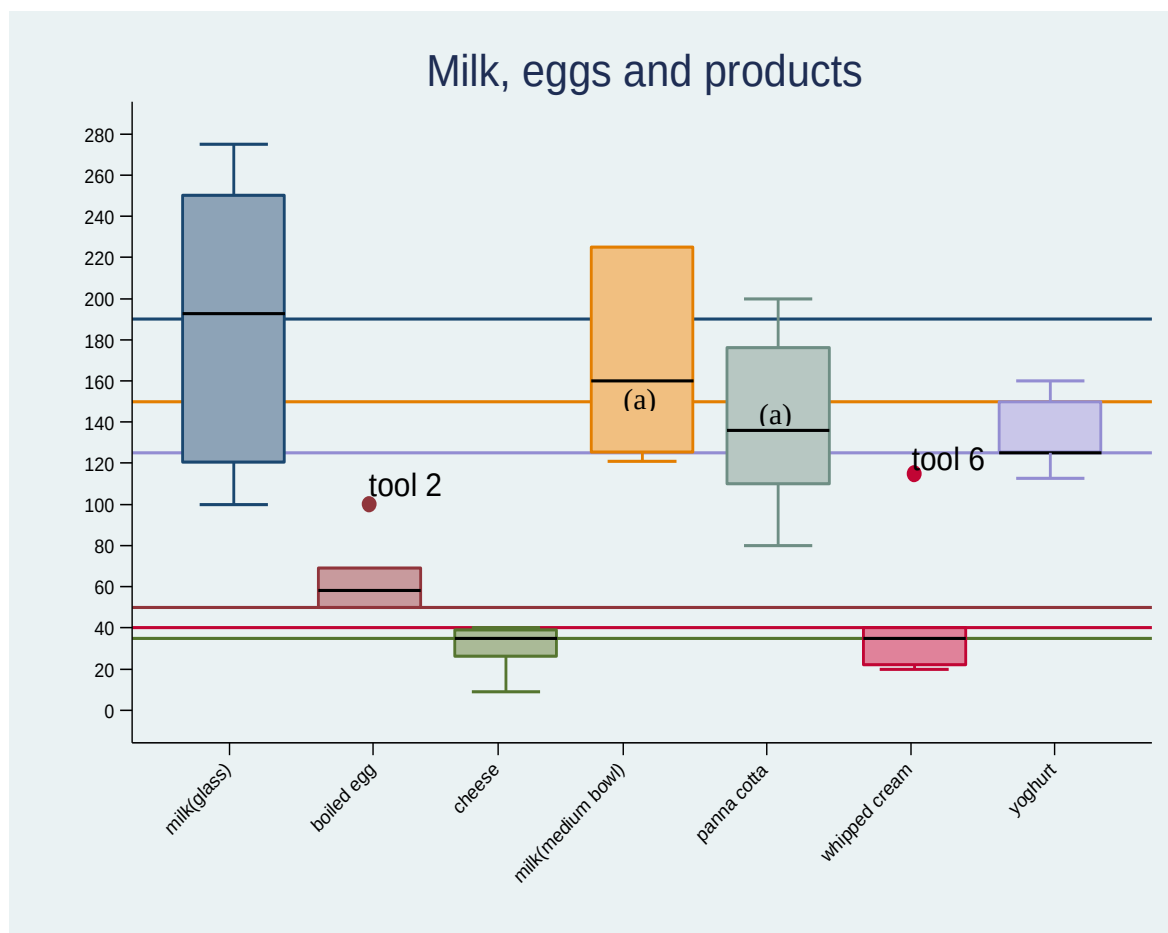
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both sausage and caviar cream have the same key quantity.

Figure 16: Boxplots presenting variance in the recorded quantities – Meat and fish products



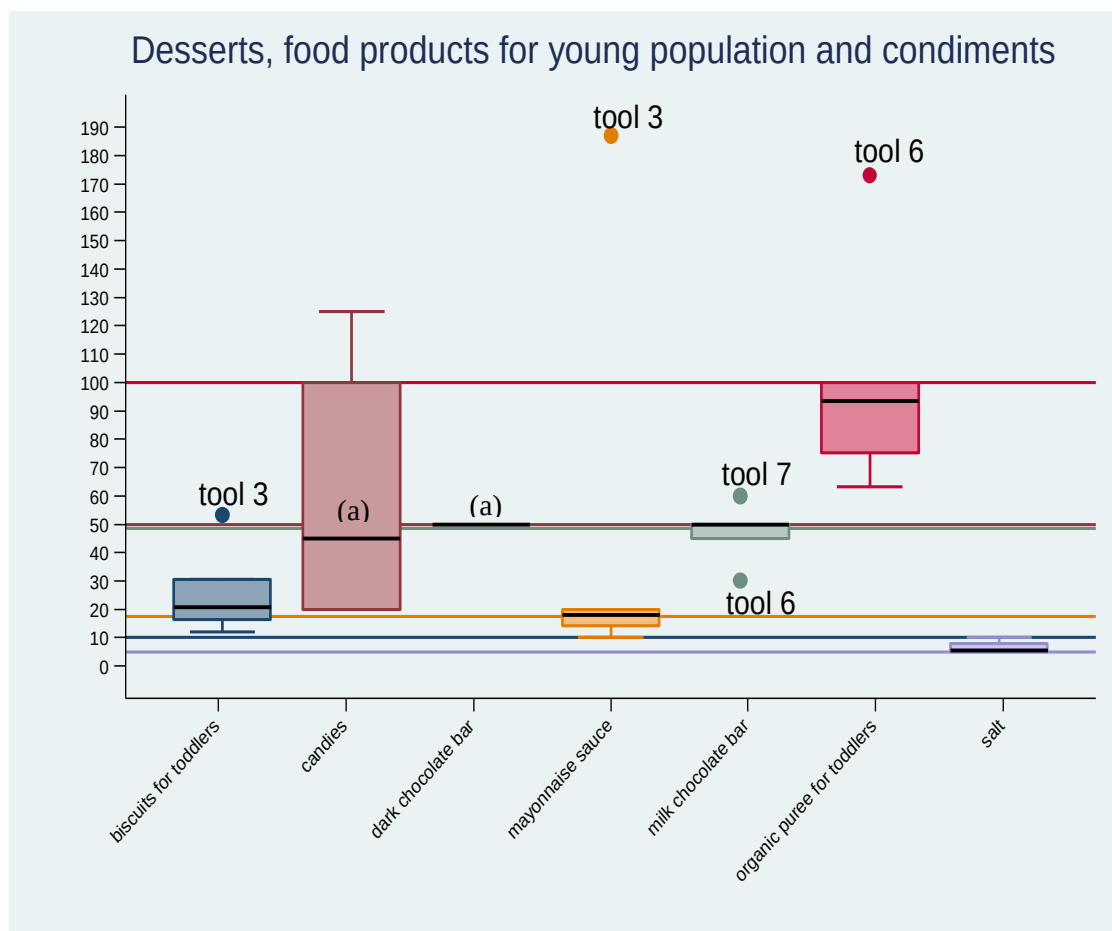
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both panna cotta and milk (medium bowl) have the same key quantity.

Figure 17: Boxplots presenting variance in the recorded quantities – Milk, eggs and products



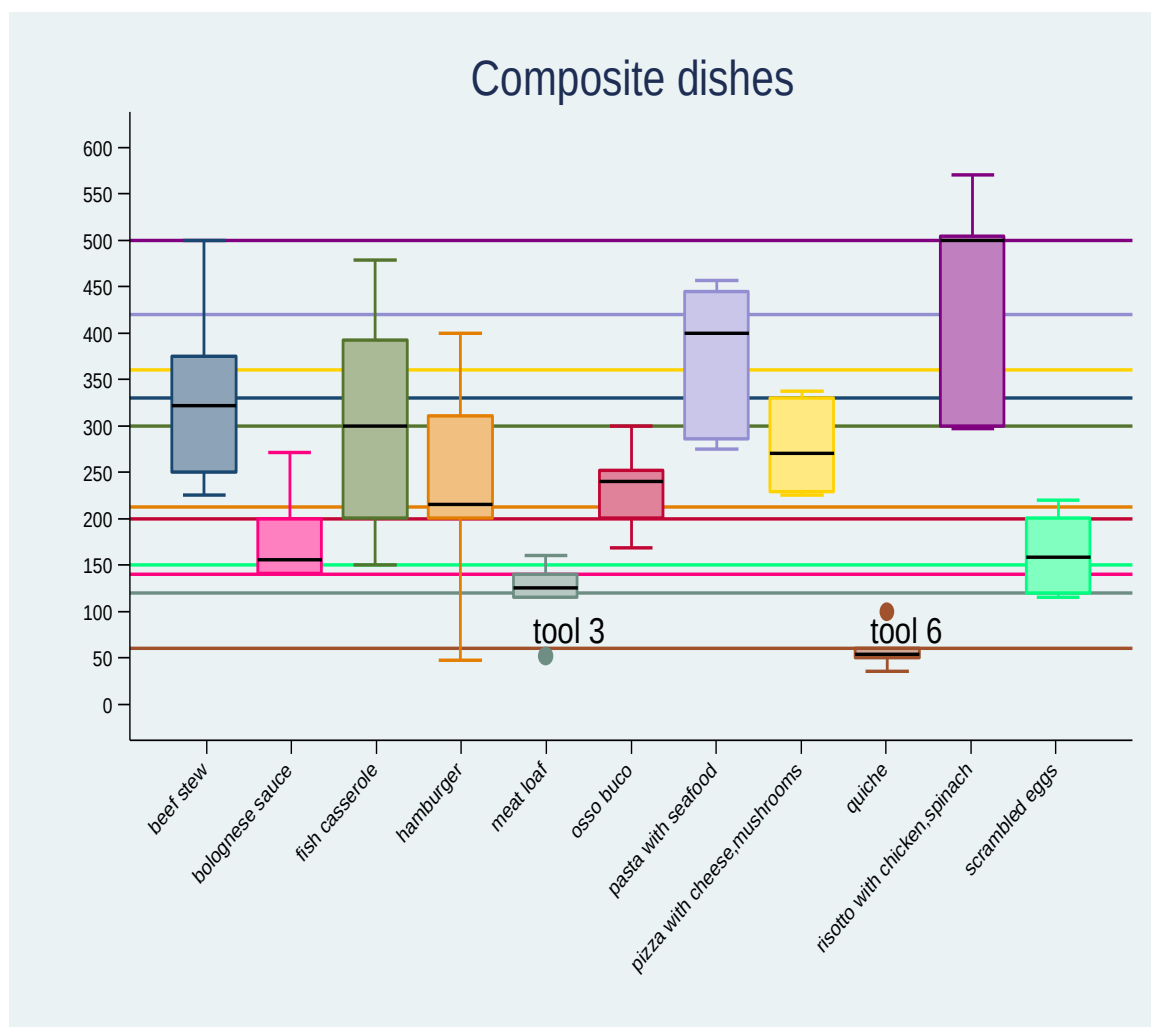
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both candies and dark chocolate bar have the same key quantity.

Figure 18: Boxplots presenting variance in the recorded quantities – Desserts, food products for young population and condiments

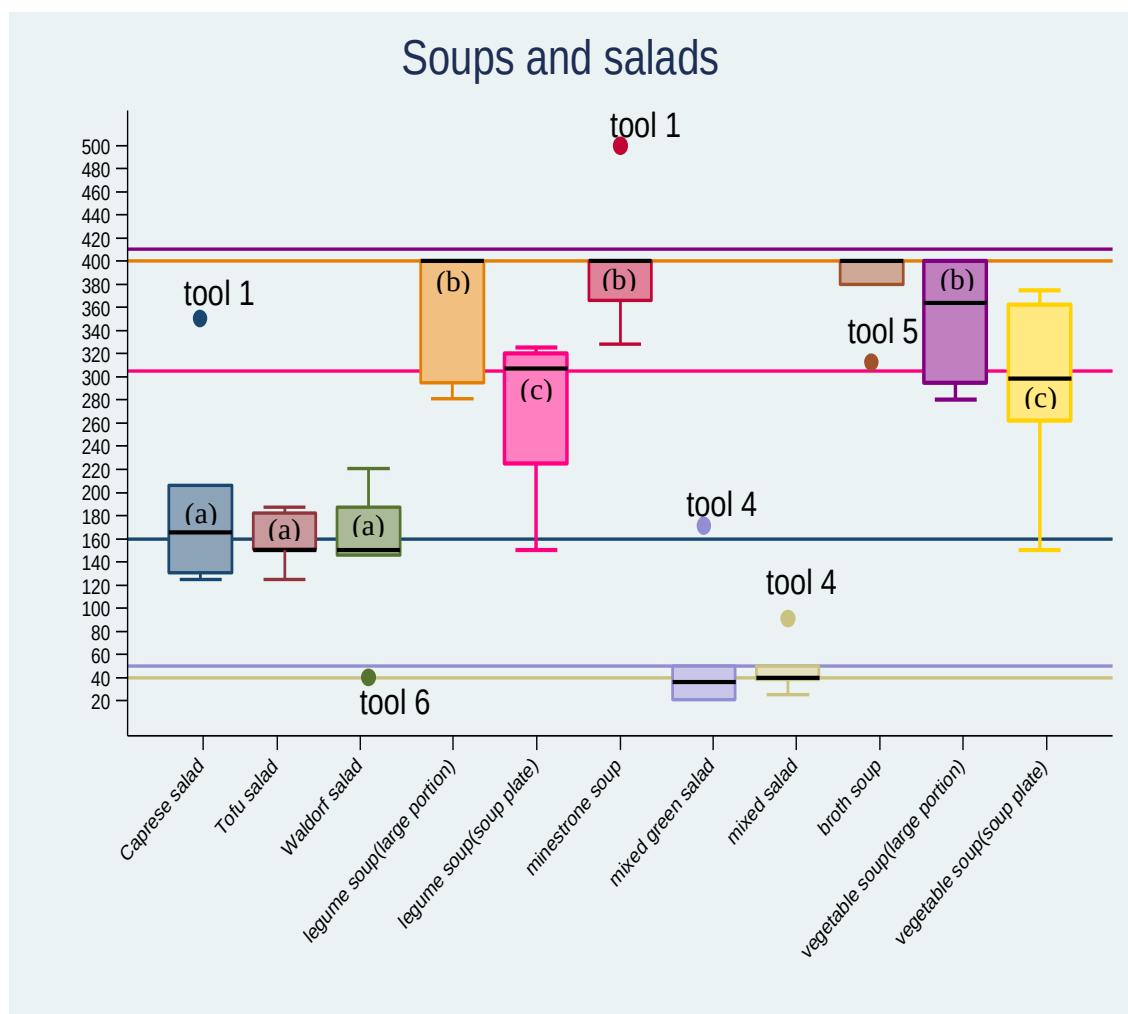


The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

Figure 19: Boxplots presenting variance in the recorded quantities – Composite dishes



The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

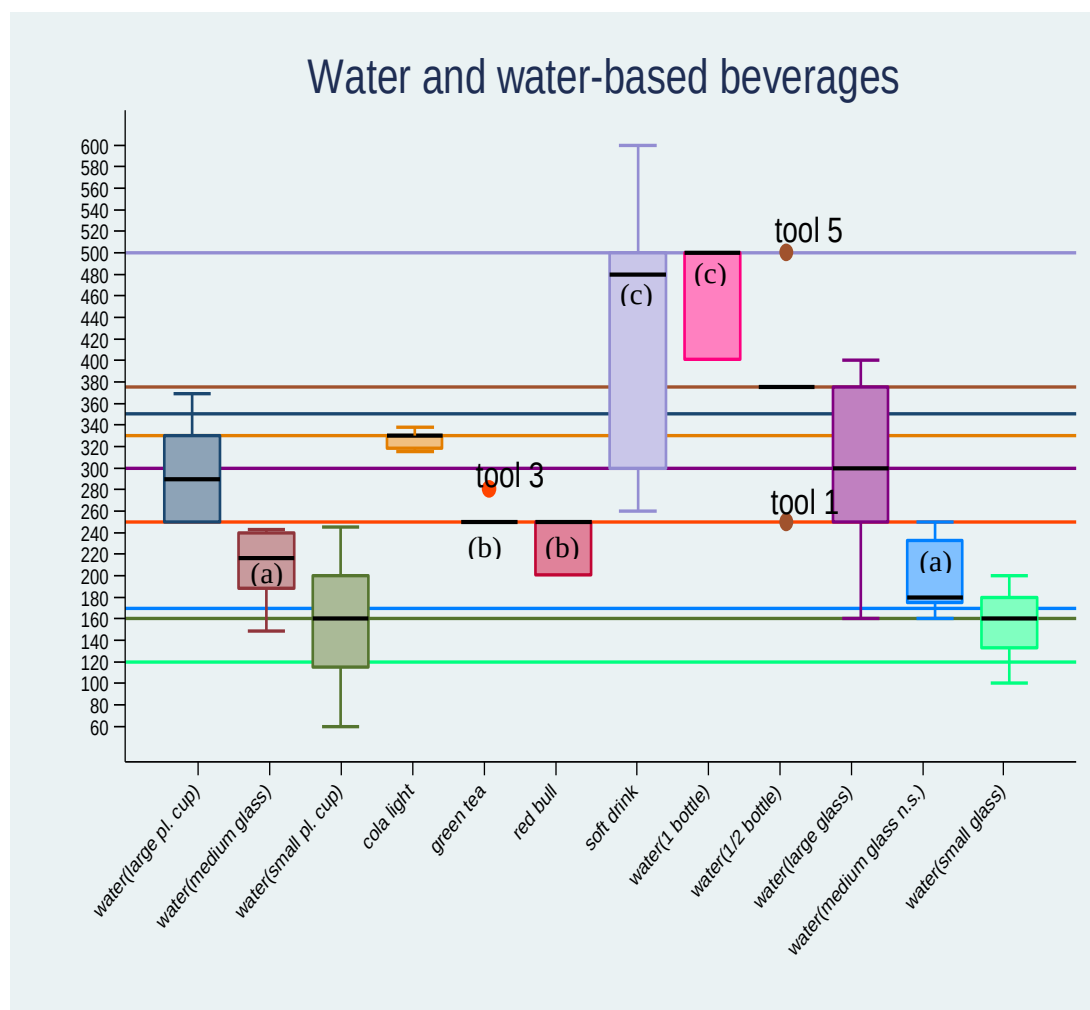
Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Caprese, Tofu and Waldorf's salad have the same key quantity.

(b) Legume soup (large portion), minestrone soup and broth soup have the same key quantity.

(c) Both legume soup (1 soup plate) and vegetable soup (1 soup plate) have the same key quantity.

Figure 20: Boxplots presenting variance in the recorded quantities – Soups and salads



The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

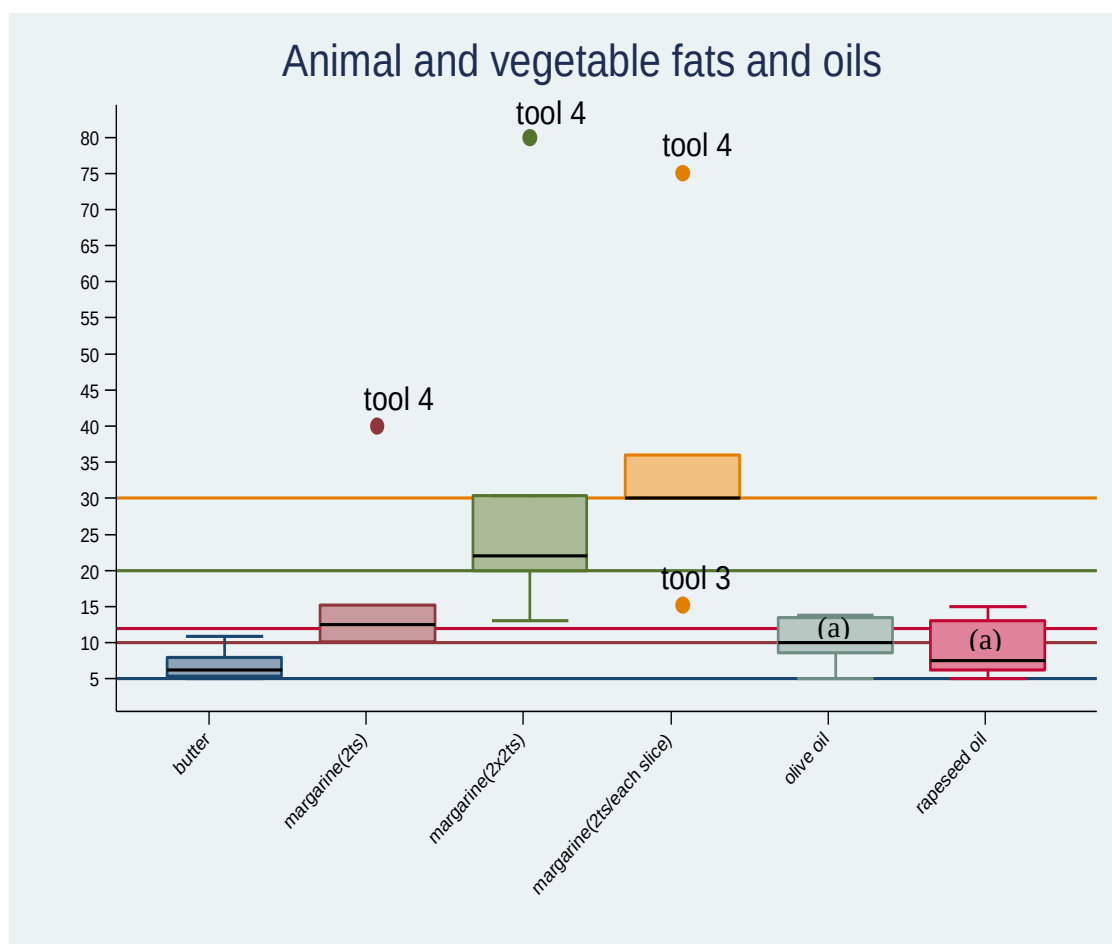
Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both water (medium glass) and water (medium glass n.s.) have the same key quantity.

(b) Both green tea and red bull have the same key quantity.

(c) Both soft drink and water (1 bottle) have the same key quantity.

Figure 21: Boxplots presenting variance in the recorded quantities – Water and water-based beverages



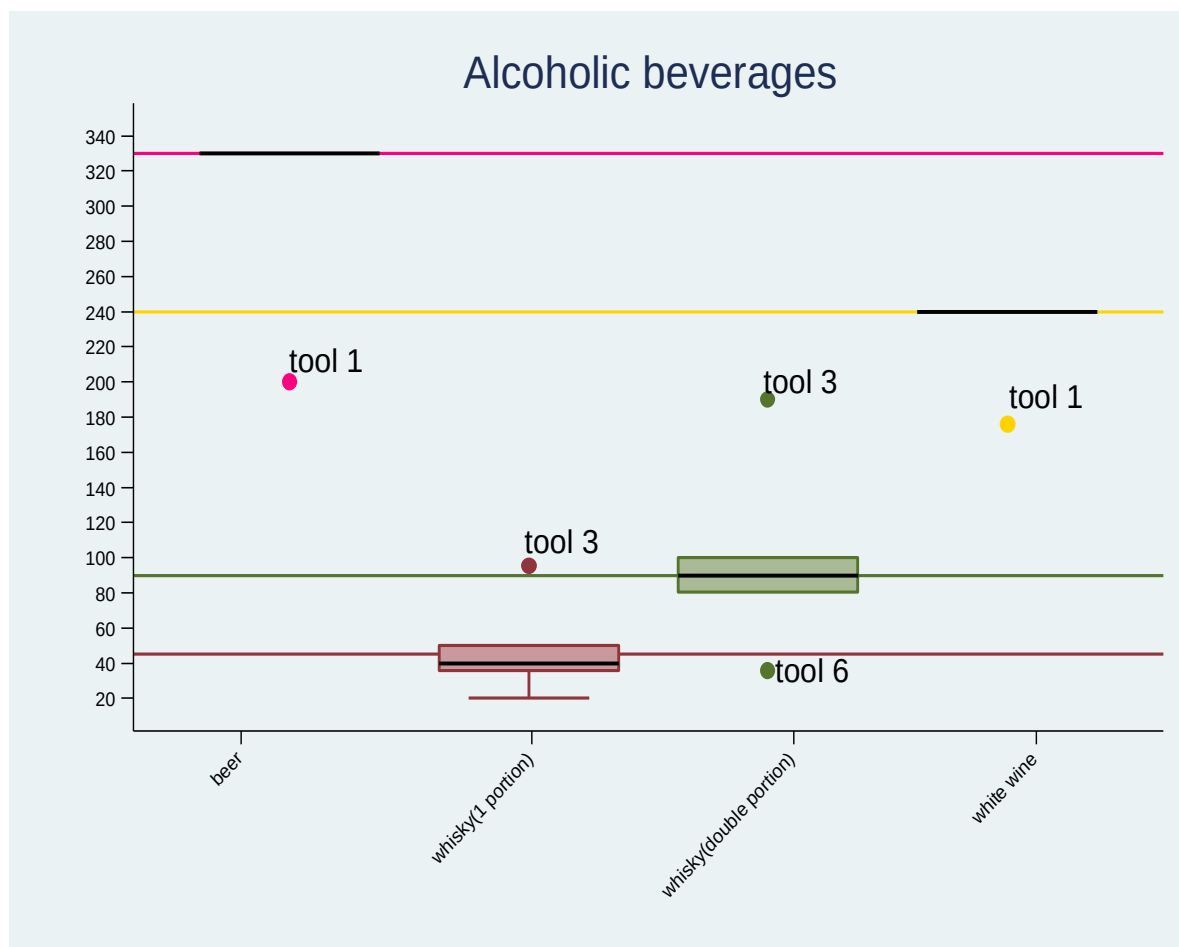
The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value.

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

(a) Both olive oil and rapeseed oil have the same key quantity.

Figure 22: Boxplots presenting variance in the recorded quantities – Animal and vegetable fats and oils



The lower line of each box represents the 25th percentile, the upper line represents the 75th percentile and the black lines the median value

Horizontal lines illustrate the key quantities of the food items. Each one has the same color with its corresponding box.

Dots on the graph represent outliers. The tools that recorded the outliers are being mentioned, as well.

Figure 23: Boxplots presenting variance in the recorded quantities – Alcoholic beverages

There is no consistent pattern regarding the deviation of the recorded quantities between tools of the same method (24h recalls or food records) and from the key quantity. The observed deviations are probably the result of sheer chance. Dark chocolate bar was the only item the quantities of which were recorded consistently among tools through both methods and were also equal to the corresponding key quantities. The boxplots with the majority of items presenting small interquartile ranges, indicating smaller differences between the values recorded by the various tools, were: a) Vegetables and sugar plants, b) Fruit products and nuts, c) Desserts, Food products for young population and condiments, d) Animal and vegetable fats and oils and e) Alcoholic beverages. The boxplot with the majority of items presenting large interquartile ranges was Composite dishes, reflecting probably the heterogeneity of items classified in this group. It should be borne in mind though that profound comparisons between values recorded through the two different methods are not always meaningful because of differences in the data collection process.

We have subsequently focused on items with obviously large interquartile ranges (e.g. corn flakes, pasta, watermelon, peach, mixed nuts and dried fruits (40g), pork chops lean, raw salted salmon, milk (glass), milk (medium bowl), panna cotta, candies, beef stew) and we tried to identify possible sources of this

variability. We noted that items of this type belonged to various (almost all) food groups; were quantified with all selected methods (weight, unit, portions); with or without the use of food pictures. Some of the variation, however, could be attributed to the food pictures or the combination of pictures used to report the quantity consumed as in certain occasions the selected pictures did not exactly match the pre-defined key quantity.

We have also tried to identify possible sources of difference between the recorded and the key quantities (e.g. chocolate biscuits, white bread, vegetables, mushrooms, broccoli, jam, smoked small fish, salmon, luncheon meat, chicken, etc). Again we were not able to identify any type of pattern.

Tools 1, 3, 4 and 6 recorded outlying values in nine occasions; tool 5 in four; tool 2 in two and tool 7 in one occasion.

Differences in the data recorded were observed among tools for each one of the three quantification methods, (i.e. exact weight, portions and units). Several of these differences were somewhat expected as they reflect country-specific diversities in what is considered as a standard unit or a standard portion by country. Others may have resulted from a misunderstanding of the reported foods and portion sizes from the interviewer/food record keeper part. Some indicative examples are given below:

- According to Tool 6, a medium glass of water corresponds to 250g (anticipated quantity 160-180g)
- According to Tools 3, 5 and 6, a small banana corresponds to 63, 80 and 73g, respectively (anticipated quantity 120g).
- According to Tool 5, a large glass of orange juice corresponds to 400g (anticipated quantity 300g).
- According to Tools 5 and 6, a slice of rye whole bread corresponds to 25 and 30g, respectively (anticipated quantity 50g).
- According to Tools 2, 5 and 6, a big slice of white wheat bread corresponds to 20, 50 and 25g, respectively (anticipated quantity 90g).
- According to Tools 2 and 6, a cup of espresso corresponds to 30 and 100g, respectively (anticipated quantity 60g).
- According to Tools 4 and 5, two teaspoons of margarine correspond to 40 and 12g, respectively (anticipated quantity 10g).
- According to Tools 1, 2, 3, 4, 6 and 7, a small glass of water cup of espresso corresponds to 180, 160, 150, 100, 200 and 180g, respectively (anticipated quantity 120g).
- According to Tool 6, a medium glass of water corresponds to 250g (anticipated quantity 160-180g).
- According to Tool 5, a large glass of water corresponds to 160 g (anticipated quantity 300g).
- According to Tools 2 and 5, a large plastic cup of water corresponds to 250g in both cases (anticipated quantity 350g).

- According to Tools 4, 5 and 6, a small plastic cup of water corresponds to 100, 60 and 200g, respectively (anticipated quantity 160g).
- According to Tools 3, 5 and 6, three graham crackers correspond to 14, 18 and 42g, respectively (anticipated quantity 11g).
- According to Tools 3 and 4, a large walky cup of soft drink corresponds to 300 and 600g, respectively (anticipated quantity 500g).

In an attempt to better understand sources of discrepancies between key quantities and recorded quantities (assessed through relative accuracy) and differences in values reported in exactly the same manner (assessed through reproducibility), the project Consortium evaluated the information included in the following files:

- a) two files including the information that EFSA anticipated to be recorded by the tools
- b) ten scanned food lists, one for each reporting day, that the interviewees had available during the interview and in which they kept personal notes. These files were available only for the tools participating in the RT with 24h recalls. When the interviewee reported a characteristic/picture, it was highlighted. When the interviewee had circled the characteristic/picture, partly highlighted it or didn't highlight/ circle it at all, this indicated that the characteristic/picture was partly reported or not reported at all, because the interviewer did not ask about this particular detail
- c) the scanned food diaries related to the food record method. In one occasion, data entry was directly performed through the web and food diaries were not available. In this case, there is an indication for the use of pictures but no information was made available about what the food record keeper reported
- d) the outputs generated immediately after 24h recall interviews
- e) the files that were sent by the participating countries to EFSA, including their raw data translated in English. In general these files did not provide information on whether the reported item was quantified through a picture or not. In only two occasions, this information was available in the final output files
- f) the picture books and their keys (quantities behind the pictures) which were sent to EFSA by all countries prior to their participation in the RT.

In Table 29, an example is given to indicate how all the aforementioned files were collectively evaluated in order to identify sources of inconsistent recordings. The table presents five repetitions of butter intake in the case of one tool. In all cases, the interviewee was instructed to report the exact same quantity through the same picture. The last two columns show what the interviewee reported and what was finally recorded. Possible explanations for the discrepancies observed could include: (a) misunderstanding between the interviewer and the interviewee (b) an interpretation of the quantity related to a teaspoon by the interviewer which was different to the one anticipated by EFSA (country-specific definitions).

Table 29: Indicative example of how five repetitions of butter intake were recorded by one tool

Day	Food Item	Key Quantity (g)	Instructions to interviewee	Quantity behind the picture (g)	Interviewee reported	Quantity recorded by the tool (g)
M1	Butter	5	Thin layer Picture 57-2	5	Thin layer Picture 57-2	4.4
T1	Butter	5	Picture 57-2	5	Picture 57-2	4.4
TH1	Butter	5	Thin layer Picture 57-2	5	Thin layer Picture 57-2	30.6
F1	Butter	5	1 teaspoon, 4-5 g Picture 57-2	5	1 teaspoon	7.6
W2	Butter	5	Thin layer, 1 teaspoon Picture 57-2	5	1 teaspoon	7.6

Following this approach, we have probed into several cases of inconsistent quantities recorded by the tools and we concluded on several possible scenarios that could explain the “output” data. Table 30 presents some examples of possible sources of inconsistent recordings. It should, however, be born in mind that some of these inconsistencies could be attributed to country-specific differences previously described. Lastly, in most of the cases, the identification of sources of inaccurate recordings was based on a speculative line of argument rather than on clear pragmatic evidence on who (interviewer or the interviewee) or which step in the process was to be held responsible for the inaccuracy.

In several occasions the interviewer/food record keeper was solely responsible for the inaccurate record (interviewer bias in the case of 24h recalls or responder bias in the case of food records) (Table 30: examples 1-16). In some cases, the interviewer did not ask for all the information the interviewee was prepared to report (not highlighted/circled data in the food lists), e.g. sugar in case of coffee or the food record keeper/interviewer misunderstood the reported items.

The interviewees, although well-trained and with clear and standardised instructions on what to report/record were also responsible for discrepancies observed. In addition, misunderstandings between the interviewers and the interviewees could not be ruled out. Limitations of the tools’ integrated databases and corresponding picture books may have also resulted in inconsistent recordings. All or any of the aforementioned possible sources of variation could explain the discrepancy observed in example 17 (Table 30).

The data handling after the completion of the data collection could have also introduced errors. This data handling included translation to English and data transfer to excel or word files (Table 30: example 18).

Errors in the recorded quantities also resulted from inconsistent instructions provided to the interviewees/food record keepers (Table 30: examples 19-22).

In the case of Tool 6, we were unable to identify the source of error as only the output of the tool was available. Furthermore, scanned diaries were not available for this tool. It should be noted, however, that Tool 6 was developed as a self-administered tool and the number of possible foods are limited to the study’s target population. The tool was designed to be used for the adult population and accordingly children’s foods were not specifically included.

Table 30: Indicative examples of sources of inconsistent recordings

Example	Tool	Days	Food Item	Reported Quantity (Key Quantity) ^(a)	Recorded Quantity	Source of error
1	Tool 1 24h recall	F1	Hamburger	1 portion (175-250 g)	47 g	Interviewer
2	Tool 1 24h recall	M1	Cereal bar	1 filled cereal bar (32 g)	200 g	Interviewer
3	Tool 1 24h recall	SA	Smoked small fish	10 tiny fish (40 g)	168 g	Interviewer
4	Tool 2 24h recall	T1	Risotto	1 large portion (500 g) plus picture	810 g	Interviewer
5	Tool 3 24h recall	W1	Rapeseed oil	1 tablespoon (12 g)	0.8 g	Interviewer
6	Tool 3 24h recall	M1	Chocolate biscuit filled	2 pieces (30 g)	2 g	Interviewer
7	Tool 3 24h recall	SA	Mayonnaise sauce	1 tablespoon full (15-20 g)	187 g	Interviewer
8	Tool 3 24h recall	W1	Rice biscuits for toddlers	Four (10 g)	180 g	Interviewer
9	Tool 3 24h recall	SA	Raw salted salmon	2 slices (30 g)	150 g	Interviewer
10	Tool 4 24h recall	TH1	Pasta	1.5 portion of the indicated picture (325 g)	90.5 g	Interviewer
11	Tool 4 24h recall	TH1	Filtered Coffee	Normal (150 g)	32 g	Interviewer
12	Tool 4 24h recall	SA	Pate	1/3 portion of the indicated picture (20 g)	70 g	Interviewer
13	Tool 4 24h recall	SA	Mushrooms	3 tablespoons (25 g)	150 g	Interviewer
14	Tool 5 Records	T1	Broccoli	1 medium portion plus picture (55 g)	250 g	Data recorder
15	Tool 5 Records	SA	Raw-salted salmon	0.25 of a small portion plus picture (30 g)	112.5 g	Data recorder
16	Tool 6 Records	F1	Whipped cream	2 tablespoons full (40 g)	200 g	Unable to identify the source of error
17	Tool 1 24h recall	TH1, SA, SU	Rolls	TH1: 2 normal plus picture, SA: picture, SU: 2 pieces/g plus picture (90-100 g)	100, 60, 108 g	Interviewee Interviewer (Picture Book)
18	Tool 3 24h recall	T1	Rice biscuits for toddlers	4 small light (10 g)	2 g	Person who translated and transferred data in Word file
19	Tool 5	T1	Risotto with	1 small portion	205 g	EFSA's Instructions or

EFSA supporting publication 2014:EN-607

81

The present document has been produced and adopted by the bodies identified above as author(s). This task has been carried out exclusively by the author(s) in the context of a contract between the European Food Safety Authority and the author(s), awarded following a tender procedure. The present document is published complying with the transparency principle to which the Authority is subject. It may not be considered as an output adopted by the Authority. The European Food Safety Authority reserves its rights, view and position as regards the issues addressed and the conclusions reached in the present document, without prejudice to the rights of the authors.

Example	Tool	Days	Food Item	Reported Quantity (Key Quantity) ^(a)	Recorded Quantity	Source of error
	Records		chicken and spinach	plus picture (500 g)		person who completed the diaries Data recorder
20	Tool 6 Records	T2	Watermelon	1 medium wedge with unedible part (360-390 g)	90 g	Unable to identify the source of error
21	Tool 6 Records	SA	Raw-salted salmon	2 slices (30 g)	100 g	Unable to identify the source of error
22	Tool 7 Records	W2	White bread	1 slice plus picture (180 g)	55 g	EFSA's Instructions
23	Tool 1 24h recall	W1, TH1, SA, SA, W2	White bread	W1, TH1: 2 big slices/g plus picture SA: - SA: 2 slices W2: 1 slice (180 g)	120, 146, 36, 54, 36 g	EFSA's instructions Interviewer
24	Tool 3 24h recall	TH1	Pasta	2/3 from 1 large portion plus picture (325 g)	50.4 g	EFSA's instructions (non-existent picture, although it could be assumed that the interviewee managed to display the correct one) Interviewer (deleted the information of pasta in the output) Person transferred and translated data from immediate output (translated the deleted information)
25	Tool 6 Records	SA	Caprese salad	1 medium portion/ g (160 g)	40 g	Unable to identify the source of error
26	Tool 6 Records	SA	Waldorf salad	1 medium portion (160 g)	40 g	Unable to identify the source of error
27	Tool 6 Records	TH1	Sausages	3 (120 g)	30 g	Unable to identify the source of error

(a): The reported quantity was highlighted by the interviewees in the scanned foodlists or filled in by the food record keepers in the scanned diaries. In the case of Tool 6 scanned diaries were not available.

8. Qualitative characteristics of the reported food items

Table 31 provides the percentages of item-specific characteristics which were adequately captured (received grade 1), partially captured (received grade 2) or not captured (received grade 3) by the tools. All tools managed to capture the reported qualitative characteristics to a certain extent, percentages, however, for grade 1 were rather low. Only Tools 1 and 3 in the case of 24h recalls and Tool 7 in the case EFSA supporting publication 2014:EN-607

of food records managed to capture 50% and more of the 573 characteristics. The percentage of characteristics captured (received grade 1) by tool, by specific category and by method are presented in Table 32. The facets, highlighted in green, were captured adequately enough (i.e. the facet-specific characteristics received grade 1 in at least 50% of the cases that were reported) by the majority of the tools (at least two out of four in the case of 24h recalls and at least two out of three in the case of food records), while those, highlighted in orange, were not (the facet-specific characteristics received grade 1 in less than 50% of the cases that were reported). The facets that were not highlighted at all, are those that no clear conclusion could be made regarding how well they were captured by the majority of the tools in each method.

The facets: " ingredients", "physical state", "qualitative info" and "production method" were adequately captured by all tools using 24h recalls while "target consumer" facet was not captured adequately by any tool using the 24h recall method. On the other hand, no facet was adequately captured by all tools using records, whereas the facets: "flavor note", "sweetening agent", "process technology", "production method" and "target consumer" were not captured by any of these tools. All these facets are indicated in bold.

