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Report
APPROVED: 17 January 2024
doi: 10.2903/sp.efsa.2024.EN-8578

Advice for the update of the EU Menu guidance: results of the ERA EU Menu project

Marga Ocké[1], Caroline van Rossum[1], Catarina Carvalho[2,3], Milton Severo[3], Daniela Correia[3,4], Andreia Oliveira[3,4], Duarte Torres[2,3], Carla Lopes[3,4]

1 RIVM, The Netherlands,
2 Faculty of Nutrition and Food Sciences, University of Porto, Portugal,
3 EPIUnit, Institute of Public Health and Laboratory for Integrative and Translational Research in Population Health (ITR), University of Porto, Portugal,
4 Department of Public Health and Forensic Sciences, and Medical Education, Faculty of Medicine, University of Porto, Portugal

Abstract

The availability of detailed and high-quality food consumption data is essential for EFSA's risk assessments. In 2014, EFSA published the EU Menu guidance on collecting such data in a harmonised way. The ERA EU Menu project aims to give evidence-based recommendations for updating the EU menu guidance. Based on a literature review on the landscape of methods and tools available for national dietary surveys, lessons learned through an evaluation of the data collected under the EU menu, and a symposium on 'Harmonised Food Consumption Data Collection in Europe: Time to Reflect and Plan Ahead', recommendations for an update of the EU Menu guidance were derived. Regarding the topic organisation and planning, the current guidance seems adequate. It is recommended to stimulate more data collection on subgroups such as pregnant and lactating women, vegetarians, and adults over 74. For dietary assessment, flexibility is recommended to accommodate differences in the appropriateness of using interviewer-administered or self-administered new –technology-based 24-hour dietary recalls or food records. More specific guidance is recommended regarding the aspects of food description using FoodEx2 facets, standardisation of the food propensity questionnaire, quality monitoring and assurance, data transfer and reporting. Such updated guidance is thought to lead to better data quality and better insight in data quality. Moreover, better harmonised data can be achieved with improvements in various EU Menu guidance aspects. For dietary assessment, creating flexibility is needed due to differences in the degree of digitalisation in European societies and to gain more experience in the large-scale application of self-administered dietary assessment methods. It is recommended that EFSA also uses other strategies to obtain good quality and better harmonised data. These could include financial incentives, tender specifications consistent with the EU Menu guidance, and supporting capacity building and the sharing of protocols, materials, and lessons learned between countries.

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Key words: national dietary surveys; EU Menu guidance; updated recommendations; sampling and recruitment; new technologies; dietary assessment method; quality assurance

Question number: EFSA-Q-2022-00823
Correspondence: iDATA@efsa.europa.eu

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Acknowledgements: We highly appreciate all input received from experts in the EFSA Network of Food consumption data, EU Menu survey coordinators to check and complete our information, EFSA colleagues (Sofia Ioannidou, Anastasia Livaniou and Ashraf Khosravi) and collaborators under the tasking grant GP/EFSA/DATA/2021/01 Lot 3 (Androniki Naska, Krystalia Niforou, Elissavet Maria Valanou and Nikolaos Koffas).

Suggested citation: Marga Ocké, Caroline van Rossum, Catarina Carvalho, Milton Severo, Daniela Correia, Andreia Oliveira, Duarte Torres, Carla Lopes. Evaluation of the data collected under the EU Menu framework and advice for the update of the EU Menu guidance. EFSA supporting publication 2024:EN-8578. 54 pp. doi:10.2903/sp.efsa.2024.EN-8578

ISSN: 2397-8325

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Summary

The availability of detailed and high-quality national dietary survey data is essential for reliable and refined dietary exposure assessments within EFSA's risk assessments work. In 2014, a guidance was published on the methodology to be used for the collection of harmonised and high-quality food consumption data. The current report presents advice how to update the EU Menu guidance. This work was part of the EFSAs granted project 'Evaluation, Review and Advice on methods and tools for EU Menu phase 2', with acronym 'ERA EU Menu', grant GP/EFSA/DATA/2021/03.

Based on lessons learned from a literature review on the landscape of methods and tools available for national dietary surveys, an evaluation of the data collected under the EU Menu program, input from the EFSA Network on Food Consumption Data, and an international symposium on 'Harmonised Food Consumption Data Collection in Europe: Time to Reflect and Plan Ahead', recommendations for an update of the various aspects of the EU Menu guidance were derived. Below a summary of the recommendations is provided.

- Retain the advice for conducting a pilot study and keep the strict criteria for interviewer selection and training, in case of interview-based methods.
- Keep the advice of maintaining the target population of the general survey from 3 months to 74 years and the minimum of 130 participants per sex/age group. In the planning and monitoring phase, give specific attention to population groups for which difficulties in achieving the targeted number of participants are expected (infants, toddlers, and older adults). Aspects related to the representativeness of the study populations should be more extensively evaluated and reported.
- Support dietary surveys on special subgroups of the population that are especially vulnerable or underrepresented, such as pregnant and lactating women, adults above the age of 74, institutionalised persons, and vegetarians.
- The dietary data should be distributed proportionally throughout the 4 seasons and the seven days of the week. More flexibility in the mode of interview administration and the number of days between the interviews can be helpful in achieving this aim.
- Keep the recommendation to pay special attention to sampling and recruitment of participants. Furthermore, keep the guidance to monitor the non-response throughout the survey and register information such as the number of refusals, non-contactables, and to report on the participation rates. It is recommended to monitor and report contact rate and two types of response rates, and to indicate which is the numerator and denominator used to estimate these ratios. The guidance text on the recruitment in waves can be extended in explaining that this type of recruitment has the advantage that the composition of wave samples can be adjusted based on differences in response rate of subpopulations. For example, invite more teenagers in the next waves, if the response rate of this age group is low in the first waves.
- Given current technical and societal developments, we advise that in the next round of EU Menu, responsible national organisations can make a choice to adhere to the previous recommended dietary assessment method and its administration, or to use self-administered tools for 24-hour dietary recalls or food records according to the country's specific context. This means the following for adults: an interviewer administered 24-hour dietary recall (face-to-face, telephone or videocall), or a self-administered 24-hour dietary recall or smart-phone food record; and for children below the age of 10, a paper or digital food record that can be completed by other persons than the main care takers (e.g. kindergarten teachers), in combination with an interview-based completion interview or digital food record administered by the main carer. During the next EU Menu period, e-skills, digitalisation, and technology-based dietary assessment will further develop as well as its implementation experience. It is advised to monitor this closely for the more distant future. Irrespective of the dietary

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assessment method, it is still recommended to keep the advice of at least two non-consecutive days for each person with a minimum of seven days in between. In addition, it is advised to limit the period in between the two days to two to six weeks, depending on the survey design. In case of incomplete data collection (only one day), although it does not qualify as a complete participant in relation to the target numbers, the data of this person should not be excluded from the final datasets.

- Keep the guidance that the choice of the dietary assessment tool is free but extend the required characteristics of the chosen tool. The tool should be able to fulfil the guidance regarding detailed food description (using FoodEx2 classification system) and portion size estimation.
- Keep the guidance that the food lists (including food supplements) in use should be specific and describe this more explicitly. Further harmonise the use of facets at the food group level, including information on brand and product names. It is advised to keep the recommendation that dietary assessment methods should have different methods for portion size estimation including the use of validated pictures; add that the pictures can either be on paper in a picture book or digital.
- Develop a central food propensity questionnaire that can be extended to country-specific contexts according to accompanying guidelines. This central food propensity questionnaire should include food items not consumed at a daily basis in a given country. Using current EU Menu data some examples are fish and seafood, offal and pulses/legumes, and food supplements. Collect the food propensity data as part of the EU Menu database.
- Revise and update the list of recommended variables regarding participants' background and standardise and extend the answer options based on the experiences in the EU Menu surveys. Emphasise the importance of conducting and reporting a comparison between participants and non-participants for evaluating a potential participation bias. It is recommended to keep the guidance of collecting some additional information from non-participants if allowed in the country.
- Keep the guidance that survey participants' weight and height should be measured in the case of children and self-reported or measured in the case of adults. For attaining higher accuracy in anthropometric measures, it is recommended to stimulate measurement of anthropometry rather than self-reports. An example to stimulate this is via the tender evaluation process. In case of measurements, the training of the personnel doing the measurements should be standardised and surveys should monitor the digit preference per interviewer during the fieldwork to tackle possible recurrent issues.
- Keep the guidance on quality assurance and that the quality assurance plans should include a number of standardised objective quality indicators to be assessed throughout the survey fieldwork for monitoring purposes and taking corrective measures. For ensuring representativeness, the use of sampling weights is recommended. Other recommended quality indicators are: energy misreporting, energy intake outliers, proportion of missing data, intra class correlation coefficient and relative standard error. The guidance should also describe the procedure to assess them. It is advised to include evaluation of the work of interviewers (if applicable), and to set criteria for corrective follow-up actions focused on minimising possible systematic errors during the fieldwork.
- Update and specify the guidance regarding data transfer and reporting. Make sure that all requested data is used (as intended), for example regarding usual intake calculations.
- Develop a glossary with clear definitions and explanations for all relevant terms in the EU Menu guidance.

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For some of these recommendations, further development, study, and pilot testing is needed before a new round of EU Menu can be started.

The updated guidance is thought to lead to better data quality and better insight into data quality. Moreover, better harmonised data can be achieved by improvements obtained in various aspects of the EU Menu guidance, while also more flexibility in dietary assessment (administration) is needed due to differences in the degree of digitalisation in European societies, but also to improve and gain more experience in the large-scale application of self-administered dietary assessment methods in various population groups.

It is recommended that EFSA, in addition to updating the EU menu guidance, also use other strategies to obtain good quality and better harmonised data. These could include financial incentives, tender specifications consistent with the EU Menu guidance, and supporting capacity building and the sharing of protocols, materials, and lessons learned between countries.

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Table of contents

Abstract 1
Summary 3
1 Introduction 8
1.1 Background and terms of reference 8
1.2 ERA EU Menu 9
1.3 Objective and Reading guide 10
2 Data and methodology 10
2.1 Data underlying the recommendations 10
2.1.1 Input from the literature review (WP1) 10
2.1.2 Input from the quality evaluation of available EU Menu data (WP2) 12
2.1.3 Experts' input 15
2.2 Methodology of deriving recommendations for advice 15
3 Results 17
3.1 Study organisation and planning 17
3.1.1 Guidance 17
3.1.2 Lessons 17
3.1.3 Recommendations for advice 17
3.2 Target population, sampling frame, sampling, timing of the fieldwork 17
3.2.1 Guidance 18
3.2.2 Lessons 18
3.2.3 Recommendations for advice 19
3.3 Recruitment and participation rate 20
3.3.1 Guidance 20
3.3.2 Lessons 20
3.3.3 Recommendations for advice: 21
3.4 Dietary assessment method and administration 21
3.4.1 Guidance 21
3.4.2 Lessons 21
3.4.3 Recommendations for advice 27
3.5 Dietary assessment tools 28
3.5.1 Guidance 28
3.5.2 Lessons 28
3.5.3 Recommendations for advice 30
3.6 Describing foods and portions consumed 31
3.6.1 Guidance 31
3.6.2 Lessons 32

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3.6.3 Recommendations for advice 33
3.7 Food propensity questionnaire 34
3.7.1 Guidance 34
3.7.2 Lessons 34
3.7.3 Recommendations for advice 34
3.8 Nondietary information 34
3.8.1 Guidance 34
3.8.2 Lessons 35
3.8.3 Recommendations for advice 35
3.9 Quality assurance 36
3.9.1 Guidance 36
3.9.2 Lessons 36
3.9.3 Recommendations for advice 37
3.10 Data transfer and reporting 37
3.10.1 Guidance 37
3.10.2 Lessons 38
3.10.3 Recommendations for advice 39
3.11 General aspects 40
3.11.1 Lessons 40
3.11.2 Recommendations for advice 41
4 Discussion 41
4.1 Main findings 41
4.2 Strengths and limitations 42
4.3 Recommendations 43
References 45
Glossary and abbreviations 47
Appendix A – ICDAM 2023 symposium - report 49

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1 Introduction

1.1 Background and terms of reference

The availability of detailed and high-quality national dietary survey data is essential for reliable and refined dietary exposure assessments within EFSA's risk assessment work. The collection of accurate and harmonised food consumption data at a European level is therefore considered a primary, long-term objective for EFSA. In 2014, a guidance was published on the methodology to be used for the collection of harmonised and high-quality food consumption data. The current report presents advice for the update of the EU Menu guidance. This work was part of the EFSA's granted project 'ERA EU Menu', grant GP/EFSA/DATA/2021/03.

Since 2011, EFSA has supported 26 dietary surveys in 17 Member States and six dietary surveys in four pre-accession countries (IPA), as part of the EU MENU framework project "What's on the Menu in Europe?". In December 2014, the guidance on the EU Menu methodology was endorsed by the EFSA Network on Food Consumption Data and it was published. This guidance describes in detail the methodology to be used for the collection of harmonised and high-quality food consumption data from all European countries under the EU Menu framework project. So far EFSA supported dietary surveys in both children and adult's population groups in the following 15 countries: Belgium, Croatia, Cyprus, Estonia, France, Hungary, Italy, Latvia, Poland, Portugal, Slovenia, Spain, The Netherlands, Montenegro, and Serbia. In Austria, Finland, Greece, Romania and Bosnia and Herzegovina only adult surveys were supported, whereas in North Macedonia this was only the case for the children population.