Table 31: Percentage of characteristics captured, partially captured and not captured by tools

Tool	% of characteristics ^(a) captured (Grade 1)	% of characteristics not captured (Grade 2)	% of characteristics not captured (Grade 3)
Tool 1 (24h recalls)	64.7	5.8	29.5
Tool 2 (24h recalls)	38.9	3.8	57.2
Tool 3 (24h recalls)	68.4	6.1	25.5
Tool 4 (24h recalls)	28.3	5.6	66.1
Tool 5 (Records)	47.3	8.2	44.5
Tool 6 (Records)	26.7	6.3	67.0
Tool 7 (Records)	61.7	6.2	32.1

(a): 573 characteristics in total

Table 32: Percentage of characteristics captured (Grade 1) by tools

Facets	% (n) of characteristics captured (Grade 1)						
	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6	Tool 7
1. Source	56.8 (25)	63.6 (28)	59.1 (26)	40.9 (18)	59.1 (26)	36.4 (16)	50.0 (14)
2. Raw source of derivatives	81.3 (26)	84.4 (27)	96.9 (31)	21.9 (7)	28.1 (9)	75.0 (24)	20.8 (5)
3. Ingredients	66.7 (4)	83.3 (5)	83.3 (5)	100.0 (6)	100.0 (6)	33.3 (2)	100.0 (4)
4. Physical state	71.1 (27)	60.5 (23)	86.8 (33)	57.9 (22)	71.1 (27)	23.7 (9)	54.2 (13)
5. Flavor note	36.4 (4)	36.4 (4)	90.9 (10)	63.6 (7)	45.5 (5)	0.0 (0)	14.3 (1)
6. Fat content	78.6 (11)	21.4 (3)	0.0 (0)	0.0 (0)	35.7 (5)	28.6 (4)	88.9 (8)
7. Sweetening agent	33.3 (3)	66.7 (6)	66.7 (6)	22.2 (2)	33.3 (3)	11.1 (1)	33.3 (2)
8. Fortification agent	71.4 (10)	0.0 (0)	35.7 (5)	14.3 (2)	0.0 (0)	42.9 (6)	61.5 (8)
9. Qualitative Info	80.8 (42)	51.9 (27)	59.6 (31)	53.8 (28)	71.2 (37)	38.5 (20)	81.3 (26)
10. Alcohol content	58.3 (7)	0.0 (0)	41.7 (5)	0.0 (0)	41.7 (5)	100.0 (12)	100.0 (6)
11. Dough-mass	100.0 (1)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	100.0 (1)
12. Process Technology	41.7 (5)	8.3 (1)	66.7 (8)	0.0 (0)	0.0 (0)	25.0 (3)	12.5 (1)
13. Treatment modifying structure/ nature	85.0 (17)	45.0 (9)	85.0 (17)	30.0 (6)	55.0 (11)	10.0 (2)	64.3 (9)
14. Cooking method	55.3 (21)	50.0 (19)	57.9 (22)	5.3 (2)	39.5 (15)	23.7 (9)	72.0 (18)

Facets	% (n) of characteristics captured (Grade 1)						
	Tool 1	Tool 2	Tool 3	Tool 4	Tool 5	Tool 6	Tool 7
15. Preservation technique	82.4 (14)	41.2 (7)	52.9 (9)	64.7 (11)	47.1 (8)	52.9 (9)	72.7 (8)
16. Packaging Format	46.0 (29)	4.8 (3)	81.0 (51)	15.9 (10)	41.3 (26)	3.2 (2)	58.1 (25)
17. Packaging Material	59.3 (32)	1.9 (1)	75.9 (41)	0.0 (0)	0.0 (0)	0.0 (0)	82.5 (33)
18. Production method	100.0 (4)	50.0 (2)	75.0 (3)	75.0 (3)	0.0 (0)	0.0 (0)	0.0 (0)
19. Preparation production place	66.7 (4)	83.3 (5)	83.3 (5)	0.0 (0)	50.0 (3)	0.0 (0)	100.0 (5)
20. Target consumer	27.3 (3)	18.2 (2)	0.0 (0)	27.3 (3)	27.3 (3)	0.0 (0)	33.3 (3)
21. Intended use	100.0 (4)	75.0 (3)	75.0 (3)	25.0 (1)	25.0 (1)	75.0 (3)	100.0 (2)
22. Brand name	64.9 (24)	32.4 (12)	86.5 (32)	32.4 (12)	91.9 (34)	16.2 (6)	91.7 (22)
23. Further description	73.0 (54)	48.6 (36)	66.2 (49)	29.7 (22)	63.5 (47)	33.8 (25)	50.0 (26)

Again the sources of inconsistent recordings could be attributed to:

- The capacity and the adequate training of the interviewer to probe for food details during the interview
- Erroneous recordings by the interviewer/food record keeper
- Properties of the tool in guiding interviewers to record details and remind them about forgotten food items
- Misreporting by the interviewees
- Misunderstandings between interviewer and interviewee
- Errors introduced during the translation of the outputs in English
- Errors introduced while manually exporting the outputs generated after the interview/data entry to Excel/Word files, in cases where the tool did not allow automatic export of the data
- Potential limitations of the tool's integrated database. For instance, in one tool (Tool 5) items (mostly fortified foods, foods for infants, mineral water and supplements) were not recorded sufficiently if the responder did not provide the brand name of the product. For instance, the food item orange juice described as *100% juice, fortified with extra Vit C and packed in Tetra-pack* was recorded by the tool as *Orange juice, fresh* due to the limited database.

In the case of 24h recall interviews, where “interviewees” had available food lists with indications on what to report, it was noted that although some characteristics were not reported by the interviewees they were recorded by the tools. Specifically, the following four occasions were identified:

1. Characteristics probably captured through assumption or default recording
2. Characteristics captured but unclear whether reported (largely relates to characteristics not on the spreadsheets, i.e. not explicitly defined by EFSA)
3. Characteristics that appear not to have been reported (not highlighted) but that have been captured
4. Other things that were captured without being reported, but are not one of the key characteristics (e.g. place of consumption)

Appendix U presents the detailed list of characteristics which fell under these four categories per tool participating in the RT with 24h recalls. Some indicative examples together with proposals for overcoming inconsistencies introduced are provided below:

1) Characteristics probably captured through assumption or default recording

- Caffeine content of coffee and cola was not always specifically reported but may have been assumed, or inherent in the food descriptions. It may be the default position to assume coffee and cola beverages are caffeinated, unless otherwise told by the interviewee.
→ *Could be part of an initial set of questions about commonly consumed products.*
- Dairy products (milk, cream, yogurt) may be assumed to be made of cow's milk, unless otherwise specified (and eggs assumed to be hen's).
→ *Could be part of an initial set of questions about commonly consumed products.*
- Not sweetened/no added sugar is normally the default for foods (especially hot drinks), but sometimes the question wasn't asked, and it was captured correctly simply because nothing was added.
→ *In-built prompts/probing questions about additions to hot drinks are an advantage.*
- "Fresh" often not reported for fruits/vegetables but probably assumed and implied in the food description so probably captured.
→ *Interviewer could be prompted to check item is fresh is not already confirmed.*
- Certain characteristics assumed for particular foods, i.e. 'frozen' captured for ice-cream, 'boiled' captured for soup.
→ *Probably safe to assume these characteristics, particularly if they do not really impact on nutritional content.*
- Some characteristics may be implied if brand is captured, and therefore may not be required separately. E.g. Red Bull captured but "energy drink with caffeine" not recorded; Jack Daniels recorded but "40% ABV" not recorded.
→ *Interviewer should be aware of possibly differences in products (e.g. red bull can be sugar free) to be sure that the brand/product captures the correct information.*
- Where things were repeated more than once, some characteristics were captured from repeating previous entries rather than explicitly reported again (e.g. cream filling in Oreo biscuits).
→ *Interviewers can ask participants if product or recipe was the same as previously recorded, but should be aware that there may be subtle differences that need to be checked.*

2) Characteristics captured but unclear whether reported (largely relates to characteristics not on the spreadsheets, i.e. not explicitly defined by EFSA)

- "Regular, not organic" often captured in Tool 1 – this information was not on the spreadsheets. Probably assumed to be regular if not characterised as organic.
- "Not fortified" often captured in Tool 1 – this information was not on the spreadsheets. Probably assumed to be unfortified if not otherwise mentioned.
- Some packaging characteristics were recorded when not reported – possibly due to assumption or an ad hoc response from the interviewee that was not recorded on the spreadsheet.
- Some of the characteristics in this list may be linked to the food description selected by the interviewer, and not to anything reported by the interviewee (e.g. grapes with seeds, dry white wine)
→ *guidance on the use of default settings and assumptions may be useful.*
→ *some tools are able to enter free text to describe foods and others select from a fixed food list – the latter may add certain characteristics that are not necessarily reported by the participant.*

3) Characteristics that appear not to have been reported (not highlighted) but that have been captured

- Some of the entries in these fields could belong in other columns – the distinction is not always very clear as we cannot be certain what was/was not reported and whether things have been truly captured or through assumption/default.
- Brand names were sometimes partially captured in food descriptions, but not explicitly mentioned and captured (e.g. 'Pepsi' seems to appear in the food name in Tool 1).
→ popular brands may just be given as an example in food descriptions, but it is necessary to record the precise brand separately.
- Cooking methods were sometimes captured, or partially captured even when not reported (e.g. roast potatoes recorded as baked in oil, flame grilled chicken breast recorded as bbq/grilled, spaghetti recorded as boiled).
→ again, important to check assumptions. Also, some fields may be automatically prefilled or prompted as a result of a food selection – it is important that interviewers know when this is happening so that the information can be checked or amended if necessary.
- Food descriptions appear to have increased the accuracy of capturing in some instances. For example, ham was correctly characterised as pork by Tool 2, but this was not reported by the interviewee (probably due to food list).
→ some characteristics are captured as part of the food description rather than separately. Important to focus on the characteristics that are important at a composition level?

4) Other things that were captured without being reported, but are not one of the key characteristics (e.g. place of consumption)

- The place of food consumption was sometimes correctly recorded despite not being reported, probably due to assumptions (e.g. early morning and late in the evening at home).
- Sometimes portions were captured relatively accurately, despite interviewees not reporting amounts very precisely. This tended to be for things in fairly standard units, e.g. a small bag of nuts, or slices of tomato.

The results presented above are limited by the subjectivity in assigning grades corresponding to the adequacy by which characteristics were captured. In the majority of occasions, grades were discussed between Consortium members, with varying degrees of rigidity in grading the information. Although we aimed to apply a flexible approach when evaluating the characteristics recorded by the tools, on many occasions the assignment of grades was difficult to decide, e.g. respondent reported "chocolate biscuit with white filling", while one tool recorded "biscuits with filling (chocolate, jam, cream)".

In order to increase our objectivity, the Consortium decided to base decisions on the FoodEx2 system of facets and descriptors. In the files EFSA provided to the Consortium, a FoodEx2 code was assigned to each food item. If the characteristic recorded by the tool would lead to same or similar FoodEx2 code, then the characteristic was considered to be well captured.

For instance, in the case of chocolate biscuits with white filling, grade 1 was assigned for "filling" as the description that provided in the FoodEx2 system and indicated in the parenthesis (*Subgroup/Item of the group "Biscuits (sweet and semi-sweet)". The group includes all types of Biscuit, filled (with inclusions, filling or coating). Taking into account the broad variability of ingredient combination, this group is not further detailed. The part consumed/analysed is by default the whole, or a portion proportionally representing all heterogeneity observed in this food item/group*) was general enough to capture the description given by the tool. It should be noted, however, that the FoodEx 2 system was not always helpful.

9. Recipes

In the outputs received by the countries, some tools provided the list of recipe ingredients, while others only recorded the name of the recipe (particularly in the case of items which usually are commercially available, like organic puree for toddlers and mixed nuts and dried fruits). Table 33 presents the percentage of recipe ingredients captured by the tools, which ranged between 69.3 (Tool 2) and 82.9% (Tool 4) in the case of 24h recalls and from 37.6 (Tool 6) to 82.6 (Tool 7) in the case of food records.

According to the replies provided to the CQ all tools could handle recipes and break them down to recipe ingredients. Furthermore, all tools allowed the addition of new recipes by a) modifying standard recipes in the database or b) entering a new list of ingredients. Three tools could record whether the recipe was homemade or ready to eat, while one tool could record this information only occasionally. Based on the above replies, the interviewer/food record keeper was able to modify predefined recipes or insert new ones. Consequently, the main source of inconsistent recordings seems to be the food record keeper (for records) or the interviewer (for 24h recalls) provided that the interviewee reported exactly what was anticipated.

It was also noted that some tools recorded mixed dishes through inserting national recipes. The most characteristic examples were vegetable-based soups (vegetable, minestrone, legume soup) where in certain cases meat was added.

The majority of the tools managed to adequately capture the main ingredients of the recipes, however they did not perform equally well in capturing their qualitative characteristics (Table 34). Three out of the four tools participating in the RT with 24h recalls and two out of the three tools participating with food records correctly recorded less than 50% of the qualitative characteristics of the main ingredients indicating that improvements are needed in this direction. The facet which was adequately captured (received grade 1 in at least 50% of the cases when a characteristic was reported) by all 24h recall tools was "treatment modifying structure-nature", while the facets not adequately captured (i.e. the facet-specific characteristics received grade 1 in less than 50% of the cases that were reported) by any of these tools were "part consumed-analyzed" and "cooking method". In the case of food records, no facet was adequately captured by all tools using this method, whereas the facets that were not adequately captured by those tools were "part consumed-analyzed" and "cooking method"; same as in the case of 24h recalls. The assessment of how well added lipids were captured is summarized in Table 34.

In order to address issues related to forgotten foods, intake of dietary supplements, days with high or low consumption due to special conditions and days with no water consumption, we have collectively assessed information provided in the CQ, the outputs sent by the countries and the observers' forms.

Table 33: Percentage of recipe ingredients captured by the tools

Tool	% of recipe ingredients captured
Tool 1 (24h recalls)	81.6
Tool 2 (24h recalls)	69.3
Tool 3 (24h recalls)	74.4
Tool 4 (24h recalls)	82.9
Tool 5 (Records)	67.7
Tool 6 (Records)	37.6
Tool 7 (Records)	82.6

Table 34: Percentage of main ingredients, their qualitative characteristics and added lipids of recipes captured or not captured at all.

Tool	Main ingredients			Qualitative characteristics of the main ingredients			Added lipids		
	Captured (% grade 1)	Partially Captured (% grade 2)	Not Captured (% grade 3)	Captured (% grade 1)	Partially Captured (% grade 2)	Not Captured (% grade 3)	Captured (% grade 1)	Partially Captured (% grade 2)	Not Captured (% grade 3)
Tool 1 (24h recalls)	71.4	28.6	0.0	68.3	17.1	14.6	92.9	0.0	7.1
Tool 2 (24h recalls)	71.4	14.3	14.3	39.0	4.9	56.1	35.7	7.1	57.1
Tool 3 (24h recalls)	46.4	32.1	21.4	36.6	2.4	61.0	85.7	7.1	7.1
Tool 4 (24h recalls)	82.1	7.1	10.7	14.6	0.0	85.4	85.7	14.3	0.0
Tool 5 (Records)	64.3	21.4	14.3	17.1	9.8	73.2	92.9	0.0	7.1
Tool 6 (Records)	17.9	64.3	17.9	7.3	0.0	92.7	21.4	14.3	64.3
Tool 7 (Records)	66.7	33.3	0.0	69.7	0.0	30.3	100.0	0.0	0.0

10. Forgotten Foods

In the CQ, countries were asked to indicate whether questions about forgotten foods were asked during the interview/data entry and if yes, how often these questions appear during the interview. Four out of the seven tools that participated in the RT replied that their tool included questions on commonly forgotten foods. In one tool (Tool 3), these questions appeared after each food item/recipe. Two tools (Tools 1 and 7) had reminders about different foods and food categories popping-up throughout the interview process. Tool 4, included a crude list of the food items consumed during the recalled day and any other clarification or note considered important by the interviewer. A probe reminding the interviewer to ask for water taken with drugs, supplements and water intake during meals appeared after the crude list. Furthermore, a more general list of forgotten food items was displayed after the above mentioned reminder, including more general categories like appetizers, sweets, beverages, fruits and vegetables, cheese, breads, condiments, sauces, oil, vinegar, butter, margarine, salt.

11. Supplements

According to the CQ, all countries asked for information about the intake of dietary supplements. Five of them asked the brand name of the products, whereas four included a question about the active compound of the supplement as well. One country reported that questions about dietary supplementation was included in the list of forgotten foods; but this detail has not been clearly specified by the other providers. According to the response of one tool provider in the observer's form, the information on supplement consumption was compiled after the study completion. After personal correspondence with the tool provider, clarifications on the issue were obtained. In particular, for each separate day during the reporting period, respondents had to choose the supplement they wanted from a drop down list of 13 different predefined dietary supplements. After they had chosen the type of supplements, they had to register the name of the product, manufacturer and unit form. The dietary supplements that had been recorded during the reporting were handled separately and were identified after the trial by type, product brand, supplier and unit form of supplement. After the study the majority of information had to be obtained directly from the suppliers. Sometimes the dietary supplements had to be excluded by this tool in the study due to insufficient information regarding the product or for other reasons.

Table 35 describes how supplements were recorded by the tools. Almost all tools managed to adequately capture supplement consumption. Supplements were recorded as units by the majority of tools, while Tool 4 recorded them through grams, probably because grams were the default measurement unit. Tool 5 was the only tool that additionally used pictures for recording supplement intakes, in order to identify the typology (e.g. flacon, capsule). In the case of one tool (Tool 6) the consumption of supplements was somehow unusual. It recorded that 2 tablets of fish oil supplements were consumed 6 times during the 10 days instead of 3 times, 1 tablet of Vitamin B was consumed 3 times and 1 tablet of multivitamin another 3 times. However, the days these supplements were recorded did not match the days EFSA had indicated for their consumption. Specifically, the tool recorded those supplements to have been consumed during the first six days of the ten. Table 35 presents the recordings that matched the anticipated ones in relation to this tool. The discrepancy observed was due to the technical characteristics of Tool 6. This tool was designed to operate as a 4-day food record and the open format and system's coding were not adapted to accommodate ten days.

Table 35: Supplements recorded by the tools

Day	Supplement	Key Quantity	Tool 1 24h recall	Tool 2 24h recall	Tool 3 24h recall	Tool 4 24h recall	Tool 5 Records	Tool 6 Records	Tool 7 Records
M1			2 capsules	2 capsules	2 capsules	2 g	0.5 capsules	2 capsules	(a)
TH 1	fish oil	2 capsules	2 capsules	2 capsules	2 capsules	2 g	2 capsules	2 capsules	-
W2			2 capsules	2 capsules	2 capsules	2 g	2 capsules	-	2 capsules
F1			-	1 tablet	1 tablet	1 g	1 tablet	1 tablet	-
SU	multi-vitamin	1 tablet	1 tablet	1 tablet	1 tablet	1 g	1 tablet	-	1 tablet
T2			1 tablet	1 tablet	1 tablet	1 g	1 tablet	-	1 tablet
F1			1 tablet	1 tablet	-	1 g	1 tablet	1 tablet	-
M2	vitamin B	1 tablet	1 tablet	-	1 tablet	1 g	1 tablet	-	1 tablet
W2			-	1 tablet	1 tablet	1 g	1 tablet	-	1 tablet

(a): The kind of supplement was recorded but not the quantity.

12. Days with high or low consumption due to special conditions

From the information assessed in the CQ, all tools had the option to record whether the day recalled (e.g. illness) and the diet followed (e.g. attending a wedding) was a special one or not. Six tools explicitly recorded the type of the special day whereas one tool (Tool 6) recorded only the occasion of sickness. Most of the tools used this information to evaluate over or underreporting and interpret the observations accordingly. For two tools (Tool 4 and Tool 5) a question on whether the reported intakes were more, less or the same as usual intakes was also asked. Furthermore, Tools 3, 4, 5 and 6 evaluated over- and underreporting based on energy intake and the outputs of all tools provided energy intake. According to the outputs, all tools except of Tool 6 recorded special days and diets.

13. Days with no water consumption

All countries responded in the CQ that their tools had questions on water consumption during the day and/or for water included as ingredient in recipes. From the ten days EFSA prepared, one was a day with no water consumption. Only Tool 2 had pointed out in the output that no water was consumed during that day.

OVERALL SUMMARY OF RESULTS

We have analysed the descriptions of operational and other related characteristics of 11 dietary data collection software applied by European organisations in national or regional, large-scale surveys. The descriptions were provided through a CQ, developed to be completed online. In accordance to the terms of reference, software allowing the collection of 24h recalls and/or food records were only included in this analysis. Six out of the 11 software further participated in a RT based on common test cases. The primary aim of the trial was to understand the importance of the influence of the dietary assessment tool, the integrated and connected databases and standard operational procedures on the results of the data collection, in relation to the uncertainty and variability of the generated results. The results of the RT further allowed assessment of the equivalence of data collected or entered using different tools.

The main outcomes derived from the CQ include:

- The variation in dietary intake assessment methods and tools could be explained by:
 - simple differences in the methodologies applied (e.g. 24h recall vs food records)
 - country-specific differences
 - the age of the tool or its stage of development
 - the use of new technologies, such as web-based tools, particularly in creating differences in interaction time between researchers/interviewers and subjects.

Information on the national surveys and studies conducted using the tools was also collected by the questionnaire, as the scope and aims of the surveys are often the driving forces of the tool development.

- Differences in methodology and administration are largely responsible for the more overt differences between tools.
- The scope of the use of the tool influences some of the more intricate differences, such as the recording of detailed packaging information, which presumably is designed to collect data on exposure to contaminants.

Many of the tools have been developed in-house, and therefore the software is managed and licensed accordingly. As a result of this rather limited development and use, most are currently only available in their national language(s). In theory, in-house development results in greater control over the features and design, and perhaps more frequent updates to the software. However, it is potentially limiting for use outside of the institution, and due to the national specifics of the software, few tools are available or used outside of the developing organisation. Nevertheless, the majority of the tools have reasonable compatibility and modest PC requirements, so these should not prove to be limitations should a wider scope of use is implemented.

The depth of information collected through the CQ is difficult to summarise concisely in a report, and there are some limitations that should be discussed:

- Primarily, it is not always possible to tell whether a question that has been answered online has been interpreted as the Consortium intended. Indeed, there are some instances where a

respondent provided answers in different sections that appeared to contradict each other. However, these instances were few and therefore each answer was taken at face value.

- It was not possible to explore all the data through the report without discussing each tool individually in great depth.

Although all of the tools included in the report are used for national/regional dietary assessment, it is obvious to see where many of the differences will arise when comparing a self-administered web-based food record with an interview-based 24h recall. The difficulty in designing the CQ was in making the questions as relevant and meaningful to all methodologies and approaches as possible. This report, and the database of answers given by respondents, represents a unique summary of information pertaining to eleven dietary assessment tools from Europe. It highlights the differences, similarities, common and unique features of the software and the accompanying protocols and studies.

The RT exercise gave the opportunity to evaluate the way the tools of six out of the eleven countries completing the CQ, operate when imitating, as closely as possible, real life dietary assessment. However, the fact that food record keepers had available all the information EFSA had prepared results in a situation of a perfect food record, which may have substantially deviated from the “real life” situation. Therefore, it is scientifically sound to limit comparisons among datasets collected through the same method (either 24h recalls or food records).

Of the six countries, three participated in the RT with 24h recalls, two with food records and one with both methodologies. The RT exercise gave insight in the assessment of information regarding characteristics of the meal occasion, the quantities of the food items consumed (how consistently and accurately had been recorded), qualitative characteristics accompanying these food items e.g. cooking method, fortification, packaging, whether forgotten food items and supplements were consumed, how recipes were handled and whether special occasions, special diets and days without water consumption were captured.

The main outcomes of this assignment include:

- The majority of the tools managed to adequately record specific characteristics of the meal occasions, i.e. time, place and type of the meal consumed.
 - Provided that all items had been reported as instructed, all tools presented some variation in consistently capturing the quantities of identical items that had been repeatedly reported. The small number of repetitions does not, however, allow the generalization of the results and drawing firm conclusions regarding repeatability.
 - The relative accuracy of the tools was generally low, even when small deviations from the key quantities were tolerated. There was an underlying assumption that flexible tools which have various means of food quantification available may perform better in a dietary survey. The results of this RT failed to provide evidence to support this assumption, particularly in the case of 24h recalls. Tool 2 recorded values with the highest relative accuracy in the case of 24h recalls. However, in Tool 2, food intake could be quantified through only two different means (gram/volume and pictures). Tools 3, 4 and 1 all used seven means to quantify food consumption; nonetheless Tools 3 and 4 recorded food consumption with greater relative accuracy than Tool 1. In the case of food records, Tool 7 presented the greatest relative accuracy. It used nine different means for quantifying food intake contrary to Tools 5 and 6 which used six and five means respectively and presented similar relative accuracy. The food quantification means used by each tool are presented in Appendix V.
- The use of food pictures generally increased the accuracy of the recorded quantities.

Box plots indicated that no general conclusions could be drawn regarding the ability of the tools to adequately capture the key quantities of the food items. Furthermore, some tools appeared to systematically overestimate or underestimate the quantities of items that have been quantified through weight, portions and units. Again it was not possible to identify a specific pattern among the items that were systematically over- or underestimated. The over- or underestimation of the recorded quantities was generally random and independent of specific food groups, use of food pictures or other quantification method. Inconsistencies in reporting were caused by the aforementioned variety of issues.

- There was some indication of a systematic underestimation of quantities recorded by Tools 5 & 6 (food records). The underestimated items belonged to more than one food groups and had been quantified through various methods. All items except from two, either underestimated or not, were quantified through pictures in case of Tool 5 whereas in case of Tool 6 only some of the underestimated items were quantified through pictures. The picture book of Tool 5 was separate to the program and included one to four pictures per item, while the picture book of Tool 6 was integrated into the program and the pictures per item ranged from one to seven. Tool 5 had nine integrated databases from the 15 assessed through the CQ, while Tool 6 eleven. Different databases were missing between the two tools.
- Tools did not perform very well in capturing the qualitative characteristics of the food items, indicating that improvements need to be made in this direction. Only Tools 1 and 3 (24h recalls) and Tool 7 (food records) managed to adequately capture above 60% of the total characteristics EFSA anticipated to be captured, whereas the other tools captured below 50% of the total characteristics. The range of the total characteristics captured by the tools was 28.3-68.4% in the case of 24h recalls and 26.7-61.7% in the case of food records. Bearing in mind that the duration of the interview was estimated or recorded only in the case of Tools 1 and 4, Tool 1 needed more time to complete the interview and captured a greater percentage of characteristics compared to Tool 4. However, no clear overall conclusion could be made regarding the ability of the tools to capture qualitative characteristics and the time taken to accomplish the interviews/data entry as the available information is very limited.
- The majority of the tools in both methods managed to capture most of the ingredients added in a recipe in total, as well as the main ingredients and the type of added lipids. Again, the qualitative characteristics of the recipes' main ingredients were not adequately captured by the majority of the tools in both methods.
- Tool 1, in the case of 24h recalls, and Tool 7, in the case of food records, again adequately captured the characteristics of the recipe ingredients. The qualitative characteristics of main recipe ingredients that were captured by the tools ranged from 14.6-68.3% (24h recall method) and 7.3-69.7% (food records method). In case of food records, the same tools that did and did not capture well qualitative characteristics of the single items (described in the previous paragraph) did and did not capture well the characteristics of the recipe ingredients as well. This was not the case, however, for the tools using 24h recalls, implying that the interviewer is a significant source of variation when capturing qualitative characteristics. The tools displayed different abilities to capture facets depending on whether they corresponded to single items or to recipe ingredients. Provided that the tool does not have inherent programming limitations, one could argue that the discrepancy could be attributed to the interviewer/food record keeper. It would be difficult to conclude though, since the characteristics evaluated in the case of recipes were fewer and in some occasions different to the ones evaluated in the case of single food items.
- The majority of the tools adequately recorded the information on supplement consumption and whether or not the day recorded and the diet followed was a special one.

- Three tools (Tool 1, Tool 3, Tool 4) in the case of 24h recalls and Tool 7, in the case of food records, asked about forgotten food items and only one (Tool 2) managed to indicate the day with no water consumption, although neither tool recorded water during that day.

Firm conclusions regarding the performance of the tools in relation to their integrated databases cannot be drawn. Regarding the 24h recall tools, Tool 2 had only three integrated databases while Tool 1 had 14. Tool 1 captured qualitative characteristics better than Tool 2, but Tool 2 performed better than Tool 4 which had 11 integrated databases. Furthermore, Tool 3 which had 9 integrated databases managed to capture the greatest percentage of qualitative characteristics compared to all tools using this method. Similar observations were made regarding the tools participating in the RT with the food record method: Tool 7 (14 integrated databases) captured a greater percentage of characteristics compared to Tool 5 (9 integrated databases) which captured a greater percentage of characteristics compared to Tool 6 (12 integrated databases). With respect to the tools' relative accuracy, which may also be related to the number of integrated databases, Tool 2 (24h recall method) and Tool 7 (food records method) had the highest relative accuracy while Tool 1 (24h recall method) and Tools 5 and 6 (food records method) the lowest. Based on the results of this exercise, it appears that the number of integrated databases does not seem to affect the quality of the recorded data. Certainly, the design of the RT did not aim to evaluate all the integrated databases, e.g. yield factors database, estimated energy requirements of individuals database, retention factors database etc. and as a result the number of integrated databases was not so important.

Regarding inherent quality control, Tools 1, 3 reported having extended (10) quality controls (both real time and non-real time), whereas Tool 4 did not report any. Regarding food records, Tools 5, 6 and 7 had nine, three and 10 quality controls, respectively. The relative accuracy of the tools was independent of the quality controls each tool had. Similar was the case for the tool's repeatability, while food characteristics were better captured by tools with more quality controls.

In relation to the picture books, there is no clear evidence that the tools with more pictures performed better than the tools with less pictures, taking into account either the total number of pictures or the number of pictures per item. The results are mixed and the variation of the number of pictures per item used by tools, makes the drawing of conclusions even harder. Tool 5 and Tool 6 had among the lowest performances regarding relative accuracy. Tool 5, however, had the same number of pictures with Tool 7 which presented the greatest relative accuracy, and a five time less number of pictures from Tool 6. Mixed observations were made regarding the tools participating with 24h recalls in the RT, as well. It should be borne in mind though, that differences in picture books may reflect the country's cultural norms and dietary habits.

No clear conclusions could be drawn regarding asking about forgotten items; and whether the interviewer/food record keeper could make notes in the software or not. There is some indication, however, that the tools which have probing questions and which guide interviewers/food record keepers through standard pathways captured a greater percentage of qualitative characteristics compared to the other tools.

Tool 7 seemed one of the most equipped and flexible tools and it had one of the best performances in relation to all assessments made: repeatability, relative accuracy, qualitative characteristics and handling of recipes. However, one should bear in mind that Tool 7 recorded less days than the other tools and also used the record method which was an "easy and fully supported" food record, not fully imitating "real life" situations. On the other hand, less flexible tools in the case of 24h recalls, presented very good performances as well e.g. Tool 2, showing that well trained interviewers could balance to a certain extent the deficiencies of the tools.

The analysis of the RT points towards systematic and random errors in data collection. The repeatability of results can provide a first approximation of the tool's performance and an indication of random errors. For random errors the law of large numbers applies, i.e. the average value of many repeated measures approaches the true value. Many repeated measures may be interpreted as studies with large sample sizes and many recordings, particularly for food items commonly consumed. Furthermore, the assessment of the repeatability allows the evaluation of the data collection protocols, together with the consistency in which protocols are implemented. It can further provide some information on the clarity and quality of the tools' integrated databases and on the nature and magnitude of errors that could subsequently be introduced. In the RT, the repeatability analysis allowed the identification of errors introduced by interviewers/food record keepers. These were the cases when the exact same items in one occasion were recorded correctly (i.e. the tool was capable to record the information), whereas in another occasion the same item was not fully captured. Relative accuracy is often considered to indicate the extent by which systematic errors may influence the results. Systematic errors are the ones affecting the comparability of results and can occur for various reasons. Notwithstanding the fact that in some occasions the instructions given to the respondents were not fully controlled, sources of discrepancies could be identified in every stage of the dietary assessment process. In particular:

- The interviewer and food record keeper were found to be primarily responsible for the inconsistencies which seemed to be related to:
 - the ability and adequate training of the interviewer to probe for food details during the interview
 - erroneous entries with no obvious explanation
- Interviewees, although well-trained and with clear and standardised instructions on what to report/record were also responsible for misreporting, though in relatively few cases.
- Misunderstanding between the interviewer and the interviewee seemed possible in some instances.
- Incorrect entries by the people who translated the raw data into English or exported them manually to Excel/Word files could not also be ruled out.
- In some cases, properties of the tool in guiding interviewers to record details and remind them about forgotten food items as well as the target-population, which the tools have been developed to address and the tools' integrated databases limited the detail through which the reported information could be recorded. According to the responses received to the CQ, four tools reported following the multiple pass method, facilitating interviewees to probe for more food details. On the other hand, limitations were also introduced by the tools, as observed during the RT. For instance, some tools had limited options for recording the time of the meal, i.e. could not record quarter hours. Furthermore, one tool did not allow the detailed description of the item if the brand name was not inserted. Consequently, the various limitations of the tools prevented interviewers/food record keepers from recording all the information they intended to. In addition, the various standard portions and dishes included in the countries' specific databases may have contributed to the observed variability.
- Lastly, country-specific diversities in standard portions and units were, also, observed.

As limitations of the RT could be considered firstly the fact the the interviews and food record entries were performed in the national languages of the participating organisations and as a result the Consortium was not able to follow the procedures in full detail and recognize potential mistakes,

EFSA supporting publication 2014:EN-607

95

The present document has been produced and adopted by the bodies identified above as author(s). This task has been carried out exclusively by the author(s) in the context of a contract between the European Food Safety Authority and the author(s), awarded following a tender procedure. The present document is published complying with the transparency principle to which the Authority is subject. It may not be considered as an output adopted by the Authority. The European Food Safety Authority reserves its rights, view and position as regards the issues addressed and the conclusions reached in the present document, without prejudice to the rights of the authors.

misreporting etc. Furthermore, the data derived could not be easily handled due to their heterogeneity and the small number of repetitions. As a result, the data were analyzed in a more descriptive rather than a statistical way, preventing from drawing firm conclusions. The deviation of the data from the normal distribution limited further the ability of applying more sophisticated statistical analysis tests. Lastly, the comparison of the data between the tools participating with 24h recalls and the tools participating with food records was not possible, as it was not scientifically sound to compare a very close to “real life” 24 hr recall with an “easy and fully supported” food record, which deviated from usual survey conditions. Nevertheless, the RT exercise could be considered as a novel exercise which gave unique data for the evaluation of the performance of several national tools for dietary assessment in Europe.

CONCLUSIONS AND RECOMMENDATIONS

Overall, methods and tools that are used in 11 European countries present similarities. Differences also exist and mainly derive from the methodology and administration of the tools. The tools of the six countries participating in the RT generally produced comparable results irrespective of the method, although all of them displayed limitations. The results indicate that there is room for improvement in all of the tools as many sources of inaccurate recordings were identified for each one of them and the indication of one type of tool or set of features as better than another is not feasible. In summary:

- **The major feature that all tools need improvement is the recording of the qualitative characteristics of the items consumed**
- **The use of pictures is recommended in order to increase the tool's relative accuracy in recording food consumption**

Ideally, the development of the tools' integrated databases should be based on capturing as many details as possible regarding the origin, production, preparation, packaging, process and consumption of food items. By all means, this is not a win-win situation and the addition of questions and related descriptors will increase the duration of the interview and, inevitably, the burden not only to the study participant, but also to the interviewee. To partly compensate for this, a flexible tool is recommended. A software design that would allow asking about some and not all of the available details/characteristics during a specific survey, e.g. by using default characteristics, will either ease the burden of the interview or at least not increase it. This should also be the case when deciding on the number and the extent of probing questions. The trade off with time taken to complete the interviews/records should always be kept in mind as it would be a problem to overload the interviewee but probably difficult to capture extra information without doing that. Researchers should aim to develop a dynamic, up-to-date software, which will relatively easily adjust to each survey's objectives. In every data collection the tool's capacity could be accustomed to the relevant research questions and researchers should weigh the cost over the benefit, as it may be the case that one type of survey may not fit for all goals.

- **Certain qualitative characteristics described by certain facet descriptors, in particular:**
 - **fat content, fortification agent, alcohol content, dough-mass, process-technology, packaging format and target consumer, in the case of the 24h recall method**
 - **raw source of derivatives, flavor note, fat content, sweetening agent, fortification agent, dough mass, process technology, cooking method, packaging format, packaging material, production method and target consumer, in the case of the food records method**
- were not adequately captured by the majority or any of the tools.**

We postulate that the interviewers could not sufficiently apprehend the information provided, either because they did not ask for it or the reply they received was not fully understood. In addition, limitations in the databases supporting the tools cannot be ruled out, mostly in the case of food records as record keepers had available all the information required. Since these descriptors are included in the EFSA FoodEx2 multi-faceted classification system and aim to serve purposes related to risk assessment, our observation that these particular facets have not been adequately recorded should be considered in adjusting national softwares and interviewers' training before data collection. As indicated above, each tool should be designed to include all facet descriptors, but in the fieldwork tools should be flexible enough to collect data on some prioritised facets.

- **The pop-up of probing questions during the data entry, the guidance of the interviewer/food record keeper by the tool through standard pathways and the incorporation of quality controls are recommended**, in order to help interviewers/food record keepers to record in a harmonised manner the maximum information needed including also commonly forgotten food items, supplements and water as well as to take into consideration special days or diets.

However, a well- trained interviewer could be capable of acquiring the information needed irrespectively of the existence of probing questions. It is true that the quality may be more standardised, if probing questions would be incorporated but the ‘game’ is not totally lost if based on well-trained interviewers. In any case, as the quality of the interviewers cannot be standardised, the incorporation of such functions and features to tools is recommended for answering specific questions or performing multiple functions across several disciplines. Nevertheless, although tempting to assume the tool with the most features and greatest level of recording detail to be the most robust, each one is developed with specific aims in mind, and there are always compromises to be made (e.g. level of detail versus interviewer/participant burden).

- **The harmonization and automation of the tools** in terms of:
 - guiding the interviewers probing for details of the food items
 - raw data exportation to different electronic types of files, e.g. Excel, Word files
 - translation in English,

would result in capturing greater detail of the items consumed as well as in the elimination of errors introduced when the collected data are cleaned and managed before being exported for further use.

- Some tools had incorporated automatic procedures of some of the critical issues mentioned and evaluated above and as a consequence, **tools were significantly dependent, in a different extent one from the other, on the training of the interviewers and food records keepers.**

On that basis, several recommendations for improvements could be made so that European studies on dietary assessment will generate more homogeneous information among countries and of better quality.

- **The thorough training of the interviewers/food record keepers, the automatisisation of tools' procedures and the update of the tools' integrated databases so as to reflect commonalities in Europe and underscore country-specific particularities in a harmonized way would also improve the comparability of the data collected in national European studies.**

REFERENCES

- Baranowski T, Islam N, Baranowski J, Cullen KW, Myres D, Marsh T and de MC, 2002. The food intake recording software system is valid among fourth-grade children. *Journal of the American Dietetic Association*, 102(3), 380-5.
- Baranowski T, Islam N, Douglass D, Dadabhoy H, Beltran A, Baranowski J, Thompson D, Cullen KW and Subar AF, 2012, ahead of print. Food Intake Recording Software System, version 4 (FIRSS4): a self-completed 24-h dietary recall for children. *Journal of Human Nutrition and Dietetics*, doi: 10.1111/j.1365-277X.2012.01251.x.
- Baum K and Trubo R, 2000. *Metabolize: The Personalized Program for Weight Loss*. Berkley Publishing Group, New York, USA, 283 pp.
- Ben Slama F, Jebali N, Chemli R, Ben Rayana C, Achour A, Najjar MF, Achour N and Belhadj O, 2011. Dietary fiber in the diets of urban Tunisian women: association of fiber intake with BMI, waist circumference and blood chemistry: preliminary study. *Clinics and Research in Hepatology and Gastroenterology*, 35(11), 750-4.
- Bethlehem, J, 2002. The Future of Surveys for Official Statistics. Available online: <http://www.blaiseusers.org/2009/papers/ProceedingsIBUCXII.pdf>
- Biltoft-Jensen A, Trolle E, Christensen T, Islam N, Andersen LF, Egenfeldt-Nielsen S and Tetens I, 2012, ahead of print. WebDASC: a web-based dietary assessment software for 8-11-year-old Danish children. *Journal of Human Nutrition and Dietetics*, doi: 10.1111/j.1365-277X.2012.01257.x.
- Bjermo H, Sand S, Nälsén C, Lundh T, Enghardt Barbieri H, Pearson M, Lindroos AK, Jönsson BA, Barregård L and Darnerud PO, 2013. Lead, mercury, and cadmium in blood and their relation to diet among Swedish adults. *Food and Chemical Toxicology*, 57, 161-9.
- Buonomo E, de Luca S, Tembo D, Scarcella P, Germano P, Doro Altan AM, Palombi L, Liotta G, Nielsen-Saines K, Erba F and Marazzi MC, 2012. Nutritional rehabilitation of HIV-exposed infants in Malawi: results from the drug resources enhancement against AIDS and malnutrition program. *International Journal of Environmental Research and Public Health*, 9(2), 421-34.
- Cade JE, Frear L and Greenwood DC, 2006. Assessment of diet in young children with an emphasis on fruit and vegetable intake: using CADET-Child and Diet Evaluation Tool. *Public Health Nutrition*, 9(4), 501-8.
- Colleran HL and Lovelady CA, 2012. Use of MyPyramid Menu Planner for Moms in a weight-loss intervention during lactation. *Journal of the Academy of Nutrition and Dietetics*, 112(4):553-8.
- Coyle KK, Potter S, Schneider D, May G, Robin LE, Seymour J and Debrot K, 2009. Distributing free fresh fruit and vegetables at school: results of a pilot outcome evaluation. *Public Health Reports*, 124(5), 660-9.
- Crispim SP, Geelen A, Le Donne C, De Vries JH, Sette S, Raffo A, Siebelink E, Ocke MC, van't Veer P and Leclercq C, 2010. European Food Consumption Validation (EFCOVAL). Dietary exposure to flavouring substances: from screening methods to detailed assessments using food consumption data collected with EPIC-Soft software. *Food Additives and Contaminants Part A Chemistry Analysis Control Exposure Risk Assessment*, 27(4), 433-446.
- Crispim SP, Nicolas G, Casagrande C, Knaze V, Illner AK, Huybrechts I and Slimani N, 2013. Quality assurance of the international computerised 24 h dietary recall method (EPIC-Soft). *British Journal of Nutr*, 4, 1-10, doi: 10.1017/S0007114513002766.