All EU Menu projects are expected to be finalised by the end of 2023 and the food consumption data collected within these dietary surveys will, step by step, be added to those already available in the EFSA Comprehensive European Food Consumption Database.

Consumer behaviours, however, evolve over time and it is fundamental to keep EFSA's food consumption database updated. Therefore, the collection of up-to-date, harmonised, and high-quality food consumption and related data should continue after 2023. EFSA needs to prepare the ground for the next round of national dietary surveys within the EU, expected to be carried out after 2025 (EU Menu phase 2). This must be cost and time effective without jeopardising the quality of the collected data.

The objective of this grant was to map the landscape of methods and tools available/used for national dietary surveys outside the EU Menu project and to evaluate those used under the EU Menu surveys as well as the consumption data received so far. Based on the results of these activities, the EU Menu guidance will be updated in view of the possible use of new technology and harmonisation of the best quality methods across surveys during the next round of national dietary surveys for different age classes and within the EU, EFTA, and IPA countries (EU Menu phase 2).

The specific objectives were the following:

1. Develop a search protocol and carry out an extensive literature review on methodologies and tools (e.g., dietary software) for collecting food consumption data at individual level in view of their use in national dietary surveys.
2. Establishment of a protocol for the evaluation of the food consumption and related data collected under the EU Menu framework project in view of identifying differences in the quality of the results due to the use of different methods and/or tools.

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3. Deliver a report describing the results of the quality evaluation of the EU Menu dietary surveys and of the food consumption and related data collected so far, as described in the above- mentioned protocol. Based on this analysis and the extensive literature review, the report should as well provide suggestions for an update of the EU Menu guidance, with the possible use of new technologies, in view of the next round of national dietary surveys for different age classes and within the EU, EFTA and IPA countries (EU Menu phase 2).

This grant was awarded by EFSA to the National Institute for Public Health and the Environment (RIVM), Bilthoven, the Netherlands, with beneficiaries the RIVM and the University of Porto, Portugal. The grant title was 'Evaluation and development of methods and tools for the preparation of the next round of national dietary surveys (EU Menu phase 2)' with grant number GP/EFSA/DATA/2021/03.

1.2 ERA EU Menu

Under the grant as described in section 1.1, RIVM and the University of Porto worked together in the project 'Evaluation, Review and Advice on methods and tools for EU Menu phase 2', with acronym ERA EU Menu. The objective of the ERA EU Menu project is to give advice to EFSA for an update of the EU Menu guidance, based on an extensive literature review on methodologies and tools that are currently used in national dietary surveys, or that have recently been developed and can potentially be used for collecting such data, and based on an evaluation of the data collected under the EU Menu framework.

The ERA EU Menu project consists of 3 main parts, i.e., work packages, that each provides answer to a specific question:

1. What are the available methodologies and tools suitable for collecting data in national dietary surveys (WP1)?
2. Which lessons can be learned from the current available data in the EU Menu framework (WP2)?
3. Which recommendations can be given for an update of the guidance for collection of high quality and harmonised data in national dietary surveys in the EU Menu framework (WP3)?

Figure 1 provides a graphical representation of the project's work packages which relate directly to the questions above.

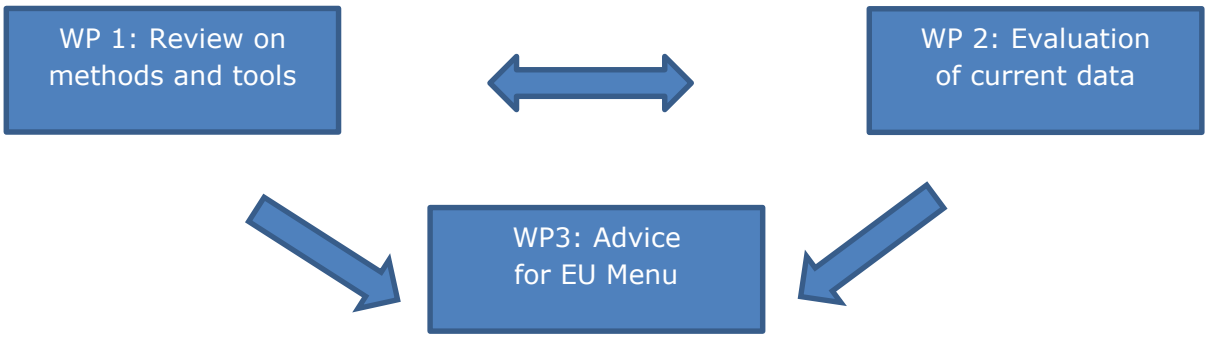

Figure 1: Graphical representation of the ERA EU Menu project.

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1.3 Objective and Reading guide

In this report, recommendations for updates of the 2014 EU Menu Guidance are given. The input and methodology used to derive the recommendations is described in Chapter 2. Within Chapter 3, for each topic of the Guidance, the current advice is summarised, lessons from the previous work packages are given, and recommendations for the update of the guidance or follow-up actions are formulated. Chapter 4 includes a brief overall discussion.

2 Data and methodology

2.1 Data underlying the recommendations

Input for the lessons were derived from various sources, i.e., the literature review conducted in WP1, the quality evaluation of available EU Menu data in WP2, and input collected from various experts. Because the input from WP1 and WP2 was such an important source of the lessons underlying the recommendations, the objectives, methodologies, and results of both work packages are summarised in sections 2.1.1. and 2.1.2, respectively. In addition, the approach of collecting information of experts is described in paragraph 2.1.3.

2.1.1 Input from the literature review (WP1)

The literature review conducted in WP1 was described in detail elsewhere (van Rossum et al. 2022). Below follows a concise summary of its objectives, methodology and results.

In work package 1: Review on methods and tools, the following specific research questions were defined:

1. Which methods and tools were used in national dietary surveys in EU Member states, IPA and EFTA countries, and selected other countries in the period 2006-2021?
2. Which method and tools are available in the world that could be used for national dietary surveys and which lessons can be learned on the evaluation of these methods and tools?

See also figure 2 for an overview of the activities in work package 1.

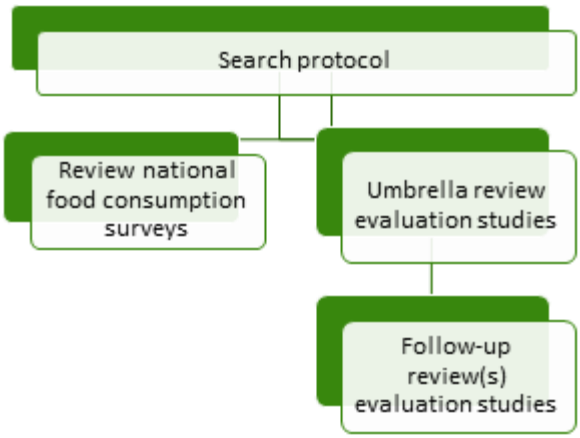

Figure 2: Graphical representation of work package 1 'Review of the methods and tools'.

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For research question 1, the review started with information from existing inventories of national dietary surveys, complemented with a consultation of survey contact persons and a grey literature search. This specific approach was chosen because for most countries there is usually one organisation or consortium of organisations responsible for the national dietary surveys. The inventory of used methods and tools in national surveys in the period 2006-2022 was based on data available in the EFSA comprehensive food consumption database, the FAO Global Individual Food consumption data Tool database, the Global dietary database of Tufts university, and two published literature reviews by Huybrechts et al. in 2017 and De Keyzer et al. in 2015 (Huybrechts et al. 2017; de Keyzer et al. 2015). For EU Menu surveys the published survey reports in the EFSA Journal were used as information source. Experts of the EFSA Food Consumption Data Network checked and corrected the overview of surveys. In total, 81 surveys were included, of which 29 were EU Menu surveys.

For research question 2, the work started with an umbrella review, a review of reviews published since 2006 on the evaluation of the methods and tools that are in use or that can potentially be used for national dietary surveys. Based on the findings of the umbrella review, it was decided if and for which methods or tools follow up literature research was needed based on individual studies. In the umbrella review, reviews were searched that evaluated one or more potential dietary survey methods regarding a) its value for dietary exposure assessment for the European population and relevant subpopulations such as done by EFSA, b) its feasibility for participants and subject burden, c) its feasibility from an organisational point of view, and/or d) its absolute or relative validity. Publications from 2006 onwards till the end of 2022, that were either systematic reviews or meta-analyses, or reviews with a systematic approach, were included. In total, 36 reviews were identified of which 8 reviews received a low-quality score, leading to 28 reviews included in the results. A follow-up review was conducted focussed on recent individual studies on mobile phone and image-based dietary assessment tools identified in the umbrella review and published in the period 2020-2022.

The inventory of used methods and tools in national surveys since 2006 showed a large heterogeneity in sampling designs, response rates, sample sizes, underreporting, and dietary assessment. Also, for several indicators many missing data occurred, especially from reports. The age range of the studies varied a lot across the surveys, and barely 40% of the surveys were conducted among both children and adults. In addition, some small-scale surveys were specifically aimed at pregnant or breastfeeding women or breastfed children. The national population register was used as sampling frame in 21% of the surveys, next to a variety of other sampling frames. Some form of probabilistic sampling seemed to be used in many surveys. Information on response rate, participation or cooperation rate was not always available and it was not always clear in which way these rates were calculated. The mostly used dietary assessment methods were repeated 24-hour dietary recalls and, among the younger children, food records. The level of energy underreporting was indicated in 30% of the studies and was on average 18%. In general, the variation in dietary assessment methods and the number of days for which data was collected were smaller in the EU Menu surveys than for the non-EU Menu surveys.

The umbrella review showed that among the conventional dietary assessments, the 24-hour dietary recall is the preferred method in adults, given feasibility and validity aspects. Moreover, the umbrella review indicated that a range of new technology-based dietary assessment tools were developed in the last decades. Most of the evaluated tools are self-administered variations of the conventional dietary assessment methods. Examples are online 24-hour dietary recalls, smartphone food records, and automated dietary assessment through wearables as technology-based variant of the observation method. Several technology-based

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methods were image-assisted or image-based. These methods have advantages like reduced administration costs, flexibility in time and location, but also disadvantages such as the required e-skills, non-response bias, and investment costs. Although these methods are not yet extensively validated, they seem to have similar, or slightly lower (relative) validity compared to conventional methods. Both online 24-hour recalls, and smart-phone food records have potential for use in national dietary surveys. Specifically, for the quantification of food portion sizes, two literature reviews were identified. They showed that only few methodologies for quantification were validated. The results of these studies indicated a reasonable level of validity and showed that image-based portion size estimation was more accurate than food models and household utensils. For use by children, no clear conclusion on the most valid portion size estimation could be drawn. Online 24-hour dietary recall tools were applied in several large-scale studies, whereas smartphone food records are less often used in large scale research. Based on the reviews no conclusion could be made about the accuracy of one specific tool compared with another.

In a follow-up review of recent individual studies on the mobile phone and image-based dietary assessment tools identified in the umbrella review, it was observed that 11 tools had recent publications in 2020-2022, in which three tools were actually used in large-scale studies with more than 520 participants. All studies were performed in adults.

In conclusion, the umbrella review showed that the 2014 EU Menu guidance regarding the 24-hour dietary recall as preferred dietary assessment method for adults is supported by the conclusions of evaluation studies on conventional dietary assessment methods. Moreover, it showed that in the last decades various new technology-based dietary assessment methods were developed and evaluated. Both online 24-hour dietary recalls and smart-phone food records might have potential for use in national surveys. A comprehensive insight of advantages, disadvantages, opportunities, and risks is needed to evaluate whether they are suitable for use in large-scale settings in representative populations in European countries. In view of the update of the guidance for the next round of EU Menu surveys, it is recommended to collect supplementary information for this evaluation. Such information should include level of internet access, e-skills, available input data and expertise in the countries; tool specific information to evaluate flexibility, fitness-for-purpose, data protection, governance and sustainability aspects; best practices and lessons from front-runners in using these tools; insights in the impact of current heterogeneity of EU menu tools on quality; and monitoring of scientific literature on further development and the evaluation of tools as important input for this evaluation.

2.1.2 Input from the quality evaluation of available EU Menu data (WP2)

The quality evaluation of available EU Menu data conducted in WP2 was described in detail elsewhere (Carvalho et al. 2023). In summary, the second work package in the ERA EU Menu project aimed to provide robust and scientific-based evidence to consent an update of the EU menu guidance by the evaluation of the current data, collected under the EU menu framework, and the assessment of their quality.