- Crowe TC, Fontaine HL, Gibbons CJ, Cameron-Smith D and Swinburn BA, 2004. Energy density of foods and beverages in the Australian food supply: influence of macronutrients and comparison to dietary intake. *European Journal of Clinical Nutrition*, 58(11), 1485-91.
- Dahm CC, Keogh RH, Spencer EA, Greenwood DC, Key TJ, Fentiman IS, Shipley MJ, Brunner EJ, Cade JE, Burley VJ, Mishra G, Stephen AM, Kuh D, White IR, Luben R, Lentjes MA, Khaw KT, Rodwell Bingham SA, 2010. Dietary fiber and colorectal cancer risk: a nested case-control study using food diaries. *Journal of the National Cancer Institute*, 5, 102(9), 614-26.
- Dop MC, Arcella D, Burlingame B, Charrondiere R, FAO internal report, 2006. Assessment of software for food consumption surveys to be adapted for use in developing countries. Nutrition Planning, Assessment and Evaluation Service (ESNA), Food and Nutrition Division.
- Ellingrod VL, Taylor SF, Brook RD, Evans SJ, Zöllner SK, Grove TB, Gardner KM, Bly MJ, Pop-Busui R and Dalack G, 2011. Dietary, lifestyle and pharmacogenetic factors associated with arteriole endothelial-dependent vasodilatation in schizophrenia patients treated with atypical antipsychotics (AAPs). *Schizophrenia Research*, 130(1-3), 20-6.
- EFSA (European Food Safety Authority), 2009. General principles for the collection of national food consumption data in the view of a pan-European dietary survey. *EFSA Journal* 2009;7(12):1435, 51 pp. doi:10.2903/j.efsa.2009.1435.
- EFSA (European Food Safety Authority), 2011. Use of the EFSA Comprehensive European Food Consumption Database in Exposure Assessment. *EFSA Journal* 2011;9(3):2097, 34 pp. doi:10.2903/j.efsa.2011.2097.
- Food/Analyst PLUS CD-ROM. Available online: <http://www.hoptechno.com/faplus.htm>
- Garcin M, Doussot L, Mille-Hamard Land Billat V, 2009. Athletes' dietary intake was closer to French RDA's than those of young sedentary counterparts. *Nutrition Research*, 29(10), 736-42.
- Glibetic M, Gurinovic M, Kadvan A, Milesevic J, Nikolic M and Novakovic R, 2013. Nutritional research tools harmonized with EuroFIR recommendations used in food compositions information systems, EuroFIR Nexus 2nd annual meeting and conference: Developments in Food Composition Information Systems Supporting ethnic and traditional food in Europe, Ljubljana, Slovenia, Programme and abstracts, 70.
- Gonzalez-Rodriguez LG, Aparicio A, Lopez-Sobaler AM and Ortega RM, 2013a. Omega 3 and omega 6 fatty acids intake and dietary sources in a representative sample of Spanish adults. *International Journal of Vitamin and Nutrition Research*, 83(1), 36-47.
- Gonzalez-Rodriguez LG, Estaire P, Penas-Ruiz C and Ortega RM, 2013b. Vitamin D intake and dietary sources in a representative sample of Spanish adults. *Journal of Human Nutrition and Dietetics*, 26 (Suppl. 1), 64-72.
- Greenfield H and Southgate D.A.T, 2003. Food composition data. Food and Agriculture Organization of the United Nations, Rome, Italy, 156 pp.
- Gurinović M and Kadvan A, 2011. Methodology of the dietary survey in YUSAD study; The quality of nutrition in schoolchildren and adult members of families. Yugoslav study of atherosclerosis precursors in schoolchildren in Serbia: twenty years follow-up. Medical Faculty University of Nedeljkovic S, Belgrade 334-368 pp.
- Gurinović M, Kadvan A, Bucchini L, Matthys C, Torres D, Novaković R, Smith R and Glibetić M, 2010. EURRECA nutritional planning and dietary assessment software tool: NutPlan. *European Journal of Clinical Nutrition*, 64 Suppl 2, S38-42.

- Haubrock J, Nöthlings U, Volatier JL, Dekkers A, Ocké M, Harttig U, Illner AK, Knüppel S, Andersen LF and Boeing H, 2011. European Food Consumption Validation Consortium. Estimating usual food intake distributions by using the multiple source method in the EPIC-Potsdam Calibration Study. *Journal of Nutrition*, 141(5), 914-20.
- Heath AL, Skeaff CM and Gibson RS, 2000. The relative validity of a computerized food frequency questionnaire for estimating intake of dietary iron and its absorption modifiers. *European Journal of Clinical Nutrition*, 54(7), 592-9.
- Hinds HE, Johnson AA, Webb MC and Graham AP, 2011. Iron, folate, and vitamin B12 status in the elderly by gender and ethnicity. *Journal of the National Medical Association*, 103(9-10), 870-7.
- Huybrechts I, Sioen I, Boon PE, Ruprich J, Lafay L, Turrini A, Amiano P, Hirvonen T, De Neve M, Arcella D, Moschandreas J, Westerlund A, Ribas-Barba L, Hilbig A, Papoutsou S, Christensen T, Oltarzewski M, Virtanen S, Rehurkova I, Azpiri M, Sette S, Kersting M, Walkiewicz A, Serra-Majem L, Volatier JL, Trolle E, Tornaritis M, Busk L, Kafatos A, Fabiansson S, De Henauw S and Van Klaveren JD, 2011. Dietary exposure assessments for children in europe (the EXPOCHI project): rationale, methods and design. *Archives of Public Health*, 24, 69(1), 4.
- Illner AK, Freisling H, Boeing H, Huybrechts I, Crispim SP and Slimani N, 2012. Review and evaluation of innovative technologies for measuring diet in nutritional epidemiology. *International Journal of Epidemiology*, 41(4), 1187-1203.
- INFOODS online. International Network of Food Data System. Available online: <http://www.fao.org/infoods/infoods/software-tools/en/>
- Jelke Bethlehem, 2009. The Future of Surveys for Official Statistics. Statistics Netherlands, Methodology Department. 12th International Blaise Users' Conference, Riga, Latvia, 15.
- Kardasz M, Małyszko J, Stefańska E and Ostrowska L, 2011. Assessment of dietary habits in hemodialysis and peritoneal dialysis patients. *Przegląd lekarski*, 68(4), 216-21.
- Kaur N, Mann SK, Sidhu P and Sangha JK, 1997. A comparative study of energy balance among housewives of Ludhiana city. *Indian Journal of Maternal and Child Health*, 8(3-4), 76-8.
- Knight, J, 2011. NUT – Nutritional software. *Linux Journal*, Aug 29, 2011. Available online: <http://www.linuxjournal.com/content/nut-nutrition-software>
- Knudsen VK, Fagt S, Trolle E, Matthiessen J, Groth MV, Biloft-Jensen A, Sørensen MR and Pedersen AN, 2012. Evaluation of dietary intake in Danish adults by means of an index based on food-based dietary guidelines. *Food and Nutrition Research*, 56. doi: 10.3402/fnr.v56i0.17129.
- Kobe H, Kržišnik C, Mis NF, 2012. Under- and over-reporting of energy intake in slovenian adolescents. *Journal of Nutrition Education and Behavior*, 44(6), 574-83.
- Korosec M, Golob T, Bertonecelj J, Stibilj V and Seljak BK, 2013. The Slovenian food composition database. *Food Chemistry*, 140(3), 495-9.
- Landig J, Erhardt JG, Bode JC and Bode C, 1998. Validation and comparison of two computerized methods of obtaining a diet history. *Clinical Nutrition*, 17(3), 113-7.
- Lanigan JA, Wells JC, Lawson MS, Lucas A., 2001. Validation of food diary method for assessment of dietary energy and macronutrient intake in infants and children aged 6-24 months. *European Journal of clinical Nutrition*, 55(2), 124-9.
- Leclercq C, Arcella D, Piccinelli R, Sette S, Le Donne C and Turrini A, on behalf of the INRAN-SCAI 2005e06 Study Group., 2009. The Italian National Food Consumption Survey INRAN-SCAI 2005-06: main results in terms of food consumption. *Public Health Nutrition*, 12, 2504-32.

- Lu C, Pearson M, Renker S, Myerburg S and Farino C, 2006. A novel system for collecting longitudinal self-reported dietary consumption information: the internet data logger (iDL). *Journal of Exposure Science and Environmental Epidemiology*, 16(5), 427-33.
- McAfee AJ, Mulhern MS, McSorley EM, Wallace JM, Bonham MP, Faure J, Romain S, Esther C, Shamlaye CF, Watson GE, Myers GJ, Clarkson TW, Davidson PW and Strain JJ, 2012. Intakes and adequacy of potentially important nutrients for cognitive development among 5-year-old children in the Seychelles Child Development and Nutrition Study. *Public Health Nutrition*, 15(9), 1670-7.
- McDonald A, Van Horn L, Slattery M, Hilner J, Bragg C, Caan B, Jacobs D Jr, Liu K, Hubert H, Gernhofer N, 1991. The CARDIA dietary history: development, implementation, and evaluation. *Journal of the American Dietetic Association*, 91(9), 1104-12.
- Merten C, Ferrari P, Bakker M, Boss A, Hearty A, Leclercq C, Lindtner O, Tlustos C, Verger P, Volatier J L and Arcella D, 2011. Methodological characteristics of the national dietary surveys carried out in the European Union as included in the European Food Safety Authority (EFSA) Comprehensive European Food Consumption Database, Food Additives & Contaminants- Part A- Chemistry, Analysis, Control, Exposure & Risk Assessment, 28, 975-995.
- Mikode, S.M and Adrienne, A W, 1994. Dietary assessment of middle-income pregnant women during the first, second, and third trimesters. *Journal of the American Dietetic Association*, 94(2), 196-199.
- Ministry of Social Affairs, Estonia, 2012. Public Health Development Plan 2009–2020 Summary of activity report of 2011. Available online: http://www.sm.ee/fileadmin/meedia/Dokumendid/Tervisevaldkond/Rahvatervis/RTA/Inglistkeelne/2011_RTAruanne_ENG.pdf
- Moore C, Gitau R, Goff Lewis FJ, Griffin, MD, Chatfield MD, Jebb SA, Frost GS, Sanders TAB, Griffin, BA and Lovegrove, JA on behalf of the RISCK Study Group, 2009. Successful Manipulation of the Quality and Quantity of Fat and Carbohydrate Consumed by Free-Living Individuals Using a Food Exchange Model. *Journal of Nutrition*, 139(8), 1534-1540.
- Nathan, I., Hackett A and Kirby S, 1996. The dietary intake of a group of vegetarian children aged 7-11 years compared with matched omnivores. *British Journal of Nutrition*, 75(4), 533-44.
- Nyuar KB, Khalil A and Crawford MA, 2012. Dietary intake of Sudanese women: a comparative assessment of nutrient intake of displaced and non-displaced women. *Nutrition and Health*, 21(2), 131-44.
- Ocké M, de Boer E, Brants H, van der Laan J, Niekerk M, van Rossum C, Temme L, Freisling H, Nicolas G, Casagrande C, Slimani N, Trolle E, Ege M, Christensen T, Vandevijvere S, Bellemans M, De Maeyer M, Defourny S, Rupich J, Dofkova M, Rehurkova I, Jakubikova M, Blahova J, Piskackova Z and Maly M, 2012. PANCAKE – Pilot study for the Assessment of Nutrient intake and food Consumption Among Kids in Europe. EFSA Supporting Publications 2012:EN-339, 120 pp. Available online: <http://www.efsa.europa.eu/en/supporting/pub/339e.htm>
- Ortega RM, López-Sobaler AM, Andrés P, Requejo AM and Molinero LM, 2004. DIAL software for assessing diets and food calculations. Departamento de Nutrición (UCM) & Alce Ingeniería SA. Madrid, Spain. Available online: <http://www.alceingenieria.net/nutricion.htm>
- Ortega RM, López-Sobaler AM, Andrés P, Requejo AM, Aparicio A and Molinero LM, 2013. DIAL software for assessing diets and food calculations (version 3.0.0.5). Departamento de Nutrición (UCM) & Alce Ingeniería SA. Madrid, Spain. Available online: <http://www.alceingenieria.net/nutricion.htm>

- Ortega RM, Gonzalez-Rodriguez LG, Navia B, Perea JM, Aparicio A and Lopez-Sobaler AM, grupo de investigación n.º 920030, 2013a. Ingesta de calcio y vitamina D en una muestra representativa de mujeres españolas; problemática específica en menopausia. *Nutrición Hospitalaria*, 28(2), 306-313.
- Ortega RM, Gonzalez-Rodriguez LG, Villalobos TK, Perea JM, Aparicio A and Lopez-Sobaler AM, 2013b. Fuentes alimentarias y adecuación de la ingesta de ácidos grasos omega-3 y omega-6 en una muestra representativa de adultos españoles. *Nutrición Hospitalaria*, 28(6), 2236-45.
- Probst Y and Tapsell LC, 2005. Overview of computerized dietary assessment programs for research and practice in nutrition education. *Journal of Nutrition Education and Behaviour*, 37(1), 20-26.
- Probst Y and Tapsell LC, 2007. Over- and underreporting of energy intake by patients with metabolic syndrome using an automated dietary assessment website. University of Wollongong, Research Online. Available online: <http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1127&context=hbspapers>
- Ramdath DD, Hilaire DG, Brambilla A, Sharma S, 2011. Nutritional composition of commonly consumed composite dishes in Trinidad. *International Journal of Food Sciences and Nutrition*, 62(1), 34-46.
- Reinivuo H, Hirvonen T, Ovaskainen ML, Korhonen T and Valsta LM, 2010. Dietary survey methodology of FINDIET 2007 with a risk assessment perspective. *Public Health Nutrition*, 13(6A), 915-9.
- Roberts K and Flaherty SJ, 2010. Review of dietary assessment methods in public health. Oxford, National Obesity Observatory. Available online: <http://www.seen.es/docs/apartados/851/Review%20dietary%20assessment%20methods%20in%20public%20health.pdf>
- Salvo D, Frediani JK, Ziegler TR and Cole CR, 2012. Food group intake patterns and nutrient intake vary across low-income Hispanic and African American preschool children in Atlanta: a cross sectional study. *Nutrition Journal*, 29(11), 62.
- Schatzkin A, Kipnis V, Carroll RJ, Midthune D, Subar AF, Bingham S, Schoeller DA, Troiano RP and Freedman LS, 2003. A comparison of a food frequency questionnaire with a 24-hour recall for use in an epidemiological cohort study: results from the biomarker-based observing protein and energy nutrition (open) study. *International Journal of Epidemiology*, 32(6), 1054-62.
- Shatenstein B, Amre D, Jabbour M and Feguary H, 2010. Examining the relative validity of an adult food frequency questionnaire in children and adolescents. *Journal of Pediatric Gastroenterology and Nutrition*, 51(5), 645-52.
- Shirazi AS, Mobarhan MG, Nik E, Kerayechian N and Ferns GA, 2011. Comparison of dietary intake between fixed orthodontic patients and control subjects. *Australian Orthodontic Journal*, 27(1), 17-22.
- Sillero Quintana M, Garcia Aparicio A, Torres García A and Garrido Pastor G, 2010. Dietary habits and nutritional intervention in elite spanish athletes. *World Congress on Science in Athletics*, Barcelona, Spain, 14.
- Slimani N, Deverhagen Gand Chardonniere RU, 1999. Structure of the standardized computerized 24-h diet recall interview used as reference method in the 22 centers participating in the EPIC project. *European Prospective Investigation into Cancer and Nutrition. Computer Methods and Programs in Biomedicine*, 58(3), 251-266.
- Souverein OW, Dekkers AL, Geelen A, Haubrock J, de Vries JH, Ocké MC, Harttig U, Boeing H and van 't Veer P, EFCOVAL Consortium, 2011. Comparing four methods to estimate usual intake distributions. *European Journal of clinical Nutrition*, 65 Suppl 1, S92-101.

- Staudte H, Kranz S, Völkel A, Schütze J and Sigusch BW, 2012. Comparison of nutrient intake between patients with periodontitis and healthy subjects. *Quintessence International*, 43(10), 907-16.
- Subar AF, Kirkpatrick SI, Mittl B, Zimmerman TP, Thompson FE, Bingley C, Willis G, Islam NG, Baranowski T, McNutt S and Potischman N, 2012. The Automated Self-Administered 24-hour dietary recall (ASA24): a resource for researchers, clinicians, and educators from the National Cancer Institute. *Journal of the Academy of Nutrition and Dietetics*, 112(8), 1134-7.
- Supasyndh O, Satirapoj B, Seenamngoen S, Yongsiri S, Choovichian P and Vanichakarn S, 2009. Nutritional status of twice and thrice-weekly hemodialysis patients with weekly Kt/V > 3.6. *Journal of the Medical Association of Thailand*, 92(5), 624-31.
- Szponar L, Ciok J, Dolna A and Ołtarzewski M, 2006. Policy options for responding to the growing challenge from obesity. A cross-national comparative study. Polish National Report. Available on line: http://s3.amazonaws.com/zanran_storage/www.sussex.ac.uk/ContentPages/3383445.pdf
- Temme E, Huybrechts I, Vandevijvere S, De Henauw S, Leveque A, Kornitzer M, De Backer G and Van Oyen H, 2010. Energy and macronutrient intakes in Belgium: results from the first National Food Consumption Survey. *British Journal of Nutrition*, 103(12), 1823-1829.
- Tengvall M. and Ellegård L, 2007. Dietary intake in Swedish medical students. *Scandinavian Journal of Food and Nutrition*, 51(2), 79-84.
- Tinoco-Veras CM, Bezerra Sousa, MS, da Silva, BB, Franciscato Cozzolino, SM, Viana Pires, L, Coelho Pimentel, JA, do Nascimento-Nogueira, N and do Nascimento-Marreiro D, 2011. Analysis of plasma and erythrocyte zinc levels in premenopausal women with breast cancer. *Nutrición Hospitalaria*, 26(2), 293-7.
- Vaask S, Pomerleau J, Pudule I, Grinberga D, Abaravicius A, Robertson A and McKee M, 2004. Comparison of the Micro-Nutrica Nutritional Analysis program and the Russian Food Composition Database using data from the Baltic Nutrition Surveys. *European Journal of clinical Nutrition*, 58(4), 573-9.
- Van Biervliet S, Van Biervliet JP, De Neve J, Watteyne R and D'Hooghe M, 2011. Nutritional intake evolution in adolescent sporting boys over the last two decades. *Acta Clinica Belgica*, 66(4), 280-2.
- Van Dongen MC, Lentjes MA, Wijckmans NE, Dirckx C, Lemaître D, Achten W, Celis M, Sieri S, Arnout J, Buntinx F, Siani A, Cappuccio FP, de Lorgeril M, Iacoviello L and Dagnelie PC, 2011. European Collaborative Group of the IMMIDIET Project. Validation of a food-frequency questionnaire for Flemish and Italian-native subjects in Belgium: The IMMIDIET study. *Nutrition*, 27(3), 302-9.
- Weiss R, 2011. Innovative Technologies for Improving Dietary Assessment. Innovative Technologies for Longitudinal Birth Cohort Study Visit Assessments Web Seminar, July 19, 2011. Available online: <http://www.nationalchildrensstudy.gov/research/workshops/Pages/Weiss-Diet-Assessment-7-19-11.pdf>
- Welch AA, Luben R, Khaw KT and Bingham SA, 2005. The CAFE computer program for nutritional analysis of the EPIC-Norfolk food frequency questionnaire and identification of extreme nutrient values. *Journal of Human Nutrition and Dietetics*, 18(2), 99-116.
- WHO (World Health Organisation), 2007. European Action Plan for Food and Nutrition Policy 2007-2012. WHO Regional Office for Europe, Copenhagen, Denmark. 35 pp.
- Willett W, 1998. *Nutritional Epidemiology*. Second Edition. Oxford University Press, New York, 497 pp.

- Wrieden W, Peace H, Armstrong J and Barton K, 2003. A short review of dietary assessment methods used in National and Scottish Research Studies. Briefing Paper Prepared for: Working Group on Monitoring Scottish Dietary Targets Workshop. Available online: <http://multimedia.food.gov.uk/multimedia/pdfs/scotdietassessmethods.pdf>
- Zatońska K, Campos H, Ilow R, Janik-Konieczny K, Różańska D, Regulska-Ilow B, Poltyn-Zaradna K, Szuba A and Zatoński WA, 2012. Dietary intake and adipose tissue level of specific fatty acids in a selected group from the Lower Silesia population. *Annals of Agricultural and Environmental Medicine*, 19(3), 389-94. (*Structure of the comprehensive questionnaire*)

APPENDICES

Appendix A. Short Questionnaire

SHORT QUESTIONNAIRE ABOUT STUDIES IMPLEMENTED USING 24h RECALLS

Please indicate the name of the software

Can the tool be used for 24-HDRs or for entering data collected through food records or both? (Please indicate the use)

When was the last time the software was used?

Please indicate the year of the software's last update

Is it computerized or web-based dietary software? (Please reply Yes or No)

Are the software and an experienced interviewer available to be included in the ring-trial?

Which are the newest and the oldest operating systems with which this software is compatible?

Who maintains the software? (Please indicate if the maintenance is internal or external)

Has the tool been used in a recent national survey? (Please reply Yes or No)

If yes, when was the survey undertaken?

If no, in which survey it is going to be used? Please indicate if it is a national or a regional survey

Does the tool include probing questions facilitating the interview/data entry? (Please reply Yes or No)

Are databases integrated in the software (e.g. recipe, food composition, food classification, yield factors, fat absorbed during cooking, portion sizes)?
(Please reply Yes or No)

Does the software include a function to export the complete dataset in order to be imported in an external system? (Please reply Yes or No)

SHORT QUESTIONNAIRE ABOUT STUDIES IMPLEMENTED USING FOOD RECORDS

Please indicate the name of the software

Can the tool be used for 24-HDRs or for entering data collected through food records or both? (Please indicate the use)

When was the last time the software was used?

Please indicate the year of the software's last update

Is it computerized or web-based dietary software? (Please reply Yes or No)

Which are the newest and the oldest operating systems with which this software is compatible?

Who maintains the software? (Please indicate if the maintenance is internal or external)

Has the tool been used in a recent national survey? (Please reply Yes or No)

If yes, when was the survey undertaken?

If no, in which survey it is going to be used? Please indicate if it is a national or a regional survey

Does the tool include probing questions facilitating the interview/data entry? (Please reply Yes or No)

Are databases integrated in the software (e.g. recipe, food composition, food classification, yield factors, fat absorbed during cooking, portion sizes)?
(Please reply Yes or No)

Does the software include a function to export the complete dataset in order to be imported in an external system? (Please reply Yes or No)

Appendix B. List of computerised data collection tools for nutritional assessment referenced in PubMed

Name	Year ^(a)	Developer	Country	Reference	Key features	FCDB/in/out of tool	Language	Data collection tool ^(b)
Coronary Artery Risk Development in Young Adults (CARDIA) Diet History Questionnaire (DARCC)	1985 last version 2006	The University of Alabama, the University of Minnesota, Northwestern University, Kaiser Permanente	USA	McDonald et al. 1991	Influence of diet and other lifestyle factors on the evolution of risk factors for the CVD	The nutrient database (Version 36) for CARDIA	English	DH, 24-HDR, FFQ
Nutritionist Pro™	1982 last version 2000	Axxya Systems	USA	Mikode et al. 1994	Diet Analysis - Recipe Analysis- Menu Analysis- Reports, Search, Preview Nutrients	The Nutrition Knowledge Base	English	24 -HDR, FFQ
Microdiet	updated	University of Salford Manchester	UK	Nathan et al. 1996	Translate the structured data into weights of food and nutrient data for analysis	McCance and Widdowson's 4th, 5th and 6th editions; American and Italian data sets are also supplied with the software	English	FR
Nutriguide	updated	Nutri-Science, Stuttgart	Germany	Kaur et al. 1997	Software and database package that provides nutrition	German BLS (Bundeslebensmittelschlüssel) data and the German Hesecker database	German, Swiss, Austrian	Weighed Dietary Protocol (WDP)

					information for recipes			
GIES - General Intake Estimation System	updated	University of Hohenheim, Stuttgart	Germany	Landig et al. 1998	Analyzing the diets of patients or clients with diet related diseases	Danish Food Composition Database	Danish	pre-coded FD
Iron-FFQ	2000 paper	Department of Human Nutrition, University of Otago, Dunedin	New Zealand	Heath et al. 2000	Estimation of intake of total, non-haem, haem and meat iron as well as vitamin C, phytate, calcium	New Zealand Food Composition Database	English	FFQ, FW
COMP-EAT	updated	VIS Visual Information Systems Limited	UK	Lanigan et al. 2001	CompEat Pro is a feature packed, and powerful software program for analysing diets and recipes; recipe calculation	McCance and Widdowson's 6th edition; USDA database; Commercial UK data including some South African foods	English	24 -HDR, FFQ
DINER	updated	University of Cambridge - EPIC Norfolk	UK	Welch et al. 2001	Allows food intake and the amount consumed to be translated exactly as recorded in the original diary	A food list of 9000 food items and values for 24,000 portion sizes have been incorporated into the database, using information from the 5979 diaries coded since 1995	English	24 -HDR

FIRSSt2 (Food Intake Recording Software System, version 2)	2002 paper	Baylor School of Medicine, Houston, TX	USA	Baranowski et al. 2002	Interactive, multimedia, and multiple pass 24h for self report intake		English	24-HDR
Finnish Micro Nutrica Dietary Analysis program	updated	Finnish Social Insurance Institute, Turku	Finland	Vaask et al. 2004	To convert dietary information into daily nutrient intakes	Over 1150 food items and dishes and 66 nutrients	English Estonian, Latvian, Lithuanian, Russian	24-HDR
AusNut	2004	Food Standards Australia New Zealand's	Australia New Zealand	Crowe et al. 2004	Specific nutrient database for estimating nutrient intakes from foods	The AUSNUT 2007 database	English	24-HDR
Nutri-Cal	updated	NutriCalc	UK	Probst and Tapsell 2005	Access-based food diary analysis; recipe analysis function	UK Nutrient Databank, USDA	English	FR
Diet and Nutrition Tool for Evaluation (DANTE)	updated	Nutrition Epidemiology Group at the University of Leeds	UK	Cade et al. 2006	Allows food intake and the amount consumed to be translated exactly as recorded in the original diary		English	FFQ, FD, 24 – HDR - food tick list
The internet Data Logger (iDL)	2006 paper	Information Service, Rollins	USA	Lu et.al. 2006	Self-reporting of daily dietary consumption	incorporated database	English	24-HDR

		School of Public Health, Emory University, Atlanta			for use in a longitudinal dietary assessment study			
MATs version 4.03	2001	Rudans Lättdata, Västerås	Sweeden	Tengvall and Ellegard 2007	To estimate energy and nutrient intake (including supplements)	NFA food composition database (version 2_97)	Swedish	FR
INMUCAL	updated	Institute of Nutrition, Mahidol University	Thailand	Suoasynndh et al. 2009	Industry food labeling; Hospital food service; Dietary assessment; Recipe and menu analysis	Thai food composition database - (Reference Database; Purpose: National Database)	English; Other - Thai food names	FR
Nutrilog	2002	Nutrilog	France	Garcin et al. 2009	Nutrient intake and energy expenditure.	table of composition of French foods	French, English	FR
DIDO (Diet in, Data out) updated in DINO (Diet in Nutrients out)	2006	MRC Human Nutrition Research, Cambridge	UK	Moore et al. 2009	Dietary assessment system, analysis of dietary GI (high glycemic index)	MRC HNR's in-house database of the nutrient composition of foods consumed in the UK	English	Diet Diary (DD)
Food Intake Analysis System FIAS -Millennium Edition	2010 last version	University of Texas School of Public Health	USA	Coyle et al. 2009	Dietary assessment, Food Intake Analysis	Efficient access to USDA reference databases: Food and Nutrient Database used for the 1994-1996 CSFII and 1998 Supplemental Children s	English	24-HDR, FR

Survey, FNDDS (version 1-4)								
Finessi	2010 paper	National Institute for Health and Welfare (THL)	Finland	Reinivuo et al. 2010	Calculating the nutritional composition of foods consumed; Automatic quality control checker; Food consumption data; Food may be at the ingredient level (recipe data disaggregated)	Finnish national food composition database	Finish, English	24 -HDR,FD
INRAN-DIARIO 3.1	2009 paper	INRAN, Italy	Italy	Leclercq et al. 2009	System translates the amount of food eaten into individual energy and macronutrients	Italian national food composition table	Italian	24-HDR, FR
NutPlan	2010	Center of Research Excellence in Nutrition and Metabolism, IMR	Serbia	Gurinovic et. al 2010	Nutrition planning, recipe calculation, creating food labels, and nutrient intake assessment. Data collection method	Contains the following databases: foods, dish recipes, meals, menus, average menus and glossary	English	24-HDR, FFQ, FR
CANDAT	1990	Godin London	Canada	Shatenstein et al. 2010	Industry food labeling;	Canadian and the USDA food files	French, English	FR, Food history (FH)

	2010 paper	Incorporated			Hospital food service; Dietary assessment; Recipe and menu analysis; General public			
DINERMO	updated	University of Cambridge - EPIC Norfolk	UK	Dahm et al. 2010	Translate the structured data into weights of food and nutrient data for analysis	Nutrient database based on the 2200 foods in the UK food composition database (UKFCD)	English	FD
Dietplan6	1991 updated	Forestfield Software Ltd	UK	Shirazi et al. 2011	Nutrition analysis software for professional dietitians and nutritionists; recipe analysis	McCance and Widdowsons Food Composition Tables 6th edition	English	24-HDR
SUDAAN software (version 9.0)	2010 last version	Research Triangle Institute International, Research Triangle Park, North Carolina	USA	Hinds et al. 2011	Analyze data from complex surveys and experimental studies involving cluster- correlated data.	USDA	English	24-HDR
BINS	2011 paper	Becel institute nutrition software (BINS), Becel,	Belgium	Van Biervliet et al. 2011	Nutritional software			FR

Belgium								
BILNUT	2011 paper	Nutrisoft, France	France	Ben Slama et al. 2011	Software for estimation of energy intake and the proportions of fats, carbohydrates, and proteins	French food composition tables, French National Institute of Health and Medical Research (INSERM) food table.	French	Food Weighing (FW), 24- HDR, FR
Nutribase Clinical	updated	Cybersoft Inc., Phoenix,	USA	Ramadath et al. 2011	Food analysis; Food comparison; Recipe analysis; Comparisons of DRVs DACH and RDAs; Cost analysis	USDA	English	24-HDR
Nubel Food planer	2010 new version	Nubel	Belgium	Van Dongen et al. 2011	Nutritional software	Dutch Food Composition Database, NEVO table; Belgium food composition Database, NUBEL	English, Dutch, French	24-HDR, FFQ
Nutrition Data System for Research (NDSR)	updated	University of Minnesota - Nutrition Coordinating Center	USA	Ellingrod et al. 2011	Dietary analysis program designed for the collection and analyses of 24h dietary recalls and the analysis of food records, menus, and recipes.	NCC Food and Nutrient Database	English	24-HDR, FR

Food Processor	1981 updated	ESHA Research	USA	Zatonska et al. 2012	Hospital food service; Dietary assessment; Recipe and menu analysis	ESHA Database	English	FR, 24-HDR, FFQ
NDSR - Nutrition Analysis Software and Database	1988 updated continually	University of Minnesota, Nutrition Coordinating Center	USA	Salvo et al. 2012	Nutrition assessment in free-living populations.	The NCC Food and Nutrient Database	English	24-HDR
Automated Self Administered 24h recall (ASA24)	2011 last update	The National Cancer Institute, USA	USA	Subar et al. 2012	Automated self- administered 24-HDR, and a Researcher Web site to obtain data analyses.	Food and Nutrient Database for Dietary Surveys (FNDDS)	English, Spanish	24- HDR
WebDASC / Web- based Dietary Assessment Software for Children	2011	National Food Institute; Technical University of Denmark; Division of Nutrition; Denmark	Danmark	Biltoft- Jensen et al. 2012	Dietary change resulting from a school-based intervention.	Danish Food Composition Databank	English, Danish	24 - HDR, Food Diaries (FD) and Food Frequency Questionnaires (FFQ)
ASA24™-Kids- 2012	2012	The National Cancer Institute, USA	USA	Baranowski et al. 2012	ASA24- Children friendly software for 24HDR	Food and Nutrient Database for Dietary Surveys (FNDDS)	English, Spanish	24 - HDR
WISP-DES	2013	Tinuviel	UK	McAfee et	Nutrition	UK or the USA food	English	24h diet recall

	last update	Software, UK		al. 2012	analysis of food intake records Physical activity diaries: calculate energy expenditure Statistical analyses	composition databank		(24 – HDR), Food Record (FR)
MyPyramid Menu Planner	2008	The USDA Center for Nutrition Policy and Promotion (CNPP)	USA	Colleran and Lovelady, 2012	Dietary assessment; Recipe and menu analysis	My Pyramid Food Data; data sources: USDA Food and Nutrient Database for Dietary Studies Version: FNDDS 3.0 (2005-06)	English	24-HDR
Nutrisurvey	2007 last update	Dr. Juergen Erhardt, Germany	WHO	Buonomo et al. 2012	Nutrient analysis and calculation of energy requirements, planning of diets	With the many food databases it is possible to complement the standard food database of NutriSurvey, mainly German and USDA	English, German	DH, FFQ, FR
Prodi	updated	Nutri-Science, Stuttgart	Germany	Kobe et al. 2012	Combine food composition data, recipes and dietary assessment to estimate food and nutrient intakes	German BLS (Bundeslebensmittelschlüssel) and the German SFK (Souci-Fachmann-Kraut) data	German, English, French, Italian, Swiss, Austrian	FFQ, WDP
DGE-PC	updated	DGE	Germany	Staudte et al. 2012	Food Analysis; Creation of diet plans	nutritional database with over 12 000 150 foods and ingredients.	German	FR

					.Individual demand calculation; Recipe Management			
FoodBase 2000	updated	Professor Michael A Crawford PhD	USA	Nyuar et al. 2012	Food analysis; Food list; Recipe and Meal analysis; Record analysis; Comparisons of DRVs DACH.			24-HDR
Optijed	2008	Institute of Public Health	Republic of Slovenia	Korosec et al. 2013	Nutritional software; meal planning	Slovenian FCDB	Slovenian	24-HDR, FFQ
EPIC-SOFT	1998 updated	International Agency for Research on Cancer (IARC) in collaboration with all national EPIC centers; Dietary Exposure Assessment Group	WHO	Crispim et al. 2013, and many	Dietary assessment; foods, recipes, and supplements consumed in the course of the preceding day	EPIC Nutrient Database Project, ENDB	English, German, French	24-HDR; Food- Recording Booklet (FRB)
The Riksmaten tool	updated	National Food Agency, Food Data Division	Sweden	Bjermo et al. 2013	Web-based food diary	Swedish Food Composition Database, integrated in the software	Swedish	FR

NutWin	updated	Nutritional Assessment, quantify nutrient intake and preparing food plans;	Portuguese	24 -HDR, FR
--------	---------	---	------------	-------------

- (a): Year of development (if available), or year of use in peer reviewed paper, or information about the latest version/update;
 (b): Abbreviations: Twenty-four hour diet recall (24 – HDR), Food Record (FR), Food Diaries (FD), Food Frequency Questionnaires (FFQ), Food Weighing (FW), Food history (FH), FFQ, Food Propensity Questionnaire (FPQ), Food-Recording Booklet (FRB), Weighed Dietary Protocol (WDP)

Appendix C. List of computerised data collection tools for nutritional assessment referenced in grey literature

Name	Year ^(a)	Developer	Country	Reference	Key features	FCDB/in/out of tool	Language	Data collection tool ^(b)
Automated Multiple Pass Method (AMPM) Blaise 4.7	2002	The U. S. Department of Agriculture's	USA	Bethlehem, 2002	To conduct dietary intake interviews	USDA	English	24-HDR
Dieta FAO	2006 Paper	National Food and Nutrition Institute	Poland	Szponar et al. 2006	Energy and nutrient contents in the daily, individual diet	Tables With Nutritional Values of Foodstuffs	Polish	24h diet recall (24-HDR)
DietAdvice	2005-2006	Illawarra region of NSW	Australia	Probst et al. 2007	An Internet application that combined a multiple-pass approach with FFQ and 24h recall procedures	AUSNUT database	English	24-HDR, Food Frequency Questionnaires (FFQ)
Dine Healthy 7	1982 updated 2009	Dine Healthy	USA	Nobles, 2009	Dietary assessment; Recipe and menu analysis	User Database (that incorporates data from a single Reference Database	English	FR
The Nutridata pro survey platform	2010	National Institute for Health Development	Estonia	Public Health Development Plan 2009–2020	Nutritional analysis	Nutridata, Estonian FCDB	Estonian and English	24-HDR, FR, FFQ
NUT Nutrition Software	1996 updated 2010	Jim Jozwiak	USA	Knight, 2011	Nutritional Assessment	NUT Nutrition SoftwareDatabase Data Sources: USDA	English	Food Record (FR)

EFSA supporting publication 2014:EN-607

						Nutrient Database for Standard Reference; Version: SR22		
DIET-ASSESS	2003, first version NUTQ- Vrs 1 - last updated 2013 as DIET - ASSESS	Centre of Research Excellence in Nurtition and Metabolism, IMR	Serbia	Gurinovic and Kadvan, 2011	Data entry and dietary assessment program designed for the collection and analyses of 24h dietary recalls, food records, FFQ, menus, and recipes, food groups consumption; Languag & Foodex2 classification, nutritive values for consumed foods and meals in questionnaire; energy , macronutrients values; micronutrients; recommendations nutrient adequacy assessment	Serbian Food Composition data base (FCDB); Balkan Regional FCDB; Data base of regional traditional recipes; EuroFIR FCDB	Interface and reports- in English; Database – In English and Serbian (or other native language)	24 HDR, FFQ, FR
DIAL	2004 first version, 2013 last version	Alce Ingeniería S.A., Madrid	Spain	Ortega et al.	Transformation dietary data into energy and nutrients	Nutritional composition table with around 1215 foods, classified into 15 different groups and 67 subgroups in total	Spanish	24-HDR, FR
Food/Analyst Plus	Updated	Hopkins Technology	USA	Food/Analyst PLUS CD- ROM	Evaluation of dietary records; Meal planning with	USDA	English	FR

					optimization options for all nutrients			
Food Finder	2010 last update	South African Medical Research Council (MRC)	South Africa	INFOODS	The database is intended to collect and play with nutritional information	South African Food Composition Database	English?	24-HDR
HHF Nutritional tool		Hellenic Health Foundation (HHF)	Greece	EFSA Ring trial, 2013	National data collection			24-HDR
Food Consumption Information System (FCIS)		Assesment and Registration Agency of Food and Veterinary service	Latvia	EFSA Ring trial, 2013	National data collection			24-HDR, FR

(a): Year of development (if available), or year of use (gray literature data), or information about the latest version/update;

(b): Abbreviations: Twenty-four hour diet recall (24 – HDR), FR (Food Record), Food Frequency Questionnaires (FFQ).