An accurate measurement of data, particularly dietary data, across populations from different countries, as the ones included in the EU Menu framework, is a challenging task. Surveys are easily prone to random and systematic errors that might affect the accuracy and precision of the final estimates. Random errors will decrease the precision of the measurement estimates, resulting in a loss in statistical power. These random errors can result, for example, from the natural day-to-day variation in food intake that arises from differences in food intake both between individuals (between- or inter-person variation) and within one person (within- or intra-person variation) (Rutishauser 2005; de Boer et al. 2011). At the same time, surveys

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are also prone to systematic errors that can reduce study accuracy, and that can be introduced at any stage of the survey, from the study sampling to the publication of results. Potential sources of systematic errors can be related with the use of non-probabilistic samples, the procedures used in data collection (day of the week or season reported, the methods used to quantify dietary intake, etc.), the magnitude of the energy misreporting, among others (Gibson, Charrondiere, and Bell 2017). Ultimately, systematic errors will bias dietary intake measurements, yielding potentially erroneous conclusions with regard to the absolute quantity of foods and nutrients consumed. Previous studies have identified procedures to overcome these errors, namely by incorporating standardised quality-control procedures and collecting more than one 24-hour dietary recall per person, as advised by EFSA guidance (EFSA 2014). Moreover, standardisation of methodologies in the Pan-European context, such as the EU Menu framework, enables consistency and harmonisation of data collection for risk assessment and other purposes.

The nature, direction, and magnitude of these errors will vary across surveys depending on the methods and procedures conducted, which highlights the importance of establishing guidelines for data quality assessment within the EU Menu framework. Quality indicators are objective, standardised, evidence-based measures that may help to collect and analyse better quality data and track the performance of accurate and harmonised food consumption outcomes within and among countries.

The specific objectives within work package 2 were:

1. To identify the most relevant data quality indicators related to EU Menu dietary surveys;
2. To describe the statistical approach for evaluating the overall quality of the surveys and for finding factors associated to the quality indicators;
3. To summarise the quality of the surveys in the EU Menu framework and its main associated factors.

See also figure 3 for an overview of the activities in this work package.

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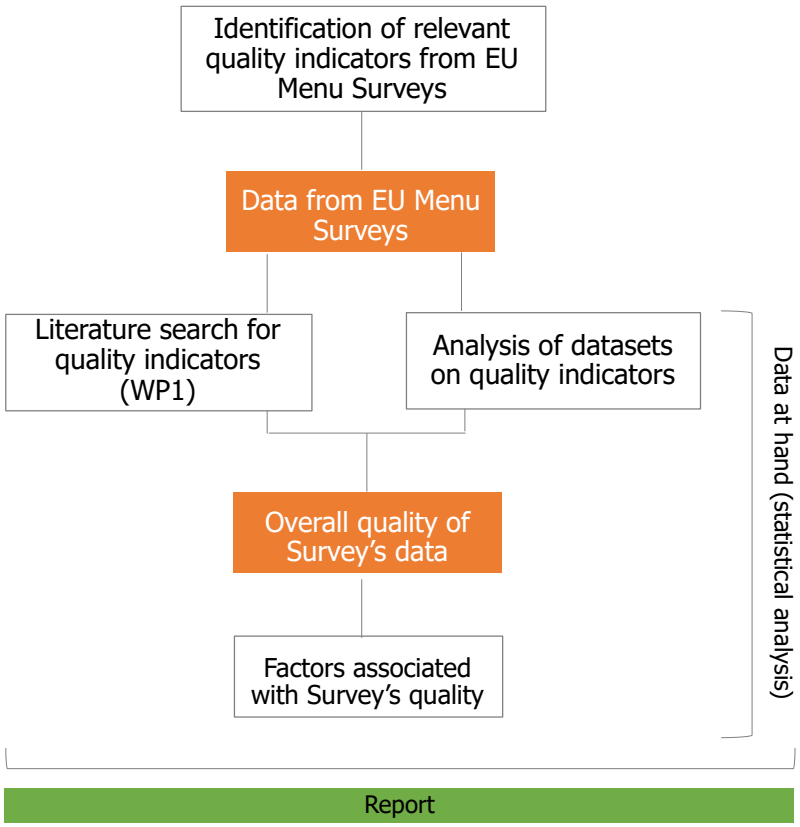

Figure 3: Graphical representation of work package 2 'Evaluation of current data'.

Thirty-one surveys conducted under the EU Menu guidelines were assessed through the datasets shared with EFSA and the methodological reports to map the surveys according to the 96 quality indicators identified in a Protocol published elsewhere (Carvalho et al. 2023). The quality indicators focus on nine survey dimensions: Sampling, Recruitment, Training and supervision of interviewers, Data collection procedures, Software tools and validation, Non-dietary data collection, Data completeness, Data analyses and Reporting. Moreover, exploratory analyses were done to investigate inter-correlations and dependencies among quality indicators within different dimensions.

Our findings indicate that, in general, the surveys adhered well to the EFSA 2014 guidelines, resulting in a commendable level of harmonisation and compliance with the recommendations. Nevertheless, several inconsistencies within and between surveys were identified throughout this study that deserve to be highlighted for future improvement. For instance, challenges were noted in the dimension related to recruitment, where definitions of participation rate, contact rate, and cooperation rate were often inaccurately reported. Similarly, the dimension assessing food and recipe description faced challenges due to the lack of consistency and harmonisation on reporting FoodEx2 facets. Other issues included the omission of crucial information in reports, differences in seasonality coverage during the dietary data collection, and variations in data reporting to EFSA.

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Generally, an enhanced sampling plan was linked to greater data reliability, a reduced occurrence of outliers, and improved collection of non-dietary data. Thus, ad-hoc surveys exhibited lower quality in these aspects. Furthermore, improved interviewer training and the application of appropriate interview procedures were associated with more accurate food and recipe descriptions and a reduced rate of missing data. The country's level of education and demographic factors also played a significant role in data quality. Highly educated populations are likely to better report and describe the foods consumed despite of investing less in the training and supervision of interviewers. Countries with higher proportion of the population living in rural areas presented lower data reliability.

In conclusion, this study highlights the relevance of defining and measuring data quality indicators and emphasises their significance as valuable lessons that inform recommendations for future survey rounds.

2.1.3 Experts' input

For this advisory report, input from members of the Network on Food consumption data was sought during the meetings of the Network organised by EFSA in April 2023.The findings of WP1 regarding conventional and technology based dietary assessment methods and a selection of the findings WP2 with preliminary recommendations for the update of the EU Menu guidance were presented and discussed (EFSA FCD Network 2023).

In June 2023, experts' input was also gathered at a symposium entitled 'Harmonised food consumption data collection in Europe: time to reflect and plan ahead'. The symposium was organised by the authors in collaboration with EFSA and the University of Athens as part of the International Conference on Diet and Activity Methods (ICDAM) 2023. ICDAM provides a forum for the discussion of high-quality and novel research to advance methods for assessing dietary and physical activity exposures and outcomes ('ICDAM' 2023). Participants included scientists and professionals in the area of dietary and physical activity assessment. The aim of the symposium was to share the preliminary findings of the ERA EU Menu project and to discuss options regarding the administration of the dietary assessment method and for the level of flexibility in dietary assessment tools as input for sections 3.4 and 3.5. About 35 participants from 20 countries, including 15 European countries, participated in the symposium. Participants were presented with advantages and disadvantages of some advice choices and were invited to provide insights in showstoppers and additional arguments for or against a certain choice. More details of the symposium and the way input was collecting is given in Appendix A.

2.2 Methodology of deriving recommendations for advice

In chapter 3, lessons and recommendations regarding the EU Menu guidance are presented. The outline of the 2014 EU Menu guidance is used to structure the contents. For every topic in the guidance, the result section has three paragraphs. These are:

1. Guidance: i.e., a summary on this topic from the guidance; the reader is referred to the original guidance document (EFSA 2014) for more details, and arguments for the given guidance.
2. Lessons: i.e., lessons regarding the topic of the guidance derived from the various sources of input described in section 2.1.
3. Recommendations for advice: recommendations for the update of the EU Menu guidance on the topic. In case no recommendation for an update can be formulated, the recommended additional steps for deriving this is given (see below).

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In general terms, each recommendation is framed as one of the following options:

- Keep the 2014 guidance.
- Change the 2014 guidance to conduct the surveys in a specific way.
- Change the 2014 guidance with the advice to share good practices, protocols, tools, etc., among countries rather than specifying exactly how something should be performed. Only mention what the intention is (general advice to EFSA: create a protocol and tool hub for this).
- Conclude that there are no arguments (some aspects were not evaluated) to keep or change the guidance. State this explicitly.
- Conduct activities before a decision can be taken if and how the guidance can best be changed. For example, EFSA can for example start a preparation and piloting project to perform those tasks if they agree.
- Provide other support (e.g., on special groups).

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3 Results

3.1 Study organisation and planning

3.1.1 Guidance

Special attention should be paid to the planning and preparation phase of a survey.

3.1.2 Lessons

Pilot study. A lesson related to the organisation and planning was that performing a pilot study is a feasible step in survey preparation, as more than 90% of all surveys report that a pilot study was conducted prior to the survey. This was independent of the target group (<10, ≥10 years, and ad-hoc). However, it was not possible to determine whether the pilot studies were conducted in a similar setting and with similar methods due to missing information in the survey reports (Carvalho et al. 2023).

Background in nutrition and dietetics. A lesson regarding interviewer selection was that most surveys met the recommendation of having interviewers with a background in nutrition or dietetics or who at least had experience in health assessment. This aspect of having a background in nutrition was moderate-strongly correlated with improved food and recipe description and lower prevalence of missing values in the datasets (Carvalho et al. 2023).

Training. The guidance recommends a training phase for the interviewers to ensure the collection of comprehensive data, which was carried out for all surveys. However, details about these trainings are frequently missing in the reports. Examples of missing details are whether there were standard operating procedures in place, in which phase the training took place, and if it covered all survey aspects (Carvalho et al. 2023).

Planning phase. Training and planning seem important, because surveys with a better planning phase (training of interviewers, adequate survey monitoring) also tend to have better food and recipe description, namely through adequate reporting of foods and recipes and better use of the FoodEx2 classification system (facets and specificity). The surveys with focus on staff training were also more likely to use a validated software, with several automatic validation procedures (probing questions, outlier detection, etc). The surveys with higher focus on staff training were also more likely to use a validated software, with several automatic validation procedures (probing questions, outlier detection, etc). The strong association between these survey subdimensions, observed in the WP2 analysis, suggests that data quality can be further enhanced if an adequate training phase is complemented by a harmonised software tool (Carvalho et al. 2023).

3.1.3 Recommendations for advice

We recommend retaining the advice for conducting a pilot study, unless the team has experience with a survey with the same/similar methods, study population and context.

Furthermore, in case of interview-based methods, we recommend keeping the strict criteria on a background in nutrition or dietetics in interviewer selection and on training of the interviewers, as this has been shown to result in better food description.

We recommend facilitating the sharing of best practices on survey preparations, interviewer recruitment and training.

3.2 Target population, sampling frame, sampling, timing of the fieldwork

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3.2.1 Guidance

The guidance focuses on collecting data from population groups, ranging in age from 3 months to 74 years. This includes children from 3 months to 9 years old, divided into three age classes (infants aged from 3 months to 1 year, toddlers aged from 1 to 2 years, and other children aged from 3 to 9 years), and all other subjects aged from 10 to 74 years, divided into three age classes (adolescents aged between 10 and 17 years, adults aged between 18 and 64 years and the elderly aged between 65 and 74 years).

For each country, the sample size should be high enough to ensure that, taking into account the anticipated response rate in the country, at least 260 participants, 130 males and 130 females, in each age class defined in the study population, will finally participate in the survey. However, it is strongly recommended that more than the minimum number of subjects be included to account for a variety of diet types, particularly in countries where the diet is expected to be highly heterogeneous because of regional, socio-economic or other differences.

A probability sampling strategy with at least, where possible, pre-defined age and sex classes to define strata should be used. The sampling frame recommended as a basis for sampling in an EU Menu survey is a national population register. If a population register is not available, alternative sampling frames may be used, provided special attention is paid to their suitability for the survey.

3.2.2 Lessons

Target population. Approximately 40% of the EU Menu surveys was conducted among both children and adults. However, not all surveys included participants within the age range recommended in the guidance (3 months-74 years). In fact, there was considerable variation in age ranges included and this can be attributed to the fact that the contract between EFSA and specific countries was not always in line with the guidelines (EFSA 2014). It was also observed that specific groups, like pregnant women and exclusively breastfed children are not often included in the surveys. The number of ad hoc surveys on special groups were limited to eleven. If special groups were surveyed, they were mainly conducted among pregnant women, vegetarians, or lactating women. Institutionalised individuals were not assessed in the EU Menu surveys. For Middle, Western and Northern Europe there are fewer data on special groups in the EU Menu data warehouse, as compared to Eastern and Southern Europe (Carvalho et al. 2023).

Sampling frame. There is large variation in the sampling frames from which the study populations in the surveys have been drawn. The most used frames were national population registers and census data. Also, other sampling frames were used, for example lists of subjects that participated in health interview surveys, lists of professionals, and lists of schools. According to what is reported, except for ad hoc studies, most sampling frames used covered the defined target population. However, no estimates of coverage error are indicated to estimate possible bias.

Sampling design. Except for ad-hoc samples, all surveys employed a probabilistic sampling design stratified by sex, age and in many cases, geographical region (Carvalho et al. 2023).

Sample size. The minimum sample size per sex and age group was in general achieved by most surveys, for the age groups included in the survey. Infants and elderly are the age groups with most lack of compliance. It was not clear in most cases whether the surveys applied adequate statistical procedures to determine the appropriate sample size according to the countries' characteristics. Based on the quality assessment, it seems likely that the

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total sample size was adequate in terms of precision, as the relative standard error (RSE) calculated for some key-variables (energy, BMI, food groups) was in general low. The correlation analysis showed that lower RSE for key estimates was associated with higher data reliability. In ad-hoc surveys higher RSE values were found indicating lower data reliability.

Timing of the fieldwork. A higher compliance with seasonality and days distribution was associated with higher data reliability and food and recipe description. Most surveys comply with the recommendation of uniform distribution of interviews across the four seasons, but some deviations were found. Some surveys covered only two different seasons, which might be explained by the tender specifications (Communication by EFSA staff)[1] that had this as a minimum award requirement. Similarly, some surveys had fewer data for the weekend (Fridays-Sundays) (Carvalho et al. 2023). A better distribution of dietary interviews per weekdays and seasons was found for surveys that did not necessarily have at least one-face to face interview or had more flexibility in applying different methods of interview administration.

3.2.3 Recommendations for advice

Target population. It is recommended that EFSA maintains the target population of the general survey from 3 months to 74 years. Moreover, it should support dietary surveys on special subgroups of the population that are important because they are at risk groups or for other reasons, since they are currently not represented or underrepresented. For example, it can be useful to provide targeted financial support for such surveys. Examples of underrepresented subgroups are pregnant and lactating women, adults above the age of 74, institutionalised persons, and vegetarians.

Sample size. Keep the advice regarding the minimum of 130 participants per sex/age group, as the currently available EU Menu data show that this number is feasible and sufficient to estimate the intake of some key indicators with sufficient precision (a low relative standard error). For surveys among specific groups, it is recommended to stimulate larger sample sizes, for instance by giving extra incentives for larger sample sizes. If the food consumption data will be used for broader purposes, it is recommended to investigate the required sample size and if needed to adjust the minimum or put extra financial incentives in the contracts on larger sample sizes. It is also recommended that the guidance for the study organisation and planning (paragraph 3.1), includes specific attention to the population groups for which difficulties in achieving the targets are expected. We recommend that EFSA facilitates and

[1] 2015: OC/EFSA/DATA/2015/03 "Support to National Dietary Surveys in Compliance with the EU Menu methodology (fifth support)", https://etendering.ted.europa.eu/cft/cft-display.html?cftId=844

2016: OC/EFSA/DATA/2016/02 "Support to National Dietary Surveys in Compliance with the EU Menu methodology (sixth support)" for children & OC/EFSA/DATA/2016/03 for adults, https://etendering.ted.europa.eu/cft/cft-display.html?cftId=1590 & https://etendering.ted.europa.eu/cft/cft-display.html?cftId=1592

2017: OC/EFSA/DATA/2017/01 "Support to National Dietary Surveys in Compliance with the EU Menu methodology (seventh support)" for adults and OC/EFSA/DATA/2017/02 for children, https://etendering.ted.europa.eu/cft/cft-display.html?cftId=2683 & https://etendering.ted.europa.eu/cft/cft-display.html?cftId=2682

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stimulates the sharing of experiences and best practices on this. For instance, for infants, it is useful to use actual sampling identification lists and successive sampling waves. In case low numbers for elderly are due to low response levels, it would be useful to increase the contact attempts, and more flexibility in the interview setting and timing. And adolescents are in some cases more sensitive for higher incentives.

Sampling frame. The representativeness of a study population is an important quality characteristic for national dietary surveys. Therefore, it is advised that more information on these aspects should be evaluated and reported. For instance, the undercoverage due to the sampling frame of ineligibles, and a comparison of the target population and the study population for at least some pre-defined characteristics, such as socio demographic characteristics. This comparison gives an indication of coverage error as the study sample is derived from a frame that may not perfectly enumerate the population. Special attention should be given on the undercoverage of some certain socioeconomic groups.

Timing of the fieldwork. Keep the guidance that surveys should distribute the fieldwork throughout the 4 seasons and a uniform distribution of dietary recalls on the seven days of the week. For the seasons, it is recommended that covering all seasons becomes a requirement in the tender specifications too. The guidance should emphasise that the survey planning should ensure a uniform distribution of dietary interviews per week and weekend days. Particular attention should be paid to days such as Fridays and Saturdays. Also explain in the guidance that habitual intakes can be estimated better if all combinations of days of the week are available in the data. More flexibility in the mode of administration and the number of days between the interviews can be helpful in achieving this aim.

3.3 Recruitment and participation rate

3.3.1 Guidance

Special attention should be paid to sampling and recruitment of participants. This is to ensure a representative sampling in the country and to make every possible effort to keep the participation rate as high as possible.

3.3.2 Lessons

Participation rates. The guidance indicates definitions for the calculation of participation and contact rates. However, surveys mostly present a so-called "Response-rate" somewhat equivalent to the cooperation rate, but not defined in the EU Menu Guidance, and do not report the other requested related rates (Carvalho et al. 2023).The presented response rates vary widely suggesting methodological differences in the calculations, especially since very high, thus, seemingly unplausible values are reported (Carvalho et al. 2023; van Rossum et al. 2022). Another explanation is differences in sampling frames. Some ad hoc surveys had high response rates but at the same time were often conducted in convenience samples. Response rates for convenience samples cannot be compared to response rates for which the denominator of the calculation is a representative population for the target population.

Representativeness. Overall (except from ad-hoc surveys), the samples are reported as representative of countries' general population, but no comparison of specific characteristics (sample vs population) is provided for its objective assessment (Carvalho et al. 2023). Weighted factors are used in some surveys to ensure representativeness. However, these factors are not available in the EU Menu database (Carvalho et al. 2023). Furthermore, a higher data reliability is associated with a similar distribution of the study population as the target population and applying weighting procedures.

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3.3.3 Recommendations for advice:

Keep the recommendation to pay special attention to sampling and recruitment of participants. Although the approaches can be country-specific, it is worthwhile to share possible strategies on this in order to ensure a representative sampling in the country and to keep the participation rate as high as possible.

Representativeness. Furthermore, keep the guidance to monitor the non-response throughout the survey and register information on the number of refusals, non-contactables, etc. and to report on the participation rates. If the sampling frame allows, the recommendation to monitor non-response in the different age and sex strata could be extended to socio-economic variables such as educational level. The guidance text on the recruitment in waves can be extended in explaining that this type of recruitment has the advantage that the composition of wave samples can be adjusted based on differences in response in subpopulations.

Participation rate. It is recommended to keep a guidance on the terms and formula of the participation rates. For surveys with a probabilistic sampling approach, it is recommended to monitor and report three different ratios to address subjects' participation in the surveys. These are:

- contact rate (eligible/(eligible + unknown eligible individuals)),
- response rate 1 (former cooperation rate)= (participants / eligible individuals)
- response rate 2 (former participation rate) = (participants / (eligible + unknown eligible individuals)).

The difference between response rates 1 and 2 is whether the people whose eligibility is unclear (unknown eligible individuals) are included in the denominator. This is usually the case if there has been no contact. The formulas were also used in the 2014 guidance, but the terms response rate 1 and response rate 2 were not used before.

For surveys that do not use a form of probabilistic sampling, such as ad hoc surveys based on a convenience sample, it is recommended to report Response rate 3, i.e., the number of participants divided by the number of approached persons. In this way it is clear that response rates of surveys with and without a probabilistic sampling are not comparable.

It is also recommended to enforce standardisation of the calculations by reporting both the numerator and denominator of the calculations in a digital form (see section 3.10). Of note, the number of full participants (those with minimally two days of consumption data) should be mentioned. In case of partial participants these should be reported separately.

3.4 Dietary assessment method and administration

3.4.1 Guidance

Detailed food consumption information (including food supplements) should be collected on two non-consecutive days for each person. The use of a food diary followed by a computer-assisted personal or telephone interview (CAPI/CATI) should be used to collect data in the case of infants and children, and the 24-hour dietary recall CAPI/CATI method should be used for adolescents and in older age groups. The method recommended for children may be used as an alternative method for adolescents aged 10–15 years. The parent/caretaker can help conduct the interviews if the subject is below the age of 16 years.

It is important to keep the dietary interview time as short as possible, without decreasing the survey output quality, and thus keep the subject burden reasonable.

3.4.2 Lessons

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Method for adults. The review confirmed that within the conventional dietary assessment methods, the 24-h dietary recall with multiple-pass structure was the best choice as main dietary assessment method for harmonised national dietary surveys in adults (van Rossum et al. 2022). This is in accordance with the 2014 EU Menu guidance and practice (Carvalho et al. 2023), and with the practice in most national dietary surveys outside EU Menu (van Rossum et al. 2022). It does not rely on literacy, provides detailed and quantified data on food consumption, has a relatively low subject burden and computerised versions reduce administration and processing costs. However, an interview duration above 30 minutes is also thought to be a reason for decreasing response rates in current Western societies (input at Network of food consumption data) The multiple pass 24-h dietary recall has a lower degree of misreporting than other dietary assessment methods, including food records (van Rossum et al. 2022).

Method for children. For children, there is limited evidence regarding the most valid method. For younger children it needs to be considered that one or more caretakers need to provide the dietary information. For this reason a food diary based method is the advised approach (van Rossum et al. 2022). In other surveys than EU Menu surveys, food records are also the most used dietary assessment methods, but 24-hour dietary recalls are also commonly used (van Rossum et al. 2022).

Interview-based methods. Based on experience of the network on food consumption data, the need for conducting interviews in person has become less relevant. For instance, in the Netherland, hardly any second interview among older adults has been conducted in person, because the interviewer judged the participant capable for a CATI [personal communication/check network]. Since the COVID-19 pandemic more experience has been built on videoconferences instead of CAPI or CATI. This option can also be considered for interviewer-based dietary assessment. An interview duration closer to 30-45 minutes was moderately correlated with higher intraclass correlation coefficients for food groups reported (Carvalho et al. 2023).

New self-administered methods. The umbrella review showed that a range of new technology-based tools were developed in the last decades. Most of the evaluated and validated tools are self-administered variations on the conventional dietary assessment methods, such as online 24-hour dietary recalls and smart-phone food records(van Rossum et al. 2022).

These self-administered, new technology-based methods have advantages like reduced administration costs, flexibility in time and location, to be more appealing and engaging, particularly for children adolescents and more functionalities. Technologies, such as cameras, can be used for bar code scanning of food packages instead of text descriptions, or making pictures of foods and their portion sizes. These features are particularly interesting for food record-based methods, so participants can use them throughout the daily consumption moments. Similarly, reminder pop-ups can be sent to participants based on their activity in the dietary assessment. Hoosen et al. concluded that self-administered dietary assessment can reduce participant and researcher burden, as well as increase adherence to the tool protocol (Hooson et al. 2020; Carvalho et al. 2023). Although several studies reported that participants preferred the self-administered methods, it is unclear if higher response rates can be expected in national dietary surveys if these would change to self-administered dietary assessment (van Rossum et al. 2022).

The reduced administration costs has several aspects. Connectivity enables rapid and remote interaction between the participants and researchers and self-administration offers potential cost-savings. Eldridge et al. indicate that online methods can be deployed to large groups with minimal resources compared to methods requiring in-field researchers (Eldridge et al. 2019). Hooson et al. indicate that technology-based tools improve data analysis, and reduce

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the time and cost required for data entry and data coding (Hooson et al. 2020). The reduced cost advantage is not yet applicable to image-based methods, because computerised identification of foods and quantification of portion sizes is not sufficiently advanced. Professionals are still needed for this task.

Self-administered, technology-based methods also have disadvantages such as the required adequate literacy level and e-skills, which are not equally distributed across Europe and differ greatly by age and education, the non-response bias, and investment costs. See figure 4 for differences between European populations and by age in internet use; and figure 5 that illustrates that internet use in Europe increases and differences between countries decrease. Moreover, the self-administered technology-based tools rely on a good digital data structure. In addition, these methods are not yet extensively validated in larger studies including all age groups and with adequate design and objective reference methods. Till now, they seem to have similar or slightly lower validity compared to conventional methods. Insight in objective validity for all relevant subpopulations within national dietary surveys using biomarkers is highly needed. Whether detailed food and recipe description will be possible via self-administered, technology-based tools probably differs by tool. E.g., tools with bar code scan functionalities allow the capturing of foods at the brand level, whereas self-administered tools that only include text searching might perform less than a trained interviewer.

Considering the data needs of EFSA, participant acceptability and effects on representativeness of study populations, feasibility from an organisational point of view and validity, the most promising types of tools for future use in harmonised national dietary surveys are web-based 24-hour dietary recalls, potentially image-assisted versions, and mobile phone food records. Some countries are using these new technology-based tools or are planning to use these tools (see section 3.5). Less promising tools for implementation in national dietary surveys in the short-term are the automated dietary assessment via wearables, the mobile phone ecological momentary assessment, as these are more in their proof-of-concept phase, and the image-based food records as they do not yet have the advantage of reducing personnel costs.