Appendix D. Meetings

During the one and a half years this project lasted 12 meetings took place:

- Kick of meeting on September 19-20th, 2012 at EFSA premises, Parma, Italy
 - Discussion points: a) work plan, b) identified protocols and tools, c) screening questionnaire, d) administration, e) analysis of the questionnaire replies, f) preparation of the ring-trial
- 1st web-meeting on December 18th, 2012
 - Discussion points: a) discussion on a new version of the comprehensive questionnaire, b) preparation for the web interviews with software providers, c) preparation of the ring-trial, d) discussion on the first Interim report
- 2nd plenary meeting on January 28-29th, 2013 at EFSA premises, Parma, Italy
 - Discussion points: a) work progress, b) finalization of the comprehensive questionnaire, c) reflect on ring-trial's progress and outcome of observation, d) analysis of the ring-trial data, e) work plan
- 2nd web-meeting on January 16th, 2013
 - Discussion points: a) update on progress, b) organisation of the ring-trial, c) the observer's form, d) practical details, e) agenda on the 2nd plenary meeting
- 3rd web-meeting on March 27th, 2013
 - Discussion points: a) understanding the ring-trial data, b) aim of the data analysis: qualitative appraisal, quantitative assessment, analysis in combination with the comprehensive questionnaire, c) specific objectives of data analysis
- 4th web-meeting on April 30th, 2013
 - Discussion points: a) discussion on the excerpt of the database sent to partners by the project leader, b) suggestions on ring-trial data analysis, c) update on development (testing trial version) of the comprehensive questionnaire and list of participating institutes, d) update on the systematic review of dietary survey methodologies applied in Europe
- 5th web-meeting on June 28th, 2013
 - Discussion points: a) discussion on the analysis of the ring-trial data, b) issues related to the comprehensive questionnaire
- 6th web-meeting on July 23, 2013
 - Discussion points: discussion on the preliminary results of the ring-trial

- 7th web-meeting on October 3rd, 2013
 - Discussion points: a) briefing partners about the submission of the revised 2nd interim report and the request for a project extension until January 7, 2014, b) discussion on the preliminary analysis on how well tools captured the qualitative characteristics of the reported food items
- 8th web-meeting on November 7th, 2013
 - Discussion points: a) the statistical analysis of the ring-trial data, b) discussion on slides to be presented by Prof. Trichopoulou at the 8th Annual Meeting of the EFSA Network on Food Consumption Data (Parma, November 13 - 14, 2013), c) discussion on an excerpt of an e-mail sent by Sofia Ioannidou in late September in the context of discussions related to the 2nd interim report, where Sofia was trying to summarise EFSA's rationale for selecting the items reported in the RT
- 9th web-meeting on November 15th, 2013
 - Discussion points: a) discussion on the statistical analysis of the ring-trial data
- Final meeting on November 28th, 2013 in Athens, Greece
 - Discussion points: a) presentation of the draft of the final project report, b) recommendations for drafting the final report, c) presentation of the draft paper of the systematic review

Appendix E. Evaluation Questionnaire

Evaluation Questionnaire

- Section A -

*Aspects of the tool*⁷

- A. General characteristics
- B. Data collection

⁷ To be pre-filled by the project team and confirmed by respondents

A. General characteristics

Item Num.	Question	Type	Responses	Comments
1	Responsible Institute	Open question	-	
2	Contact details (telephone, email, address)	Open question	-	
3	Year of the study	Open question	-	
4	Nature of dietary assessment data	Categorical	Cross-sectional, Longitudinal	
5	Sample size	Continuous	-	
6	Age range of participants	Open question	-	
7	Age recording	Categorical	Continuously, Categorically	
7.1	If age was recorded categorically, specify age groups	Open question	-	
8	Reference population	Categorical	National, Regional	
8.1	If the reference population was regional, please specify	Open question	-	
9	Sampling method	Categorical	Population registry, phone book, population census, postcode address file, registry of general practitioners, electoral list, other (specify)	

B. Data collection

1	Dietary assessment method	Categorical (Multiple replies possible)	24-hour recall; food record; Food Propensity Questionnaire; Food Frequency Questionnaire	
A Food Propensity Questionnaire is a non-quantitative FFQ.				
2	If dietary assessment method was FFQ, was it quantified?	Categorical	Yes, No, Not known	
3	If dietary assessment method was 24-hour recall, please specify how many recalls per participant	Continuous	-	
4	If dietary assessment method was food record, please specify how many days per participant	Continuous	-	
5	If dietary assessment method was 24-hour recall or food record, were weekend days included?	Categorical	Yes, No, Not known	
6	If dietary assessment method was food record, were instructions given to participants?	Categorical	Yes, No, Not known	
6.1	If instructions were given please provide us with a copy (in English)	Attachments	-	
7	Where were interviews conducted?	Categorical	Institute, hospital, home, work place, other (specify)	
8	Were under/over reporting (based on energy intake) evaluated?	Categorical	Yes, No, Not known	
9	If misreporting has been evaluated, please specify how	Categorical	Doubly Labelled Water, Published cut-offs (specify)	
10	Please provide any publications regarding methodological aspects of dietary assessment in the study	Attachments	-	
11	Do participants have the opportunity to receive feedback about their diet quality and nutrient adequacy from the study team?	Categorical	Yes, No, Not known	

- Section B -

Aspects of the tool

- A. General characteristics
- B. Data collection
- C. Data management
- D. Software and IT characteristics*

Objective

To understand how different aspects of tools **affect the comparability** of food consumption data across Europe

* To be filled-in by IT specialists

Is a demonstration version of the software available or would you agree to provide us with a trial version for our assessment? Categorical Demonstration version available, Provision of a trial version, No Both

A. General part

A1. General characteristics

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records) Both	Comments
1	What is the name of the dietary tool?	Open question	-	Both	
2	Please indicate if the software maintenance is internal or external.	Categorical	Internal, external	Both	
3	When was the last time the software was used?	Open question	-	Both	
4	Can the tool be used to conduct 24-HDRs, for entering data collected through food records, or both?	Categorical	24-HDRs, Food records, Both, Other (please specify)	Both	
5	Which age group(s) is the tool applicable to?	Open question	-	Both	
6	Has the software been used in a recent national food survey?	Categorical	Yes, No, Not known	Both	
6.1	If yes, when was that survey undertaken?	Open question	-	Both	
7	Are there plans to use the software in a future survey?	Categorical	Yes, No, Not known	Both	
7.1	If yes, please indicate if it is a national or a regional survey.	Categorical	National, Regional	Both	
7.2	If yes, when is it going to be undertaken?	Open question	-	Both	
8	Please provide any publications of a food survey in which the software was used for entering and analyzing food intake information collected in the	Open question	Attachments	Both	

	form of records or recalls?			
8.1	If publications do not exist, please include any other available reports, summaries or full texts (in English)	Open question	Attachments	Both
9	Could you provide us with screenshots from the interface of the tool?	Open question	Attachments	Both
10	In your opinion what are the three biggest advantages and disadvantages of the tool?	Open question	-	Both

A2. Language

1	In which language(s) is the software available?	Open question	-	Both
2	Are language settings configurable by the users?	Categorical	Yes, No, Not known	Both
2.1	If yes, please describe.	Open question	-	Both

A3. Background of the user and training needs

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	How long is the estimated minimum training period for an interviewer to become an 'independent user' of the software/tool?	Open question	-	Both	
2	What is the required educational background of the interviewer?	Categorical	Nutrition, Public health, Medicine, Food sciences, Other (Please specify)	Both	

A4. Pilot/Feasibility study of the tool

1	Has the dietary tool been pilot tested?	Categorical	Yes, No, Not known	Both	
	If yes, please provide us with the following concerning the pilot study:			Both	
2	Year of the pilot study	Open question	-	Both	
3	Sample size	Continuous	-	Both	

4	Age range of participants	Open question	-	Both
5	Age recording	Categorical	Continuously, Categorically	Both
5.1	If age was recorded categorically, please specify the age groups	Open question	-	Both
6	Publications describing the pilot study and results	Open question	Attachments	Both
6.1	If publications do not exist, please include other reports	Open question	Attachments	Both
7	Was the software usability evaluated by the interviewers?	Categorical	Yes, No, Not known	Both
7.1	If yes, can you summarize the results of this evaluation?	Open question	-	Both
8	Was any other feedback obtained from the interviewers?	Categorical	Yes, No, Not known	Both
8.1	If yes, please could you summarize the feedback?	Open question	-	Both

A5. Validation studies

If more than one validation study has been conducted, please fill-in the following questions separately for each study.

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Has a validation study been conducted for the dietary tool?	Categorical	Yes, No, Not known	Both	
	If yes, please provide us with the following concerning the validation study:			Both	
2	Year of the study	Open question	-	Both	
3	Sample size	Continuous	-	Both	
4	Age range of participants	Open question	-	Both	
5	Age recording	Categorical	Continuously, Categorically	Both	
5.1	If age was recorded categorically, please specify the age groups	Open question	-	Both	
6	Reference method of the validation study	Categorical	Food records, 24-HDRs, 24-HDR		Multiple replies

			DLW, Recovery biomarkers (urine, blood), Other (Please specify)		possible
7	Reference method of the validation study	Categorical	24-HDRs, DLW, Recovery biomarkers (urine, blood), Other (Please specify)	Food record	Multiple replies possible
8	If biomarkers were used, please specify	Open question	-	Both	
9	Please provide any publications regarding the validation of the tool	Open question	Attachments	Both	
9.1	If publications do not exist, please include other reports	Open question	Attachments	Both	

A6. Portion size photos validation (if relevant)

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Has a validation study been conducted for any picture books used?	Categorical	Yes, No, Not known	Both	
	If yes, please provide us with the following concerning the validation study:			Both	
2	Year of the study	Open question	-	Both	
3	Sample size	Continuous	-	Both	
4	Age range of participants	Open question	-	Both	
5	Age recording	Categorical	Continuously, Categorically	Both	
5.1	If age was recorded categorically, please specify the age groups	Open question	-	Both	
6	Validation of perception	Categorical	Yes, No, Not known	Both	
7	Validation of the accuracy of reported quantities	Categorical	Yes, No, Not known	Both	
8	Please provide a brief description of the validation study	Open question	-	Both	
9	Please provide any publications regarding the validation of the picture book	Open question	Attachments	Both	
9.1	If publications do not exist, please include other reports	Open question	Attachments	Both	

B. Data collection

B1. Administration

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	The mode of administration of the tool is (please indicate):	Categorical	Self-administered only, Interviewer-administered only, Self-administered combined with an interview, Other (please specify)	Both	
1.1	If it is interviewer-administered, does the participant have the opportunity to watch the screen during the interview?	Categorical	Yes, No, Not known	Both	
1.2	If yes, please give further details.	Open question		Both	
2	Is the interview process a:	Categorical	Face-to-face interview, Telephone interview, Other (please specify)	24-HDR	Multiple replies possible
3	What is the duration from the beginning of the interview to an available food consumption output ?	Open question	-	24-HDR	
4	Is there a question to explicitly define the time frame recalled during the interview?	Categorical	Yes, No, Not known	24-HDR	
5	Is there a question to explicitly define the time frame recorded?	Categorical	Yes, No, Not known	Food record	
6	Does the software/protocol apply a multiple pass method?	Categorical	Yes, No, Not known	Both	

In general, a multiple pass method guides the respondent through a 24 h reference period of food intake more than once, providing different opportunities for the respondent to remember food details and also additional foods.

e.g. USDA also used a multiple pass method in the Continuing Survey of Food Intakes by Individuals (CSFII) 1994–1998, using a paper questionnaire (Tippett and Cypel, 1998). Pass 1 was an uninterrupted listing of all foods and beverages consumed the previous day. Pass 2 asked specific questions about each item, in the order reported in Pass 1, to obtain complete descriptions of the foods and amounts consumed, as well as eating occasion names and times.

B1. Administration

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
The third pass was a chronological review of foods reported at each occasion, with questions to help in remembering additional foods the respondent may have consumed during or between eating occasions.					
In: Raper, N., Perloff, B., Ingwersen, L., Steinfeldt, L., & Anand, J. (January 01, 2004). An overview of USDA's Dietary Intake Data System. Journal of Food Composition and Analysis: an Official Publication of the United Nations University, International Network of Food Data Systems, 17, 3, 545.					
6.1	If yes, please elaborate on how this concept is considered in your tool	Open question	-	Both	
7	Are there questions about forgotten items and, if so, how often within an interview?	Continuous	-	Both	

B2. Details on foods, beverages and supplement consumption and meal patterns

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	What means does the tool use to estimate portion size?	Categorical	Food models, Food pictures, Household measures, Standard (natural) units, Standard portions, Known packaging size, Ruler, Sketches, Gram/Volume method, Other (specify)	24-HDR	Multiple replies possible
The 'standard portions' method is relatively rarely used. They are available for foods in small quantities on the dish and not known by the subject (e.g. grated cheese on pasta; or onion, nut or ham in a mixed salad). When the dietary software allows for reporting the quantity consumed using "standard (natural) units", it allows the interviewee to respond e.g. "I ate 3 carrots" or "I ate 20 peanuts" etc. The 'gram/volume' method is systematically proposed for all foods. This method is used particularly for the ingredients of mixed recipes which are frequently reported in their raw form before any preparation and/or cooking (e.g. 500 g of potatoes), or when the subject knows the precise weight of the portion actually consumed (e.g. a 250 g packet of commercial French fries). Weight in grams can be computed from Volume in mL, as long as corresponding density coefficients are available. Adapted from: , M. C., Welch, A., Lagiou, A., ... Riboli, E. (January 01, 1999). Structure of the standardized computerized 24-h diet recall interview used as reference method in the 22 centers participating in the EPIC project. <i>European Prospective Investigation into Cancer and Nutrition. Computer Methods and Programs in Biomedicine</i>, 58, 3, 251-66.					
	What means does the tool use to estimate portion size?	Categorical	Weighing, Food models, Food pictures, Household measures, Standard (natural) units, Standard portions, Known packaging size,	Food record	Multiple replies possible

B2. Details on foods, beverages and supplement consumption and meal patterns

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
			Ruler, Gram/Volume Other (specify)	Sketches method,	
2	Are portion size photos used?	Categorical	Yes, No, Not known	Both	
2.1	What is the number of pictures per item?	Continuous	-	Both	
2.2	Are the pictures integrated into the program or is there a separate picture book?	Categorical	Integrated, Separate picture-book	Both	
2.3	Describe the difference in weight between adjacent pictures of portions?	Categorical	Constant difference in absolute values, constant logarithmic difference, Other (Please specify)	Both	Multiple replies possible
3	How does the software handle the inability of a subject to report the consumed quantity?	Open question	-	Both	
4	Is the amount of food leftover recorded?	Categorical	Yes, No, Not known,	Both	
4.1	If yes, in what way?	Open question	-	Both	
5	Is there a question on whether the participant consumed an additional portion?	Categorical	Yes, No, Not known	Both	
6	Is the amount of added salt recorded?	Categorical	Yes, No, Not known	Both	
7	Is the amount of added dry herbs, spices and condiments recorded?	Categorical	Yes, No, Not known	Both	
8	Is organic food consumption assessed?	Categorical	Yes, No, Not known	Both	
9	Is fortified food consumption assessed?	Categorical	Yes, No, Not known	Both	
10	Are brand names recorded?	Categorical	Yes, No, Not known	Both	
10.1	Is it possible to manually add new brand names, not available in a pre-defined list?	Categorical	Yes, No, Not known	Both	
11	Is the producer's name recorded?	Categorical	Yes, No, Not known	Both	

B2. Details on foods, beverages and supplement consumption and meal patterns

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
12	Is information on the type of packaging collected?	Categorical	Yes, No, Not known	Both	
12.1	If yes, please indicate the options available	Open question	Bought at the bulk aisle (bought loose, no packaging), Box, Bag/Net, Bottle, Can, Jar, Jug, Cup, Wrapped in aluminum foil/paper/plastic wrap, Other (Please specify)	Both	Multiple replies possible
13	Is information on the packaging material collected?	Categorical	Yes, No, Not known	Both	
13.1	If yes, please indicate the options available	Open question	-	Both	Some overlapping with wrapping material in question 11
14	Is the area of origin for each food recorded?	Categorical	Yes, No, Not known	Both	
15	Are cooking procedures recorded?	Categorical	Yes, No, Not known	Both	
16	Are heating procedures recorded?	Categorical	Yes, No, Not known	Both	
17	How is water consumption recorded?	Open question	-	Both	
18	Is information recorded on whether the recalled day was a special day (for instance religious celebration, travel)?	Categorical	Yes, No, Not known	Both	
18.1	Is the type of special day explicitly recorded?	Categorical	Yes, No, Not known	Both	
18.2	How is this information utilized?	Open question	-	Both	
19	Is there a question on whether the reported intakes were more, less or the same as usual intakes?	Categorical	Yes, No, Not known	Both	
20	Is the time of each eating occasion recorded?	Categorical	Yes, No, Not known	Both	
21	Is the place of each eating occasion recorded?	Categorical	Yes, No, Not known	Both	

B2. Details on foods, beverages and supplement consumption and meal patterns

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
21.1	If yes, please provide a list of pre-defined eating places	Open question	-	Both	
22	Is the place of preparation of each meal recorded?	Categorical	Yes, No, Not known	Both	
22.1	If yes, please provide a list of the pre-defined meal preparation places	Open question	-	Both	
23	Is there a question on whether the respondent participated in the food preparation?	Categorical	Yes, No, Not known	Both	
24	Is the 'type' of eating occasion recorded? (e.g. 'breakfast', 'dinner', 'snack', etc.)	Categorical	Yes, No, Not known	Both	
24.1	If yes, please provide a list of the pre-defined 'types' of eating occasions	Open question	-	Both	
25	Are other activities while eating (e.g. watching TV, computer use) recorded?	Categorical	Yes, No, Not known	Both	
26	Is eating company (e.g. family, friends etc.) recorded?	Categorical	Yes, No, Not known	Both	
27	Are questions on the consumption of nutritional supplements included?	Categorical	Yes, No, Not known	Both	
27.1	Is the brand name of supplements recorded?	Categorical	Yes, No, Not known	Both	
27.2	Are active compound(s) recorded?	Categorical	Yes, No, Not known	Both	

B3. Non dietary information

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
	For which of the items below does the tool include questions? Please indicate			Both	
1	Height	Categorical	Yes, No, Not known	Both	
2	Weight	Categorical	Yes, No, Not known	Both	
3	Sex	Categorical	Yes, No, Not known	Both	
4	Age	Categorical	Yes, No, Not known	Both	
5	Socio-economic information (e.g. educational level)	Categorical	Yes, No, Not known	Both	
5.1	Please indicate which	Open question			
6	Physical activity	Categorical	Yes, No, Not known	Both	
6.1	Please give the list of questions	Open question			
7	Health condition	Categorical	Yes, No, Not known	Both	
7.1	Please give the list of questions	Open question			
8	Special diets followed (e.g. vegetarian diet)	Categorical	Yes, No, Not known	Both	
9	Special life cycles (e.g. lactation, pregnancy)	Categorical	Yes, No, Not known	Both	

C. Data management

C1. Data entry / format of records

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	What is the average time needed for a field worker to enter food consumption data per 10 study participants?	Open question	-	Food records	
2	What is the average duration of an interview?	Open question	-	24-HDR	
3	What is the estimated time needed to carry out energy/nutrient intake calculations per 10 study participants?	Open question	-	Both	
4	Does the software allow the interviewer to write notes at any stage of the data entry?	Categorical	Yes, No, Not known	Both	
4.1	If yes, please explain	Open question	-	Both	
5	Does the software guide and control the interviewers by standardizing the pathways to be followed during the data input?	Categorical	Yes, No, Not known	Both	
5.1	If yes, please explain	Open question	-	Both	

C2. Recipe handling

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Does the software handle recipes/composite dishes (e.g. a pizza or a tossed salad)?	Categorical	Yes, No, Not known	Both	
1.1	If yes, in what way?	Open question	-	Both	
2	Does the software perform the break-down of recipes into single ingredients (foods)?	Categorical	Yes, No, Not known	Both	
3	Does the software allow the addition of new recipes?	Categorical	Yes, No, Not known	Both	
3.1	If yes, in what way?	Categorical	By modifying standard recipes in the database, By assembling ingredients from scratch, Other (Please specify)	Both	Multiple replies possible
4	Is the 'type' of recipe (e.g. home-made, ready-to-eat) recorded?	Categorical	Yes, No, Not known	Both	
4.1	If yes, please provide a list of the 'types' of recipe	Open question	-	Both	

C3. Food classification

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Which food classification system is used?	Categorical	Language, FoodEx, FoodEx 2, EFG, Other (Please specify)	Both	
2	Does the software include <i>facets</i> (and related <i>descriptors</i>) that would allow classification to commonly used systems?	Categorical	Yes, No, Not known	Both	

Description of terms:

When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A sequence of windows corresponding to questions to be asked on different **characteristics of foods**, called '**facets**' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of '**descriptors**' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet).

2.1	If yes, please indicate the one(s) used	Categorical	Language, FoodEx, FoodEx2, EFG, Other (specify)	Both	Multiple replies possible
3	Please provide a list of the groupings in the food classification system used.	Open question	-	Both	

C4. Databases

C4.1. Databases integrated into the tool (built-in databases)

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
	Which of the following databases are integrated into the tool?			Both	
	Please indicate in the list below				
1	Food composition database	Categorical	Yes, No, Not known	Both	
2	Food quantities presented in the portion size pictures	Categorical	Yes, No, Not known	Both	
3	Standard portion sizes database	Categorical	Yes, No, Not known	Both	
4	Standard recipes database	Categorical	Yes, No, Not known	Both	
4.1	Please provide the number of recipes	Continuous	-	Both	
5	Nutritional supplements database	Categorical	Yes, No, Not known	Both	
5.1	Please provide the number of products	Continuous	-	Both	
6	Nutritional supplements composition database	Categorical	Yes, No, Not known	Both	
7	'Yield' factors database	Categorical	Yes, No, Not known	Both	
7.1	At which level are the 'yield' factors applied?	Categorical	Recipe level, Ingredient level	Both	

'Yield' factors reflect weight changes during cooking, owing to water loss/gain or fat loss/gain.

In: Church, S. M. (September 01, 2009). EuroFIR Synthesis report No 7: Food composition explained. Nutrition Bulletin, 34, 3, 250-272.

8	Brand names database	Categorical	Yes, No, Not known	Both	
9	Estimated energy requirements of individuals database	Categorical	Yes, No, Not known	Both	To be confirmed
10	Retention factors database	Categorical	Yes, No, Not known	Both	
10.1	At which level are the retention factors applied?	Categorical	Recipe level, Ingredient level	Both	

Retention factors reflect changes in nutrient content on cooking, particularly vitamin losses.

In: Church, S. M. (September 01, 2009). EuroFIR Synthesis report No 7: Food composition explained. Nutrition Bulletin, 34, 3, 250-272.

11	Edible Portion Coefficients database	Categorical	Yes, No, Not known	Both	
12	Density Coefficients database	Categorical	Yes, No, Not known	Both	
13	Raw-to-Cooked Coefficients database	Categorical	Yes, No, Not known	Both	
14	Standard (natural) units database	Categorical	Yes, No, Not known	Both	
15	Household measures units database	Categorical	Yes, No, Not known	Both	
16	Nutrient requirements	Categorical	Yes, No, Not known	Both	To be confirmed
17	Other databases available (Please list)	Open question	-	Both	

C4.2. Food composition database

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Upon completion of the data collection, are intake data exported and subsequently connected to a food composition database?	Categorical	Yes, No, Not known		
2	Please indicate the sources of the data included in the food composition table (built-in or not)?	Categorical	National data, International data, Analytical data, Literature data, Other (Please specify)	Both	Multiple replies possible
3	Concerning the food composition data:			Both	
3.1	What percentage is national?	Open question	-	Both	
3.2	What percentage is international?	Open question	-	Both	
3.3	What percentage is based on chemical analysis?	Open question	-	Both	
3.4	What percentage is literature-derived?	Open question	-	Both	
3.5	What percentage is based on calculated or imputed values?	Open question	-	Both	
4	What other food composition databases have been used to build the database used?	Open question	-	Both	
4.1	Please provide a list of additional sources	Open question	-	Both	

5	Are international recipes included in the food composition database?	Categorical	Yes, No, Not known	Both
6	When was the food composition database last updated?	Continuous	Year	Both
7	Is it possible to use other national food composition databases in the software?	Categorical	Yes, No, Not known	Both

C4.3. Conversions – Algorithms – RACs

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Is there a pre-defined algorithm used to convert food quantities – in whatever way reported – to “as consumed”?	Categorical	Yes, No, Not known	Both	
1.1	If yes, could you provide a short description of the algorithm?	Open question	-	Both	
2	Is there a food conversion model integrated in the software to estimate Raw Agricultural Commodities (RACs) from foods reported?	Categorical	Yes, No, Not known	Both	
2.1	If yes, could you provide a short description of the model?	Open question	Yes, No, Not known	Both	

C4.4. Database flexibility

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Does the software include features for expanding the existing databases by adding ‘new’ entries?	Categorical	Foods, Recipes, Nutritional supplements, Food	Both	Multiple replies possible

	Please indicate which databases can be added to.		composition values, Other	
1.1	Does the software restrict the possibility of adding new entries only to a specific staff member (e.g. database manager) and not to the interviewers?	Categorical	Yes, No, Not known	Both
2	Does the software include features for importing databases on standard portion sizes/household measures/ nutrient requirements?	Categorical	Yes, No, Not known	Both
2.1	Does the software include features for importing other databases?	Categorical	Yes, No, Not known	Both
2.2	Please indicate which databases	Open question	-	Both
3	Is the option to add descriptors within a facet during the interview available to the interviewer?	Categorical	Yes, No, Not known	Both
3.1	If this is not possible for certain facets, please indicate the ones for which this is not possible.	Open question	-	Both
4	Can the databases be stored and exported in standardized commonly used formats (e.g. MySQL, DBF, SQL)?	Categorical	Yes, No, Not known	Both
4.1	If this is not possible for certain databases, please indicate which ones.	Open question	-	Both
5	Can the intake data be stored and exported in standardized commonly used formats?	Categorical	Yes, No, Not known	Both
5.1	If this is not possible for some intake data, please indicate which one.	Open question	-	Both

C5. Standard Operational Procedures and specific quality controls

C5.1. General

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Are there Standard Operating Procedures (SOPs) available?	Categorical	Yes, No, Not known	Both	
1.1	If yes, please provide a copy of them.	Provide material	-	Both	
2	Does the software provide field-specific help during data entry?	Categorical	Yes, No, Not known	Both	
3	Are there guidelines/protocols available to the participant while completing the questionnaire or record (in case of a self-administered method)?	Categorical	Yes, No, Not known	Both	
4	Is communication with the research team possible for the participant to ask for clarifications?	Categorical	Yes, No, Not known	Both	
5	Are there protocols and instructions for editing the collected data?	Categorical	Yes, No, Not known	Both	

C5.2. Data entry

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Are there real-time quality controls throughout the data entry concerning:			Both	
	Incomplete fields	Categorical	Yes, No, Not known	Both	
	Inconsistent entries	Categorical	Yes, No, Not known	Both	
	Suspicious answers	Categorical	Yes, No, Not known	Both	
	Missing information	Categorical	Yes, No, Not known	Both	
	Extreme values	Categorical	Yes, No, Not known	Both	
	Other (Please specify)	Open question	-	Both	
2	Are there non-real time quality controls concerning:			Both	
	Incomplete fields	Categorical	Yes, No, Not known	Both	
	Possible errors	Categorical	Yes, No, Not known	Both	
	Suspicious answers	Categorical	Yes, No, Not known	Both	
	Missing information	Categorical	Yes, No, Not known	Both	
	Extreme values	Categorical	Yes, No, Not known	Both	
	Other (Please specify)	Open question	-	Both	
3	Is it possible to clarify such errors with the subject?			Both	
	During the interview	Categorical	Yes, No, Not known	24-HDR	
	After the interview	Categorical	Yes, No, Not known	24-HDR	
	During data entry	Categorical	Yes, No, Not known	Food record	
4	Does the software include probing questions during data entry?	Categorical	Yes, No, Not known	Both	

C5.3. Databases

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Does the software include checks on the food composition tables, such as detecting missing values?	Categorical	Yes, No, Not known	Both	
2	Does the software include consistency checks regarding nutrients in the food composition tables (e.g. the sum of all proximate nutrients should be equal to 100 grams)?	Categorical	Yes, No, Not known	Both	
3	Please report other accuracy and consistency checks conducted	Open question	-	Both	
4	What are the standardized database maintenance procedures employed?	Open question	-	Both	
5	What are the standardized database updating procedures employed?	Open question	-	Both	

C6. Output - Reports

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Types of output provided	Categorical	Foods, Food groups, Raw Agricultural Commodities, Energy, Macro-nutrients, Micro-nutrients, Other (please specify)	Both	Multiple replies possible
2	Level of information presented in the output	Categorical	Individual, group level	Both	
3	Please specify the exact output provided, particularly if it does not fall under any of the above categories	Open question	-	Both	
4	Is the output in a form that can be directly imported in to one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)?	Categorical	Yes, No, Not known	Both	
5	Is it possible to directly compare intake values with current recommendations on nutrient adequacy?	Categorical	Yes, No, Not known	Both	
6	What kinds of output/report are available A) on screen, and B) in printed format?	Open question	-	Both	
7	How much time is needed for the output(s) to be produced?	Open question	-	Both	
8	Does the interviewer have access to all the outputs?	Categorical	Yes, No, Not known	Both	

C7. Exporting

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Does the software allow the export of data in an electronic format (e.g. that can be read in a spreadsheet) for energy and nutrient intakes or food consumption at the per participant level?	Categorical	Yes, No, Not known	Both	
2	Does the software allow the export of data in an electronic format (e.g. that can be read in a spreadsheet) for energy and nutrient intakes or food consumption at the per food item level?	Categorical	Yes, No, Not known	Both	
3	What are the possible data export formats?	Open question	-	Both	

D. Software characteristics – Database management – IT aspects

D1. General information on software

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	What company/organization provides the software?	Open question	-	Both	
2	What is the current stable version?	Open question	-	Both	
3	When was the first version developed?	Open question	-	Both	
4	When was the last version updated?	Open question	-	Both	
5	What is the licensing scheme?	Open question	-	Both	
6	If relevant, please provide a reference to a scientific publication or a report describing the development and technical features of this software?	Open question	Attachments	Both	

D2. System requirements

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Is it PC x86-compatible?	Categorical	Yes, No, Not known	Both	
2	Is it PC x64-compatible?	Categorical	Yes, No, Not known	Both	
3	Which operating systems and versions is the software compatible with? Please provide a compatibility matrix.	Open question	-	Both	
4	What is the minimum RAM required?	Open question	-	Both	
5	What is the suggested RAM requirement?	Open question	-	Both	
6	What is the minimum CPU requirement?	Open question	-	Both	
7	What is the suggested operating CPU requirement?	Open question	-	Both	
8	What is the minimum hard disk space required?	Open question	-	Both	
9	Are there any other requirements (e.g. preinstalled software)?	Categorical	Yes, No, Not known	Both	
9.1	If yes, please indicate	Open question	-	Both	

D3. Programming language

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	In which programming language has the software been written? Please specify the version.	Open question	-	Both	
2	Was the software developed within your institution/company ?	Categorical	Yes, No, Not known	Both	
2.1	If not, are you still in contact with those who developed it?	Categorical	Yes, No, Not known	Both	
3	Do you have access to the source code?	Categorical	Yes, No, Not known	Both	
4	Does the software have an open Application Programming Interface (API)?	Categorical	Yes, No, Not known	Both	
4.1	Please specify	Open question	-	Both	
5	Does the software use open source code?	Categorical	Yes, No, Not known	Both	
5.1	If not, please specify otherwise	Open question	-	Both	

D4. Architecture and technology

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Is the software based on 3-Tier architecture?	Categorical	Yes, No, Not known	Both	
1.1	Please specify	Open question	-	Both	
2	Please specify the middleware compatibility matrix.	Open question	-	Both	
3	Is the application web-based or client-server?	Categorical	Web-based, Client server	Both	
4	Is the application web-based or for local PC use?		Web-based, Local PC	Both	
5	In the case of a web application (app), is the software W3C compliant?	Categorical	Yes, No, Not known	Both	
6	In the case of a web app, does it works under https?	Categorical	Yes, No, Not known	Both	
7	In the case of a web app, does it support Mozilla Firefox, Safari, IE and Google Chrome as web browsers? Please indicate which are supported and the corresponding latest versions.	Open question	-	Both	
8	In the case of a web app, please specify the browser compatibility matrix.	Open question	-	Both	
9	In the case of a client-server app, can it work in off-line mode?	Categorical	Yes, No, Not known	Both	
10	In the case of a client-server app, is it compatible with Android, Apple iOS, or Windows Mobile?	Categorical	Android, Apple iOS, Windows Mobile, Other (Please specify)	Both	Multiple replies possible
11	Does the software support failover?	Categorical	Yes, No, Not known	Both	
11.1	Please specify failover options supported?	Open question	Yes, No, Not known	Both	
12	Is the software scalable?	Categorical	Yes, No, Not known	Both	
13	Is there an interface for automated bulk data upload?	Categorical	Yes, No, Not known	Both	

If some aspects of the tool were not addressed throughout the previous sections, please give further details.

Open question

-

Both

D5. Databases

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Is the software able to store data in an <i>ORACLE</i> database?	Categorical	Yes, No, Not known	Both	
1.1	If not, is it able to store data in SQL, MySQL, or another database (please specify)?	Categorical	Yes, No, Not known (select one of multiple answers)	Both	
2	Is the software able to use the <i>ORACLE Real Application Clusters</i> ?	Categorical	Yes, No, Not known	Both	
2.1	If no, is the software able to use database clustering?	Categorical	Yes, No, Not known	Both	
3	Which database connectors is the software able to use?	Open question	-	Both	
4	Please provide a compatibility table with other external databases.	Open question	Attachment	Both	

D6. Virtual environment

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	Does the software OFFICIALLY support virtual environment?	Categorical	Yes, No, Not known	Both	
2	Is the software VMWare (company providing virtualization software) compliant?	Categorical	Yes, No, Not known	Both	

3	Is the software VMWare VMotion compliant?	Categorical	Yes, No, Not known	Both
---	---	-------------	--------------------	------

D7. Security

Item No.	Question	Type	Responses	Dietary tools (24-HDR; food records)	Comments
1	What are the security requirements? Please specify.	Open question	-	Both	
2	Is the software protected against code injection?	Categorical	Yes, No, Not known	Both	
3	Is the software protected against SQL injection?	Categorical	Yes, No, Not known	Both	
4	Is the software protected against cross site scripting?	Categorical	Yes, No, Not known	Both	
5	Does the software provide interface with MS Active Directory for authentication purposes?	Categorical	Yes, No, Not known	Both	
6	Does the software provide user profiling options (e.g. group policies)?	Categorical	Yes, No, Not known	Both	
7	Does the software provide a front end deployable separately (in DMZ) from a back end part?	Categorical	Yes, No, Not known	Both	

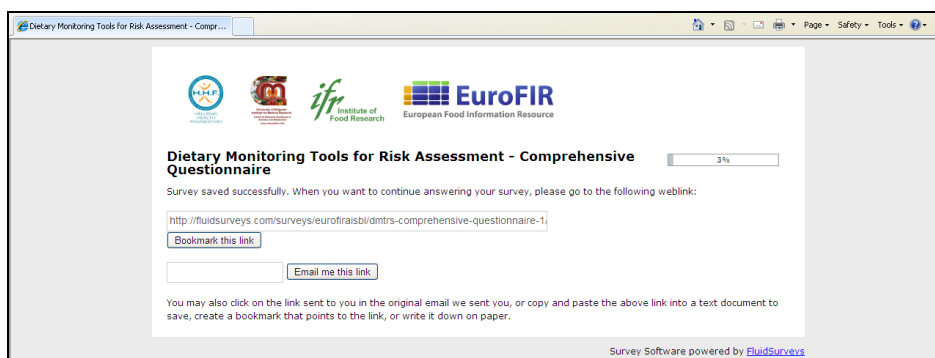
Appendix F. Instructions for respondents

Please use the following link to access the questionnaire:
<http://fluidsurveys.com/surveys/eurofiraibl/dmtrs-comprehensive-questionnaire-1/>

Use the 'NEXT' and 'BACK' buttons at the bottom of each page to move through the questionnaire pages. Please answer all the questions. **The 'SAVE' button will save the answers you have given on each page, so it is good practice to click 'SAVE' before moving to the 'NEXT' page.**



The questionnaire will take approximately 60 minutes to fully complete, though more than one person may be required to answer the questions. You will notice a progress bar at the top right of the page. Using the 'SAVE AND CONTINUE LATER' button will provide you with a link that will allow you to return to the questionnaire at another time. Please bookmark or save this link.



The 'SAVE AND CONTINUE LATER' feature also allows you to share the questionnaire with another person if additional input is required. This feature may be particularly useful for section D, which may require the input of an IT specialist. When you click this button (see screenshot above), you are provided with the option of emailing the saved questionnaire link to another individual, but it is also recommended that you also bookmark the link too in case there are any problems in emailing the link.

Supporting documentation:

Please send any supporting information requested in the questionnaire to the following address: questionnaire@hhf-greece.gr. A document checklist has been provided that lists the requested additional information, please complete this and email it, with the supporting documents, to the email address above.

****THANK YOU FOR YOUR TIME AND FOR COMPLETING THE QUESTIONNAIRE****

If you have any questions, please contact: Androniki Naska (anaska@hhf-greece.gr) or Rachel Berry (Rachel.Berry@ifr.ac.uk)

Appendix G. Checklist of requested background documents

Please complete the final column of the table to indicate which supporting documents you can provide. Please attach the completed form and with all relevant documents to an email and send to the following address: questionnaire@hhf-greece.gr

Institution:		Tool/software:	
---------------------	--	-----------------------	--

Q section	Requested document(s)	Document format	Provided?
B: Data collection	A copy of any instructions given to participants for completing food records	Instructions, guidelines	Yes / No / Not available
	Publications regarding methodological aspects of dietary assessment in the study.	Publication, report, summary	Yes / No / Not available
A1: General characteristics	Evidence of a food survey in which the software or tool was used for entering/analysing intake	Publication, report, summary	Yes / No / Not available
	Screenshots from the tool interface	Picture files	Yes / No / Not available
A4: Pilot study of the tool	Evidence describing any pilot study and results	Publication, report, summary	Yes / No / Not available
A5: Validation studies	Evidence of any validation of the tool	Publication, report, summary	Yes / No / Not available
A6: Portion size photo validation	Evidence of any validation of picture books or portion size photos	Publication, report, summary	Yes / No / Not available
D1: General information on software	Description of the development and technical features of the tool	Publication, report, summary	Yes / No / Not available
D5: Database	A compatibility table/matrix with other external databases	Table, matrix	Yes / No / Not available

If you have any additional documents or information that you would like to provide, please summarise it in the table below and add the attachments to the email.