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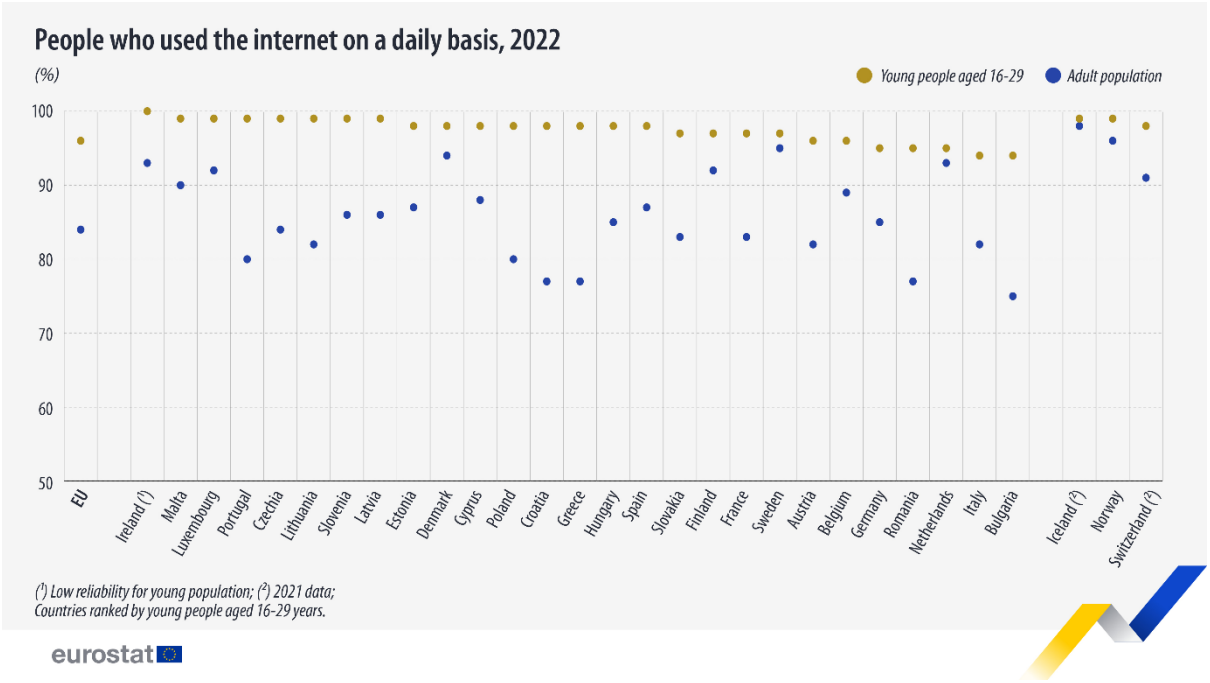

Figure 4: People who use internet on a daily basis; young people (16-27 y) versus adults population (18-74 y) (Eurostat 2023a).

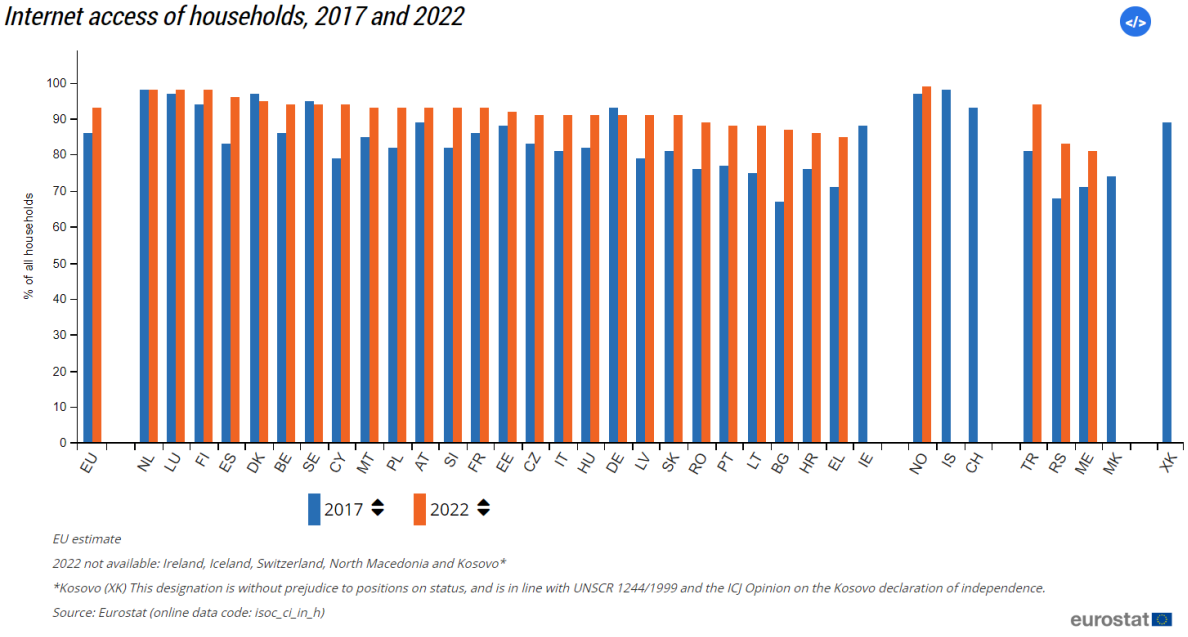

Figure 5: Internet Access of households in Europe in 2017 and 2022 (Eurostat 2023b).

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From the viewpoint of obtaining a representative study population, the preferred administration mode can differ between subgroups within a country, and between the EU member states, IPA and EFTA countries. This seems particularly the case in the current time where digitalisation and e-skills are still developing, and not all population subgroups/countries do this in the same pace (van Rossum et al. 2022; Eurostat 2023b). Apart from prescribing one type of administration method in the EU Menu guidance, it is also possible to allow flexibility and leave the choice to the organisation responsible for the survey, or to the participant. This option is expected to result in higher response levels, as shown in table 1 that lists the advantages of interviewer administration, versus self-administration, versus a choice in administration. To allow for the differences between populations and population subgroups, participants at the ICDAM 2023 symposium clearly preferred the options that the administration method would be flexible (n=23), whereas the option of a single administration mode was less preferred (n=8 for interviewer administered and n=3 for self-administered as only option) (Appendix 1) Different modes of administration of the interview within the same survey or between surveys may imply less standardisation. However, we found that having the same mode of administration to all participants was negatively associated with quality indicators such as "uniform distribution of seasons and weekdays", "compliance with the recommended period of 7-15 days between the two interviews" as well as with the overall score of "food and recipe description". This finding implies that more flexibility can result in better performance on these indicators (Carvalho et al. 2023). Later discussions in the consortium revealed that the 2014 guidance regarding the recommended period between the two interviews was at least 7 days rather than 7-15 days; at various sections of the guidance this was not phrased consistently which leads to misinterpretation.

Table 1: Summary of the advantages by administration method.

Interviewer administration	**Self -administration**	**Choice is free**
Similar types of measurement error in all countries /participants	Similar types of measurement error in all countries /participants	
More complete dietary assessment for easily forgotten foods	Less socially desirable answers	
Higher response rates for older adults and less digitalised countries	Higher response rates for adolescents and young adults and more digitalised countries	Higher response levels if administration method is fitted to the population, or if participants can choose themselves
	Convenient for participants - can be done whenever it suits	
	Less costly once a tool is available	

In conclusion, from the literature review and the interaction with participants of the ICDAM 2023 symposium 'Harmonised Food Consumption Data Collection in Europe: Time to Reflect and Plan Ahead', there is not one preferred choice of dietary assessment method and one way of administration that fits the whole European population at present time.

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Number of days of dietary assessment and period between recall days. If the dietary assessment method is the 24-hour dietary recall or food record, multiple independent administrations (at least two) and statistical modelling are required to estimate usual intake(van Rossum et al. 2022). Based on the analyses of reliability, two reporting days (24-hour dietary recall or food diaries) are enough to reliably estimate the consumption of the majority of food groups. However, some important food groups (including foods not frequently consumed) cannot be reliably estimated, namely: fish and seafood, offal and pulses/legumes (Carvalho et al. 2023). The 2014 guidance text was considered unclear and inconsistent regarding the gap between the two dates for which food consumption data is collected. At some places it seemed that only a minimum period was set, and at other places it seemed a minimum and maximum. EFSA staff confirmed that the intention was that it should be at least seven days. Theoretically, for the estimation of within and between-person variation (needed for usual intake calculations), a random sampling of two days within the data collection period is best. This would mean that for some persons the days would be very close, while for others, they are very far apart over time. If only a period of one or a few weeks is allowed, within person variability will be underestimated, i.e., seasonal variation will all seem as between-person variation whereas it is partly within-person variation. However, there are some reasons to limit the maximum period. In case of a large period in between the two days, the risk of drop-out of a participant increases. Furthermore, for surveys that conduct in person data collection in various regions of a country during consecutive periods, there can be reasons related to the study design (e.g., sampling, logistic) to limit the maximum period to for example two weeks (experience Portugal). In the Netherlands, no problems were experienced with a gap of 2-6 weeks and allowing a longer period if requested by the participant. Moreover, if information on anthropometrics, lifestyle, food propensity etc. is collected only once (sections 3.7 and 3.8), limiting the maximum period might be more important, as that information might not apply anymore to both interview days if they are far apart. Especially for (younger) children, this would be the case.

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3.4.3 Recommendations for advice

Dietary assessment method and its administration. Given current technical and societal developments, it is recommended that the updated EU menu guidance should not focus on only the conventional methods but also allow technology-based variations of the 24-hour dietary recall or food record. We advise that in the next round of EU Menu, responsible national organisations can make a choice to adhere to the previous recommended dietary assessment method and its administration, or to use self-administered tools for 24-hour dietary recalls or food records. In making a choice, an evaluation of advantages and disadvantages for each country is advised. This could include collecting information regarding availability of internet access and e-skills of populations, availability of necessary technical expertise in national dietary survey teams to tailor the tool for the survey needs, availability of data that is needed as input for the tools, and a data infrastructure to collect the data. In case a self-administered new-technology method is chosen, it is recommended to also allow interviewer-administrations for persons that have insufficient skills to do the self-administration. It is expected that this flexibility will increase response rates.

This means the following for adults, adolescents and children:

- Adults and adolescents (ages 10 and over): an interviewer administered 24-hour dietary recall (face-to-face, telephone or videocall), or a self-administered 24-hour dietary recall or smart-phone food record.
- For children below the age of 10, a paper or digital food record that can be completed by other persons than the main care takers, in combination with an interview-based completion interview or digital food record administered by the main carer.

We advise EFSA that they require countries to justify in the study proposals the choice of the dietary assessment method and the way it is administered. It is also important to register the mode of administration in the data submitted to EFSA so that the impact of administration mode on data quality and harmonisation of data can be analysed (see section 3.10).

It is advised to collect and share lessons and best practices from organisations that have experience with the use of self-administered tools in national dietary monitoring or are currently considering changing their dietary assessment method.

In case of interviewer-administration, a 24-hour dietary recall that takes about 30-45 minutes is advised.

Role of the parents/caretakers. Based on our results, no lessons were available on the role of the parents/caretakers in the data collection for children. The above advise on the dietary assessment methods for children assumes that the previous guidance on involving parents/caretakers still apply. Questions on how to deal in practice with multiple caretakers throughout the day for younger children have become more relevant in current times because of higher proportions of children that are a member of multiple households and are relevant both for interviewer-based as well as self-administered dietary assessment. It is recommended to collect and share practical lessons learned on these aspects. Such follow-up activity could be done via an inventory of experiences and best practices from recent national food consumption surveys or other large-scale studies or formative research with parents/caretakers.

Number of days. Irrespective of the dietary assessment method, it is still recommended to keep the advice of at least two non-consecutive days for each person. However, attention should be given to the data collection of foods which are less frequently eaten by the population but are of importance for food safety or other issues. This point may be solved via

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food propensity questionnaires (see section 3.7). It is also recommended that the gap between the first and second interview should be at least seven days in all surveys. In addition, it is recommended to work with a maximum period in between the two days that can be survey-specific. Depending on the context this could be set to two to six weeks, and for individual participants >10 y deviations to a longer period can be allowed if it prevents drop out. In case of incomplete data collection (only one consumption day), the data of this subject should not be excluded from the submitted datasets (see section 3.10), even if the guidance on the minimum required sample sizes (section 3.4) refers to participants with complete data, i.e. two consumption days.