Q section	Additional documentation provided	Document format

Appendix H. Summary of answers to Part 1, Section B (Data collection)

	Dietary assessment method details	Where interviews were conducted?	Under/over reporting evaluated?	How was misreporting evaluated?	Participants given dietary feedback?
Country 1	24h recall: 2 per participant, w/ends included Food record: 2 days, w/ends included, instructions given to participants	Institute, home, work	No		Yes
Country 2	Food record: 2 days, w/ends included, no instructions given to participants. 24h recall: 2 recalls, w/ends included. FFQ: quantified.	Home, work, other (schools, kindergartens)	No		No
Country 3	24h recall: two per participant, w/ends included. FPQ	Institute, home, work, hospital,	Yes	Published cut-offs [Black AE. Critical evaluation of energy intake using the Goldberg cut-off for energy intake: basal metabolic rate. A practical guide to its calculation, use and limitations. Int J Obes 2000; 24: 1119 – 1130]	No
Country 4	24h recall: 2 per participant, w/ends included. FPQ	Other (Universities, pharmacies, health care centres)	Yes	Published cut-offs [The discrepancy between energy intake (EI) and theoretical energy expenditure (EE) was determined with the following equation: $(EE - EI) \times 100 / EE$. We use this in the statistical analysis of dietary data, as covariate]	Yes
Country 5	Food record: 3 consecutive days, including w/ends, participants given instructions	Home	Yes	Published cut-offs [on the basis of Goldberg, 1991 (see details in Leclercq, 2009)]	No
Country 6	Food record: four days, including w/ends, instructions given to participants. FPQ	Other (not specified - online tool)	Yes	Doubly Labeled Water	Yes

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

Country 7	24h recall: one (or sometimes 3) per participant, w/ends included FFQ: quantified Food record: unclear on duration, example of one month to one year given, w/ends included.	Home, institute, other (schools)	No	But border values checked?	Yes
Country 8	24h recall: 2 per participant, w/ends included. FPQ	Institute, home, other (Local health centres, community centres)	No		Yes
Country 9	Food record: 4 to 7 days, w/ends included, instructions given to participants. FFQ: quantified. 24h recall: 2 or 4 per participant, w/ends included.	Institute, home	Yes	Published cut-offs (not specified)	Yes
Country 10	24h recall: 2 randomly distributed recalls per participant, w/ends included. FPQ.	Other (by telephone)	Yes	Published cut-offs [Goldberg-Black cut-offs]	Yes
Country 11	Food record: 7 days, no info on w/ends, instructions given to participants	Home	Yes	EI/BMR 1.1	No

Appendix I. Summary of Section A1: Use of the software/tools

	Software maintenance internal or external?	Last use of software	24-HDRs, Food records or both?	Which age group(s) is the tool applicable to?	Has the software been used in a recent national food survey (if yes, when was it undertaken)?	Are there plans to use the software in a future survey (if yes, please give year and whether national or regional)?
Country 1	External	2013	Both	The tool is developed to be used by all who are literate.	No	Yes National 2013-2014
Country 2	External	2013	Both	0-64	Yes [2007-2009 and 2012-2014]	Yes National It is used now for national survey and will be used in next surveys as well.
Country 3	External	2013	Both	Was used for 10-74yr	No	Not known
Country 4	External	2013	Both	all ages	Yes [2009]	Yes Regional 2013
Country 5	Internal	It is currently in use	Both	All	Yes [2005-2006]	Yes National 2016-2017 (subject to finances)
Country 6	Internal	2013	Both	adults, will be adapted for teenagers	Yes [2010-2011]	Yes National 2016
Country 7	Internal	Currently used	Both	For all	No National survey, but the tool is frequently used in regional surveys, projects etc	Yes Regional surveys
Country 8	Internal	Currently used	24-HDRs	10 years and older	Yes [in progress]	Yes National 2014
Country 9	Internal	Feb-13	Both	all	Yes [2012]	Yes National Ongoing
Country 10	Internal	2013	Both	0-110	Yes [2011]	Yes National 2014
Country 11	Internal	On-going	Both		Yes 2003-08	Yes National 2011-2013

Appendix J. Main advantages and disadvantages of the tools, as completed by responders

	Advantages	Disadvantages
Country 1	- Flexibility - it can be easily used for data collection in different dietary surveys with different methodologies, interview protocols and languages - User friendliness - the main issue that was focused on during the development of the software was usability and it has been repeatedly been tested and enhanced in this regard resulting with a very easy to use tool - Innovativeness - we focused on creating innovative functionalities in the tool that would allow easy data entering and clear display of results while maintaining the flexibility of the tool	
Country 2	- Web access - Data analysis possibilities - Complete food composition database add-on	- No pictures of portion sizes included - Only one external exclusive developer of system - No automatic system for under- over- reporter detection
Country 3	- Highly standardised and detailed 24-hour recall method prepared to be used across EU countries - Comprehensive quality controls (before, during and after interview collection) - Tested in different study designs and populations	- Very demanding and time-consuming to prepare the country specific version, some installation problems and difficulties - Rough orientation for the reported energy and macronutrient intakes - External maintenance and dependence of an international organisation for extracting and getting access to the data collected
Country 4	- Friendly, intuitive, and easy to use and to export information - Food, recipes, CDR and household measures databases are expandable and modifiable by the user/interviewer at any time - The same food can be searched by various names, including names in any language and scientific name (for example, the same fruit - apple - can have different names depending on the region of the country)	- It does not consider weight reduction or loss of nutrients by cooking - Does not work on-line - Can only record the amount of ingested food in grams (for foods), and in grams or servings (for recipes), but we can not record data on household measures (as the interviewee describes his/her consumption). For example, for "half glass of milk" we have to register "100 g" of milk
Country 5	- The system permits a multi-operator data entry and food codification - During the data entry the software permits to create new food item and portion size - The system calculates all macro and micronutrient for each eating occasion. In addition the software applies quality control routines identifying the under-reporter subjects.	- The last version (Adobe AIR Technology multiplatform) is not perfectly tested, even if in use from 2011; for this reason sometimes need the intervention of software developer - The modality of input of some foods as a recipe (single ingredients) or as a food product (group of ingredients) do not allow a proper classification of the food item: for this reason a number of cereal products such as plain pizza with tomato and biscuits were classified as cereal products, whereas they also contain other ingredients (fats, eggs,

Advantages	Disadvantages
Country 6 • Intuitive, user-friendly method that does not require personal appointment for the participant to carry out the registration. • Direct feedback of dietary intake to the participant. • Calculated nutrient intake and variety of specific foods and food groups, including the intake of raw material level can easily be removed from the computer system. • Able to easily keep track of how many people have registered and it is simple to make controls in reported data	tomatoes, sugar, etc.) • Hard to know in advance what foods to include in the survey • The web requires constant updating and adaptation to new technologies • Time-consuming for the test subjects to record everything they eat and drink for four days
Country 7 • Standardized the methodology between scientists and centers • one center (Dpt.of Nutritional Epidemiology) is responsible for bases included in • Is possible to updating in case of changing the DRI or Food Composition Table and sending upgrades to users, what is in practiced by giving a new version on www pages	
Country 8 • Able to capture several food characteristics (facets and descriptors) • Digitalised library of food pictures inserted in the tool • The variety of supporting databases (e.g. density factors, rawcook coefficients, edible/inedible proportions)	• Respondent burden • Demanding interviewer training • Duration of the interview
Country 9 • Possibility to create/adjust recipes reported during the interview • Possibility to withdraw data from any of 28 EUROFIR databases • Foods are indexed to Languag and FOODEX2 • User friendly	
Country 10 • Made for national food pattern, contains all used foods in the national dietary survey on adults • The software is both a food calculation system, and has now a module where 24-h recalls can be entered directly • The food list consists of single foods, and not facets , which gives the possibility of direct linking to the food database and thereby direct calculation of energy and nutrients	• Specific food characteristics like smoked, cured or with added sugar have to be coded separately
Country 11 • Built-in modules • Flexible	



Advantages

Disadvantages

- Development in-house, therefore possible to develop further in close contact with users

Appendix K. Software: general information and requirements

	Software provider	Current stable version	First version date	Last update	Licensing scheme	PC x86-compatible	PC x64-compatible	Compatibility (operating systems)	Min. RAM	Suggested RAM	Minimum CPU	Suggested operating CPU	Min. hard disk	Additional requirements
Country 1	Developed in-house		2013	2013	To be determined.	✓	✓	Offline: Windows XP Windows 7 Windows 8 Vista Online: Linux	1 GB for offline, 4 GB for online	2 Gb for offline, 8 GB for online	4 core Xeon processor	Intel i5 / i7 multiple core processor		Not known
Country 2	Not developed in-house		2007	2013	custom development under MS Dynamics AX licenses	✓	✓	System is client - server based. Interviewer interface web based and all latest popular web browsers are supported. Data manager access follows MS Dynamics AX requirements. Latest version of MS Dynamics AX is used.						MS Dynamics AX
Country 3	Not developed in-house	don't know	don't know	2012	Still developing	✓	✓	Don't know	512 Mb			Intel / Pentium III	600 MB	Yes SQL

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

Country 4	Not developed in-house	2.2	2004	2012	Per-computer license or concurrent user license in network environment	✓	✓	Windows XP, Vista, 7 and 8	We haven't analyzed this aspect, but the program works on almost any PC that is on the market.					Firebird
Country 5	Not developed in-house	3.1	2000	20/05/2013	Agreement with Centre for Research	✓	✓	Cross-OS compatible but the requirements (RAM, HD space, ...) are OS specific. The requirements can be found at: http://www.adobe.com/products/air/tech-specs.html						AIR Engine which is released by ADOBE and it is free
Country 6	Developed in-house	2.29.200.0	2008	2011	SQL Server 2008	✓	✓	Windows XP - Winserver 2008 Windows 7	Hosting OS requirements			50 MB client 1 GB DB /Server		
Country 7	Developed in-house	5.0	c. 1990	2011	Licenced	✓	✓	Windows XP minimum	?					
Country 8	Developed in-house	Version 2	Jul-12	Jun-13	Proprietary software (IPR protected)			These questions are not relevant as the tool runs on the web and not locally in PCs.	Question not relevant, it runs in the web					
Country 9	Developed in-house	-	2003	2013	-	✓	✓	WIN XP, WIN 7 (32- and 64- bit) , WIN 8	512MB	1GB	1GHz	1GHz	50MB	No
Country 10	Not developed in-house	KBS, 7.0	2000	2013	It is administered by a University, and they allow people to use it if needed.									Yes QB vision



DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

Country 11	Developed in-house	?	?	Continuously	?	?	?	?	?	?	?	?	?	Not known
------------	--------------------	---	---	--------------	---	---	---	---	---	---	---	---	---	-----------

Appendix L. Replies to the Short Questionnaire

Replies received in relation to collecting dietary data using 24h recalls.

Questions	Country 2	Country 3	Country 4	Country 8	Country 12 ^(a)
Can the tool be used for 24-HDRs or for entering data collected through food records or both? (Please indicate the use)	BOTH	BOTH	BOTH	24-hour dietary recalls	BOTH
When was the last time the software was used?	Software is used on regular basis since 2009. Last use is for data collection in National Food Consumption Survey 2012-2014 and EFSA DCM Support to National Dietary Surveys 2012-2014.	Never used yet. Prepared for running the National Dietary Survey. Planning to be tested during the PANEU.	We use this tool continuously in our research projects, to tabulate diets, mainly Dietary Records, but also 24-hDRs. The last time we use it for 24hDRs was for a study of the sodium intake in adult population, in a representative sample at national level (n=418) in 2009.	During the pilot phase of the national nutrition and health study and in the pilot-PANEU project	During the PANCAKE project (2010-2011), only for children (data entry version, not interview version)
Year of the software's last update	2012, added web-based dietary survey feature.	Beta version in September 2011. Consolidated version during October 2012.	2012	The software was completed in 2012 (dynamic software periodically updated).	2010 (but for adults 24-h recalls 2004!)
Is it computerized or web-based dietary software?	YES	It is computerized. It can be adapted for web based application.	YES, it is computerized	YES	Computerized but not web-based
Which are the newest and	Windows Server 2003,	The application was	The software is	The software is	I think at least

EFSA supporting publication 2014:EN-607

the oldest operating systems with which this software is compatible?	Windows Server 2008.	developed based on the following platforms: MySQL (management system databases) and Java (programming language and environment). Since these are free software platforms, there will be NO extra cost associated with software licenses. Thus, the developed applications can be run on any computer system that supports the installation of these two previous applications. It runs with windows too.	compatible with the newest available operating system of Windows 7 and is also compatible with oldest versions of Windows (Windows Vista, XP).	compatible with Windows XP and later versions.	windows 2003 is necessary
Questions	Country 2	Country 3	Country 4	Country 8	Country 12^(a)
Who maintains the software? (Please indicate if the maintenance is internal or external)	External	External	External	Internal	External
Has the tool been used in a recent national survey?	YES	NO	YES	NO	YES in PANCAKE pilot studies (but only data entry version for children)
If YES, when was the survey undertaken?	2012-2014		National survey in 2009, in a study of the sodium intake in adult population (2 x 24-hDR)	-	2011

Questions	Country 2	Country 3	Country 4	Country 8	Country 12 ^(a)
<i>If NO, in which survey it is going to be used? Please indicate if it is a national or a regional survey</i>	-	National Dietary Survey is planned for 2013-2015	-	It is going to be used in the national nutrition and health survey (2013-2014)	-
Does the tool include probing questions facilitating the interview/data entry?	NO	YES. It was developed using the Automated Multiple Pass Method and include filters during the interview.	NO	YES	YES
Does the software include a function to export the complete dataset in order to be imported in an external system?	YES. Export is compatible with EFSA food consumption data exchange standard.	YES.	YES, is exported in DBase	YES	YES
Are databases integrated in the software (e.g. recipe, food composition, food classification, yield factors, fat absorbed during cooking, portion sizes)? (Please reply YES or NO)	YES	YES. Food composition database, recipes, portion sizes. The food is classified by Languel.	YES, the program includes recipes, food composition, food classification, and portion sizes. But the program doesn't consider yield factors NOR the fat absorbed during cooking. Nevertheless, in the dishes description there is a specific field for entering a data regarding the amount of	YES	YES, but food composition data (just energy and macronutrients) not to be used for final intake calculations

			water and/or oil absorbed during cooking (an estimation)		
--	--	--	--	--	--

(a) Country 12 did not participated neither in the CQ completion nor in the RT

Replies received in relation to collecting dietary data using food records

Questions	Country 1	Country 5	Country 6	Country 9
Can the tool be used for 24-HDRs or for entering data collected through food records or both?	It can be used for entering data collected through dietary recalls and food records.	The software was created for data inputting and data processing of the food records.	The tool is constructed to collect food records for four consecutive days.	24h –HDRs and food record with dietary assessment
When was the last time the software was used?	September 2012	It is currently used in two national projects: Food record of 1 day – n. 13,000 above 6 y Food record of 4 NOt-consecutive days : members of 30 households	May 2010 – July 2011 (The software is used for various validation studies at the moment)	2011-2012
Year of the software's last update	2012	Last update of source code in 2011, but it is continuously updated according to the demands of ongoing projects	May 2010	January 2012
Is it computerized or web-based dietary software?	Web-based	It is web-based	YES	YES
Which are the newest and the oldest operating systems with which this software is compatible?	There are NO limitations to operating systems compatibility.	Adobe AIR TechNOlogy multiplatform	The newest operating system compatible with the system is Windows XP and the latest windows 7 (and probably 8). For these operating system, internet explorer 6 or later (7 or 8) are needed.	WIN 7 (32 and 64 bit), WIN XP, Win98
Who maintains the software?	Content maintenance is done	The software is updated	We do	Internal

EFSA supporting publication 2014:EN-607

(Please indicate if the maintenance is internal or external)	by internal administrators. Technical maintenance is done by an external contractor.	externally, whereas the databanks internally		
Has the tool been used in a recent national survey?	NO	YES	YES	YES
<i>If YES, when was the survey undertaken?</i>	-	2005-06	May 2010 – July 2011	2011-2012
<i>If NO, in which survey it is going to be used? Please indicate if it is a national or a regional survey</i>	The software will be used in the national children's dietary survey taking place in 2013-2014 and in the national adult's dietary survey taking place in 2014-2015.	-	-	-
Does the tool include probing questions facilitating the interview/data entry?	YES	YES	NO	YES
Are databases integrated in the software (e.g. recipe, food composition, food classification, yield factors, fat absorbed during cooking, portion sizes)?	YES	YES	YES	YES
Does the software include a function to export the complete dataset in order to be imported in an external system?	YES	YES	YES	YES

Appendix M. The Observer's Form

1. Before the interview		
Questions to be asked		
Date (dd/mm/yy): / /	Country:	Name of the dietary tool:
The software is web based / The software is designed for local PC use?		Observer's name:
In which national languages is the software available? Are the language settings configurable by the users OR a special administration is needed?		Which is your level of expertise in interviewing? Which is your educational background? Which are the most common interviewers' educational backgrounds?
Are there Standard Operating Procedures (SOPs) available? (please circle) YES NO		
Please provide us with a copy of SOPs or the manual.		
Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed? (the idea is to ask this question once at the beginning)		<i>e.g. A four-step method could include: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.</i>

	What needs to be given special attention to during an interview? (i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool)	
. During the interview		
A. Specific part		
2.1 How is the recalled period ("day") defined?		
2.2 At which stage in the process of the interview?		
2.3 Are there pre-defined eating occasions?		
2.4 Portion size estimation (Circle the one(s) used in the interviews observed):		Weighing Food models Food pictures
2.5 Does the quantification method vary depending on the type of food? (please circle)		
YES NO 2.6 Are other methods than the ones just observed, used? (to be asked)		

2.7 If picture series are used indicate the number of pictures per item: 2.8 The pictures are integrated in the software (please circle) YES NO 2.9 There is a separate picture book (please circle) YES NO 2.10 Can the interviewee watch from a shared screen the portion size pictures? (please circle) YES NO	Household measures Standard (natural unit) Standard portions Known packaging size Ruler Sketches Gram/Volume method Other (specify)				
Comments					
Water consumption At which stage is it asked in the process of the interview? How? Comments:					
2.11 Are questions on the following matters asked during the interview? <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> ☐ Forgotten food items ☐ Amount of food leftover ☐ Additional food served ☐ Salt ☐ Pepper ☐ Herbs ☐ Is the type of milk consumed asked? </td> <td style="width: 50%; padding: 5px;"> ☐ Consumption of water and beverages during the meal(s) ☐ Consumption of water and beverages except of those during meal(s) ☐ Is adding sugar to tea or coffee asked? </td> </tr> </table>	☐ Forgotten food items ☐ Amount of food leftover ☐ Additional food served ☐ Salt ☐ Pepper ☐ Herbs ☐ Is the type of milk consumed asked?	☐ Consumption of water and beverages during the meal(s) ☐ Consumption of water and beverages except of those during meal(s) ☐ Is adding sugar to tea or coffee asked?	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> ☐ Special diet followed ☐ Reported day a special one? ☐ Time of eating occasion ☐ Place of consumption ☐ Place of food preparation ☐ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed) </td> <td style="width: 50%; padding: 5px;"> ☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☐ Fellow diners ☐ Brand name of foods </td> </tr> </table>	☐ Special diet followed ☐ Reported day a special one? ☐ Time of eating occasion ☐ Place of consumption ☐ Place of food preparation ☐ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)	☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☐ Fellow diners ☐ Brand name of foods
☐ Forgotten food items ☐ Amount of food leftover ☐ Additional food served ☐ Salt ☐ Pepper ☐ Herbs ☐ Is the type of milk consumed asked?	☐ Consumption of water and beverages during the meal(s) ☐ Consumption of water and beverages except of those during meal(s) ☐ Is adding sugar to tea or coffee asked?				
☐ Special diet followed ☐ Reported day a special one? ☐ Time of eating occasion ☐ Place of consumption ☐ Place of food preparation ☐ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)	☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☐ Fellow diners ☐ Brand name of foods				

☐ Is the type of fat spread consumed asked?	☐ Cooking procedures ☐ Was a certain food fortified or not ☐ Was a certain food organic or not ☐ Dietary supplements consumption ☐ Supplement brand name ☐ Supplement active compound ☐ Height ☐ Weight ☐ Age ☐ Sex
Comments	
2.12 Duration of the interview <i>It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool</i>	

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

3. After the interview

3.1 Description of the Food Composition Database used 3.2 Is it "integrated" in the software? 3.3 Food Classification System used: e.g. LanguaL - FoodEx - FoodEx2 - EFG - combination Other (Please specify)	3.4 Does the software handle recipes/composite foods and if so, how? 3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) Please indicate																										
3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle) YES NO <i>When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A sequence of windows corresponding to questions to be asked on different characteristics of foods, called 'facets' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of 'descriptors' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet</i>	3.7 Does the software include features for expanding the existing databases by adding: (please circle) <table border="0"> <tr> <td>Food items</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Recipes</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Food composition values</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Dietary supplements</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Portion sizes</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Pictures/photos</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Other</td> <td></td> </tr> </table>	Food items	YES	NO		Recipes	YES	NO		Food composition values	YES	NO		Dietary supplements	YES	NO		Portion sizes	YES	NO		Pictures/photos	YES	NO		Other	
Food items	YES																										
NO																											
Recipes	YES																										
NO																											
Food composition values	YES																										
NO																											
Dietary supplements	YES																										
NO																											
Portion sizes	YES																										
NO																											
Pictures/photos	YES																										
NO																											
Other																											
3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.)																											
3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food?																											
3.10 Does the interviewer have access to the outputs derived from the 24-hour recall? Which ones? (circle)																											

Foods, Food groups, Raw Agricultural Commodities, Energy, Macro-nutrients, Micro-nutrients, Other (please specify)

How soon?

Is it possible for the interviewer to identify an under-reporter? (please circle)

YES NO

3.11 Which outputs /reports are available on screen and which in printed format?

3.12 How much time is needed for the output to be produced?

3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle)

YES NO

3.14 Is there a critical aspect/characteristic of the tool that was not mentioned?
Any other comments?

3.15 Interviewee's comments

Appendix N. Files Consortium received from the ring-trial

- (a) *FoodList_For_Translation.xls*, including 10 spreadsheets (one per consumption day) listing the items and related information to be reported by the interviewees (in English). The file was prepared by the EFSA/DCM Unit.
- (b) *Foodlist-ID#.pdf*: translations of the aforementioned foodlists in national languages. The files are scanned copies of the original spreadsheets the interviewees had in hand during the RT and on which they indicated whether an item and its related information were reported (highlighted); whether they were not asked by the interviewers (circled or not highlighted); and, other notes they considered important to be reported to the RT observers (with the exception of the Portuguese interviewee, all the others kept notes in English).
- (c) *EFSA_final_REPETITIONS_table.xls*: The file includes information on the reported items. In addition to the data already provided in the *Foodist_For_Translation.xls* file, this table provides information on how many times each item was repeated, as well as insight on the quantity in grams anticipated of being recorded for each item. This file was also prepared by the EFSA/DCM Unit.
- (d) *RingTrialFoodPictures_Version2.doc*: The file includes pictures of packages of popular items (e.g. Mars bar, PEPSI max can, bottle of Evian water) or standard portions (e.g. bread rolls, sausages). The file was provided by EFSA to the interviewees to assist them in reporting food consumption.
- (e) Several files per participating country corresponding to national picture books displayed to interviewees for quantification purposes and further including information on key quantities behind the pictures.
- (f) Multiple files per country including both the raw data produced immediately after the conclusion of each interview and the raw data files the countries provided to EFSA some days after the conclusion of the RT.

Appendix O. Description of the ring-trial database

No.	Variable name	Description	Type	Value labels
INPUT VARIABLES (from the spreadsheets the interviewees had in hand)				
1	code	key variable of the database	numeric-integer	
2	ingredient	code as part of recipe	Numeric	
3	method	Data coming from 24HDR or food records	Categorical	1. 24h, 2. Food record
4	country	ring-trial country	Categorical	1. Estonia, 2. Latvia, 3. Portugal, 4. Spain, 5. Italy, 6. Sweden
5	date	date of the interview	Date	
6	day	day of 24h-recall recording	Categorical	1. M1, 2. T1, 3. W1, 4. TH1, 5. F1, 6. SA, 7. SU, 8. M2, 9. T2, 10. W2
7	id	number of the interview according to ring-trial series	numeric-integer	
8	tr_time	true time of the day that the food was consumed	24 hour type	
9	tr_meal	true meal of the day that the food was consumed	String	
10	tr_place	true place that food was consumed	String	
11	tr_name	true name of food	String	
12	tr_q	true portion in different units	Numeric	
13	tr_q_un	true portion unit	String	
14	tr_char_1	true characteristic 1 of food item	String	
15	tr_char_2	true characteristic 2 of food item	String	
16	tr_char_3	true characteristic 3 of food item	String	
17	tr_recip	the food was part of a recipe	Categorical	1. Yes, 0. No
KEY VARIABLES (retrieved from the EFSA_final_repetitions_table.xls)				
18	repetition	number of repetitions in all interview days	numeric-integer	
19	key_q	key input quantity (EFSA provided)	Numeric	
20	key_q_min	key max input quantity (EFSA provided) in case of min/max	Numeric	
21	key_q_max	key min input quantity (EFSA provided) in case of min/max	Numeric	
22	key_unit	unit of key quantity	Numeric	
OUTPUT VARIABLES (retrieved from the data provided by the countries)				
23	rec_time	time of the day the food was consumed	Numeric	

24	rec_meal	meal of the day the food was consumed	String	
25	rec_place	place of food consumption	String	
26	comment	comments related to food entry	string	
27	rec_recipe	the food part of a recipe recorded	Categorical	1. Yes, 0. No
28	amount_rec	grams of recipe	Numeric	
29	food_item	name of food item	String	
30	rec_q	portion in different units	Numeric	
31	rec_q_un	unit of the portion	String	
32	brand_nam	brand name recorded	Categorical	1. Yes, 0. No
33	fat_cont	fat content recorded	Categorical	1. Yes, 0. No
34	organic_gmo	organic foods or GMOs recorded	Categorical	1. Yes, 0. No
35	country_orgn	country of origin recorded	Categorical	1. Yes, 0. No
36	packag_mat	packaging material recorded	Categorical	1. Yes, 0. No
37	packag_shape	packaging shape recorded	Categorical	1. Yes, 0. No
38	pres_prep	preservation or preparation methods recorded	Categorical	1. Yes, 0. No
39	ext_cook	extent of cooking recorded	Categorical	1. Yes, 0. No
40	part_con	part of food that was consumed recorded	Categorical	1. Yes, 0. No
41	fortification	fortification agents recorded	Categorical	1. Yes, 0. No
42	additives	additives included in food recorded	Categorical	1. Yes, 0. No
43	flavour	flavors included in food recorded	Categorical	1. Yes, 0. No
44	alcohol	alcohol included in food recorded	Categorical	1. Yes, 0. No
45	sugars	sugars included in food recorded	Categorical	1. Yes, 0. No
46	caffeine	caffeine included in food recorded	Categorical	1. Yes, 0. No
47	place_prep	place of food preparation recorded	Categorical	1. Yes, 0. No
48	cook_meth	cooking method recorded	Categorical	1. Yes, 0. No
49	activ_sub_sup	active substances of dietary supplements recorded	Categorical	1. Yes, 0. No

Appendix P. Food items reported through exact weight: key quantity, quantity recorded by the tools, percentage deviation of the recorded quantities from the key quantity and use of pictures

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
M1	5	banana	120	1 small (g including unedible part)	fresh	YES	130	8.3	YES	120	0.0	NO	63	-47.5	YES	115.6	-3.7	YES	80	-33.3	NO	73	-39.2	YES	120	0.0
SU	5	banana	120	1 small (g including unedible part)	fresh	YES	120	0.0	YES	120	0.0	NO	63	-47.5	YES	115.6	-3.7	YES	80	-33.3	NO	73	-39.2	YES		
SU	5	banana	120	1 small (g including unedible part)	fresh	YES	120	0.0	YES	120	0.0	NO	63	-47.5	YES	115.6	-3.7	YES	80	-33.3	NO	73	-39.2	YES	120	0.0
T1	5	banana	120	1 small (g including unedible part)	fresh	YES	130	8.3	YES	120	0.0	NO	63	-47.5	YES	115.6	-3.7	YES	80	-33.3	NO	73	-39.2	YES	120	0.0
W2	5	banana	120	1 small (g including unedible part)	fresh	YES			YES	120	0.0	NO	63	-47.5	YES	115.6	-3.7	YES	80	-33.3	NO	73	-39.2	YES	120	0.0
M1	1	beef stew	330	1 large portion /gr	with vegetables	YES	325	-1.5	NO	250	-24.2	YES	321.2	-2.7	YES	500	51.5	YES	375	13.6	YES	300	-9.1	YES	225	-31.8

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
TH1	1	bolognese sauce	140	small portion	jarred, Barilla, pan reheated	YES	140	0.0	YES	140	0.0	NO	160.9	14.9	YES	200	42.9	YES	270.9	93.5	YES	150	7.1			
SA	5	bread	180	2 big slices/g	white, wheat bread	NO	36	-80.0	YES	40	-77.8	YES	113.3	-37.1	YES	109	-39.4	YES	100	-44.4	NO	50	-72.2			
SA	5	bread	180	2 big slices/g	white, wheat bread	NO	54	-70.0	YES	40	-77.8	YES	141.7	-21.3	YES	109	-39.4	YES	100	-44.4	NO	50	-72.2			
TH1	5	bread	180	2 big slices/g	white, wheat bread	YES	146	-18.9	YES	40	-77.8	YES	113.3	-37.1	YES	66	-63.3	YES	100	-44.4	NO	50	-72.2			
W1	5	bread	180	2 big slices/g	white, wheat bread	YES	120	-33.3	YES	40	-77.8	YES	113.3	-37.1	YES	66	-63.3	YES	100	-44.4	NO	50	-72.2	YES	184	2.2
W2	5	bread	180	2 big slices/g	white, wheat bread	NO	36	-80.0	YES	140	-22.2	YES			YES	132	-26.7	YES	100	-44.4	NO	50	-72.2	YES	55	-69.4
F1	5	bread	50	1 slice	rye, whole grain	YES	165	230.0	YES	50	0.0	YES	21.1	-57.8	YES	60	20.0	YES	25	-50.0	NO	30	-40.0			
T1	5	bread	50	1 slice	rye, whole grain	YES	160	220.0	YES	50	0.0	YES	40.4	-19.2	YES	30	-40.0	YES	25	-50.0	NO	30	-40.0	YES	184	268.0
M1	5	bread	50	1 slice	rye, whole grain	YES	90	80.0	YES	50	0.0	YES	20.2	-59.6	YES	45	-10.0	YES	25	-50.0	NO	30	-40.0	YES	184	268.0
T2	5	bread	50	1 slice	rye, whole grain	YES	55	10.0	YES	50	0.0	YES	20.2	-59.6	YES	45	-10.0	YES	25	-50.0	NO	30	-40.0	YES	55	10.0
W2	5	bread	50	1 slice	rye, whole grain	YES ?	55	10.0	YES	50	0.0	YES	84.8	69.6	YES	45	-10.0	YES	25	-50.0	NO	30	-40.0	NO	35	-30.0
T1	1	broccoli	55	1 dl (measured)	steamed	NO	100	81.8	NO	100	81.8	NO	65	18.2	NO	40	-27.3	YES	250	354.5	YES	81	47.3	NO	75	36.4

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
				red)																						
W2	5	butter	5	thin layer, 1 ts	n.s.	YES	5	0.0	YES	10	100.0	NO	7.6	52.0	YES	5	0.0	YES	6	20.0	YES	5	0.0	YES	5	0.0
M1	5	butter	5	thin layer	n.s.	YES	5	0.0	YES	5	0.0	YES	4.4	-12.0	YES	5	0.0	YES	6	20.0	YES	5	0.0	YES	5	0.0
T1	5	butter	5	thin layer	normal	YES	16	220.0	YES	5	0.0	YES	4.4	-12.0	YES	5	0.0	YES	6	20.0	YES	7	40.0	YES	5	0.0
F1	5	butter	5	thin layer, 1 ts	normal 80% fat butter	YES	4	-20.0	YES	5	0.0	NO	7.6	52.0	YES	5	0.0	YES	6	20.0	YES	5	0.0			
TH1	5	butter	5	thin layer	normal fat, paper envelope	YES	10	100.0	NO			YES	30.6	512.0	YES	20	300.0	YES	6	20.0	YES	5	0.0			
SA	1 and 3	Caprese salad	160	1 medium portion / gr	fresh mozzarella, tomatoes, basil, olive oil, balsamic vinaigrette	YES	350	118.8	YES	160	0.0	YES	206	28.8	YES	171	6.9	YES	130	-18.8	YES	125	-21.9			
W1	1	cauliflower	55	1 dl (measured)	boiled	NO	100	81.8	NO	100	81.8	NO	24	-56.4	NO	40	-27.3	YES	37.5	-31.8	YES	94	70.9	NO	67	21.8
T1	1	cheese	35	1 piece	extra hard, parmesan, 32	YES	40	14.3	YES	35	0.0	YES	39	11.4	YES	36	2.9	YES	26.3	-24.9	NO	9	-74.3	NO	35	0.0

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					months seasoned, cow milk																					
T2	1	chocolate bar	50	1 (50g)	dark chocolate, plain, Hershey's (special dark)	NO	50	0.0	NO	50	0.0	NO	50	0.0	NO	50	0.0	YES	50	0.0	NO	50	0.0	NO	50	0.0
T1	5	coffee with milk	250	1 large cup	instant coffee, Nescafe, with skimmed milk: UHT pasteurised, no sugar added	YES	270	8.0	YES	260	4.0	YES			YES	227	-9.2	YES	262	4.8	NO	300	20.0	YES	280	12.0
T2	5	coffee with milk	250	1 large cup	instant coffee, Nescafe, with skimmed milk: UHT pasteurised, no	YES	260	4.0	YES	260	4.0	YES	280	12.0	YES	227	-9.2	YES	256	2.4	NO	230	-8.0	YES	280	12.0

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					sugar added																					
T2	5	coffee with milk	250	1 large cup	instant coffe, Nescafe, with skimmed milk: UHT pasteurised, no sugar added	YES	260	4.0	YES	260	4.0	YES	280	12.0	YES	227	-9.2	YES	259	3.6	NO	230	-8.0	YES	280	12.0
TH1	5	coffee with milk	250	1 large cup	instant coffe, Nescafe, with skimmed milk: UHT pasteurised, no sugar added	YES	255	2.0	YES	270	8.0	YES	280	12.0	YES	227	-9.2	YES	262	4.8	NO	230	-8.0			
W2	5	coffee with milk	250	1 large cup	instant coffe, Nescafe, with skimmed milk: UHT pasteur	YES	260	4.0	YES	340	36.0	YES	280	12.0	YES	252	0.8	YES	256	2.4	NO	230	-8.0	YES	280	12.0

EFSA supporting publication 2014:EN-607

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					ised, no sugar added																					
T2	1	doughnut	85	1 large	with chocolate icing, yeast leavened dough	NO	120	41.2	YES	85	0.0	NO	44	-48.2	YES	78	-8.2	YES	45.2	-46.8	NO	50	-41.2	NO	55	-35.3
SU	1	fish casserole	300	1 medium plate/gr	baked in oven, no salt added	YES	200	-33.3	YES	300	0.0	YES	478.4	59.5	YES	392	30.7	YES	150	-50.0	YES	225	-25.0	YES	300	0.0
W2	5	grapes	177.5	1 medium bowl	n.s.	YES			YES	175	-1.4	YES	184	3.7	YES	197.8	11.4	YES	127.5	-28.2	YES	140	-21.1	YES	180	1.4
M2	5	grapes	177.5	1 medium bowl	n.s.	YES	181	2.0	YES	175	-1.4	YES	184	3.7	YES	197.8	11.4	YES	127.5	-28.2	YES	140	-21.1	YES	180	1.4
F1	5	grapes	177.5	1 medium/gr/with inedible part	n.s.	YES	180	1.4	YES	175	-1.4	YES	184	3.7	YES	197.8	11.4	YES	127.5	-28.2	YES	140	-21.1			
T2	5	grapes	177.5	1 medium/gr/with inedible part	n.s.	YES	181	2.0	YES	175	-1.4	YES	178	0.3	YES	197.8	11.4	YES	127.5	-28.2	YES	140	-21.1	YES	180	1.4
TH1	5	grapes	177.5	1 medium	n.s.	YES	181	2.0	YES	175	-1.4	YES	185	4.2	YES	197.8	11.4	YES	127.5	-28.2	YES	140	-21.1			

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
Day				m/gr/with unedible part																						
M2	3	green tea	250	1 large cup	Lipton, infusion	YES	250	0.0	NO	250	0.0	YES	280	12.0	YES	250	0.0	YES	250	0.0	NO	250	0.0	YES	250	0.0
M2	3	green tea	250	1 large cup	Lipton, infusion	YES	250	0.0	YES	250	0.0	YES	280	12.0	YES	250	0.0	YES	250	0.0	NO	250	0.0	YES	250	0.0
M2	3	green tea	250	1 large cup	Lipton, infusion	YES	250	0.0	YES	250	0.0	YES	280	12.0	YES	250	0.0	YES	250	0.0	NO	250	0.0	YES	250	0.0
T2	1 and 3	legume soup	305	1 soup plate	pea soup/split pea soup/chick pea soup/bean soup/lentil soup	NO	320	4.9	YES	150	-50.8	YES	300	-1.6	NO			YES	225	-26.2	YES	315	3.3	YES	325	6.6
F1	1 and 4	legume soup	400	1 large portion /gr	pea soup/split pea soup/chick pea soup/bean soup/lentil soup	YES	400	0.0	YES	400	0.0	NO	294	-26.5	NO			YES	281.3	-29.7	YES	400	0.0			
TH1	1	meat loaf	120	2 slices	minced beef	YES	130	8.3	YES	140	16.7	YES	52	-56.7	YES	160.5	33.8	YES	120	0.0	YES	115	-4.2			

EFSA supporting publication 2014:EN-607

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
Day																										
					and pork meat, baked in oven, fat n.s.																					
SU	2	milk	150	1 medium bowl/ml	liquid, cow, UHT semi-skimmed, fortified by vitamins, plastic bottle	YES	200	33.3	NO	160	6.7	YES	121	-19.3	NO	200	33.3	YES	100	-33.3	NO	250	66.7	YES	150	0.0
F1	2	milk	150	1 medium bowl/ml	milk, cow, liquid, pasteurised, semi-skimmed, glass bottle	NO	160	6.7	NO	160	6.7	YES	121	-19.3	NO	250	66.7	YES	150	0.0	NO	200	33.3			
SU	1 and 4	minestrone soup	400	1 large plate/gr	homemade	YES	500	25.0	YES	400	0.0	YES	380	-5.0	NO	400	0.0	YES	328.1	-18.0	YES	400	0.0	YES	365	-8.8
SA	1	mixed green salad	50	1 small portion / gr	lemon juice, olive oil, pepper	YES	20	-60.0	YES	50	0.0	YES	20	-60.0	YES	171	242.0	YES	32.5	-35.0	YES	40	-20.0			

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
T2	2 and 3	mixed nuts and dried fruits	40	1/2 sack	plastic sack	NO	20	-50.0	NO	60	50.0	YES	40	0.0	YES	40	0.0	YES	33.8	-15.5	NO	15	-62.5	YES	40	0.0
T2	2 and 3	mixed nuts and dried fruits	40	1/2 sack	plastic sack	NO	20	-50.0	NO	60	50.0	YES	40	0.0	YES	40	0.0	YES	35.3	-11.8	NO	15	-62.5	YES	40	0.0
M1	2	mixed salad	40	1 small portion / gr	fresh, green, lettuce, ruola	YES	40	0.0	YES	50	25.0	YES	55	37.5	YES	50	25.0	YES	25	-37.5	YES	40	0.0	YES	40	0.0
W1	2	mixed salad	40	1 small portion / gr	fresh, mixed	YES	60	50.0	YES	50	25.0	YES	20	-50.0	YES	131	227.5	YES	25	-37.5	YES	40	0.0	YES	40	0.0
SU	1	muesli	37.5	1 medium portion / gr	mixed dried fruit and nuts, n.s.	YES	50	33.3	YES	35	-6.7	YES	40	6.7	YES	40	6.7	YES	30	-20.0	YES	40	6.7	YES	40	6.7
M1	5	orange juice	300	1 large glass/ ml	orange 100% juice, packed in Tetra-pack, fortified with extra Vit C	YES	400	33.3	YES	440	46.7	NO	300	0.0	YES	300	0.0	YES	400	33.3	NO	250	-16.7	YES	300	0.0
M2	5	orange juice	300	1 large glass/ ml	orange 100% juice,	YES	400	33.3	YES	330	10.0	NO	300	0.0	YES	300	0.0	YES	400	33.3	NO	350	16.7	YES	300	0.0

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					packed in Tetra-pack, fortified with extra Vit C																					
T1	5	orange juice	300	1 large glass/ml	orange 100% juice, packed in Tetra-pack, fortified with extra Vit C	YES	400	33.3	YES	440	46.7	NO	300	0.0	YES	300	0.0	YES	400	33.3	NO	250	-16.7	YES	200	-33.3
T2	5	orange juice	300	1 large glass/ml	orange 100% juice, packed in Tetra-pack, fortified with extra Vit C	YES	400	33.3	YES	330	10.0	YES	300	0.0	YES	300	0.0	YES	400	33.3	NO	350	16.7	YES	300	0.0
W2	5	orange juice	300	1 large glass/ml	orange 100% juice, packed in Tetra-pack,	YES	90	-70.0	YES	330	10.0	YES	300	0.0	YES	300	0.0	YES	400	33.3	NO	350	16.7	YES	90	-70.0

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					fortified with extra Vit C																					
F1	1	orange juice	95	1 small glass/ml	no sugar added, freshly squeezed (spremuta)	NO	90	-5.3	YES	90	-5.3	YES	83	-12.6	YES	100	5.3	YES	112.5	18.4	NO	250	163.2			
SA	1	Osso buco	200	1 large portion (with bone)	veal meat, baked in oven	YES	300	50.0	YES	200	0.0	YES			YES	252	26.0	YES	240	20.0	NO	168	-16.0			
SA	1	panna cotta	150	1 portion	with vanilla honey	YES	200	33.3	NO	80	-46.7	YES	147	-2.0	NO	125	-16.7	YES	176.3	17.5	NO	110	-26.7			
TH1	1	pasta	325	1 large portion / g; only 2/3 of the portion eaten	spaghetti, dried durum pasta, boiled	YES	350	7.7	YES	400	23.1	YES	50.4	-84.5	YES	90.5	-72.2	YES	166	-48.9	YES	250	-23.1			
W1	2	pasta with seafood	420	1 large portion / gr	with seafood n.s., penne, boiled	YES for pasta /NO for seafood	400	-4.8	YES	400	-4.8	YES	211.3	-49.7	YES			YES	456.3	8.6	YES	200	-52.4	YES	445	6.0
T2	2	pasta with seafood	420	1 large portion /gr	with seafood n.s.,	YES for both	400	-4.8	YES	400	-4.8	YES	400	-4.8	NO	285	-32.1	YES	456.3	8.6	YES	350	-16.7	YES	445	6.0

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
		d			penne, boiled																					
SA	1	pate	20	small piece	goose liver, n.s.	YES	23	15.0	YES	20	0.0	YES	12.3	-38.5	YES	70	250.0	YES	16	-20.0	NO	13	-35.0			
W1	1 and 3	peanuts	40	40 gr	roasted , salted	YES	37.5	-6.3	NO	40	0.0	NO	40	0.0	NO	40	0.0	NO	40	0.0	NO	24	-40.0	YES	40	0.0
SU	1	pie	180	2 pieces/ gr	apple, homemade, baked in oven, fructose	YES	280	55.6	NO	120	-33.3	YES	180	0.0	YES	120	-33.3	YES	125	-30.6	NO	200	11.1	YES	310	72.2
W1	1	pork chops lean	300	2 thick chops/ gr; weight after cooking		YES	99	-67.0	YES	300	0.0	YES	323	7.7	YES ^(a)	470.2	56.7	YES	300	0.0	NO	200	-33.3	YES	150	-50.0
T1	1	pumpkin seeds	20	20 gr (with non edible part)	homemade, baked in oven, salted	NO	15	-25.0	NO	20	0.0	NO	10.3	-48.5	NO	20	0.0	NO	20	0.0	NO	9	-55.0	NO	15	-25.0
SA	1	quiche	60	1 small portion / gr	spinach , cheese, n.s.	YES	60	0.0	YES	50	-16.7	YES	58	-3.3	YES	35.5	-40.8	YES	50	-16.7	NO	100	66.7			
F1	3	risotto with chicken and spinach	500	1 large portion / gr	chicken and spinach , boiled	YES			YES	500	0.0	YES	504	0.8	YES	300	-40.0	YES	342	-31.6	YES	210	-58.0			