3.5 Dietary assessment tools

3.5.1 Guidance

The software for the 24-hour recall and food diary entry needs to ensure the collection of high-quality data within the survey. The software should include a food list that is open-ended and allows foods, beverages and food supplements consumed on survey days to be entered in accordance with common 24-hour recall entry practices (e.g., the multiple-pass method or similar). The following databases, at least, should be incorporated into the software tool: food descriptors, portion sizes, standard recipes, and yield factors. The food descriptors should be based on or at least be compatible with, the EFSA FoodEx2 facet descriptor system and include the selected facet descriptors indicated in this guidance document. The dietary software tool needs to quantify the foods "as consumed". In addition to this, in the case of recipes, each of the components of the recipe should be quantified "as processed" and "as raw". Data entry should allow each item to be automatically searched, described, quantified, and checked using pre-entered rules. The dietary software tool should include automatic checks, pathways to be followed during the data inputting and probing questions, so as not to overlook the collection of mandatory information and foods that are easily forgotten. Systematic quality controls should be performed throughout the data input procedure. Additional quality checks based on energy values of foods and intake per day are considered an asset. Maintenance procedures for the different databases must be ensured. Like any open-ended method, the databases should be updated regularly so that new foods, recipes, and other information reported by the study subjects can be added. The software tool must allow storage, output, and export of the different survey databases. If an external dietary software tool is used, the software provider should also provide the "training of local trainers" on the use and features of the software tool. Use of a tool that is validated or tested in a population similar to the study population is recommended.

3.5.2 Lessons

Interviewer-based tools for 24-hour dietary recalls. In the first round of EU Menu, a validated tool for 24-hour dietary recalls complying with the multiple-pass method was adopted in more than two third of the surveys (Carvalho et al. 2023). Most software tools were used in survey(s) of a single country. Those applied in more than one country included Globodiet, and DAP (Diet Assess & Plan) (van Rossum et al. 2022). Globodiet is however no longer maintained and hosted by IARC and therefore no software changes are possible and only past users can still use the software (M Ocké; personal communication).

Quality control. Regarding quality control in the dietary software, most surveys report having some automatic quality controls in the software. However, information on the type of controls implemented was heterogeneously reported (Carvalho et al. 2023). The data evaluation showed that 24-hour dietary recall software with the multiple-pass method, including quality controls, outlier detection, monitoring of interview time and with different methods for portion size estimation was associated with lower prevalence of missing data (Carvalho et al. 2023).

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Self-administered tools for 24-hour dietary recalls or mobile phone food records. The umbrella literature review showed that many technology-based tools were developed in the last decades. Most new technology-based tools are not yet validated in larger studies including all age groups and with a good design and objective reference methods. Based on the available validation studies, no conclusions can be drawn on the accuracy of one specific tool compared to others (van Rossum et al. 2022).

Tools for online 24-hour dietary recalls. In a 2021 review, two image-assisted 24-hour dietary recall tools were identified that were applied on a large scale, i.e. ASA24 (Automated self-administered 24-hour dietary assessment tool) and the CAAFE tool (Food Intake and Physical Activity of Schoolchildren tool) (van Rossum et al. 2022). In the 2023 ICDAM conference this appeared also to be the case for Intake24 and Inddex24. Recently, online, and self-administered tools were introduced for national dietary surveys in a few countries. The UK and Sweden use self-administered 24-hour dietary recalls and Denmark an online food record (using Intake24 (Amoutzopoulos et al. 2022), RiksmatenFlex (Lindroos et al. 2019), and WebDASC (Biltoft-Jensen et al. 2014), respectively). France also decided to use Intake24 for future surveys and a pilot study is planned.

Tools for mobile phone food diaries. Of the 37 mobile phone and image dietary assessment methods identified in the umbrella review of WP1, eleven had recent publications and three of them were applied in large scale studies. However, these specific tools were not suitable for national dietary surveys without alterations. Two were focused on weight management rather than objectively monitoring of dietary intake, and the third tool was very labour intensive after data collection. Alternatively, large scale application is seen for the large range of smartphone applications for food logging outside the research and monitoring field (van Rossum et al. 2022). The ASA24 web-based software tool (NCI 2023) cannot only be used as 24-hour dietary recall but also as self-administered food diary. Moreover, Croatia, the Netherlands, and Germany are in different stages of developing smartphone food diary tools (Input from the EFSA Network on Food Consumption data).

Standardisation versus flexibility. Regarding the software or tools, either a single dietary assessment software tool can be required in all participating countries, or a choice of dietary assessment software tools can be allowed that fulfils harmonisation criteria regarding the dietary assessment steps, and input and output data. Both options have advantages and disadvantages, which are presented in Table 2. During the ICDAM conference 2023, this point was discussed with participants, and they were asked to show their preference by voting. There were slightly more votes for freedom in the choice of software (n=18) as compared to a single dietary assessment software (n=15). The flexibility argument was mentioned most often as reason for the vote for freedom in software (Appendix 1).

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Table 2: Advantages and disadvantages of a single dietary assessment software for all participating EU Menu countries.

A single dietary assessment tool for all participating countries	**Choice of tool is free, but functionalities/food descriptions are harmonised**
Most standardised data for all countries	Harmonised data rather than standardised
Makes use of expertise in all countries • to make/adapt one tool to suit EFSA needs • to maintain one tool • to develop training materials • to develop scripts for data handling and analyses	More flexibility for countries to use a tool (also) fitting national purposes and national contexts • time trends with past surveys • dietary interest not relevant for EFSA • direct links with national food databases
Less costly at European level: Less costly for countries without a tool yet	Less costly for countries that already have another tool
One governance organisation, no similar activities needed in each country	Requires less governance efforts and collaboration with and between countries; changes can be made more rapidly

In case of self-administered tools, certain quality controls can be arranged more easily in the software, while in the interviewer-based interviews this was arranged with trained interviewers.

3.5.3 Recommendations for advice

Flexibility. From the literature review and the interaction with participants of the ICDAM symposium, we conclude that there is not one preferred choice of dietary assessment tool at present time. Therefore, we recommend EFSA to keep the guidance to allow flexibility in tool choice. Harmonisation of the future EU Menu data in this situation needs to be ensured by specification of the characteristics for the software (see below), and the description of foods and portions consumed (see section 3.6).

Characteristics for the software. Several required characteristics for the software that were mentioned in the 2014 guidance are important to keep. These include:

- Data entry should allow each item to be automatically searched, described, quantified, and checked using pre-entered rules.
- The software tools for dietary assessment should include quality controls: empty food occasions, missing quantities, food amount outliers, energy, and macronutrient outliers, probing questions for easily forgotten foods.
- The software tool must allow storage, output, and export of the different survey databases. If an external interviewer-administered dietary software tool is used, the software provider should also provide the "training of local trainers" on the use and features of the software tool.
- Use of a tool that is validated or tested in a population similar to the study population is recommended.

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In addition, the chosen tool should be able to fulfil the guidance regarding detailed food description, using FoodEx2 classification system, and portion size estimation specified in section 3.6, should be flexible to adjust if needed (e.g., food lists, food description questions and probing questions), should enable appropriate data protection, governance and sustainability.

It is recommended to include in the guidance that countries collect information to evaluate if self-administered technology-based tools are feasible for their countries including all relevant subpopulations. Such information should include level of internet access, e-skills, available input data and expertise in the countries, and available tools. As the data on food consumption should cover all EU member states, IPA and EFTA countries, it is also advised that EFSA supports open access tools that fulfil the EU Menu criteria and have proven experience with adaptations for different countries. In this way, countries that do not have a tool yet, do not need to identify the best tools themselves or develop them themselves. And can potentially also use country-specific databases in the tools as a starting point to develop their own databases.

Sharing best practices. Moreover, it is advised that EFSA supports the sharing of best practices and lessons from front-runners in using these tools; and to keep monitoring of scientific literature on further development and the evaluation of tools as important input for this evaluation.

3.6 Describing foods and portions consumed

3.6.1 Guidance

Particular attention should be paid to harmonising food lists across the Member States, as well as improving the food descriptors, based on the EFSA FoodEx2 food classification and description system, in the dietary surveys. The minimum set of FoodEx2 facets to be included in the survey are as follows:(1) source facet (e.g. animal/plant origin if not implicit from the food name);(2) part-consumed analysed facet (e.g. with peel, with bone, excluding visible fat);(3) process facet (including preparation/processing methods, cooking methods and preservation methods); (4) qualitative-info facet (e.g. fat content at qualitative level as full-fat and semi-skimmed);(5) fortification facet (data to be provided by national food consumption/composition data experts);(6) sweetening-agent facet and (7) packaging-material facet. Information on the brand and product name of manufactured and packaged foods (e.g., of fat spreads, soft drinks, infant formulae, and food supplements) should be collected as much as possible.

The parallel use of different country and age-appropriate and tested or validated portion size measurement aids (PSMAs) is needed to obtain best estimates on quantities consumed for different foods. The different PSMAs are portion-size picture books, household measures (HHMs), standard portions and known package sizes as weight or volume. The PSMAs should be developed based on knowledge about foods on the national market, food preferences and preferably using weighed records or, if this is not feasible, portion sizes of different foods and dishes consumed by population groups of interest, as estimated in previous national dietary surveys. The food portions measured with other PSMAs (e.g., national standard portions or HHMs) should be tested by weighing prior to the survey or validated at the national level to obtain accurate portion size estimates. In the case of a picture book, a minimum of four colour pictures should be used per picture series. A reasonable number of picture series to be included in the picture book should be around 45. However, more picture series could be included at the country level if found necessary. Extended versions of picture books may be used in face-to-face interviews; however, for phone interviews, the minimum requirements

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should be followed. Different validation protocols for picture books, available from the PANCAKE and PILOT-PANEU projects, are provided as supporting documents in connection with the guidance document and may be used as reference materials.

3.6.2 Lessons

Food description. The quality assessment of EU Menu survey data showed that most surveys report almost 100% of foods with higher specificity levels regarding FoodEx2 hierarchy, which was defined as level 4 or level ≥3 with use of a facet. This illustrates that collecting dietary intake data with high specificity is feasible. Some of the surveys with less specificity in description of foods (>5% of foods: ≤level3 FoodEx2) are also the ones with smaller unique food reports and with higher proportion of foods without facets. This illustrates that in practice facets were not used to compensate for less specific food description. Facet use is heterogeneous and sparse, differing by food group, software used and surveys. The proportion of foods reported without facets (considering all food consumption occasions reported) mostly varies between 6.4% and 68% but goes up to 90% for 3 surveys from the same country. Concerning the EFSA recommended facets, we highlight the following conclusions by facet:

- F01 - Source: This facet defines the origin of raw commodities, but it's often not reported in assessments because it's mostly implicit.
- F08 - Sweetening Agent: Mainly used in beverages and dairy products, its usage varies widely across surveys, ranging from 0% to 100% in different food groups.
- F09 - Fortification Agent: Usage varies based on food groups, even in expected groups like infant cereals. It can range from 0% to 100%, with Dairy Substitutes and Margarines also showing heterogeneity.
- F10 - Qualitative Information: Used more often than F09 but inconsistently across food groups like infant cereals, beverages, dairy, fruits, breakfast cereals, and sweets.
- F19 - Packaging Material: Expected to be used extensively since many foods are packaged. However, it is not consistently used across all surveys, with some omitting it in most food groups.
- F20 - Part Consumed Analysed: This facet is used to specify which part of a food is analysed and is applicable mainly to foods like potatoes, fruits, vegetables, and animal foods. Its usage varies greatly across surveys.
- F28 - Processing: This is the most commonly added facet, especially for foods that are not consumed raw, such as meat, fish, rice, pasta, potatoes, and pulses. Still, even for these food groups where the report median is >90%, some surveys report 0%, indicating heterogeneity across surveys (Carvalho et al. 2023).

Collecting information on brand and product names can be useful to infer food description that is unknown by the participants, e.g., on fortification, or type of sweetener used (experience in the Netherlands). It can be facilitated with barcode scanning of food packages. Several mobile phone food records included this feature in combination with a branded food database (van Rossum et al. 2022). In WP2, it was not possible to analyse brand information in the current surveys, because even though some datasets included variables that collected this information, most of them did not. Moreover, even among the ones that did, the spelling of the brand names apparently was not harmonised.

Food supplements. Apart from two surveys, all surveys assessed food supplements within the 24-hour dietary recalls/food diaries. This observation shows that collecting information on dietary supplements is feasible. However, for half of surveys, it was not reported if supplements quantification in grams was available. (Lessons on food supplements in the food propensity questionnaire are described in section 3.7).

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Recipes. In general surveys have recipe databases that were updated during the fieldwork. In consequence, the percentage of composite dishes (from the FoodEx2 exposure hierarchy) reported as single food items is very low (max 2%), as these were disaggregated into ingredients. For lessons on recipe information in the EU Menu database, see section 3.10. This is also the case for lessons on the variables place, meal, and identification of exception days.

Portion sizes. In the EU Menu surveys, almost all surveys included a validated food picture book for quantification of consumed amounts. In addition, over 85% of surveys also included food standard units as a quantification method, and default quantities were indicated to be used in 36-57% of the surveys. From the WP2 data analyses, we identified a positive moderate association (marginally significant, r=0.35 p=0.07) between the number of picture series in the picture book and the quality dimension (Ga) on Food and Recipe description (Carvalho et al. 2023).The literature review confirmed that using pictures to estimate portions sizes is the preferred approach. Digital pictures seem to perform as well as printed pictures on paper (Amoutzopoulos et al. 2020), although this conclusion was based on only two studies that conducted a direct comparison using a limited number of foods (Amoutzopoulos et al. 2020). This indicates that pictures can also be included in digital tools, and that insight in their validity is important.

3.6.3 Recommendations for advice

Food description. It is recommended to keep the guidance that the food lists in use should be specific. In fact, it could be more explicitly prescribed in the guidance document that the standard should include food items with FoodEx2 level >4. If less-specific codes are used, facets are essential to improve the accuracy of food description. Given the changing market of foods, it is even more important that maintenance procedures of the databases in the tool must be ensured for example updating the food list at a regularly basis. A way to improve the specificity and harmonisation across countries, could be a procedure in which EFSA checks the specificity of the food list and attached facets in the software before the start of a survey. In the (Ocke et al. 2011) (previously called EPIC-Soft) consortium there is experience with this type of harmonisation (Slimani, Valsta, and Group 2002; Ocke et al. 2011). In addition, it is recommended that data collectors/providers are trained providers on the use of FoodEx2. It is also recommended to further harmonise the use of facets. It is advised to develop a complete compendium on the facets applicable to every food group to be implemented in the software tools of the countries to improve harmonisation. The use of facets can be improved by a sharpened software programming. Automatic prompts for specific facets and respective descriptors (particularly for the recommended) should be in place for foods that are expected to have that characteristic. It is advised to keep the guidance that information on brand and product name should be collected wherever possible for manufactured and packaged foods (especially fat spreads, soft drinks, breakfast cereals, infant formulae and food supplements). Dietary assessment with a barcode scanning functionality and a branded food database can help with this.

Food supplements. It is recommended to keep the guidelines on the collection of food supplement data as part of the 24-hour dietary recall or food record as well as in the food propensity questionnaire (see section 3.7). This enables the estimation of usual intake of compounds in food supplements.

Portion sizes. It is recommended to keep the recommendation that dietary assessment methods should have different methods for portion size estimation, namely using pictures with ≥4 pictures per series, having food standard units, household measures, and gram/ml available and default quantities. It can be added that, in general, the pictures are the

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preferred quantification method and that the pictures can either be printed on paper in a picture book or digital. It is important to keep the recommendation that the pictures should be validated, and it is advised that this should be done in the format (e.g., digital or printed) that they will be used in the survey.

3.7 Food propensity questionnaire

3.7.1 Guidance

An additional short, non-quantitative, food propensity questionnaire evaluating usual consumption frequencies of some less frequently eaten foods, and usual consumption frequencies of food supplements, should be included in the survey.

3.7.2 Lessons

All EU Menu surveys applied a food propensity questionnaire. However, the information on the characteristics of the questionnaires and on foods items included was scarcely reported. Only for dietary supplements it was clear that it was included in most food propensity questionnaire. There seemed to be a large heterogeneity in included foods. Food propensity questionnaire data was not available in EFSA datasets hampering the evaluation of its utility in the estimation of food groups less frequently consumed (Carvalho et al. 2023).

Some important food groups cannot be reliably estimated using food consumption data of two days. For many countries this was the case for fish and seafood, offal, and pulses/legumes (Carvalho et al. 2023).

In the EFSA Food Consumption Data network, various members indicated that the food propensity data are not used. And that procedures to estimate usual intake with such data are not known (Input from the EFSA Network on Food Consumption data)

3.7.3 Recommendations for advice

It is recommended, to collect food propensity questionnaire data in the EFSA data database, for better assessment of dietary exposure from dietary supplements and food groups that are not consumed at a daily basis. See section 3.10.

To enhance harmonisation, it is recommended that a central food propensity questionnaire is developed that can be adapted to country-specific contexts according to accompanying guidelines. This central food propensity questionnaire should include food items mentioned in the previous paragraph. Phrasing of the questions and frequency categories can be centrally determined and used for all items.

The current recommendation of including food supplements in the food propensity questionnaire should be kept. To improve the reliability of estimating the usual intake of some food groups such as fish and seafood, offal and pulses/legumes these foods should also be included in the food propensity questionnaire. This list could be extended by infrequently consumed foods that are relevant for dietary exposure assessment of EFSA.

We recommend facilitating the sharing of best practices on the procedures to use the food propensity questionnaire data to model usual intake. See the SPADE manual for examples (Dekkers, de Jong, Verkaik-Kloosterman, and Ocke 2021).

3.8 Nondietary information

3.8.1 Guidance

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Background information on the participants should be collected using a self-administered questionnaire or by the interviewer. Some information, such as sex and age, may already be available from the sampling frame. The answers should be entered in electronic format after the face-to-face meeting or directly with the assistance of an electronic questionnaire entry tool. The minimum set of questions is also proposed.

Survey participants' weight and height should be measured in the case of children and self-reported or measured in the case of adults.

3.8.2 Lessons

Background information on participants. Many variables regarding participants' background are recommended to be collected in the guidance, but these were not mandatory to share with EFSA within the corresponding Subjects dataset. Consequently, a high prevalence of missing values was found for the variables on energy intake, energy misreporters, profession-related, labour-related variables and ethnicity in most EU Menu surveys. Even education-related variables are missing for all participants in some surveys (Carvalho et al. 2023). Also, the EFSA survey reports showed a lot of missing information on additional non-dietary data. Information on physical activity was collected in almost all cases with a questionnaire (van Rossum et al. 2022).

Background information on non-participants. In the detailed guidance, information on age and gender of non-participants is set as minimum required information for comparison with participants. Other relevant variables for providing insight in a potential selection bias, such as educational level, and urban/rural area seem often not available. According to WP2 results these factors can also impact data quality, i.e. food characterisation and data reliability (Carvalho et al. 2023).

Anthropometric information. Based on the available information weight and height of children was mainly measured. For adults, weight and height was mainly measured (26%), but also self-reported (11%) (van Rossum et al. 2022). Anthropometric data were measured using standardised procedures in most surveys, and usually interviewers were trained regularly for this. However, many surveys do not report relevant details regarding the procedure (e.g. if the self-reported weight before pregnancy was collected in case of pregnant women; on regular checking of the equipment used for anthropometric measurements) and if deviations from the procedure were monitored (Carvalho et al. 2023). Higher digit preference was observed in surveys with higher prevalence of self-reported weight and height (Carvalho et al. 2023). In general, ad-hoc surveys had lower levels of measured anthropometrics (Carvalho et al. 2023).

3.8.3 Recommendations for advice

Background information on participant. It is recommended to revise and update the list of recommended variables regarding participants' background. Only the relevant ones should be kept, and these should become mandatory variables in the EFSA template for data sharing. It is advised to include at least one indicator for the participant's socioeconomic status. It is also important to standardise and extent the answer options based on the experiences. In making the revision it is important to consider the regulations of the GDPR.

Background information on non-participants. It is recommended that the guidance stresses the importance of conducting and reporting a comparison between participants and non-participants for evaluating a potential participation bias. The evaluation of survey results in the view of sample representativeness would benefit from the comparison between participants and non-participants (data from registers or refusal questionnaires, when

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possible) for at least some core variables. It is recommended to keep the guidance of collecting some additional information from non-participants, if allowed in the country.

Anthropometric information. It is recommended to keep the guidance that survey participants' weight and height should be measured in the case of children and self-reported or measured in the case of adults. For attaining higher accuracy in anthropometric measures, it is recommended to stimulate conduct measurement of anthropometry rather than self-reports. For example, via the tender evaluation process, and giving higher evaluation points for tenders in which height and weight are measured. In this case, the training of the personnel doing the measurements should be standardised and surveys should monitor the digit preference per interviewer during the fieldwork to tackle possible discrepancies with the standard procedures. In the case surveys have no conditions to perform objective anthropometric measurements, self-reported measurements could be useful anyway to estimate misreporting or to be used in risk assessments. Digit preference should also be monitored in this case. The reference to the EHES procedures (Tolonen 2016) can be updated in the updated guidance.

3.9 Quality assurance

This paragraph does not include quality assurance of the recruitment process, the dietary assessment and anthropometry. For these topics see paragraph 3.3, 3.5, and 3.8, respectively.

3.9.1 Guidance

Quality assurance plans should be prepared at the country level in accordance with this guidance document on the EU Menu methodology. Quality assurance plans need to cover overall management of the survey including the compliance of the survey procedures outlined by this guidance document, organisation and content of training, piloting, quality control of the dietary survey and evaluation of the achieved quality.

The assessment of the prevalence of misreporting (i.e., under-and over-reporting of dietary energy intakes) should be performed both at group level and at individual level using the Goldberg cut-off method (Goldberg et al.,1991), updated by Black (2000a), taking into account the physical activity levels (low, moderate or vigorous) of the survey participants. If no information on the specific physical activity categories is available, age-specific average physical activity may be used for the evaluation. Because the exclusion of misreporters from datasets would introduce bias, they should be identified, but not excluded from the dataset.

3.9.2 Lessons

Quality assurance. The quality evaluation of the available EU Menu surveys showed that all survey methodological reports include a quality assurance section, where the quality procedures are described. All surveys had a coordination team responsible for monitoring the fieldwork and managing possible errors, but details regarding the monitoring of the interviewer, the statistics on observer bias and the strategies to solve fieldwork constraints or to deal with observer bias could not be objectively assessed in most cases due to missing information. All surveys applied quality control procedures. Nonetheless, not all the procedures outlined across surveys were uniform. Moreover, in many cases, few concrete measures are available to assess quality objectively for several survey aspects (Carvalho et al. 2023). See also the recommendation on monitoring digital preference in 3.8.3.

Misreporting. In the EU Menu survey reports, the Goldberg method (Goldberg et al. 1991) updated by Black (Black 2000) used to identify misreporting of energy intake, was reported in 16 survey units. It is unclear if for other surveys misreporting was not assessed or not

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reported since it was not a mandatory information in the survey reports, nor was the underreporters indicator mandatory in the data transfer. The umbrella literature showed, that energy underreporting is common in dietary assessment including 24-hour dietary recalls and food records (van Rossum et al. 2022). This was confirmed in the EU Menu databases with participant over 10 years of age. When calculating the proportion of plausible reporters in the EU Menu data for surveys over 10 years with available estimated for energy intake using standard PAL values, the meta-average of the prevalence was 80.8% varying between 65.9 and 91.8%. The majority of unplausible energy reporters seemed to underreport energy intake (Carvalho et al. 2023). The WP1 literature review, based on a meta-analyses indicated that no differences by sex were observed in the level of underreporting (van Rossum et al. 2022). Additionally, a higher proportion of plausible reporters correlated moderately ($r>0.3$ and $p\text{-value}<0.05$) with a higher intraclass correlation coefficient for nutrients, higher prevalence of reporting foods from higher FoodEx2 hierarchical levels, and a more uniform distribution of interviews across seasons.

Selection bias. Most surveys do not seem to perform a comparison between participants and non-participants, hampering the evaluation of a potential selection bias (Carvalho et al. 2023).

3.9.3 Recommendations for advice

Quality assurance. It is recommended to keep the guidance on quality assurance and that the quality assurance plans should include a number of standardised objective quality indicators to be assessed throughout the survey fieldwork for monitoring purposes and taking corrective measures. For ensuring representativeness the use of sampling weights is recommended. A comparison between participants and refusals is recommended to obtain insight in potential selection bias. Recommended quality indicators are: energy misreporting, energy intake outliers, proportion of missing data in food-related and background variables (overall and per interviewer), intra-class correlation coefficients for food groups and nutrients and relative standard error. The quality indicators should be calculated for the overall survey sample and also stratified by group (i.e., age group, ad-hoc sample, and sex). The guidance should also describe the procedure to assess them. It is advised to include objectively evaluation of the work of interviewers (if applicable), and to set criteria for corrective follow-up actions focused on minimising possible systematic errors during the fieldwork. The explained variance (%) for key variables, such as participants' energy intake, BMI and quantification of some relevant food groups, as fruit and vegetables, cereals or others, should be compared between interviewers to avoid observer bias, as well as the proportion of missing values, digital preference and outliers.

Misreporting. It is recommended that individual specific PAL-values are used instead of standard ones to estimate the prevalence of underreporting (see also section 3.10).

Sharing best practices. Because the context and situations of data collection differ between countries, it is advised that national protocols for additional quality indicators and for corrective measures should be developed to deal with deviations (more training, replacing the interviewer, etc.) at the national level. These protocols can be shared among countries to benefit from each other's experiences. Moreover, sharing of the protocols would also allow similar analyses of the impact of quality assurance aspect on data quality such as conducted in the current ERA EU Menu project, but with fewer missing data.

3.10 Data transfer and reporting

3.10.1 Guidance

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It is highly recommended that the results are made readily available to other interested parties in the field, both nationally and internationally. When reporting, it is recommended that the EFSA EU Menu reporting criteria are followed. These are provided in this guidance document.

3.10.2 Lessons

Data transfer. Many variables in the EU Menu data transmission schema were not mandatory, creating differences in the extensiveness of the data shared for the different surveys (Carvalho et al. 2023).

The place, meal and identification of exception days were mandatory variables in the consumption dataset, and the percentage of "unclassified" values was low in most surveys. Nonetheless, some surveys present a high percentage of unclassified values in these variables, which may result from a limitation in the data schema catalogue of options to classify them. These issues were explained by the surveys in commentaries, but an update of options considering the particularities explained in such comments would be beneficial in the next round of EU Menu surveys. Similarly, for identification of foods that were consumed together as part of a recipe, a recipe code variable, based on the FoodEx2 classification is available in the consumption dataset. However, the report of recipe codes was not observed in all surveys.