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
W2	3	risotto with chicken and spinach	500	1 large portion / gr	chicken and spinach, boiled	YES	500	0.0	YES	400	-20.0	YES	504	0.8	YES	300	-40.0	YES	342.2	-31.6	YES	420	-16.0	YES	500	0.0
T1	3	risotto with chicken and spinach	500	1 large portion / gr	chicken and spinach, boiled	YES	500	0.0	YES	810	62.0	YES	504	0.8	YES	300	-40.0	YES	205	-59.0	YES	420	-16.0	YES	500	0.0
M1	5	roasted potatoes	200	1 medium portion	baked with oil n.s.	YES	200	0.0	YES	200	0.0	YES	228.1	14.1	YES	255	27.5	YES	200	0.0	YES	168	-16.0	YES	200	0.0
SA	5	roasted potatoes	200	1 medium portion	baked with oil n.s.	YES	180	-10.0	YES	200	0.0	YES	237.1	18.6	YES	255	27.5	YES	200	0.0	YES	168	-16.0			
SA	5	roasted potatoes	200	1 medium portion	baked with oil n.s.	YES	200	0.0	YES	200	0.0	YES	237.1	18.6	YES	255	27.5	YES	200	0.0	YES	168	-16.0			
TH1	5	roasted potatoes	200	1 medium portion	baked with oil n.s.	YES	200	0.0	YES	200	0.0	YES	237.1	18.6	YES	255	27.5	YES	200	0.0	YES	168	-16.0			
W1	5	roasted potatoes	200	1 medium portion	baked with sunflower oil	YES	300	50.0	YES	200	0.0	YES	67	-66.5	YES	250	25.0	YES	200	0.0	YES	168	-16.0	YES	200	0.0
SA	3	rolls	95	2 normal (=1 large)	mixed grain, baked, reduced salt	YES	60	-36.8	YES	90	-5.3	NO			YES	93	-2.1	YES	120	26.3	NO	90	-5.3			
SU	3	rolls	95	2 pc/ gr	mixed grain,	YES	108	13.7	YES	90	-5.3	NO	112	17.9	YES	93	-2.1	YES	60	-36.8	NO	180	89.5	YES	92	-3.2

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					baked, reduced salt																					
TH1	3	rolls	95	2 pc/ gr	mixed grain, baked, reduced salt	YES	100	5.3	YES	90	-5.3	NO	130	36.8	YES	93	-2.1	YES	120	26.3	NO	180	89.5			
T1	1	salmon	50	1 small piece of fillet/ gr	baked in oven, n.s.	YES	55	10.0	YES	55	10.0	YES	59	18.0	YES	64	28.0	YES	126.2	152.4	YES	50	0.0	YES	55	10.0
SA	1	sausage	10	piece of 1 cm thick, 5 cm long	dried	YES	10	0.0	NO	20	100.0	NO	7	-30.0	YES	10.1	1.0	YES	12.5	25.0	NO	20	100.0			
M2	1 and 4	soup/broth	400	1 large bowl/ ml	with vegetables, boiled	NO	400	0.0	YES	400	0.0	YES	380	-5.0	NO	400	0.0	YES	312.5	-21.9	YES	400	0.0	YES	400	0.0
SA	3	sponge cake	110	1 medium portion	sponge-type, chocolate filled, sugar-iced	YES	62	-43.6	YES	120	9.1	YES	107	-2.7	YES	71	-35.5	YES	68	-38.2	NO	70	-36.4			
W1	3	sponge cake	110	1 medium portion	sponge-type, chocolate filled, sugar-iced	YES	120	9.1	YES	120	9.1	YES	107	-2.7	YES	71	-35.5	YES	68	-38.2	NO	52.5	-52.3	YES	120	9.1

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
TH1	3	sponge cake	110	1 medium portion	sponge-type, chocolate filled, sugar-iced	YES	50	-54.5	YES	120	9.1	YES	170	54.5	YES	71	-35.5	YES	68	-38.2	NO	52.5	-52.3			
F1	1	strawberries	120	1 medium portion / gr	fresh	YES	128	6.7	YES	135	12.5	YES	107.3	-10.6	YES	120.5	0.4	YES	80	-33.3	YES	120	0.0			
T2	1 and 3	Tofu salad	160	1 medium portion	Tofu (soy "cheese"), tomato, broccoli, cucumber, leek, soy sauce, sesame seeds	YES	150	-6.3	YES	150	-6.3	YES	187	16.9	NO	150	-6.3	YES	182	13.8	YES	125	-21.9	YES		
W1	1	tomato	57.5	3 slices/gr	fresh	NO	51	-11.3	YES	50	-13.0	YES	55	-4.3	YES	53	-7.8	YES	56.3	-2.1	NO	45	-21.7	YES	58	0.9
T1	2 and 3	vegetable soup	305	1 soup plate	clear, with vegetables, boiled	YES	350	14.8	YES	150	-50.8	YES	300	-1.6	NO			YES	262.5	-13.9	YES	300	-1.6	YES	325	6.6
W2	2 and 3	vegetable soup	305	1 soup plate	clear, with vegetables	YES	400	31.1	YES	150	-50.8	NO	294	-3.6	NO			YES	262.5	-13.9	YES	300	-1.6	YES	400	31.1

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
SA	1 and 4	vegetable soup	410	1 large portion /gr	clear, with vegetables, boiled	YES	400	-2.4	YES	400	-2.4	NO	294	-28.3	NO	280	-31.7	YES	328.1	-20.0	YES	400	-2.4			
F1	1	wafers	50	50 gr	filled with hazelnut cream, Manne r	NO	50	0.0	NO	30	-40.0	NO	75	50.0	NO	50	0.0	YES	50	0.0	NO	10	-80.0			
SA	1 and 3	Waldorf's salad	160	1 medium portion	Waldorf's salad, n.s.	YES	150	-6.3	YES	150	-6.3	NO	187	16.9	YES	220.7	37.9	YES	145	-9.4	NO	40	-75.0			
M1	11	water	170	1 medium glass	still mineral water, plastic bottle	NO	200	17.6	NO	280	64.7	YES	180	5.9	NO	200	17.6	YES	160	-5.9	NO	250	47.1	NO	200	17.6
SA	11	water	170	1 medium glass	still mineral water, plastic bottle	NO	200	17.6	NO	180	5.9	NO	210	23.5	NO	200	17.6	YES	160	-5.9	NO	250	47.1			
SU	11	water	170	1 medium glass	still mineral water, plastic bottle	YES	180	5.9	NO	200	17.6	YES	180	5.9	NO	200	17.6	YES	160	-5.9	NO	250	47.1	NO		
M1	11	water	170	1 medium glass	tap water	YES	180	5.9	YES	280	64.7	NO	210	23.5	YES	200	17.6	YES	120	-29.4	NO	200	17.6	YES	180	5.9

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
SU	11	water	170	1 medium glass	tap water	NO	400	135.3	NO			NO	180	5.9	YES	200	17.6	YES	120	-29.4	NO	250	47.1	NO	400	135.3
TH1	11	water	170	1 medium glass	tap water	YES	180	5.9	NO	180	5.9	YES	180	5.9	YES	200	17.6	YES	160	-5.9	NO	250	47.1			
W2	11	water	170	1 medium glass	tap water	NO	180	5.9	YES	180	5.9	YES	180	5.9	YES	200	17.6	YES	160	-5.9	NO	250	47.1	NO	180	5.9
F1	1	water	375	1/2 of bottle (0.75 l wine bottle size)	carbonated, plastic bottle	NO	250	-33.3	NO	375	0.0	NO			NO	375	0.0	YES	500	33.3	NO	375	0.0			
T2	1	watermelon	375	1 medium wedge with uneatable part	fresh	YES	198	-47.2	YES	360	-4.0	YES	173.3	-53.8	YES	518	38.1	YES	150	-60.0	YES	90	-76.0	YES	350	-6.7
F1	5	white wine	240	2 glasses of 12 cl	glass bottle, 12.5% alcohol	NO	200	-16.7	NO	240	0.0	NO	240	0.0	NO	240	0.0	YES	240	0.0	NO	240	0.0			
SA	5	white wine	240	2 glasses of 12 cl	glass bottle, 12.5% alcohol	NO	160	-33.3	NO	240	0.0	NO	240	0.0	NO	240	0.0	YES	240	0.0	NO	240	0.0			
SA	5	white wine	240	2 glasses of 12 cl	glass bottle, 12.5% alcohol	NO	200	-16.7	NO	240	0.0	NO	240	0.0	NO	240	0.0	YES	240	0.0	NO	240	0.0			
T2	5	white wine	240	2 glasses of 12 cl	glass bottle, 12.5% alcohol	NO	160	-33.3	NO	240	0.0	NO	240	0.0	NO	240	0.0	YES	240	0.0	NO	240	0.0	NO	240	0.0

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity to be reported	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					alcohol																					
TH1	5	white wine	240	2 glasses of 12 cl	glass bottle, 12.5% alcohol	NO	160	-33.3	NO	240	0.0	NO	240	0.0	NO	240	0.0	YES	240	0.0	NO	240	0.0			
M1	1	yoghurt	125	1 small container	cow milk, normal fat, plastic container, with fruits and cereals: pear and mixed cereals, sweetened	NO	150	20.0	YES	125	0.0	NO	125	0.0	YES	160	28.0	YES	125	0.0	YES	112.5	-10.0	YES	125	0.0

(a)The interviewee kept a note that the designated picture may have been wrongly selected

Appendix Q. Food items reported through portions: key quantity, quantity recorded by the tools, percentage deviation of the recorded quantities from the key quantity and use of pictures

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
SA	1	bread	1 medium slice	1 medium slice	n.s.	YES	36		NO	20		NO	48.9		NO	20		YES	50		NO	25		-	-	
M1	1	capuccino	1 medium portion	1 cup	cappuccino, full fat milk 3.5%, not fortified, sweetener (aspartame) 1 tablet	NO	150		NO	160		NO	280		NO	152		YES	150		NO	250		NO	200	
SA	1	caviar creme	10	2 teaspoons	caviar crème n.s.	NO	8	-20.0	NO	10	0.0	NO	14.4	44.0	NO	330	3200.0	YES	12.8	28.0	NO	10	0.0			
SA	1	chicken	110	1 medium portion	breast, grilled	NO	170	54.5	NO	200	81.8	NO	132	20.0	NO	167	51.8	YES	100	-9.1	NO	200	81.8			
SA	5	coffee	150	1 normal small coffee cup	filtered coffee, 2 teaspoon sugar (g), coffee cream	NO	169	12.7	YES	170	13.3	NO	68.9	-54.1	NO	122	-18.7	YES	174	16.0	NO	165	10.0			

EFSA supporting publication 2014:EN-607

					12%																					
SU	5	coffee	150	1 normal small coffee cup	filtered coffee, 2 teaspoon sugar (g), coffee cream 12%	NO	165	10.0	YES	170	13.3	NO	68.9	-54.1	NO	220	46.7	YES	182	21.3	NO	225	50.0	NO	180	20.0
TH1	5	coffee	150	1 normal small coffee cup	filtered coffee, 2 teaspoon sugar (g), coffee cream 12%	NO	165	10.0	YES	175	16.7	NO	68.9	-54.1	NO	32	-78.7	YES	182	21.3	NO	230	53.3			
W1	5	coffee	150	1 normal small coffee cup	filtered coffee, 2 teaspoon sugar (g), coffee cream 12%	NO	165	10.0	YES	160	6.7	NO	68.9	-54.1	NO	112	-25.3	YES	173	15.3	NO	175	16.7	NO	175	16.7
W2	5	coffee	150	1 normal small coffee cup	filtered coffee, 2 teaspoon sugar (g), coffee cream 12%	NO	170	13.3	YES	180	20.0	NO	68.9	-54.1	NO	120	-20.0	YES	182	21.3	NO	210	40.0	NO	180	20.0
F1	5	coffee	60	1 espresso cup	espresso , 1 teaspoon white sugar (	NO	70	16.7	NO	35	-41.7	NO	57	-5.0	NO	96	60.0	YES	68	13.3	NO	100	66.7			

					g)																					
M1	5	coffee	60	1 espresso cup	espresso, 1 teaspoon (ts) white sugar (g)	NO	73	21.7	NO	35	-41.7	NO	57	-5.0	NO	97	61.7	YES	68	13.3	NO	100	66.7	NO	75	25.0
T1	5	coffee	60	1 espresso cup	espresso, 1 teaspoon (ts) white sugar (g)	NO	75	25.0	NO	35	-41.7	NO	57	-5.0	NO	97	61.7	YES	68	13.3	NO	100	66.7	NO	75	25.0
TH1	5	coffee	60	1 espresso cup	espresso, 1 teaspoon (ts) white sugar (g)	NO	75	25.0	NO	35	-41.7	NO	57	-5.0	NO			YES	68	13.3	NO	100	66.7			
W1	5	coffee	60	1 espresso cup	espresso, 1 teaspoon (ts) white sugar (g)	NO	75	25.0	NO	35	-41.7	NO	57	-5.0	NO	92	53.3	YES	68	13.3	NO	50	-16.7	NO	75	25.0
F1	1	corn flakes	30	1 medium portion/gr	plain, organic, Barbara's organic, fruit juice sweetened	NO	40	33.3	NO	50	66.7	NO	40	33.3	NO	30	0.0	YES	30	0.0	YES	18	-40.0			
F1	1	hamburger	212.5	1 portion	baked	NO	47	-77.9	NO	400	88.2	NO	221	4.0	NO	311	46.4	YES	210	-1.2	NO	200	-5.9			
M2	1	honey	1 table	1 table spoon	n.s.	NO	20		NO	20		NO	14		NO	25		YES	20		NO	20		NO	10	

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

			spoon																							
SU	3	ice cream	2 small scoops	2 small scoops	milk-based, vanilla, cartoon container	NO	100		NO	80		NO	66		NO	40		NO	70		NO	100		NO	50	
W2	3	ice cream	2 small scoops	2 small scoops	milk-based, vanilla, cartoon container	NO	80		NO	80		NO	65		NO	40		NO	70		NO	100		NO	50	
T1	3	ice cream	2 small scoops	2 small scoops	milk-based, vanilla, plastic container	NO	50		NO	100		NO	50		NO	40		NO	70		NO	100		NO	50	
TH1	1	jam	16	1 tea spoon	strawberry, sweetened, jarred	NO	8	-50.0	NO	15	-6.3	NO	8	-50.0	NO	13	-18.8	YES	10	-37.5	NO	6	-62.5			
T2	4	margarine	10	2 teaspoons	low fat 40%, plant sterols, plant sterols/stanols, Becel proactiv	NO	20	100.0	NO	10	0.0	NO	15.2	52.0	NO	40	300.0	YES	12	20.0	NO	10	0.0	NO	20	100.0
T1	4	margarine	10	2 ts. on top of the risotto	low fat 40%, plant sterols, plant sterols/stanols, Becel proactiv	NO	10	0.0	NO	10	0.0	NO	15.2	52.0	NO	40	300.0	YES	12	20.0	NO	10	0.0	NO	10	0.0

					v																					
W1	4	margarine	10	2 x 1 ts.	low fat 40%, plant sterols, plant sterols/ stanols, Becel proactiv	NO	10	0.0	NO	10	0.0	NO	15.2	52.0	NO	40	300.0	YES	12	20.0	NO	10	0.0	NO	10	0.0
SA	1	margarine	20	2x2 teaspoons	low fat 40%, plant sterols, plant sterols/ stanols, Becel proactiv	NO	13	-35.0	NO	20	0.0	NO	30.4	52.0	NO	80	300.0	YES	24	20.0	NO	20	0.0			
W2	1	margarine	30	2 ts/ each slice (3 slices in total)	low fat 40%, plant sterols, plant sterols/ stanols, Becel proactiv	NO	30	0.0	NO	30	0.0	NO	15.2	-49.3	NO	75	150.0	YES	36	20.0	NO	30	0.0	NO	30	0.0
SU	4	margarine, high fat, 80%, ns.	10	2x1 ts (1 ts/slice)	normal	NO	10	0.0	NO	10	0.0	NO	15.2	52.0	NO	40	300.0	YES	12	20.0	NO	10	0.0	NO	10	0.0
SA	1	mayonnaise sauce	17.5	1 tbls full	n.s.	NO	20	14.3	NO	20	14.3	NO	187	968.6	NO	10	-42.9	YES	16	-8.6	NO	14	-20.0			
TH1	1	milk	190	1 glass	cow, liquid, fresh,	NO	275	44.7	NO	200	5.3	NO	185	-2.6	NO	100	-47.4	YES	120	-36.8	NO	250	31.6			

					pasteurised, whole, plastic bottle																							
SA	1	mushrooms	25	3 tablespoons	n.s.	NO	30	20.0	NO	60	140.0	NO	40.2	60.8	NO	150	500.0	YES	24.75	-1.0	NO	33	32.0					
M1	2	olive oil	12	1 tablespoon	extra virgin, glass bottle	NO			NO	12	0.0	NO	18.4	53.3	NO	10	-16.7	YES	9	-25.0	NO	13	8.3	NO	5		-58.3	
W1	2	olive oil	12	1 tablespoon	extra virgin, glass bottle	NO	10	-16.7	NO	15	25.0	NO	9.2	-23.3	NO	10	-16.7	YES	9	-25.0	NO	4	-66.7	NO	5		-58.3	
F1	3	organic purée for toddlers	100	1 small jar/ 5 full table spoons	jarred, commercial	NO	50	-50.0	NO	80	-20.0	NO	100	0.0	NO	100	0.0	YES	80	-20.0	YES	113	13.0					
T2	3	organic purée for toddlers	100	1 small jar/ 5 full table spoons	jarred, commercial	NO	90	-10.0	NO	100	0.0	NO	100	0.0	NO	100	0.0	YES	80	-20.0	YES	203	103.0	NO	75		-25.0	
W2	3	organic purée for toddlers	100	1 small jar/ 5 full table spoons	jarred, commercial	NO	50	-50.0	NO	100	0.0	NO	100	0.0	NO	100	0.0	YES	80	-20.0	YES	203	103.0	NO	75		-25.0	
T1	2	rapeseed oil	12	1 tablespoon	n.s.	NO	5	-58.3	NO			NO	11.7	-2.5	NO	5	-58.3	YES	9	-25.0	NO	13	8.3	NO	5		-58.3	
W1	2	rapeseed oil	12	1 tablespoon	n.s.	NO	10	-16.7	NO	15	25.0	NO	0.8	-93.3	NO	10	-16.7	YES	9	-25.0	NO	13	8.3	NO	5		-58.3	
M2	3	rice	1 medium portion	1 medium portion	cooked n.s., white (parboiled)	NO	150		NO	130		NO	112		NO	80		YES	250		YES	175		NO	150			
SA	3	rice	1	1	cooked	NO	130		NO	130		NO	112		NO	65		YES	250		YES	175		-	-			

			medium portion	medium portion	n.s., white (parboiled)																					
SU	3	rice	1 medium portion	1 medium portion	cooked n.s., white (parboiled)	NO	150		NO	150		NO	171		NO	80		YES	250		YES	175		NO	150	
W1	1	salt	5	1 ts	iodised	NO	5	0.0	NO			NO	10	100.0	NO	6	20.0	YES			NO			NO	5	0.0
W2	3	water	120	1 small glass n.s.	still mineral water, plastic bottle	NO	180	50.0	NO			NO			NO			YES	120	0.0	NO	200	66.7	NO	180	50.0
W2	3	water	120	1 small glass n.s.	still mineral water, plastic bottle	YES	180	50.0	NO	160	33.3	NO	150	25.0	NO	100	-16.7	YES	120	0.0	NO	200	66.7	YES	180	50.0
SU	3	water	120	1 small glass n.s.	still mineral water, plastic bottle	NO	180	50.0	NO	160	33.3	NO	150	25.0	NO	100	-16.7	YES	160	33.3	NO	200	66.7	YES	180	50.0
T2	11	water	170	1 medium glass n.s.	still mineral water, plastic bottle	NO	200	17.6	NO			YES	180	5.9	YES	200	17.6	YES	160	-5.9	NO	250	47.1	NO	150	-11.8
T2	11	water	170	1 medium glass n.s.	still mineral water, plastic bottle	NO	275	61.8	NO	250	47.1	YES	180	5.9	YES	200	17.6	YES	160	-5.9	NO	250	47.1	NO	200	17.6
TH1	11	water	170	1 medium glass n.s.	still mineral water, plastic bottle	NO	275	61.8	YES	180	5.9	YES	180	5.9	YES	100	-41.2	YES	160	-5.9	NO	250	47.1			
F1	11	water	170	1 medium glass n.s.	still mineral water,	YES	180	5.9	YES	200	17.6	YES	180	5.9	YES	200	17.6	YES	160	-5.9	NO	250	47.1			

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

					glass bottle																					
SU	3	water	300	1 large glass n.s.	still mineral water, plastic bottle	NO	275	-8.3	NO	250	-16.7	NO	300	0.0	NO	300	0.0	YES	160	-46.7	NO	350	16.7	NO	200	-33.3
SU	3	water	300	1 large glass n.s.	still mineral water, plastic bottle	NO	500	66.7	NO			NO	300	0.0	NO	300	0.0	YES	160	-46.7	NO	350	16.7	NO	500	66.7
T1	3	water	300	1 large glass n.s.	carbon ated, plastic bottle	NO	350	16.7	NO			NO	300	0.0	NO	300	0.0	YES	160	-46.7	NO	250	-16.7	NO	500	66.7
F1	2	whipped cream	40	2 tbs full (40g)	whipping cream 20%, sweetened with sugar	NO	34	-15.0	NO	40	0.0	NO	20	-50.0	NO	40	0.0	YES	36	-10.0	NO	200	400.0			
SU	2	whipped cream	40	2 tbs full (40g)	whipping cream 20%, sweetened with sugar	NO	10	-75.0	NO	40	0.0	NO	20	-50.0	NO	30	-25.0	YES	40	0.0	NO	30	-25.0	NO	34	-15.0
W1	1	whisky	45	1 typical average portion	Jack Daniels whisky , 40 % alcohol	NO	20	-55.6	NO	50	11.1	NO	95	111.1	NO	50	11.1	YES	40	-11.1	NO	36	-20.0	NO	40	-11.1
SA	1	whisky	90	double portion	Jack Daniels whisky , 40 % alcohol	NO	80	-11.1	NO	100	11.1	NO	190	111.1	NO	100	11.1	YES	80	-11.1	NO	36	-60.0			

Appendix R. Food items reported through units: key quantity, quantity recorded by the tools, percentage deviation of the recorded quantities from the key quantity and use of pictures

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
SA	1	asparagus	3 units	3 whole units	roasted	NO	45		NO	150		NO	30.4		NO	60		NO	60		NO	45				
M1	5	beer	330	1 small can/ 330 ml	Heinek en, can, blond, 5.5% alcohol	NO	200	-39.4	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0	NO	330	0.0
T1	5	beer	330	1 small can/ 330 ml	Heinek en, can, blond, 5.5% alcohol	NO	200	-39.4	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0	NO	330	0.0
T1	5	beer	330	1 small can/ 330 ml	Heinek en, can, blond, 5.5% alcohol	NO	200	-39.4	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0	NO	330	0.0
T2	5	beer	330	1 small can/ 330 ml	Heinek en, can, blond, 5.5% alcohol	NO	200	-39.4	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0	NO	330	0.0
TH1	5	beer	330	1 small can/ 330 ml	Heinek en, can, blond, 5.5%	NO	200	-39.4	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0			

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					alcohol																					
M2	5	biscuits for toddlers	10	4 small light	rice biscuits	NO	20	100.0	YES	20	100.0	NO	28	180.0	NO	32	220.0	YES	16	60.0	NO	12	20.0	NO	20	100.0
M2	5	biscuits for toddlers	10	4 small light	rice biscuits	NO	20	100.0	YES	40	300.0	NO	28	180.0	NO	32	220.0	YES	16	60.0	NO	12	20.0	NO	20	100.0
	5	biscuits for toddlers	10	4 small light	rice biscuits	NO	12	20.0	YES	20	100.0	NO	180	1700.0	NO	24	140.0	YES	16	60.0	NO	12	20.0	NO	20	100.0
W2	5	biscuits for toddlers	10	4 small light	rice biscuits	NO	40	300.0	YES	20	100.0	NO	28	180.0	NO	32	220.0	YES	16	60.0	NO	12	20.0	NO	20	100.0
T1	5	biscuits for toddlers	10	4 small light	rice biscuits , fortified with vitamins and minerals	NO	12	20.0	YES	20	100.0	NO	2	-80.0	YES	32	220.0	YES	16	60.0	NO	12	20.0	NO	20	100.0
SU	1	brussels sprouts	7 units	7 units	steamed	NO	70		NO	140		NO	116.5		NO	150		NO	105		YES	120		NO	70	
SU	1	candies	50	1 small sack	chocolate coated, peanut, M&M's	NO	20	-60.0	NO	50	0.0	NO	125	150.0	NO	30	-40.0	YES	45	-10.0	NO	20	-60.0	NO	100	100.0

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
M1	1	cereal bar	32	1 filled cereal bar	sweet, wheat whole meal, apple filling, low fat, fortified with vitamins E, B1	NO	200	525.0	NO	30	-6.3	NO	25	-21.9	NO	23	-28.1	YES	21	-34.4	NO	10	-68.8	NO	40	25.0
W1	1	chewing gum	3	3 small pieces	sugar free	NO			NO			NO	15	400.0	NO	10.5	250.0	YES	3.9	30.0	NO	6	100.0	NO		
M1	1	chocolate bar	48.5	1 chocolate bar	milk chocolate, caramel filling	NO	50	3.1	NO	50	3.1	NO	45	-7.2	NO	50	3.1	YES	50	3.1	NO	30	-38.1	NO	60	23.3
M1	5	chocolate biscuit (filled)	30	2 pieces	Oreo type chocolate biscuit with white filling, normal size	NO	26	-13.3	NO	20	-33.3	NO	2	-93.3	NO	22	-26.7	YES	18	-40.0	NO	12	-60.0	NO	26	-13.3
SU	5	chocolate biscuit (filled)	30	2 pieces/ gr normal size	Oreo type chocolate biscuit with white	NO	26	-13.3	NO	20	-33.3	NO	40	33.3	NO	22	-26.7	YES	18	-40.0	NO	28	-6.7	NO		

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					filling																					
SU	5	chocolate biscuit (filled)	30	2 pieces/ gr normal size	Oreo type chocolate biscuit with white filling	NO	26	-13.3	NO	20	-33.3	NO	40	33.3	NO	22	-26.7	YES	18	-40.0	NO	28	-6.7	NO	26	-13.3
T2	5	chocolate biscuit (filled)	30	2 pieces/ gr normal size	Oreo type chocolate biscuit with white filling	NO	26	-13.3	NO	20	-33.3	NO	40	33.3	NO	22	-26.7	YES	18	-40.0	NO	28	-6.7	NO	26	-13.3
W2	5	chocolate biscuit (filled)	30	2 pieces/ gr normal size	Oreo type chocolate biscuit with white filling	NO	26	-13.3	NO	20	-33.3	NO	40	33.3	NO	22	-26.7	YES	18	-40.0	NO	28	-6.7	NO	26	-13.3
M1	5	cola light	330	1 can/ 330 ml	with caffeine, Pepsi Max	NO	500	51.5	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0	NO	300	-9.1
SA	5	cola light	330	1 can/ 330 ml	with caffeine, Pepsi Max	NO	370	12.1	NO	330	0.0	NO	330	0.0	NO	300	-9.1	YES	330	0.0	NO	330	0.0			

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
SA	5	cola light	330	1 can/330 ml	with caffeine, Pepsi Max	NO	270	-18.2	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0			
T2	5	cola light	330	1 can/330 ml	with caffeine, Pepsi Max	NO	350	6.1	NO	330	0.0	NO	330	0.0	NO	300	-9.1	YES	330	0.0	NO	330	0.0	NO	330	0.0
TH1	5	cola light	330	1 can/330 ml	with caffeine, Pepsi Max	NO	200	-39.4	NO	330	0.0	NO	330	0.0	NO	330	0.0	YES	330	0.0	NO	330	0.0			
W2	1	cold-smoked salmon	35	2 thin slices	sliced, in vacuum, in plastic	NO	60	71.4	YES	60	71.4	NO	150	328.6	YES	30	-14.3	YES	28.1	-19.7	NO	30	-14.3	NO	23	-34.3
T1	5	crackers	11	3 crackers	graham	NO	9	-18.2	NO	16	45.5	NO	24	118.2	NO	12	9.1	YES	18	63.6	NO	42	281.8	NO	3	-72.7
W1	5	crackers	11	3 crackers	graham	NO	9	-18.2	NO	15	36.4	NO	24	118.2	NO	12	9.1	YES	18	63.6	NO	42	281.8	NO	3	-72.7
W2	5	crackers	11	3 crackers	graham	NO	9	-18.2	NO	30	172.7	NO	24	118.2	NO	12	9.1	YES	18	63.6	NO	42	281.8	NO	3	-72.7
M2	5	crackers	11	3 crackers	graham	NO	9	-18.2	NO	30	172.7	NO	24	118.2	NO	12	9.1	YES	18	63.6	NO	42	281.8	NO	3	-72.7
M2	5	crackers	11	3 crackers	graham	NO	9	-18.2	NO	30	172.7	NO	24	118.2	NO	12	9.1	YES	18	63.6	NO	42	281.8	NO	3	-72.7
F1	1	dates	25	3	dried	NO	15	-40.0	NO	25	0.0	NO	77.4	209.6	NO	25	0.0	YES	30	20.0	NO	24	-4.0			

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
W1	1	egg	50	1 egg	hen egg, boiled	NO	50	0.0	NO	100	100.0	NO	58	16.0	NO	69	38.0	YES	60	20	NO	50	0.0	NO	50	0.0
SA	1	eggs	150	Made of 2 eggs	scrambled hen eggs, fried on butter	YES	115	-23.3	YES	220	46.7	NO	126.7	-15.5	NO	200.5	33.7	YES	190.5	27.0	YES	120	-20.0			
M1	3	fish oil capsules	2 capsules	2 capsules	n.s.	NO	2 capsules		NO	2 capsules		NO	2 capsules		NO	2		YES	0.375					NO	2 capsules	
TH1	3	fish oil capsules	2 capsules	2 capsules	n.s.	NO	2 capsules		NO	2 capsules		NO	2 capsules		NO	2		YES	1.5							
W2	3	fish oil capsules	2 capsules	2 capsules	n.s.	NO	2 capsules		NO	2 capsules		NO	2 capsules		NO	2		YES	1.5					NO	2 capsules	
W1	3	ham	22.5	2 thin slices	pork, boiled, packed in plastic pack	NO	36	60.0	NO	30	33.3	NO	20	-11.1	NO	40	77.8	YES	30	33.3	NO	10	-55.6	NO	20	-11.1
SU	3	ham	22.5	2 slice s/ gr	pork, without visible fat, cured, smoked	NO	36	60.0	NO	40	77.8	NO	40	77.8	NO	40	77.8	YES	40	77.8	NO	26	15.6	NO	20	-11.1
W2	3	ham	22.5	2 slice s/ gr	pork, without visible fat, cure	NO	30	33.3	NO	40	77.8	NO	40	77.8	NO	40	77.8	YES	40	77.8	NO	26	15.6	NO	20	-11.1

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					d, smoked																					
W1	1	luncheon meat	120	3 thick (1 cm) slices	pork, canned	NO	66	-45.0	NO	180	50.0	NO	48	-60.0	NO	60	-50.0	YES	75	-37.5	NO	60	-50.0	NO	100	-16.7
TH1	1	marshmallows	5 pieces	5 pieces	Haribo, pink and white	NO	5 pieces		NO	25		NO	10		NO	5		NO	12.5		NO	25				
SA	1	meat balls	7 small units	7 small	small	NO	21		NO	140		NO	252		NO	100		YES	150		NO	49				
M1	1	mixed nuts and dried fruits	50	1/2 sack	plastic sack	NO	100	100.0	NO	50	0.0	NO	50	0.0	NO	50	0.0	YES	50	0.0	NO	50	0.0	NO	50	0.0
F1	3	multi-vitamin tablet	1 tablet	1 tablet	n.s.	NO			NO	1 tablet		NO	1 tablet		NO	1		YES	1.375							
SU	3	multi-vitamin tablet	1 tablet	1 tablet	n.s.	NO	1 tablet		NO	1 tablet		NO	1 tablet		NO	1		YES	0.769					NO	1 tablet	
T2	3	multi-vitamin tablet	1 tablet	1 tablet	n.s.	NO	1 tablet		NO	1 tablet		NO	1 tablet		NO	1		YES	1.375					NO	1 tablet	
SA	1	olives	7 olives	7	green, pickled	NO	21		NO	28		NO	21		NO	28		NO	28		NO	35				
SA	1	peach	290	1 very large	peeled	NO	350	20.7	NO	125	-56.9	NO	270	-6.9	YES	300	3.4	YES	220	-24.1	NO					
M1	3	pizza with	360	3/4 of	with mushroom	NO			NO	375	4.2	NO	270	-25.0	NO	300	-16.7	YES	262.5	-27.1	NO	290	-19.4	NO	229	-36.4

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
		cheese and mushrooms		whole pre-baked	oms and cheese, frozen pre-baked, baked in oven, plastic film, carton box																					
SU	3	pizza with cheese and mushrooms	360	3/4 of whole pre-baked	with mushrooms and cheese, frozen pre-baked, baked in oven, plastic film, carton box	NO			NO			NO	270	-25.0	NO	300	-16.7	YES	262.5	-27.1	NO	350	-2.8	NO	229	-36.4
T2	3	pizza with cheese and mushrooms	360	3/4 of whole pre-baked	with mushrooms and cheese, frozen pre-baked, baked	NO	225	-37.5	NO	300	-16.7	NO	270	-25.0	NO	300	-16.7	YES	262.5	-27.1	NO	350	-2.8	NO	229	-36.4

https://onlinelibrary.wiley.com/doi/10.2983/efsa.2014.NL-697 by Cochrane, Wiley Online Library on [06/10/2024]. See the Terms and Conditions (https://onlinelibrary.wiley.com/terms-and-conditions) on Wiley Online Library for rules of use; OA articles are governed by the applicable Creative Commons License

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					in oven, plastic film, carton box																					
M2	1	potatoes	60	1 small potato	boiled	NO	57	-5.0	NO	50	-16.7	NO	70	16.7	NO	100	66.7	YES	100	66.7	YES	45	-25.0	NO	57	-5.0
SA	1	raw-salted salmon	30	2 slices	n.s.	NO	23	-23.3	NO	20	-33.3	NO	150	400.0	YES	30	0.0	YES	112.5	275.0	YES	100	233.3			
T1	1	Red Bull	250	1 can/250 ml	energy drink, with caffeine, fortified with vitamins	NO	200	-20.0	NO	250	0.0	NO	250	0.0	NO	250	0.0	YES	250	0.0	NO	250	0.0	NO	200	-20.0
TH1	1	sausages	120	3	Frankfurters, pan fried	NO	108	-10.0	NO	150	25.0	NO	75	-37.5	NO	137	14.2	YES	84	-30.0	NO	30	-75.0			
SA	1	shrimps	57	3 jumbo shrimps	grilled	NO	30	-47.4	NO	30	-47.4	NO	86.4	51.6	NO	40	-29.8	YES	150	163.2	NO	75	31.6			
SA	1	smoked small fish	40	10 tiny fish	n.s.	NO	168	320.0	NO	100		NO			NO	50	25.0	YES	165	312.5	YES	130	225.0			
W2	5	soft drink	500	walky cup	sugar sweetened,	NO	500	0.0	NO	400	-20.0	NO	300	-40.0	NO	600	20.0	YES	500	0.0	NO	250	-50.0	NO	500	0.0

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
				large	orange taste, Fanta																					
F1	5	soft drink	500	walk y cup large	sugar sweetened, orange taste, Fanta	NO	500	0.0	NO	250	-50.0	NO	300	-40.0	NO	600	20.0	YES	500	0.0	NO	250	-50.0			
M1	5	soft drink	500	walk y cup large	sugar sweetened, orange taste, Fanta	NO	400	-20.0	NO	440	-12.0	NO	300	-40.0	NO	600	20.0	YES	500	0.0	NO	250	-50.0	NO	500	0.0
SA	5	soft drink	500	walk y cup large	sugar sweetened, orange taste, Fanta	NO	500	0.0	NO	240	-52.0	NO			NO	600	20.0	YES	500	0.0	NO	300	-40.0			
SU	5	soft drink	500	walk y cup large	sugar sweetened, orange taste, Fanta	NO	500	0.0	NO	400	-20.0	NO	300	-40.0	NO	600	20.0	YES	500	0.0	NO	250	-50.0	NO	500	0.0
M1	1	sweetener	1 tablet	1 tablet	aspartame	NO	1 tablet, 5		NO	1		NO	1 g tablet		NO	2		YES	0.045				NO	2		
SA	1	vegetables	30	1 small portion	pickled , mixed	NO	60	100.0	NO	40	33.3	NO			YES	105	250.0	YES	50	66.7	NO	20	-33.3			
F1	3	vitamin B	1 tablet	1 tablet	B Complex, for	NO	1 tablet		NO	1 tablet		NO			NO	1		YES	0.361							

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
					adults, plastic box																					
M2	3	vitamin B	1 tablet	1 tablet	B Complex, for adults, plastic box	NO	1 tablet		NO			NO	1 tablet		NO	1		YES	0.361					NO	1 tablet	
W2	3	vitamin B	1 tablet	1 tablet	B Complex, for adults, plastic box	NO			NO	1 tablet		NO	1 tablet		NO	2		YES	0.361					NO	1 tablet	
M2	5	water	160	1 small plastic cup n.s.	carbonated, plastic bottle, lemon aroma	NO	350	118.8	NO	160	0.0	NO	150	-6.3	NO	100	-37.5	YES	60	-62.5	NO	200	25.0	NO	150	-6.3
M2	5	water	160	1 small plastic cup n.s.	carbonated, plastic bottle	NO	200	25.0	NO	160	0.0	NO	150	-6.3	NO	100	-37.5	YES	60	-62.5	NO	200	25.0	NO	150	-6.3
M2	5	water	160	1 small plastic cup n.s.	carbonated, plastic bottle	NO	200	25.0	NO	160	0.0	NO	150	-6.3	NO	100	-37.5	YES	60	-62.5	NO	200	25.0	NO	150	-6.3
M2	5	water	160	1 small plastic cup n.s.	carbonated, plastic bottle	NO	200	25.0	NO	160	0.0	NO	150	-6.3	NO	100	-37.5	YES	60	-62.5	NO	200	25.0	NO	250	56.3

EFSA supporting publication 2014:EN-607

DIETARY MONITORING TOOLS FOR RISK ASSESSMENT

EFSA						Tool 1 (24h recall)			Tool 2 (24h recall)			Tool 3 (24h recall)			Tool 4 (24h recall)			Tool 5 (Records)			Tool 6 (Records)			Tool 7 (Records)		
Day	No. of repetitions	Food item	Key Quantity	Quantity	Characteristics	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev	Use of Pictures	Quantity recorded	% dev
T2	5	water	160	1 small plastic cup	tap water	NO	275	71.9	NO	160	0.0	NO	150	-6.3	NO	175	9.4	YES	60	-62.5	NO	200	25.0	NO	200	25.0
M2	5	water	350	1 large plastic cup n.s.	carbonated, plastic bottle	NO	200	-42.9	NO	250	-28.6	NO	300	-14.3	NO	300	-14.3	YES	250	-28.6	NO	350	0.0	NO	150	-57.1
SA	5	water	350	1 large plastic cup n.s.	carbonated, plastic bottle, lemon aroma	NO	500	42.9	NO	250	-28.6	NO	295	-15.7	NO	250	-28.6	YES	250	-28.6	NO	250	-28.6			
SA	5	water	350	1 large plastic cup n.s.	carbonated, plastic bottle, lemon aroma	NO			NO	250	-28.6	NO	295	-15.7	NO	500	42.9	YES	250	-28.6	NO	250	-28.6			
T1	5	water	350	1 large plastic cup n.s.	still mineral water, plastic bottle	NO	400	14.3	NO	250	-28.6	NO	300	-14.3	NO	300	-14.3	YES	250	-28.6	NO	250	-28.6	NO	400	14.3
F1	5	water	350	1 large plastic cup	tap water	NO	375	7.1	NO	250	-28.6	NO	295	-15.7	NO	300	-14.3	YES	250	-28.6	NO	350	0.0			
SU	1	water	500	1 bottle, 5 dl	still mineral water, plastic bottle	NO	400	-20.0	NO	500	0.0	NO	500	0.0	NO	500	0.0	YES	500	0.0	NO	500	0.0	NO	400	-20.0

Appendix S. Observers' Forms Completed

1. Before the interview	
Date (dd/mm/yy): 27/01/2013	Country: Tool 1
The software is web based / The software is designed for local PC use? (please circle) YES NO	
1.1 In which national languages is the software available? The software is currently available in the national language and English. 1.2 Are the language settings configurable by the users OR a special administration is needed? The language settings are configurable by the users AND by the administrator.	TO THE INTERVIEWER 1.3 Which is your level of expertise in interviewing? I have received training on the EU Menu interview protocol and have tested data entry with the EU Menu questionnaires using the software used in the ring-trial 1.4 Which is your educational background? MSc, chemical engineering 1.5 Which are the most common interviewers' educational backgrounds? In the EU menu project, the most common educational background of the interviewers has been BSc in engineering. However, the software has been designed to be simple enough to be used by interviewers with different educational backgrounds.

Are there Standard Operating Procedures (SOPs) available? (please circle) YES NO	
Please provide us with a copy of SOPs or the manual.	
Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed? The steps of the interview can be built in by the users themselves depending on the interview protocol of the survey. For this project we are using the interview protocol of the EU menu survey that comprises of the following steps: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.	<i>e.g. A four-step method could include: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.</i>
What needs to be given special attention to during an interview? (i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool) -	
2. During the interview	
A. Specific part	
2.1 How is the recalled period ("day") defined? <i>Yesterday: morning to evening meal.</i> Wake-up time and time going to sleep were both asked 2.2 At which stage in the process of the interview? <i>Introduction</i> 2.3 Are there pre-defined eating occasions? <i>Yes, within the software.</i> The interviewer was also asking: "What was that meal?"	
2.4 Portion size estimation (Circle the one(s) used in the interviews observed): 3, 4, 5, 7, 8, 10	1. Weighing 2. Food models 3. Food pictures
2.5 Does the quantification method vary depending on the type of food? (please circle) YES NO	
2.6 Are other methods than the ones just observed, used? (to be asked)	

<i>Did not get an opportunity to check.</i> 2.7 If picture series are used indicate the number of pictures per item: <i>Between 2 and 6 per item.</i> 2.8 The pictures are integrated in the software (please circle) ☒ YES <i>(for some food items)</i> NO 2.9 There is a separate picture book (please circle) ☒ YES NO 2.10 Can the interviewee watch from a shared screen the portion size pictures? (please circle) ☒ YES <i>(see comments below)</i> NO N/A		☒ 4. Household measures ☒ 5. Standard (natural unit) ☐ 6. Standard portions ☒ 7. Known packaging size ☒ 8. Ruler ☐ 9. Sketches ☒ 10. Gram/Volume method ☐ 11. Other (specify)
Comments <i>Some pictures integrated into the software, a book used for others – unclear why this is. Interviewer shared screen with interviewee when asking for a portion size selection, but interviewee could not otherwise see the screen. Seemed as though portion photos for certain foods were built in to the software and became available once the food type selected. If none available the interviewer looked for a relevant section in the book. Participant scrolled through software pictures one at a time.</i> For some foods, it appeared as if only one picture was available. The interviewee does not see all portion sizes at once. He starts off with a specific picture and then proceeds to scroll through larger and smaller portions portion sizes until he stumbles upon the one best reflecting the quantity consumed. This approach could be both strength and weakness. It may be of interest to ask about the results of its validation.		
Water consumption At which stage is it asked in the process of the interview? How? Comments: <i>No specific question or section, but water consumption recorded throughout interview as relevant.</i>		
2.11 Are questions on the following matters asked during the interview?	☒ Special diet followed	☐ Engagement in activities while

☒ Forgotten food items ☒ Amount of food leftover ☐ Additional food served ☒ Salt ☐ Pepper ☐ Herbs ☒ Is the type of milk consumed asked? ☒ Is the type of fat spread consumed asked?	☒ Consumption of water and beverages during the meal(s) ☒ Consumption of water and beverages except of those during meal(s) ☒ Is adding sugar to tea or coffee asked?	☒ Reported day a special one? ☒ Time of eating occasion ☒ Place of consumption ☒ Place of food preparation ☒ Type of recipe (e.g. homemade, ready-to-eat etc.) ☒ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed) – <i>origin of food asked</i>	eating (e.g. watching TV, using the computer) ☐ Fellow diners ☒ Brand name of foods ☒ Cooking procedures ☒ Was a certain food fortified or not ☒ Was a certain food organic or not ☒ Dietary supplements consumption ☐ Supplement brand name ☐ Supplement active compound ☒ Height ☒ Weight ☒ Age ☒ Sex
Comments - Interviewer also asked about pregnancy/lactation - Amount of active compound in supplement not asked? Asked how many of supplement taken, but not dose. - Commonly forgotten items list used at the end of the interview (e.g. alcoholic drinks, snacks etc.) - Along with "Was anything else consumed?" - Fat content of milk/spread/cream etc asked – unclear whether most interviewees would know this? - Origin of food and packaging asked for each item – interviewer followed prompts on screen Addition of oil and sugar during meal and how much oil was used to prepare some food? Kind and fat content of milk/spread/cream, butter etc asked – unclear whether most interviewees would know		When salt was specifically reported by the interviewee, it appeared as if the interviewer did not quantify it. "Did you eat the peel of the pumpkin?", "The skin of the fish?" Other flavorings in a salad besides sauces "Was it fresh?" Shape of packaging asked "What color was the coffee after you poured the milk in?" Did the puffed rice "biscuits" had any coating on top? Carbonated water was captured by the	

this?

- **Origin of food and packaging asked for each item – interviewer followed prompts on screen**
- **Portion size confirmed in two steps, pictures used also to confirm type of a food**
- **Organic, fortified, self grown**
- Capacity of glasses in mL can be seen in pictures of glasses.
- In some cases, pictures of similar foods were used to determine the portion size.
- "How did you prepare your fruit to eat them (e.g. did you wash them)?"
- "Did you eat the seeds?"
- "Prepared with oil or not" (type not asked)
- "Type of meat in sausages? (frankfurters)"
- "Did you make/prepare it yourself?" for many foods
 - Also for sausage
- "Do you know the alcohol content of the drink (e.g. a beer)?"
- "Well-done or not?" (meat)
- Question on whether the bottle of wine had a cork.
- Question on whether the milk had added probiotics.

tool.

- When the interviewee responded with "It was conserved somehow" no further probing followed.
- Two separate files seem to be in use, parallel to the software leading the interview:
 - a free writing file, where the crude list of items consumed was entered
 - a datasheet where the interviewer entered the details of each food item
- Orange juice: room temperature or taken from the refrigerator?
- Potatoes:
 - Prepared in oil?
 - Well baked?
- Coffee
 - Canteen/Coffee machine/Self prepared
- Sugar
 - Quantified with spoon
 - Was the spoon full?
- Water
 - Was it boiled beforehand?
 - Was it filtered?
 - Did it have a flavor?
- Water and beverages consumption was assessed using multiple pictures of glasses (gradually appearing as fuller).

2.12 Duration of the interview

It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool

The interviews were around 50-70 minutes.

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

- *Interview conducted in English, with forgotten food items, and some interviewee's responses in the local language*
- *Probing questions generally software-led (therefore very structured) – **always** questions on organic, origin, packaging – question whether all are necessary in all situations?*
- *Picture portions could be doubled or halved accordingly (for integrated pictures – unsure if the software did this for booklet pictures or whether it was calculated by the interviewer)*
- *Used google to check portion sizes and brands etc*
- *Additional probing questions, such as fat content, salt addition, only seemed to be asked occasionally – presumably the software only showed these where deemed relevant?*
- *Some questions seemed unnecessary for the task, e.g. was the wine chilled? Unclear whether the software insisted on these being asked, or whether it was possible for the interviewer to be more selective*
- *Interviewee asked about any additional comments or remarks about the dietary recall period*
- *Checked whether salt was iodized*
- *Unclear whether the interviewee improvised at all and gave additional answers to the extra probing questions that may not have been anticipated before the exercise.*
- **In the beginning of every eating occasion interviewer asked about type of the meal it can be described**
- **Questions on forgotten food items**
- **Interviewer asked question about where the food was prepared e.g. work canteen- was it local or centralized**
- **Interviewee asked about any additional comments or remarks about the dietary recall period**
- **Recording about artificial sweeteners**
- **Observation was somewhat problematic due to the large distance from the interviewer's computer screen**
- **There seemed to be 2 picture books: one in paper and one in the PC.**
- **It is of interest to find out how the software captured the following replies:**
 - "I do not measure milk in coffee"
 - "My cream was quite a rich "
 - -"Where your biscuits the butter type?"
 - -"No, they were just normal"
 - -(no further probing)
- **The tool conducts long and comprehensive interviews: it would be of interest to investigate the added value of this.**
- **The crude and detailed listing of foods consumed is done on a per meal basis. All foods' names within a meal are reported at first, and then each food is quantified, specified etc. Then the interviewer asks "When was your next meal/the next time you had something to eat and what did it include?"**
- **Nice phrasing of questions.**
 - **On the list of forgotten foods: "It is very natural for people to forget some foods eaten within the day. Just in case, I'm going to go through a list of such items..."**

- **On portion size determination: "I have brought with me some pictures. They will help you"**
- **Open ended questions seem to complement closed questions:**
 - "How would you describe your steak?"
 - "Did you add anything to your coffee?"
 - "Was your milk prepared in any way?"
 - "Can you describe the juice to me?"
 - "Tell me a little bit more about them"
- **The interviewer listened to a recipe's ingredients by the interviewee and wrote them down. However this seems to be in contrast to the country's response below ("The software does not handle the recipes/composite foods")**
 - **Subsequently, each ingredient was described in detail.**
- **It is of interest that the tool is claimed to be adjustable to the survey's objectives.**
- **It is also very much of interest how does the tool actually utilize this amount of detail (e.g. association with food composition data)**

3. After the interview

3.1 Description of the Food Composition Database used National food composition database version 4, May 2012. 3.2 Is it "integrated" in the software? (please circle) ☒ YES ☐ NO 3.3 Food Classification System used: e.g. LanguaL - FoodEx - FoodEx2 - EFG - combination Other (Please specify) The facets from the FoodEx2 food classification system are used for describing foods. The food list may be classified according to different food classification systems.	3.4 Does the software handle recipes/composite foods and if so, how? The software does not handle the recipes/composite foods. 3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) (Please indicate) The dietary data is expressed in the output as cooked foods and the recipe ingredients are expressed as consumed.
3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle) ☒ YES ☐ NO <i>When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A sequence of windows corresponding to questions to be asked on different characteristics of foods, called 'facets' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of 'descriptors' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet</i>	3.7 Does the software include features for expanding the existing databases by adding: (please circle) Food items YES ☐ NO Recipes YES ☐ NO Food composition values YES ☐ NO Dietary supplements YES ☐ NO Portion sizes YES ☐ NO Pictures/photos YES ☐ NO

	Other
3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.) The possible data export format is .csv.	
3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food? The software allows intake data to be exported in electronic format.	
3.10 Does the interviewer have access to the outputs derived from the 24-hour recall? Which ones? (circle) Foods, Energy, Macro-nutrients, Micro-nutrients Other (please specify) Background information, food descriptors. How soon? The interviewer has access to the outputs derived from the 24h recall instantly after the data entry interview is finished. Is it possible for the interviewer to identify an under-reporter? (please circle) ☒ YES ☐ NO	
3.11 Which outputs /reports are available on screen and which in printed format? Respondent's background information, dietary data, intake data and food descriptors can be exported to be viewed on screen or in printed format.	
3.12 How much time is needed for the output to be produced? The outputs are produced instantly.	
3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle) ☒ YES ☐ NO	
3.14 Is there a critical aspect/characteristic of the tool that was not mentioned? Any other comments? - The software enables to create dietary survey questionnaires from the beginning or based on a template. If the option of a survey template is used, the software enables to change the settings and add translations to the questionnaires. For the ring testing we are using a 24 recall questionnaire that is based on the EU Menu questionnaire template and we have enhanced it with English translations of the questions and answers. - The software has a functionality that allows inserting data in one language (for example the national one)	

and exporting the data in the national language and in English, given that the necessary translations have been added into the system at the moment of creating the questionnaire.

- The software enables to automatically send feedback to each participant on their dietary status based on the reporting in the survey alongside with individual recommendations for diet improvements. This is used to raise response levels in the survey and motivate respondents to give more honest answers about their diet.

3.15 Interviewee's comments (asked the following day)

Very comprehensive, everything was there. The data recorded are adequate for risk assessment purposes and nutrition was also there.

Observing the pictures one by one and then choosing one was not so helpful.

The interviewee said that some of the pictures were not available before the trial and she saw them for the first time during the trial, but the interviewee is going to "clean" the data for these pictures so as to remove any possible source of bias.

1. Before the interview		
Date (25/01/13): / /	Country: Tool 2	
The software is web based / The software is designed for local PC use? (please circle) YES NO		BOTH
1.3 In which national languages is the software available? national language 1.4 Are the language settings configurable by the users OR a special administration is needed? No		TO THE INTERVIEWER 1.6 Which is your level of expertise in interviewing? Experienced from 2008. 1.7 Which is your educational background? Medical doctor 1.8 Which are the most common interviewers' educational backgrounds? Dietitians, Doctors, Nurses
Are there Standard Operating Procedures (SOPs) available? (please circle) YES Please provide us with a copy of SOPs or the manual.		
Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed?		1. Participants are asked about personal data; 2. participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h; 3. queries for the time and occasion at which the foods were consumed; 4. more detailed questions to gather descriptions and amounts of foods consumed; 5. last opportunity to elicit forgotten foods.
What needs to be given special attention to during an interview? (i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool)		

2. During the interview	
A. Specific part	
2.1 How is the recalled period ("day") defined? <i>Interviewer appears to enter the date, but unclear whether any further definition included.</i> From morning till evening meal. 2.2 At which stage in the process of the interview? <i>At the start of the interview.</i> 2.3 Are there pre-defined eating occasions? <i>Food items appeared to be entered in eating occasions, such as breakfast.</i>	
2.4 Portion size estimation (Circle the one(s) used in the interviews observed): 2.5 Does the quantification method vary depending on the type of food? (please circle) ☒ YES NO 2.6 Are other methods than the ones just observed, used? (to be asked) <i>Did not get an opportunity to check.</i> 2.7 If picture series are used indicate the number of pictures per item: <i>Varies, but typically 3 to 4 pictures per item.</i> 2.8 The pictures are integrated in the software (please circle) ☒ YES NO 2.9 There is a separate picture book (please circle) YES ☒ NO 2.10 Can the interviewee watch from a shared screen the portion size pictures? (please circle) ☒ YES NO N/A	1. Weighing 2. Food models ☒ 3. Food pictures 4. Household measures ☒ 5. Standard (natural unit) 6. Standard portions ☒ 7. Known packaging size 8. Ruler 9. Sketches ☒ 10. Gram/Volume method 11. Other (specify) *Pictures of household measures *Pictures of glasses filled with liquid
Comments <i>Photos in separate browser window that can be searched.</i> <i>All foods appear to be entered as weight in grams – each picture had corresponding weight underneath.</i> Interviewer chooses food from the list of foods in separate browser window and picture from the portion size album. The interviewer was not so strict on fully turning the screen towards the interviewee. In some cases, the interviewee saw the pictures from the side. Could that have an impact? Was it according to the protocol? Has it been validated?	

Water consumption

At which stage is it asked in the process of the interview? How?

Comments: *Did not appear to be specifically asked, but water intake given throughout day by interviewee.*

2.11 Are questions on the following matters asked during the interview?		Special diet followed	
☐ Forgotten food items ☒ Amount of food leftover ☐ Additional food served ☒ Salt ☐ Pepper ☐ Herbs ☒ Is the type of milk consumed asked? ☒ Is the type of fat spread consumed asked?	☒ Consumption of water and beverages during the meal(s) ☐ Consumption of water and beverages except of those during meal(s) ☒ Is adding sugar to tea or coffee asked?	☒ Reported day a special one? ☒ Time of eating occasion ☒ Place of consumption ☒ Place of food preparation ☒ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)	☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☐ Fellow diners ☒ Brand name of foods ☒ Cooking procedures ☐ Was a certain food fortified or not ☐ Was a certain food organic or not ☒ Dietary supplements consumption ☐ Supplement brand name ☐ Supplement active compound ☒ Height ☒ Weight ☒ Age ☒ Sex

Comments

- *Sugar & milk in tea/coffee not consistently asked by interviewer*
- *Each meal summarized by interviewer as a prompt for forgotten items, but no forgotten food list used*
- *Leftovers only asked on one occasion → inedible parts*
- *Asked about any illness on the day of recall*
- *Asked about low fat milk/spreads, but options for interviewer to select appeared limited*
- **When the interviewee reported a Mars bar, the software did not appear able to record it as in other cases of brand names.**
- **When all foods consumed have been reported and quantified the list was read out to the interviewee.**

2.12 Duration of the interview

It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool

*The interviews appeared to be quite varied in duration but were typically 35-50 minutes long, **ca 20 food items per interview.***

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

- *The interviewer did not appear to be experienced in conducting interviews, and as a result probing questions were asked inconsistently*
- *The software was a reduced version to enable a simple web-based tool that could be used on an iPad – however, there were limited software prompts which gave greater reliance on the interviewer*
- *There also appeared to be limited options and choices in the portion photos in some instances, or no relevant options at all for some foods.*
 - **e.g. when a Big Mac was reported, the interviewee could not indicate the amount in grams, so the interviewer appeared to "arbitrarily" choose amounts in grams.**
- *As all portions were entered as grams, there was potential room for error here as often the nearest match was selected.*
- *Appeared to be a comments box, which could be used to enter brand names or other relevant information*
- *Once an entry had been completed, the entry form did not seem to 'reset', so the interviewer had to overwrite the previous information, or delete the comments if not relevant*
- *Pictures also used to clarify food type? Appeared to be 3 options for biscuits, chocolate, plain and with jam/fruit filling, so not only used for portion size?*
- **Unclear how facets and recipes included and handled**
 - **Composite dishes appear to be created from available foods in the application. e.g. when the Big Mac was reported, it was recorded ingredient-by-ingredient**
- **Portion size album also used to clarify food type? Appeared to be 3 options for biscuits,**

- **chocolate, plain and with jam/fruit filling, so not only used for portion size?**
- **For each consumed food item the common food name (brand name) is entered**
- **The food amount selection based on pictures (selection of the picture series) takes a plenty of time**
- The interviewer made an introduction (to the scope and content of the interview?).
- There were instances when the interviewer appeared to explain things - it is of interest to learn what was said.
- At times the interviewee appeared to be unable to reply and asked Sofia Ioannidou for clarifications.
- How does the software handle foods reported but not included in the tool's food list?
- Each food appears to be quantified and fully described right after it is reported for the first time (no crude list for instance)

3. After the interview

3.1 Description of the Food Composition Database used Bundeslebensmittelschlüssel Max Rubner Institut 3.2 Is it "integrated" in the software? (please circle) YES 3.3 Food Classification System used: FoodEx, integration of FoodEx2 in progress	3.4 Does the software handle recipes/composite foods and if so, how? Yes 3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) (Please indicate) Raw foods and detailed recipe ingredients.														
3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle) YES <i>Interviewer can add new foods which are corrected by specialist and included in the list afterwards</i>	3.7 Does the software include features for expanding the existing databases by adding: (please circle) <table> <tr> <td>Food items</td> <td>YES</td> </tr> <tr> <td>Recipes</td> <td>YES</td> </tr> <tr> <td>Food composition values</td> <td>YES</td> </tr> <tr> <td>Dietary supplements</td> <td>NO</td> </tr> <tr> <td>Portion sizes</td> <td>NO</td> </tr> <tr> <td>Pictures/photos</td> <td>NO</td> </tr> <tr> <td>Other</td> <td></td> </tr> </table>	Food items	YES	Recipes	YES	Food composition values	YES	Dietary supplements	NO	Portion sizes	NO	Pictures/photos	NO	Other	
Food items	YES														
Recipes	YES														
Food composition values	YES														
Dietary supplements	NO														
Portion sizes	NO														
Pictures/photos	NO														
Other															

3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.) Xls csv
3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food? Yes
3.10 Does the interviewer have access to the outputs derived from the 24-hour recall? Which ones? (circle) No How soon? Is it possible for the interviewer to identify an under-reporter? (please circle) NO
3.11 Which outputs /reports are available on screen and which in printed format?
3.12 How much time is needed for the output to be produced? Few hours for 2000 respondents. It depends from amount of data.
3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle) Theoretically YES, because output formats are xls and csv which can be imported in SPSS
3.14 Is there a critical aspect/characteristic of the tool that was not mentioned? Any other comments?
3.15 Interviewee's comments

1. Before the interview		
Date (dd/mm/yy): 21 /01 /2013	Country: Tool 3	
The software is web based NO The software is designed for local PC use? YES		
1.5 In which national languages is the software available? Bulgarian Deutsche Dutch English Finnish French Greek Hungarian Polish Portuguese 1.6 Are the language settings configurable by the users OR a special administration is needed? Special administration needed		TO THE INTERVIEWER 1.9 Which is your level of expertise in interviewing? Beginner 1.10 Which is your educational background? Nutrition Sciences 1.11 Which are the most common interviewers' educational backgrounds? Nutrition Scienc
Are there Standard Operating Procedures (SOPs) available? (please circle) YES NO Please provide us with a copy of SOPs or the manual.		
Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed? 5 steps: 1) General information 2) Quick list of food and beverages consumed the day before (divided by meals and time and place of consumption) 3) Describing and quantifying the items 4) Global controls (questions about forgotten items and others) 5) Dietary supplements		<i>e.g. A four-step method could include: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.</i>

What needs to be given special attention to during an interview?
(i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool)

- How to deal with recipes (choose a pre-existent one, modify one or create a new one)
- Be aware of the different quantification methods
- Have a profound knowledge the food and the recipe list
- The participant's code cannot be change
- The physical state chosen will define the quantification method

2. During the interview

A. Specific part

2.1 How is the recalled period ("day") defined?

Interviewee is asked to give times at the start of the interview – time awake and time to bed.

From morning till evening meal, with the time and place recorded.

2.2 At which stage in the process of the interview?

This information was collected at the start of the interview, during the introduction.

From the beginning of the interview.

2.3 Are there pre-defined eating occasions?

Yes, the software & interviewer collate the intake information by eating occasion.

2.4 Portion size estimation (Circle the one(s) used in the interviews observed):

1. Weighing

2. Food models

3. Food pictures

4. Household measures

5. Standard (natural unit)

6. Standard portions

7. Known packaging size

8. Ruler – bread thickness etc.

9. Sketches – bread shapes

10. Gram/Volume

2.5 Does the quantification method vary depending on the type of food? (please circle)

YES

NO

2.6 Are other methods than the ones just observed, used? (to be asked)

Did not get an opportunity to check.

2.7 If picture series are used indicate the number of pictures per item:

Varies, but typically 4 to 6 pictures per item.

2.8 The pictures are integrated in the software (please circle)

YES

NO

2.9 There is a separate picture book (please circle)

YES

NO

2.10 Can the interviewee watch from a shared screen the portion size pictures? (please circle) YES NO N/A		method 11. Other (specify) – photos of cups, plates, bowls etc with fill lines
Comments <i>Pictures included thickness of spread on bread.</i> Bread was quantified with the aid of a ruler and shapes. It is possible to enter e.g. 1/3 of a certain picture.		
Water consumption At which stage is it asked in the process of the interview? How? Comments: <i>Did not appear to be specifically asked, but throughout the interview it was recorded at each occasion if relevant, with portion information and whether mineral, still, sparkling etc.</i>		
2.11 Are questions on the following matters asked during the interview?		☒ Special diet followed ☐ Reported day a special one? ☒ Time of eating occasion ☒ Place of consumption ☒ Place of food preparation ☒ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)
☐ Forgotten food items ☒ Amount of food leftover ☐ Additional food served ☒ Salt ☐ Pepper ☐ Herbs ☒ Is the type of milk consumed asked? ☒ Is the type of fat spread consumed asked?	☒ Consumption of water and beverages during the meal(s) ☒ Consumption of water and beverages except of those during meal(s) ☒ Is adding sugar to tea or coffee asked?	☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☐ Fellow diners ☒ Brand name of foods Brand name seems to be asked every time. ☒ Cooking procedures ☒ Was a certain food fortified or not ☐ Was a certain food organic or not ☒ Dietary

		supplements consumption
		☐
		Supplement brand name
		☐
		Supplement active compound
	☒ Height	☒
	Weight ☒ Age	☒
	☒ Sex	

Comments

- Type of sugar appeared to be asked (e.g. white/brown), and sugar/milk asked for each hot drink
- Clarification and checking of portion sizes appeared to be thorough with different options in the photobook pointed out as suggestions for the interviewee to select/confirm
- Interview conducted as an initial run through of all intake and then each eating occasion/item was completed in more detail, adding portions, brands etc.

Additional question about added oil, vinegar, mayonnaise on salads

Additional question about type of sodas-i.e. w/o sugar

Additional questions about creamer added to food (brand, amount)

Question about type of a milk- i.e. w/o lactose

Questions about size of an egg

Question about food packaging

- Supplement intake is asked for the first time after the crude list of reported food items.
- Questions on all relevant facets popped up per recipe ingredient.
- Percentage contribution of each recipe ingredient appears on screen.
- Water intake was assessed per meal.

2.12 Duration of the interview

It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool

The interviews appeared to be quite varied in duration but were typically 40-50 minutes long.

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

- *Recipes entered to generate composite dishes, with question on method of preparation*
- *Food specific questions associated with food choice – series of pop-up boxes built into the software to prompt the interviewer to ask appropriate questions – including some facets/descriptors?*
- *Portion size pictures used to help clarify portion sizes given by interviewee, and where the photos offer the most accurate way of determining portion size (e.g. beer, cola = standard package sizes, water = photos of glasses)*
- *Interviewer appeared to select items from food list – unclear whether decisions made during the interview could then be reviewed and changed later?*
- *Observers had quite different opinions about the interviews, which seemed to be related to the time of day that the interview was observed. The first few interviews were conducted thoroughly, but for some of the later ones it seems that not all of the questions were asked, as the interviewer had realized that the interviewee did not have information to answer all questions.*
- **Interviewer conducted initial run through of all intake and then each eating occasion/item was completed in more detail, adding portions, brands, preparation etc.**
- **New food items entered into the database during the interview. The details about the new (?) items checked on internet (Google, Wikipedia)**
- **Synchronized conversion factors between different units**
- **The interviewee often responded "I don't know"**
- **Question on the interviewee's health condition (i.e. presence of any disease) was asked at the beginning.**

3. After the interview																													
3.1 Description of the Food Composition Database used Unknown 3.2 Is it "integrated" in the software? (please circle) YES ☐ NO ☒ 3.3 Food Classification System used: e.g. LanguaL - FoodEx - FoodEx2 - EFG - combination Other (Please specify) Unknown	3.4 Does the software handle recipes/composite foods and if so, how? Yes. The software as pre-introduced recipes and recipes can be changed or added during the interview. 3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) (Please indicate) Dietary data output is not a significant component of this software, only very basic information present. This information intends only to detect over and under reports.																												
3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle) YES ☐ NO ☒ <i>When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A sequence of windows corresponding to questions to be asked on different characteristics of foods, called 'facets' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of 'descriptors' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet</i>	3.7 Does the software include features for expanding the existing databases by adding: (please circle) <table border="0"> <tr> <td>Food items</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Recipes</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Food composition values</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Dietary supplements</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Portion sizes</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Pictures/photos</td> <td>YES</td> </tr> <tr> <td>NO</td> <td></td> </tr> <tr> <td>Other</td> <td></td> </tr> <tr> <td colspan="2">But changing features is depends on the administrator.</td> </tr> </table>	Food items	YES	NO		Recipes	YES	NO		Food composition values	YES	NO		Dietary supplements	YES	NO		Portion sizes	YES	NO		Pictures/photos	YES	NO		Other		But changing features is depends on the administrator.	
Food items	YES																												
NO																													
Recipes	YES																												
NO																													
Food composition values	YES																												
NO																													
Dietary supplements	YES																												
NO																													
Portion sizes	YES																												
NO																													
Pictures/photos	YES																												
NO																													
Other																													
But changing features is depends on the administrator.																													
3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.) Cvs																													
3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food? No																													

3.10 Does the interviewer have access to the outputs derived from the 24-hour recall?

Which ones? (circle)

☒ **Foods**, Food groups, Raw Agricultural Commodities, ☒ **Energy**, ☒ **Macro-nutrients**, Micro-nutrients,
Other (please specify)

Energy and macro-nutrients are just general approximated values, used only to detect over and under reporting.

How soon?

The general output can be produced in the end of the interview

Is it possible for the interviewer to identify an under-reporter? (please circle)

☒ **YES** ☐ **NO**

3.11 Which outputs /reports are available on screen and which in printed format?

Food items consumed, place and occasion of consumption are available on screen.

3.12 How much time is needed for the output to be produced?

seconds

3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle)

☐ **YES** ☒ **NO**

3.14 Is there a critical aspect/characteristic of the tool that was not mentioned?

Any other comments?

This tool is directed to collect information about food contaminants, rather than nutritional information.

3.15 Interviewee's comments

1. Before the interview		
1. Before the interview		
Date: 24/01/2013	Country: Tool 4	
The software is web based / The software is designed for local PC use? (please circle) YES, the software is designed for local PC use NO		
1.7 In which national languages is the software available? The software is available in the national language. 1.8 Are the language settings configurable by the users OR a special administration is needed? Currently the software interface is only available in the national language, but we think that the designer of the software could configure it in English. However, food database has been translated into English and the user has the chance of translate it into any other language. Although the recipes database has not been translated into English yet the user has the chance of translated it into English or any other language.		TO THE INTERVIEWER 1.12 Which is your level of expertise in interviewing? Medium, I have participated in several studies where I have applied different methods to estimate the dietary intake in different groups. 1.13 Which is your educational background? PhD in Pharmacy Degree in Pharmacy 1.14 Which are the most common interviewers' educational backgrounds? Degree in Nutrition and Dietetics, Food Science, Pharmacy, and other Health Sciences.
Are there Standard Operating Procedures (SOPs) available? (please circle) Please provide us with a copy of SOPs or the manual.		YES NO

Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed? A three-step method: (a) participant inform about foods and beverages consumed in each meal the previous 24 h (crude list) (b) questions about time, amounts, cooking methods, dietary supplements, fortified foods, food brands???, forgotten foods between meals.... (c) Review and inclusion of forgotten items	<i>e.g. A four-step method could include: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.</i>
What needs to be given special attention to during an interview? (i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool) -In the data capture window, as you are introducing foods or recipes, it will appear a crude calculation of the energy and nutrients from the diet. This observation window allows the interviewer to check if there is an error in data entry (for example, it was introduced 150 of a dish of chicken and rice instead 150 g....) -You can specify which day of the week is (Monday, Sunday....) -You can specify the order in which foods are consumed within each meal if necessary (which food(s) is/are taken first, which second) -If the participant ate an specific dish (with a recipe), you can choose between introduce the consumed amount in grams (edible) or the number of portions/servings. -For each participant you have a window with a field in which you can enter any comments or clarification considered necessary (free text) -Foods are introduced as whole food, but if the participant indicates the amount (g) of edible portion consumed, there is an option to calculate the full amount for whole food at the time.- You have a calculator -You can create and store new recipes of dishes if the participant describes it if necessary.	

2. During the interview

A. Specific part

2.1 How is the recalled period ("day") defined?

According to some observers this is unclear, it may have been at defined at the start of the interview.

Other observers claim that the recalled period was not defined.

2.2 At which stage in the process of the interview?

2.3 Are there pre-defined eating occasions?

Interviewer made a free-text quick list of all foods eaten at the start of the interview, which appeared to be grouped into rough eating occasions. Unclear whether the software grouped these when each items was entered in more detail.

2.4 Portion size estimation (Circle the one(s) used in the interviews observed):

2.5 Does the quantification method vary depending on the type of food? (please circle)

☒ YES

NO

2.6 Are other methods than the ones just observed, used? (to be asked)

Did not get an opportunity to check.

2.7 If picture series are used indicate the number of pictures per item:

Typically 3 pictures per set.

2.8 The pictures are integrated in the software (please circle)

YES

☒ NO

2.9 There is a separate picture book (please circle)

☒ YES

NO

2.10 Can the interviewee watch from a shared screen the portion size pictures? (please circle)

YES

NO

☒ N/A

1. Weighing

☒ 2. Food models – selection of glasses, bowls, spoons etc

☐ 3. Food pictures

☐ 4. Household measures

☐ 5. Standard (natural unit)

☐ 6. Standard portions

☐ 7. Known packaging size

8. Ruler

9. Sketches

☒ 10. Gram/Volume method

11. Other (specify)

At some point the interviewer asked how many centimeters was a given food

and the
interviewee
responded
accordingly.

Comments

*Selection of models used, e.g. plates, bowls, glasses, spoons. (it is unknown whether these tools are used in every interview conducted with the software -the important thing is that they **can** be used)*
Foods read back to interviewee at the end of each eating occasion.

Questions about composite dishes –on ingredients

Question on additional foods and drinks

At the beginning of the interview the interviewer introduced the examinee with the portion size examples (spoons, plates, glasses...) and with the picture book

Standard portions also seemed to be used: For instance the interviewee reported a portion of French fries and the interviewer asked no further questions -instead seemed to enter a standard portion.

Info on type of bread collected (e.g. whole-wheat bread)

Water consumption

At which stage is it asked in the process of the interview? How?

Comments: *Water consumption discussed throughout the interview, particularly asked at each eating occasion.*

2.11 Are questions on the following matters asked during the interview?

☒ Forgotten food items ☒ Amount of food leftover ☒ Additional food served ☒ Salt ☐ Pepper ☐ Herbs ☒ Is the type of milk consumed asked? ☒ Is the type of fat spread consumed asked?	☒ Consumption of water and beverages during the meal(s) ☒ Consumption of water and beverages except of those during meal(s) ☒ Is adding sugar to tea or coffee asked?	☒ Special diet followed ☒ Reported day a special one? ☒ Time of eating occasion ☒ Place of consumption ☒ Place of food preparation ☐ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)	☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☒ Fellow diners ☒ Brand name of foods ☒ Cooking procedures ☐ Was a certain food fortified or not ☐ Was a certain food organic or not ☒ Dietary supplements consumption ☐ Supplement
--	---	--	---

		brand name ☒ Supplement active compound ☒Height ☒ ☒Weight ☒Age ☒Sex
Comments • <i>Free-text list created at start of interview for whole recall period – foods entered in detail in another section of the software, but possible for interviewer to go back to the free-text list to check details, add or amend information</i> • <i>Asked about saccharine (i.e. sugar substitutes)</i> • When coffee was reported, the interviewer asked the interviewee to describe in detail every ingredient and its quantity: coffee, water, sugar, milk. • Probing questions on milk fortification • <i>Physical activity, occupation, ethnicity asked</i> • <i>Lots of interviewer probing questions, e.g. type of chocolate, what type of pizza etc.</i> • Questions about place of dining-home/out • Question about time of the meal? • Was it a typical day? • What part of the week? • Profession- Anthropometry • Food consumption habits • Questions on anthropometry and PA, type of day, part of the week, profession were asked on the beginning of the interview • <i>Calculating the portion size based on picture book (if the portion size is between two pictures or 3/4 of a picture)</i> • <i>Possible to insert new supplements into database during the interview</i> • Recipe ingredients recorded but cooking method not • Supplement intake was asked in the beginning alongside the crude list and again (in more detail) at the end of the interview. • Water intake was asked alongside the supplement intake • At times, the quantity in grams was asked by the interviewer (e.g. in chocolate) • There seems to be a specific procedure used when foods not existing in the food list were reported. The interviewer seemed to be able to create a new food item and enter the details reported by the interviewee.		
2.12 Duration of the interview <i>It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool</i> <i>The interviews were around 50-55 minutes.</i> 45min		

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

- *Probing questions not in the software, had to be interviewer led. Very detailed and thorough in general, but some questions may have slipped as day went on and interviewer tired.*
- *Variety of ways to help ascertain portion sizes, including models of glasses, bowls etc (with different fill lines), plus a portion size book, and ability to enter things as household measures, standard portions etc.*
- *Initial question about interviewee's standard plate size*
- *Interviewer seemed able to edit recipes in the software to create new ones if existing not appropriate*
- *Seemed to be some calculations as the interview was happening – an inbuilt calculator in the software. Unclear whether this was to calculate uneaten food, or to adjust recipes/portion sizes.*
- *Ability to enter some notes on the free-text page used for the initial recall*
- *Software seems to have some in-built validations and checks*
- *Supplements checked at start and end of the day early on in the interview (presumably as most likely to take them at these time points)*
- *Need to establish what the 'lock' symbol means – protected fields?*
- **At the beginning, interviewer introduced herself, explained the process and showed the household measures available for quantification purposes.**

- Not sure whether the software includes controls of data consistency.
- It could be that the software is more of a tool used for entering interview data than a tool designed to lead a standardized interview.
- Crude list written down at the beginning
- The software seems to be able to immediately provide all levels of output that are of interest to EFSA (food level information, nutrient level information) and no additional output is foreseen.
- When all breakfast items have been reported, the interviewer seemed to be going through them before proceeding to the next meal.
- When all foods consumed have been reported and quantified:
 - the list was read out to the interviewee
 - the place of consumption for each meal was inquired
 - eating alone or with company is inquired
 - time of each eating occasion
 - chronic diseases, education, race

3. After the interview	
3.1 Description of the Food Composition Database used. At the present time our Food Composition Database includes 1066 foods (generic and trademarks foods). For each food, edible portion is expressed in grams per gram of complete food (as it is acquired and before any preparation), while the other information is expressed per 100 g of edible portion food (energy, water, proteins, fats, carbohydrates, fiber, vitamins and minerals and others). For all foods listed in our database, energy has been calculated from the corresponding conversion factors proposed by FAO (1985). For each food the weights for common consumer units or household measures have been indicated. These are expressed in raw foods. The interviewer can introduce new households for any food. For each food have been included synonyms and the English and the scientific name. 3.2 Is it "integrated" in the software? (please circle) ☒ YES NO 3.3 Food Classification System used: e.g. LanguaL - FoodEx - FoodEx2 - EFG - combination Other (Please specify) Foods have been classified into 15 different groups and 67 subgroups within them altogether. Each food is identified internally by a unique numeric code, but you usually use to locate food or reference to a name, it will also be unique. You have the possibility of using two different additional codes if necessary	3.4 Does the software handle recipes/composite foods and if so, how? Yes, the software has a Recipe Database which includes 1163 recipes, although it is extensible and modifiable by the interviewer/user adapting it to his/her needs and so is the Food Database. 3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) (Please indicate) It depends on the way you introduce the dietary information: if you introduce an individual food, the output is raw food; but if you introduce a recipe, you have the recipe ingredients as consumed and related to the corresponding consumed amount of the recipe

3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle)

☒ YES

☐ NO

The interviewer can create new household measures, synonyms, brand names and he/she can write any other comment in a textbox.

When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A sequence of windows corresponding to questions to be asked on different characteristics of foods, called 'facets' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of 'descriptors' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet

3.7 Does the software include features for expanding the existing databases by adding: (please circle)

Food items

☒ YES

☐ NO

Recipes

☒ YES

☐ NO

Food composition values

☒ YES

☐ NO

Dietary supplements

☒ YES

☐ NO

Portion sizes

☒ YES

☐ NO

Pictures/photos

YES

☒ NO

Other:

The portion size for comparing with Dietary Guidelines), Names or synonyms, if the food is usually eaten raw or not, brand names, type of packaging, and any other comment about the food.

3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.)

Food Composition Database:.txt and .rtf (this .rtf format can be read with word, excel, access, etc. programs).

Recipe Database: txt and .rtf (this .rtf format can be read with word, excel, access, etc. programs). An also information about recipes can be exported in .dbf

Dietary intakes can be exported in .dbf format (which can be read with excel and SPSS programs).

3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food?

Yes, the software allows exporting intake data in .dbf format which can be read in a spreadsheet (Excel and SPSS programs).

3.10 Does the interviewer have access to the outputs derived from the 24-hour recall?

Which ones? (circle)

☒ Foods, ☒ Food groups, ☒ Raw Agricultural Commodities, ☒ Energy, ☒ Macro-nutrients, ☒ Micro-nutrients,

☐ Other (please specify):

Also the interviewer has access to the food portions/servings consumed for cereals + legumes, dairy products, fruits, vegetables, and meat + fish + egg

How soon?

As soon as the interviewer finishes of typing all the 24-hour recall information and checks it.

The time required depends on the number of participants/ /24-h recall included in the database

Is it possible for the interviewer to identify an under-reporter? (please circle)

☒ YES

☐ NO

3.11 Which outputs /reports are available on screen and which in printed format?

-All information you can see on the screen can be copied in .rtf format and printed

-The software includes a text editor and you can edit different templates for extracting all information from foods, recipes or the nutrient intake.

3.12 How much time is needed for the output to be produced?

As soon as the interviewer exports the outputs.

3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle)

☒ YES

☐ NO

3.14 Is there a critical aspect/characteristic of the tool that was not mentioned?

Any other comments?

The program does not consider changes in weight while cooking or nutrient losses in cooked food or processed.

3.15 Interviewee's comments

1. Before the interview	
Date (dd/mm/yy): 18 / 01 /2013	Country: Tool 5
The software is web based / The software is designed for local PC use? (please circle) The data entry software is PC based, while the central procedure (MASTER) of the software is web based. YES NO	
1.9 In which national languages is the software available? national language 1.10 Are the language settings configurable by the users OR a special administration is needed? There is no language settings at this time. It could be easily added, since most of screen software are data-driven.	TO THE INTERVIEWER 1.15 Which is your level of expertise in interviewing? Good 1.16 Which is your educational background? Dietitian 1.17 Which are the most common interviewers' educational backgrounds? Actually, nutritionists/dietitian. In the previous national survey the interviews were standardized 'data collectors'
Are there Standard Operating Procedures (SOPs) available? (please circle) YES Please provide us with a copy of SOPs or the manual.	
Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed? Food consumption data were collected using the food record technique. The procedure steps are the following: a) Each interviewer individually meets each participant the first day of the survey to explain the procedure and to leave the food dairies and the portion size picture booklet. Together (the participant and interview) fill in the first food dairy for the breakfast of the morning. b) Each participant fill in the dairies with all foods and beverages consumed. In particular they have to specified time, place of consumption, detailed description, consumed quantity and brand (for manufactured foods) for every eating occasion. Subjects are	<i>e.g. A four-step method could include: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.</i>

also asked for reporting whether they follow a particular diet and whether the reported consumption differed from their usual one. c) Interviewer, in the second and third meeting, checks the record data together with the participant and at the end of the period survey register his/her judgment on the reliability of the information recorded in each single day. d) Each interviewer input the data using the software. During the data processing, mixed dishes are disaggregated into their ingredients. e) The data entry procedure includes a consistency check between units of measurements and food descriptors. A central software module applies quality control routines to the entered data. The hard copies of the diaries and the input data are cross-checked to identify possible data entry errors. Once the digit errors and codification errors are corrected, the average food consumption and the average energy intake (EI) during the survey period are calculated for each individual in order to detect under/over reporters.	
What needs to be given special attention to during an interview? (i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool) The software management system permit a multi-operator data entry and food codification and at the same time ensure reliable data and a high level of standardization of the field workers' procedures. The fact that the field workers meet each subject three times and carefully check every single entry helped to reduce errors such as misreporting and omissions. Particular attention during the interview should be applied to: the portion consumed referred to picture booklet, mainly to children consumption the description of the food consumed, mainly if fortified food	

2. During the interview / Clarifications asked by an Italian field worker on completed food records already handed in

A. Specific part

	2.1 How is the recalled period ("day") defined? 2.2 At which stage in the process of the interview? 2.3 Are there pre-defined eating occasions?
2.4 Portion size estimation (Circle the one(s) used in the interviews observed): 2.5 Does the quantification method vary depending on the type of food? (please circle) YES NO 2.6 Are other methods than the ones just observed, used? (to be asked) 2.7 If picture series are used indicate the number of pictures per item: Three pictures per item in the picture book the participant had available. 2.8 The pictures are integrated in the software (please circle) YES NO 2.9 There is a separate picture book (please circle) YES NO 2.10 Can the interviewee watch from a shared screen the portion size pictures? (please circle) YES NO	1. Weighing 2. Food models 3. Food pictures 4. Household measures 5. Standard (natural unit) 6. Standard portions 7. Known packaging size 8. Ruler 9. Sketches 10. Gram/Volume method 11. Other (specify)
Comments The picture book was not organized on a per food/dish basis, but per course (i.e. first course, second course, etc)	
Water consumption At which stage is it asked in the process of the interview? How? Comments:	

2.11 Are questions on the following matters asked during the interview?		☐ Special diet followed ☐ Reported day a special one? ☐ Time of eating occasion ☒ Place of consumption ☐ Place of food preparation ☐ Type of recipe (e.g. homemade, ready-to-eat etc.) ☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)	☐ Engagement in activities while eating (e.g. watching TV, using the computer) ☐ Fellow diners ☒ Brand name of foods ☐ Cooking procedures ☐ Was a certain food fortified or not ☐ Was a certain food organic or not ☐ Dietary supplements consumption ☐ Supplement brand name ☐ Supplement active compound ☐ Height ☐ Weight ☐ Age ☐ Sex
☐ Forgotten food items ☐ Amount of food leftover ☐ Additional food served ☐ Salt ☐ Pepper ☐ Herbs ☐ Is the type of milk consumed asked? ☐ Is the type of fat spread consumed asked?	☒ Consumption of water and beverages during the meal(s) ☒ Consumption of water and beverages except of those during meal(s) ☒ Is adding sugar to tea or coffee asked?		
Comments • Much attention and many requests for clarifications on the brand names • Clarifications on type of bread, type of cheese • Question on whether the skin of meat was consumed • Clarifications on place and time of consumption • Questions on interviewee's perception of the physical activity of the reported day.			
2.12 Duration of the interview <i>It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool</i>			

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

The participant has filled in the food diaries, which were sent to the research institute. A phone call followed during which the participant provided clarifications.

An issue that may compromise comparability with the other trials is that Sofia was always next to the interviewee, was following the discussions, ensured that replies were correct and also assisted him in providing replies.

3. After the interview

3.1 Description of the Food Composition Database used

Food composition database includes about 1300 food items and 100 supplements (food supplements and medicines susceptible to contains minerals and vitamins).

Each entry consists of values for energy and 36 nutrients, of which 7 minerals (iron, calcium, phosphorous, magnesium, potassium, zinc, sodium), and 13 vitamins (thiamine, riboflavin, vitamin C, vitamin B₆, retinol and β -carotene, total vitamin A as retinol equivalents, vitamin E, vitamin D, vitamin B₁₂, niacin, folate and vitamin K).

The energy and nutrients contents are based on national Food Consumption Tables. Where needed, food composition tables from other countries were used to complete missing values relatives to nutrient content. Some nutrient values were also derived from the nutritional label of commercial products.

Fortified foods were recorded with the correct description, the type of nutrient used in the fortification and the brand name. For each fortified food, supplement and for bottled water, the nutrient composition was calculated using the nutrient contents reported in the nutrition label and the food was recorded in Food composition database at level of brand name. The Food composition database is complete for all the nutrient content for each food items: for each missing value we used the best estimate figures. Reference source is recorded in the database for each food item and each nutrient.

3.2 Is it "integrated" in the software? (please circle)

YES

3.3 Food Classification System used:

e.g. LanguaL - FoodEx - FoodEx2 - EFG - combination

Other (Please specify)

The classification of food items at ingredient level into fifteen large food categories and fifty-one subcategories was based largely on the classification developed by the European Food Safety Authority (European Food Safety Authority (2005) Opinion of the Scientific Committee on a request from EFSA related to Exposure Assessments (adopted on 22 June 2005).

The EFSA Journal 249, 1–26; available at: http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1178620763345.htm

3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle)

NO

When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A

3.4 Does the software handle recipes/composite foods and if so, how?

Yes. The software use a database of standard recipes to transform the weight of prepared mixed dishes into the weight of raw single ingredients. For each recipes, the amount of the ingredients is reported to 1,000 grams of cooked mixed dish. Ingredients are identified with codes linking them to the Food composition database of nutrient value.

3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) (Please indicate)

The output reports a first record with the quantity consumed (column grams) referred to the recipe as a whole (cooked quantity, in the case of a dish that was cooked), The following records linked to the recipe refer to each ingredients with the raw quantity.

3.7 Does the software include features for expanding the existing databases by adding: (please circle)

Food items	YES	NO
Recipes	YES	NO
Food composition values	YES ¹	NO

<i>sequence of windows corresponding to questions to be asked on different characteristics of foods, called 'facets' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of 'descriptors' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet</i>	<table><tr><td>Dietary supplements</td><td>YES</td><td>NO</td></tr><tr><td>Portion sizes</td><td>YES²</td><td>NO</td></tr><tr><td>Pictures/photos</td><td>YES</td><td>NO</td></tr><tr><td>Other</td><td></td><td></td></tr></table> ¹The software permits to expand the nutrient composition of a new food item. Special administration is needed when a new specific nutrient has to be added. ²The software permits to update/add an existing portion.	Dietary supplements	YES	NO	Portion sizes	YES²	NO	Pictures/photos	YES	NO	Other		
Dietary supplements	YES	NO											
Portion sizes	YES²	NO											
Pictures/photos	YES	NO											
Other													
3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.) The software create the output data as excel file (.xls)													
3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food? YES													
3.10 Does the interviewer have access to the outputs derived from the 24-hour recall/record? Which ones? (circle) Foods, Food groups, Raw Agricultural Commodities, Energy, Macro-nutrients, Micro-nutrients, Other (please specify) NO How soon? Not applicable Is it possible for the interviewer to identify an under-reporter? (please circle) YES * NO <i>*The central procedure (MASTER) of the software identify the under-reporter subjects and send the information and, if necessary, the request to check the data to the interviewer.</i>													
3.11 Which outputs /reports are available on screen and which in printed format? The data entry operator can see on screen and print only the input data in the software, The central operator', following the elaboration of the data in the software can see on screen and print partial data directly by the software and export an excel file with all input data													
3.12 How much time is needed for the output to be produced? In mean, 3 minutes by subject													
3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle)													

YES	NO
3.14 Is there a critical aspect/characteristic of the tool that was not mentioned? Any other comments? One critical aspect of this tool is related to the modality of input of some foods: as a recipe (single ingredients) or as a food product (group of ingredients): for this reason a number of cereal products such as plain pizza with tomato and biscuits were classified as cereal products, whereas they also contain other ingredients (fats, eggs, tomatoes, sugar, etc.). Other cereal products (e.g. pizza with a variety of ingredients, most cakes, some fresh pasta and gnocchi) were handled as recipes and disaggregated into flour and other ingredients. Therefore, consumption of the subcategories 'Pizza', 'Pasta' and 'Cakes and sweet snacks' could be underestimated. On the other hand, when food items are classified in a subcategory such as 'Biscuits', this leads to an underestimate of the consumption of single ingredients such as flour and sugar in their respective food categories.	
3.15 Interviewee's comments	

1. Before the interview

Date (dd/mm/yy): 22 /01 /2013

Country: Tool 6

The software is web based / The software is designed for local PC use? (please circle)

YES NO

- 1.11 In which national languages is the software available?
national language
- 1.12 Are the language settings configurable by the users OR a special administration is needed?
The tool is only available in the national language.
Special administration for other languages.

TO THE INTERVIEWER

Not relevant for us?

- 1.18 Which is your level of expertise in interviewing?

We informed and trained interviewers at an external company with professional interviewers who gave instructions to participants.

- 1.19 Which is your educational background?
See the answer above.

- 1.20 Which are the most common interviewers' educational backgrounds?
See the answer above.

Are there Standard Operating Procedures (SOPs) available? (please circle) YES NO
Please provide us with a copy of SOPs or the manual.

Please describe briefly the process of the interview. Through how many (built-in) steps is the interview completed?

No interviews only instructions for the food diaries.

The information that was given to the participant before and during the web-registration was standardized. The time schedule for the information was also standardized.

e.g. A four-step method could include: (a) participants are asked to inform the interviewer about the foods and beverages that they had consumed in the previous 24 h (the crude list); (b) queries for the time and occasion at which the foods were consumed; (c) more detailed questions to gather descriptions and amounts of foods consumed; (d) last opportunity to elicit forgotten foods.

What needs to be given special attention to during an interview?
(i.e. what would you advise an observer of the interview process to give special attention to, given the project's aims. For example, an aspect that is special or exclusive to your tool)

The interviewer asked the participant to report various portions of the same food within a meal as separate portions. If the participant first had a big portion of soup and then a small portion of soup, the two separate portions can be reported separately, as serving size.

2. During the interview

A. Specific part

2.1 How is the recalled period ("day") defined?

2.2 At which stage in the process of the interview?

2.3 Are there pre-defined eating occasions?

2.4 **Portion size estimation** (Circle the one(s) used in the interviews observed):

4

2.5 **Does the quantification method vary depending on the type of food?**
(please circle)

YES

NO

2.6 **Are other methods than the ones just observed, used?** (to be asked)

2.7 **If picture series are used indicate the number of pictures per item:**

2.8 **The pictures are integrated in the software** (please circle)

YES

NO

2.9 **There is a separate picture book** (please circle)

YES

NO

2.10 **Can the interviewee watch from a shared screen the portion size pictures?**
(please circle)

YES

NO

1. Weighing

2. Food models

3. Food pictures

4. Household measures

5. Standard (natural unit)

6. Standard portions

7. Known packaging size

8. Ruler

9. Sketches

10. Gram/Volume method

11. Other (specify)

4. The software allows the respondent to enter e.g. 3/4 of a picture.

Comments

Water consumption

At which stage is it asked in the process of the interview? How?

Comments:

2.11 Are questions on the following matters asked during the interview?

☐ Forgotten food items

☐ Amount of food leftover

☐ Additional food served

☐ Salt ☐ Pepper
☐ Herbs

☐ Is the type of milk consumed asked?

☐ Is the type of fat spread consumed asked?

☐ Consumption of water and beverages during the meal(s)

☐ Consumption of water and beverages except of those during meal(s)

☐ Is adding sugar to tea or coffee asked?

☐ Special diet followed

☐ Reported day a special one?

☐ Time of eating occasion

☐ Place of consumption

7.1.1. ☐ Place of food preparation

☐ Type of recipe (e.g. homemade, ready-to-eat etc.)

☐ Special characteristics of foods (e.g. PDO: Protected Designation of Origin; PGI: Protected Geographical Indication; TSG: Traditional specialty guaranteed)

☐ Engagement in activities while eating (e.g. watching TV, using the computer)

☐ Fellow diners

☐ Brand name of foods

☐ Cooking procedures

☐ Was a certain food fortified or not

☐ Was a certain food organic or not

☐ Dietary supplements consumption

☐ Supplement brand name

☐ Supplement active compound

☐ Height ☐ Weight ☐
Age ☐ Sex

Comments

2.12 Duration of the interview

It is important to record the duration of each interview observed. The structure of this question depends on our decision to have one form / interview or one form/tool

Day 1 lasted 35'

B. Unstructured observation

Strengths/Weaknesses

in relation to: (a) how data are collected, (b) how data are managed or (c) any software characteristics (e.g. interface, flexibility, manual)

Strengths

Weaknesses

C. Blank space for taking notes

Observer's impressions

- During the data entry, the respondent had the opportunity to consult a guidance document
- The following two-step procedure appears to have been followed throughout the exercise:
 - Search the food list and select the food items
 - Determine the portion consumed using the picture book available
 - Food items could be either selected using the software's search engine or found by pointing and clicking under the various groups and subgroups of the available foods
 - There seemed to be some real-time quality controls (prompts appeared)

3. After the interview

3.1 Description of the Food Composition Database used

The web-registration tool is connected to the food data system that encompasses the national Food Composition Database. The food composition database in the tool is based on the national food composition database and include national staple foods and dishes. In addition new food items were added for the software's survey. In the current version of the tool it is possible to choose from approximately 1900 various food items.

3.2 Is it "integrated" in the software? (please circle)

YES

NO

3.3 Food Classification System used:

e.g. LanguaL - FoodEx - FoodEx2 - EFG - combination

Other (Please specify)

LanguaL classification is defined for some foods but not all. Foods included in the software have been FoodEx2 classified in various projects but the information is not yet available in the system. During 2013, the ingredients for all composite foods from the software will be defined within the database and available for output. Foodex2 will be defined for all ingredients.

3.4 Does the software handle recipes/composite foods and if so, how?

Yes, the composite foods are constructed by (primarily) standardized recipes from predefined cookbooks (the two most common cookbooks in the country).

The food items in the Food Composition Database are prepared in various ways. For instance they may be raw, boiled or fried as well as composite dishes. Potential nutritional losses during the cooking process concerning certain nutrients, such as the B-vitamins, vitamin C and potassium, are calculated considering the particular food item, preparation method and type of nutrient. These calculations are carried out according to EuroFIR guidelines. Further information regarding methods used to calculate nutritional losses can be obtained in the internal Food Composition Database user guide. In general, the majority of the national staple foods that are included in the Food Composition Database are analysed at national laboratories.

	3.5 How are the dietary data expressed in the output? (e.g. only raw foods and recipe ingredients as consumed, OR cooked foods and recipe ingredients as consumed) (Please indicate) As consumed																										
3.6 Is it feasible for the interviewer to create new food descriptors other than the pre-defined? (please circle) YES NO <i>When a food item consumed is reported, a food pathway is followed to describe and subsequently quantify the item. A sequence of windows corresponding to questions to be asked on different characteristics of foods, called 'facets' (e.g. cooking method, preservation method, etc.), are automatically displayed on the screen. Each of these windows contains a series of 'descriptors' corresponding to the predefined possible answers (e.g. 'grilled', 'roasted', 'fried' for the facet 'cooking method'). Another facet could be "brand name" (with various brands as the descriptors of this facet)</i>	3.7 Does the software include features for expanding the existing databases by adding: (please circle) <table border="0"> <tr> <td>Food items</td><td>YES</td></tr> <tr> <td>NO</td><td></td></tr> <tr> <td>Recipes</td><td>YES</td></tr> <tr> <td>NO</td><td></td></tr> <tr> <td>Food composition values</td><td>YES</td></tr> <tr> <td>NO</td><td></td></tr> <tr> <td>Dietary supplements</td><td>YES</td></tr> <tr> <td>NO</td><td></td></tr> <tr> <td>Portion sizes</td><td>YES</td></tr> <tr> <td>NO</td><td></td></tr> <tr> <td>Pictures/photos</td><td>YES</td></tr> <tr> <td>NO</td><td></td></tr> <tr> <td>Other</td><td></td></tr> </table> Food items are not constructed during a study. Dietary supplements are not predefined; the information is compiled after study completion.	Food items	YES	NO		Recipes	YES	NO		Food composition values	YES	NO		Dietary supplements	YES	NO		Portion sizes	YES	NO		Pictures/photos	YES	NO		Other	
Food items	YES																										
NO																											
Recipes	YES																										
NO																											
Food composition values	YES																										
NO																											
Dietary supplements	YES																										
NO																											
Portion sizes	YES																										
NO																											
Pictures/photos	YES																										
NO																											
Other																											
3.8 Which are the possible data export formats? (.mdb, .txt, .xls etc.)																											
3.9 Does the software allow exporting intake data in electronic format (e.g. that can be read in a spreadsheet) that allow estimations of individual energy and nutrient intake or individual intake by food? Yes, in Excel-format.																											
3.10 Does the interviewer have access to the outputs derived from the 24-hour recall? Which ones? Not 24-recall but our four day web registration gives Energy, Macro-nutrients, some micro-nutrients as output. How soon? Directly when the web registration is completed by the participant information on fruit- & vegetable intake is presented on the screen. The participant also gets information on the energy and energy distribution. In addition to the information on consumption the participants answer two questions on physical activity, sex, age-group, weigh and length. This information is used for calculations of the expected energy intake. Both the expected and actual energy intake is presented for the participants. Is it possible for the interviewer to identify an under-reporter? (please circle) YES NO No, but we analyze under-reporters when the study is completed.																											
3.11 Which outputs /reports are available on screen and which in printed format?																											

The information presented on the screen (explained above) is also possible to print out
3.12 How much time is needed for the output to be produced? No time at all, is automatically calculated and presented on the screen
3.13 Is the output in such a format that it can be directly imported in one of the commonly used packages for statistical analysis (e.g. SAS, STATA, SPSS)? (please circle) YES NO Not for the participants. They just get a summary of the results. We are able to export and analyze all the results in e.g. Excel and Stata.
3.14 Is there a critical aspect/characteristic of the tool that was not mentioned? No Any other comments?
3.15 Interviewee's comments

Appendix T. Descriptive statistics, key quantity, % deviation among the minimum and maximum recorded quantities and number of outliers of the food items presented in the boxplots

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
10	chocolate biscuit (filled)	18	32.4	24.2	4.7	30	24.8	20.0	26.0	6.0	80	0
10	corn flakes	18	50	34.7	11.1	30	35.0	30.0	40.0	10.0	178	0
10	crackers	3	42	18.9	12.8	11	18.0	9.0	24.2	15.2	1300	0
10	muesli	30	50	39.3	6.1	37.5	40.0	35.0	40.0	5.0	33	1
10	wafers	10	75	44.2	22.0	50	50.0	30.0	50.0	20.0	650	0
11	cereal bar	10	200	49.9	66.8	32	25.0	21.0	40.0	19.0	300	1
11	doughnut	44	120	68.2	27.9	85	55.0	45.2	85.0	39.8	173	0
11	pasta	50.4	400	217.8	140.4	325	208.0	90.5	350.0	259.5	694	0
11	pie	120	310	190.7	78.2	180	180.0	120.0	280.0	160.0	158	0
11	rolls	89.3	150	105.0	22.7	95	93.0	90.0	121.0	31.0	68	0
11	rye bread (1 slice)	25	114.5	58.1	36.4	50	45.0	30.0	105.0	75.0	358	0
11	sponge cake	58.3	128	91.8	29.5	110	77.3	68.0	120.0	52.0	119	0
11	white bread (2 big slices)	50	125.4	90.0	28.6	180	96.4	60.0	119.5	59.5	151	0
12	broccoli	40	250	101.6	68.7	55	81.0	65.0	100.0	35.0	150	1
12	cauliflower	24	100	66.1	32.5	55	67.0	37.5	100.0	62.5	317	0
12	mushrooms	24.8	150	56.3	47.5	25	36.6	30.0	60.0	30.0	142	1
12	potatoes	45	100	68.4	22.9	60	57.0	50.0	100.0	50.0	122	0
12	roasted potatoes	168	254	205.6	25.7	200	200.0	200.0	216.0	16.0	8	2
12	tomato	45	58	52.6	4.4	57.5	53.0	50.0	56.3	6.3	29	0

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
12	vegetables	20	105	55.0	31.6	30	50.0	40.0	60.0	20.0	200	1
12	watermelon	90	518	262.8	151.1	375	198.0	150.0	360.0	210.0	476	0
13	banana	63	125	99.5	26.3	120	115.6	73.0	120.0	47.0	98	0
13	grapes	127.5	197.8	169.2	25.4	177.5	180.0	140.0	183.0	43.0	55	0
13	orange juice (large glass)	300	400	336.8	46.9	300	310.0	300.0	374.0	74.0	33	0
13	orange juice (small glass)	83	250	127.1	69.6	95	100.0	90.0	112.5	22.5	36	1
13	peach	125	350	253.0	85.7	290	270.0	220.0	300.0	80.0	180	0
13	strawberries	80	135	115.1	19.5	120	120.3	107.3	128.0	20.7	69	0
14	dates	15	77.4	32.7	22.4	25	25.0	24.0	30.0	6.0	100	2
14	jam	6	15	10.0	3.4	16	9.0	8.0	13.0	5.0	150	0
14	mixed nuts and dried fruits (1/2 sack=40)	15	60	35.7	14.8	40	40.0	20.0	40.0	20.0	300	0
14	mixed nuts and dried fruits (1/2 sack=50)	50	100	57.1	18.9	50	50.0	50.0	50.0	0.0	0	1
14	peanuts	24	40	37.4	6.0	40	40.0	37.5	40.0	2.5	7	1
14	pumpkin seeds	9	20	15.6	4.7	20	15.0	10.3	20.0	9.7	122	0
15	chicken	100	200	162.3	39.5	110	171.0	132.0	200.0	68.0	100	0
15	cold-smoked salmon	23	150	54.4	44.9	35	30.0	28.1	60.0	31.9	161	1
15	luncheon meat	48	180	84.1	45.3	120	66.0	60.0	100.0	40.0	108	1

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
15	pork chops lean	99	470.2	263.2	124.4	300	300.0	150.0	323.0	173.0	375	0
15	raw-salted salmon	20	150	72.6	55.5	30	65.0	23.0	112.5	89.5	650	0
15	salmon	50	126.2	66.3	26.8	50	55.0	55.0	64.0	9.0	28	1
15	sausages	30	150	97.3	44.0	120	96.0	75.0	137.0	62.0	400	0
15	shrimps	30	150	69.4	45.9	57	60.0	30.0	86.4	56.4	400	0
15	smoked small fish	50	168	122.6	49.2	40	130.0	100.0	165.0	65.0	236	0
16	caviar creme	8	14.4	11.0	2.5	10	10.0	10.0	12.8	2.8	80	0
16	ham	20	40	31.6	8.0	22.5	34.0	20.7	36.7	16.0	100	0
16	pate	12.3	70	25.7	22.1	20	18.0	13.0	23.0	10.0	87	1
16	sausage	7	20	13.3	5.5	10	11.3	10.0	20.0	10.0	186	0
17	milk (glass)	100	275	188.4	69.2	190	192.7	120.0	250.0	130.0	175	0
17	boiled egg	50	100	62.4	18.0	50	58.0	50.0	69.0	19.0	38	1
17	cheese	9	40	31.5	10.9	35	35.0	26.3	39.0	12.7	344	0
17	milk (medium bowl/ml)	121	225	169.4	43.0	150	160.0	125.0	225.0	100.0	86	0
17	panna cotta	80	200	139.7	44.0	150	136.0	110.0	176.3	66.3	150	0
17	whipped cream	20	115	43.4	32.5	40	35.0	22.0	40.0	18.0	100	1
17	yoghurt	112.5	160	131.8	16.8	125	125.0	125.0	150.0	25.0	42	0
18	biscuits for toddlers	12	53.2	25.2	13.6	10	20.8	16.0	30.4	14.4	153	1
18	candies	20	125	55.7	41.1	49.3	45.0	20.0	100.0	80.0	525	0

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
18	dark chocolate bar	50	50	50.0	0.0	50	50.0	50.0	50.0	0.0	0	0
18	mayonnaise sauce	10	187	44.5	69.9	17.5	18.0	14.0	20.0	6.0	100	1
18	milk chocolate bar	30	60	47.9	9.1	48.5	50.0	45.0	50.0	5.0	11	2
18	organic puree for toddlers	63.3	173	97.8	35.8	100	93.3	75.0	100.0	25.0	58	1
18	salt	5	10	6.5	2.4	5	5.5	5.0	8.0	3.0	100	0
19	beef stew	225	500	328.0	90.7	330	321.2	250.0	375.0	125.0	122	0
19	bolognese sauce	140	270.9	177.0	51.1	140	155.5	140.0	200.0	60.0	93	0
19	fish casserole	150	478.4	292.2	114.0	300	300.0	200.0	392.0	192.0	219	0
19	hamburger	47	400	231.5	118.6	212.5	215.5	200.0	311.0	111.0	751	0
19	meat loaf	52	160.5	119.6	36.8	120	125.0	115.0	140.0	25.0	40	1
19	osso buco	168	300	232.0	50.5	200	240.0	200.0	252.0	52.0	79	0
19	pasta with seafood	275	456.3	366.7	76.6	420	400.0	285.0	445.0	160.0	66	0
19	pizza with cheese and mushrooms	225	337.5	279.1	45.2	360	270.0	229.0	330.0	101.0	50	0
19	quiche	36	100	58.9	21.9	60	54.0	50.0	60.0	10.0	69	1
19	risotto with chicken and spinach	296.5	570	431.5	112.5	500	500.0	300.0	504.0	204.0	92	0
19	scrambled	115	220	162.1	46.6	150	158.6	120.0	200.5	80.5	91	0

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
	eggs											
20	caprese salad	125	350	190.3	83.6	160	165.5	130.0	206.0	76.0	65	1
20	tofu salad	125	187	157.3	23.2	160	150.0	150.0	182.0	32.0	50	0
20	waldorf's salad	40	220.7	148.8	60.8	160	150.0	145.0	187.0	42.0	52	1
20	legume soup (1 large portion/gr)	281.3	400	355.1	61.7	400	400.0	294.0	400.0	106.0	42	0
20	legume soup (1 soup plate)	150	325	272.5	70.5	305	307.5	225.0	320.0	95.0	117	0
20	minestrone soup (1 large portion/gr)	328.1	500	396.2	52.7	400	400.0	365.1	400.0	34.9	22	1
20	mixed green salad	20	171	55.6	57.7	50	36.3	20.0	50.0	30.0	150	1
20	mixed salad	25	90.5	47.6	20.7	40	40.0	37.5	50.0	12.5	100	1
20	soup/broth soup (1 large portion/gr)	312.5	400	384.6	32.7	400	400.0	380.0	400.0	20.0	5	1
20	vegetable soup (1 large portion/gr)	280	400	350.4	56.6	410	364.1	294.0	400.0	106.0	43	0
20	vegetable soup (1 soup plate)	150	375	291.2	81.2	305	298.5	262.5	362.5	100.0	150	0
21	water (large plastic cup)	250	368.8	294.4	43.1	350	290.0	250.0	330.0	80.0	48	0

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
21	water (medium glass)	148.6	242.9	207.7	32.6	170	216.7	188.6	240.0	51.4	63	0
21	water (small plastic cup)	60	245	158.6	59.6	160	160.0	115.0	200.0	85.0	308	0
21	cola light	315	338	327.3	8.0	330	330.0	318.0	330.0	12.0	7	0
21	green tea	250	280	254.3	11.3	250	250.0	250.0	250.0	0.0	0	1
21	red bull	200	250	235.7	24.4	250	250.0	200.0	250.0	50.0	25	0
21	soft drink	260	600	426.6	125.1	500	480.0	300.0	500.0	200.0	131	0
21	water (1 bottle)	400	500	471.4	48.8	500	500.0	400.0	500.0	100.0	25	0
21	water (1/2 bottle)	250	500	375.0	88.4	375	375.0	375.0	375.0	0.0	0	2
21	water (large glass)	160	400	300.2	79.6	300	300.0	250.0	375.0	125.0	150	0
21	water (medium glass n.s.)	160	250	197.5	33.8	170	180.0	175.0	232.5	57.5	56	0
21	water (small glass)	100	200	157.6	33.6	120	160.0	133.3	180.0	46.7	100	0
22	butter	5	10.9	7.1	2.1	5	6.3	5.4	8.0	2.6	118	0
22	margarine (2 teaspoons)	10	40	16.0	10.7	10	12.5	10.0	15.2	5.2	52	1
22	margarine (2x2)	13	80	31.2	24.6	20	22.0	20.0	30.4	10.4	134	1

Boxplot in Figure	Food item (unit)	Range of recorded quantities		Mean	SD	Key quantity	Median	25th percentile	75th percentile	Interquartile range	%dev ^(a,b)	Number of outliers
		min	max									
	teaspoons)											
22	margarine (2ts/each slice)	15.2	75	35.2	18.7	30	30.0	30.0	36.0	6.0	20	2
22	olive oil	5	13.8	10.0	3.0	12	10.0	8.5	13.5	5.0	176	0
22	rapeseed oil	5	15	9.0	3.7	12	7.5	6.3	13.0	6.8	200	0
23	beer	200	330	311.4	49.1	330	330.0	330.0	330.0	0.0	0	1
23	whisky (1 portion)	20	95	47.3	23.3	45	40.0	36.0	50.0	14.0	150	1
23	whisky (double portion)	36	190	97.7	50.9	90	90.0	80.0	100.0	20.0	25	2
23	white wine	176	240	230.9	24.2	240	240.0	240.0	240.0	0.0	0	1

(a) Calculated as % dev = [(maximum value-minimum)/minimum value]*100. Outliers were not included in the calculations.

(b) A percentage equal to zero indicates that all tools, except from those having recorded an outlier, recorded the same quantity.

Appendix U. Detailed list of characteristics not reported by the interviewees but being recorded by the tools

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
Tool 1	1	Yogurt, assumed to be cow's milk rather than reported Caffeine in cola light	"Regular, not organic" - rye bread, cookie (cereal bar), pizza base Meat in beef stew = medium (extent of cooking/risky component) Not fortified - mineral water Mars bar wrapper (plastic/metal) Heineken packaging (jar)		Home recorded for breakfast, but not clear whether this was reported again (after pre-breakfast water)
Tool 1	2		"Regular, not organic" - milk, rye bread, butter Not fortified - rye bread, butter, water Red bull packaging - jar Heineken packaging (jar)		Time and place for final snack of day captured (home, 22:00) but not highlighted on sheet
Tool 1	3	Caffeine in coffee - does not appear to have been mentioned, but assumed not to be decaf?	"Regular, not organic" - ham, Comment that cauliflower cooked without salt but unclear where this information came from Roast potatoes without skin - not clear where this info came from		Work recorded for snacks, but did not appear to be reported "Same as previous day" sometimes entered in to comments box and further characteristics not entered during the interview Portion of peanuts not reported in grams but captured quite closely

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
			Not fortified - olive oil		Portion was not reported for tomato (0.5*picture), but a fairly accurate weight was recorded
Tool 1	4	Caffeine in coffee - does not appear to have been mentioned, but assumed not to be decaf? No sugar added to coffee, not reported but no sugar recorded as default is without (sugar added separately)	"with seeds" recorded for grapes - not clear whether this was reported	Cola light specified as having caffeine - not reported, but captured Pepsi max & beer packaging = jar, but not reported (would have been reported as a can)	Portion for sponge cake not reported, but difficult to tell how well this was captured as entered as a recipe - appears to be too low Small can not reported for pepsi, yet portion recorded as only 200ml
Tool 1	5	Milk assumed to be cow's although not reported Coffee assumed to contain caffeine? "No added sugar" not reported for orange juice - not specifically mentioned but captured by default (freshly squeezed OJ)	Cornflakes recorded as sweetened with fruit juice sugar and in a plastic package, but unclear where the information came from - could be assumed from brand? "regular, not organic" recorded for bread, crackers, wine, strawberries Not fortified - butter, water, cornflakes	Sugar in coffee not reported but captured Not reported that the organic puree for toddlers was commercial, but 'Food industry' captured for place of preparation/production	Quantity for whipped cream does not appear to have been reported, but a portion has been captured (30.6g : key quantity = 40g) Portion information for strawberries not highlighted, but a picture number entered, so assume it was covered (recorded amount quite similar to key quantity)

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
		Strawberries not reported as 'fresh', though this was probably assumed and reflected in the food description			
Tool 1	6	Eggs assumed to be chicken, though not explicitly reported Caffeine in pepsi not reported, but probably captured in food description (not captured as a separate characteristic this time)	Packaging of milk recorded but unclear whether reported (not on sheet) "Regular, not organic" recorded for bread, peach Not fortified - recorded for bread	"grilled" characteristic apparently not reported for chicken breast, but captured as 'grilled/bbq' Pepsi max brand not highlighted, but has been captured - interviewer may have assumed it was the same as before?	Not clear whether 'walky cup' was reported for fanta soft drink, but amount has been captured
Tool 1	7	Banana not reported as 'fresh' or specifically recorded as such, but probably assumed in the food description M&Ms - 'coated and glazed' characteristic not reported, but possibly assumed from brand	"Regular, not organic" recorded for sugar		Whipped cream amount (2 tbl sp) - unclear whether reported (no highlighting) - only 10g recorded rather than key weight of 40g so not really captured properly
Tool 1	8	Caffeine in tea captured, but probably assumed rather than specifically reported Boiled' not reported for soup, but 'heated' captured - implicit from food name (as noted by interviewee)		"Preserved by sugar" added for honey	

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
		"Infusion" not reported for green tea, but probably assumed from description			
Tool 1	9	Caffeine recorded for coffee but unclear whether this was reported or assumed from description	"Regular, not organic" recorded for margarine	Caffeine for cola light was captured but not reported - probably assumed from description	Information about portion size of organic puree not reported, but quantity captured quite closely, possibly due to repetition of food item, and packaging described as a jar
Tool 1	10	Fanta 'sugar sweetened' characteristic not reported, but probably assumed from description (not given as light or diet)	Not fortified - rye bread		
		Caffeine in coffee - assumed as not reported as decaf? No sugar added' not reported by interviewee, but is default "Frozen" recorded for ice-cream but not indication it was reported - assumed from description	"Regular, not organic" recorded for ice-cream		
Tool 2	1	Yogurt not reported as cow's milk but probably captured in the food description		Pepsi Max brand name not reported, but Pepsi Cola/Coca Cola Light captured, but this is probably part of the food description "Fresh" not reported for banana, but captured in description	

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
Tool 2	2	Butter characteristic of "normal" not reported, but butter captured with no other descriptors so has perhaps recorded normal butter by default "Milk-based" ice-cream not reported, but probably captured through assumption in food description			
Tool 2	3				
Tool 2	4		White wine described as 'dry' but unclear whether this was reported (not in information)	"Boiled" appears to have been captured for spaghetti, though not highlighted on the sheet Cooking method not reported for bolognese meat/sauce - recorded as fried, though should have been pan reheated Pepsi Max brand name not reported, but Pepsi Cola/Coca Cola Light captured, but this is probably part of the food description "Light, with caffeine" not reported for pepsi max, but both of these were captured through the description Baked potatoes not reported as baked with oil, but recorded as fried in oil	
Tool 2	5				

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
Tool 2	6	Eggs not specified as hens, but probably assumed in the description	White wine described as 'dry' but unclear whether this was reported (not in information)	Pepsi Max brand name not reported, but Pepsi Cola/Coca Cola Light captured, but this is probably part of the food description "with caffeine" not reported for pepsi max, but was captured through the description "Fresh" not reported for salad, but captured in description	
Tool 2	7				
Tool 2	8	"infusion" not specifically recorded for green tea, but captured as a drink		"Boiled" not reported for soup, but recorded as part of the description	Rice described as 'food prepared at home' but not reported
Tool 2	9		White wine described as 'dry' but unclear whether this was reported (not in information)	Pepsi Max brand name not reported, but Pepsi Cola/Coca Cola Light captured, but this is probably part of the food description "with caffeine" not reported for pepsi max, but was captured through the description "Fresh" not reported for watermelon, but captured in description	
Tool 2	10	"Milk-based" ice-cream not reported, but probably captured through assumption in food description		"Fresh" not reported for banana, but captured in description	

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
				"Pork" not reported for ham but captured in the description "Sliced" not reported for salmon but captured in the description	
Too 3	1	"Baked with oil" not reported for roast potatoes, but captured as "roasted/baked with fat", which was probably implied in the food name Caffeine recorded for espresso, but probably assumed from food description rather than reported	Tap water - "not sweetened"		"Not at home" captured in characteristics of many foods, even those consumed at home, so assume this refers to the place of manufacture?
Too 3	2	Soup ingredients recorded as boiled, although not specifically reported			
Too 3	3	%ABV not recorded for whiskey, but may be assumed from brand name			
Too 3	4	Cow's milk was not reported but was probably captured through assumption		Not sweetened recorded as a characteristic of the coffee although this was not reported The bolognese sauce was captured as a recipe rather than from a jar, but the tomato sauce element of this recipe was classified as in a jar, without being reported	
Too 3	5			Baked not reported for burger, but barbequed recorded as part of the recipe	

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
				"Sweetened with sugar" not reported for whipping cream, but recorded in food characteristics	
Too 3	6	Soup ingredients recorded as boiled, although not specifically reported "Bakedl" not reported for roast potatoes, but captured as "roasted/baked", which was probably implied in the food name %ABV not recorded for whiskey, but may be assumed from brand name		Margarine not reported as low fat, but "reduced fat/partially skimmed" recorded "restaurant recipe unknown" was not reported for the crème caviar, but "restaurant/catering/hotel" was recorded in the characteristics (separately from the place of consumption)	
Too 3	7	Cow's milk not reported but probably implied in the description			
Too 3	8	Soup ingredients recorded as boiled, although not specifically reported			
Too 3	9	Boiled not reported for seafood pasta but recorded as part of the recipe Only oreo was reported for the first characteristic for the biscuits, but the information about being cream filled/chocolate was also captured - probably assumed following previous repetitions		Not sweetened recorded as a characteristic of the coffee although this was not reported Mixed fruit and nuts captured as in plastic packaging, though not reported	

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
Too 3	10	Plant sterols not reported for margarine, but recorded brand so implied Soup ingredients recorded as boiled, although not specifically reported Only oreo was reported for the first characteristic for the biscuits, but the information about being cream filled/chocolate was also captured - probably assumed following previous repetitions Risotto ingredients captured as boiled although this characteristic was not reported		Not sweetened recorded as a characteristic of the coffee although this was not reported	
Too 4	1	Pepsi max not specifically recorded as including caffeine but probably implied in the name			
Too 4	2	"Energy drink with caffeine" not reported for Red Bull, but brand captured and therefore characteristics implied		No shells not reported for pumpkin seeds, but recorded as shelled.	
Too 4	3				
Too 4	4	Cow's milk did not appear to be reported but was captured, probably due to assumption			Snack before bed was correctly captured as 'at home' even though not reported

Tool	Day	Not reported but characteristic probably captured from assumption or food description	Captured but unclear whether reported	Not reported but captured	Other (e.g. portion information)
		Butter not captured as normal fat, but could be assumed from the lack of any other details Cola light not specifically captured as 'with caffeine' but could be assumed from product			
Too 4	5				
Too 4	6	Pepsi max not specifically recorded as including caffeine but probably implied in the name	Mayonnaise recorded as 'commercial' but unclear whether reported as such	Sausage not reported as dried, but captured as chorizo, which is usually dry-cured	
Too 4	7				Dinner not reported as being at home, but captured
Too 4	8				
Too 4	9	Pepsi max not specifically recorded as including caffeine but probably implied in the name			
Too 4	10	"No sugar added to coffee" not reported, but is default option to capture			

Appendix V. Food quantification means used by the tools

Mean of food quantification	Tool 1 (24h-recalls)	Tool 2 (24h-recalls)	Tool 3 (24h-recalls)	Tool 4 (24h-recalls)	Tool 5 (Records)	Tool 6 (Records)	Tool 7 (Records)
Food models							
Food pictures	✓	✓	✓	✓	✓	✓	✓
Household measures	✓		✓	✓	✓	✓	✓
Standard units	✓		✓	✓	✓	✓	✓
Standard portions	✓		✓	✓	✓	✓	✓
Packaging size			✓	✓	✓		✓
Ruler	✓						✓
Sketches			✓				
Gram/volume method	✓	✓	✓	✓	✓	✓	✓
Weightening				✓			✓
Other ^(a)	✓						✓

(a) Other: pictures of different sized-plates, cups and glasses

ABBREVIATIONS

24h recall	24 hour recall
API	Application Programming Interface
BMI	Body mass index
DCM	Dietary and Chemical Monitoring
EFSA	European Food Safety Authority
EPIC	European Prospective Investigation into Cancer and Nutrition
EU	European Union
EuroFIR	European Food Information Resource Network
FCDB	Food composition databases
FFQ	Food Frequency Questionnaire
FPQ	Food Propensity Questionnaire
HHF	Hellenic Health Foundation
IFR	Institute of Food Research, Norwich Research Park, Colney, Norwich, UK
IMR	Institute for Medical Research, Centre of Research Excellence in Nutrition and Metabolism, University of Belgrade, Serbia
QCs	Quality controls
RACs	Raw Agricultural Commodities
RT	Ring-trial
CQ	Comprehensive Questionnaire
SOPs	Standard Operating Procedures
ToR	Terms of Reference