Surveys were required to share data of two dietary interviews for a minimum of 130 participants per gender and age group. For surveys that did not share data for participants with only one available interview, it was unclear if these did not occur or that these did occur but were not shared. Such differences in data submissions might have compromised the WP2 analyses on the percentage of complete participants (i.e., participants with ≥2 interviews) (Carvalho et al. 2023).

Reporting. Most of the information about the survey that was recommended to report in Section 10 (Reporting) of the 2014 guidance was indeed presented in the survey methodological reports. However, many issues recommended to be reported in other guidance sections were not addressed in the reports compromising the ability to assess its quality across surveys. Some examples (Carvalho et al. 2023):

- Training characteristics (if SOP were followed, topics/survey phases covered, frequency throughout the survey, etc.);
- Software thorough description: validation procedure; ability to control interview time, full description of automatic quality controls in place;
- FPQ used in different age groups, at least if the items included covered less frequently eaten and seasonal foods; and foods with higher contamination potential;
- Anthropometric data collection: monitoring possible deviations from the protocol for measuring weight and height; procedure to evaluate weight on pregnant women; calibration and verification of equipment;
- Use of weighting factors to ensure representativeness.

For some characteristics in the reporting it was not clear whether the interpretation was similar across the countries, such as 'people with special diet included' and 'includes food/dietary supplements in dietary assessment method', 'Food/dietary supplements asked in questionnaire' and 'cooperation rate/participation rate/response rate', and 'interview duration' (Carvalho et al. 2023; van Rossum et al. 2022).

In general, EFSA survey reports mainly describe the survey protocols and methodological considerations, mostly neglecting the reporting of results. The results are usually presented

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in other reports, most of them in the country's own language. Consequently, because only the EFSA reports were used in WP2 assessment, a large proportion of information for the indicators regarding Reporting of Results is lacking, compromising its quality assessment. (Carvalho et al. 2023).

3.10.3 Recommendations for advice

Since more extensive data transfer and reporting increases the administrative burden for data suppliers, it is advised to only require this for information that will be used by EFSA or is considered important to share.

Data transfer. It is recommended to extend the guidance with a list of mandatory variables before the start of a new round of data collection. A review and update the variables to include in the data transmission schema, making more variables mandatory, and encompassing a response option for cases where data are missing or unclassified. See table 3 for suggestions based on the lessons learned.

The options for coding the mandatory variables from the consumption dataset in the EFSA data schema catalogue should be clarified and updated to avoid misinterpretation and accommodate all situations that are common in the member states, to avoid large proportion of unclassified values. This is at least the case for the variables on place, meal and exception day.

Table 3. Recommendations for variables to be added as mandatory.

Additional mandatory variable	Reason for recommendation
Energy misreporting	Objective quality indicator of the consumption data, can be used in sensitivity analyses
Energy intake	Useful for EFSA's and other purposes
Nutrient intake (if available)	Useful for EFSA's and other purposes, namely, to evaluate the impact of nutritional public health policies at the European level
Sampling weights (if applied by the country)	To present results representative for the national population rather than the study population
Interviewer-administered or self-administered	Allow future analyses regarding associations with data quality indicators
Food propensity questionnaire items	Useful for EFSA's and other purposes
Indicator for socio-economic status of the participant	In order to evaluate representativeness

It is recommended that in the updated EU Menu guidance, data providers should be advised to share data on all (full and partial) participants. Using all data provides more statistical power for the analyses; and information on the percentage of incomplete participants can be used in a new quality evaluation such as performed in the ERA EU Menu project.

Reporting. In case it is considered important to map the adherence to the recommendations of the EFSA guidance of future EU Menu data, expand and update the 2014 list of topics to be mentioned in the EFSA reports to accommodate all the methodological recommendations

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from the guidance. Some topics should be encouraged to describe in more detail. Examples are:

- the setting and methods of the pilot study and if it differed from the actual survey;
- not only that weighting factors are available to normalise the sample, but also if and how this factor was applied to ensure representativeness;
- not only that all seasons were covered but also more details on the distribution of participant across the seasons;
- if and how usual intake estimation was performed;
- which approaches were used to deal with misreporting of energy intake.
- the different rates to describe participation including their numerators and denominators; and the number partial participants next to the full participants (see section 3.3).

A suggestion to stimulate comprehensive reporting is to develop a reporting template in the form of a questionnaire with mandatory questions. Such a template could enforce standardised information in one language and completeness of the information on these topics. Also, for better consistence and interpretation it is recommended to include a glossary with definitions in the EU Menu guidance for items to be reported. For all derived quantitative indicators, formula should be given. For example, what is the numerator and the denominator of indicators expressed in percentages such as participation rate (see also section 3.3).

3.11 General aspects

Based on the analyses done within the ERA EU Menu project, some lessons and recommendations were derived that do not refer to the guidance or that refer to different sections of the guidance. Those are discussed below.

3.11.1 Lessons

Quality differences among countries. Based on the ecological analyses in WP2 (Carvalho et al. 2023), it was observed that highly educated populations report and describe foods better, despite investing less in training and supervision. In addition, countries with a higher proportion of their population in rural areas have lower data reliability (Carvalho et al. 2023).

Quality differences for ad hoc surveys. In the EU Menu data, relatively few data on special groups were available (see section 3.3.). Moreover, in the quality evaluation, ad hoc surveys performed poorer on the quality indicators of sampling and anthropometry (Carvalho et al. 2023). Particularly identifying a representative sampling frame and recruiting the special groups are known to be challenging.

Tender specifications. In the quality evaluation of the EU Menu data, it was observed that the quality level and particularly the extensiveness of the data submitted seem partly driven by tender specifications. Therefore, not only updating the EU Menu guidance is important, but also influencing data quality and completeness via tender specifications (Carvalho et al. 2023).

Terms and definitions. Both in the EU Menu survey reports and the submitted data, there appeared to be heterogeneity in the interpretation of terminology. Examples are the terminology for response rate and interview duration (Carvalho et al. 2023).

Use of the data. It is not clear whether the guidance is completely fitting with the methods of data analysis and interpretation by the users of the data. For instance, the advice to collect food consumption data for two days and a food propensity questionnaire is based on the

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assumption that users use these data to model the usual dietary intake if chronic intake is of interest. Similarly, it is assumed that weighing factors are used if interest is in dietary exposure of a national population rather than a study population; and that data quality indicators are taken into account in interpreting the data.

3.11.2 Recommendations for advice

Quality differences among countries. It is recommended to search for ways to improve the quality of the national dietary surveys for countries with lower educated populations and higher proportions of people living in rural areas. This could include:

- Investment in training and education of survey staff;
- Share detailed national protocols, materials, and questionnaires for re-use and learning best practices;
- Support open-source dietary software that can be adapted for use in various countries (though it is not mandatory to use it);
- Support FAIR-data and scripts for data handling. FAIR data are data which meet principles of findability, accessibility, interoperability, and reusability;
- Provide more financial help;
- Discuss the bottlenecks for improved quality with the involved countries.

Quality differences for ad hoc surveys. In order to improve the availability of data for important subgroups of the population covering all regions of Europe it is recommended to stimulate ad hoc surveys for these groups. Suggestions to do so are by providing financial support, and by sharing best practices among countries. Moreover, it is important to stress also the importance of high quality for surveys in those groups, but also to allow flexibility in order not to discourage data collection in the special groups.

Tender specifications. It is recommended to make the tender specifications more in line with the guidance. Moreover, apart from specifying minimum methodological and data requirements in the tender specifications, it is recommended to provide incentives for extras above the minimum requirements. E.g., by developing quality scores for the evaluation of tenders that are based on the quality scores developed in WP2 or lessons of WP2.

Terms and definitions. It is recommended to develop a glossary with clear definitions and explanations for all relevant terms in the EU Menu guidance.

Use of the data. It is recommended to check if the current guidance fits with the method of data analysis by EFSA or the other way around. See for examples the lessons section.

4 Discussion

4.1 Main findings

Harmonisation. The ERA-EU Menu literature review on the used methods and tools in national dietary surveys since 2006 showed that among EU Menu surveys, the dietary assessment methods and number of days of data collection were more harmonised compared to the non-EU Menu surveys. Thus, a guidance helps in harmonising the methodology of dietary surveys. The conducted quality evaluation in the ERA EU Menu project revealed that there are also options for further harmonisation and recommendations were formulated for this in the various sections 'Recommendations for advice' of Chapter 3. The main improvements can be made in the areas of recruitment, food description, food propensity questionnaires, quality assurance and monitoring of fieldwork, and reporting.

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Flexibility. However, there are also indications that providing flexibility to participants, can improve quality aspects of dietary surveys. Therefore, for some aspects, such as whether to employ CAPI or CATI, less harmonisation is advised because it improves better distribution among days of the week. Also, for dietary assessment and its administration more flexibility is recommended. Given current technical and societal developments, we advise that in the next round of EU Menu, responsible national organisations can make a choice to adhere to the previous recommended dietary assessment method and its administration, or to use self-administered tools for 24-hour dietary recalls or food records according to the country's specific context, particularly regarding the level of e-skills. This means the following for adults: an interviewer administered 24-hour dietary recall, or a self-administered 24-hour dietary recall or smart-phone food record; and for children below the age of 10, a paper or digital food record that can be completed by other persons than the main care takers (e.g. kindergarten teacher), in combination with an interview-based completion interview or digital food record administered by the main carer. During this mixed methods periods, e-skills, digitalisation, and technology-based dietary assessment will further develop as well as its implementation experiences. It is advised to monitor this closely for the more distant future and adjust the mixed method advice if possible and needed.

Quality. Next to harmonisation aspects, the ERA EU menu data evaluation showed that there are options for improvement of the quality of the surveys, for better insight in the survey quality, and for more comprehensive availability of data. Such improvements cannot be reached by merely adapting the EU Menu guidance but must be accompanied by other actions such as by stimulating the sharing of protocols, tools, materials, and data, by providing financial incentives, and by revising tender specifications. For the sharing of protocols, tools, materials, and data a digital platform could be created, taking other dietary assessment platforms as example but focussing it especially on harmonised food consumption surveys (Dao et al. 2019).

4.2 Strengths and limitations

This report was largely based on input from previous activities in the ERA EU Menu project, i.e., a literature review and a quality assessment of the current ERA EU Menu data. For this reason, limitations of those two previous activities also translate to the current advisory report. For the literature review, they are that the review was for most part an umbrella review including only systematic review and meta-analyses. As a consequence, results from individual studies in most recent years are not included. Potentially we could have missed some new developments. In addition, the umbrella review was not focussed on aspects like sampling and recruitment strategies. For the quality evaluation, the main limitations were discrepancies in reported information across surveys, and missing information for many quality indicators. This compromised the ability to draw conclusions regarding the data quality and its determinants. However, it was the first time that such a quality evaluation on more than 30 surveys was conducted, and we feel that it provided useful insights for drawing recommendations for the update EU Menu guidance. A third part of input was collected during the ICDAM symposium *Harmonised Food Consumption Data Collection in Europe: Time to Reflect and Plan Ahead* in 2023. It was very useful to collect lessons and insights from a broad range of the professionals attending the symposium, although it was not so clear if personal opinions or evidence-based facts were given. A limitation of the current procedure was that lessons from other international monitoring initiatives were not collected.

The recommendations for the next EU Menu guidance were based on both theoretical and practical lessons and considerations, and the practical considerations may vary by context (for example, may differ for different countries in Europe). Also, weighting of different impacts had to be made because some guidance leads to improvement of the representativeness of

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study populations but has a negative impact on the level of harmonisation or quality of the dietary data, or vice versa. The development of recommendations is therefore influenced by the experiences, creativity, and the viewpoints of the authors. The combination of the two teams of RIVM and University of Porto in the project had the advantage that we both have ample experience in organising, designing, and analysing national dietary surveys using different tools and methods and harmonisation of data collections. The recommendation development benefited from the collective and complementary experiences and expertise. In addition, the input from EFSA staff and the university of Athens was very useful. However, input from additional experiences, e.g., using a Delphi approach, could have made the recommendations better supported.

The recommendations were developed assuming that the next EU Menu program will be organised similarly as the previous program. The assumptions were that guidance will be used on a voluntary basis by independent national organisations; that some financial support will be provided to those organisations, but it would not cover all costs; and that (therefore) the national organisations must also collect the data for other, often national purposes. Although it is efficient that national dietary surveys serve purposes at the national level as well as the European level, it is at the same time a very challenging situation in which the various involved organisations have varying stakes. In case of very different situations, e.g., all costs would be covered by EFSA, or a single organisation would be responsible for a European wide data collection, one could recommend more standardised and mandatory rules.

4.3 Recommendations

In chapter 3, a range of recommendations for the update of the EU Menu guidance are formulated. The contents of this paragraph are additional recommendations. We advise to discuss the recommendations of chapter 3 with both the potential organisers of future national dietary surveys, i.e., the Network of food consumption data, and with the users of the data, i.e., the EFSA panels. Their input can be important to refine or revise the recommendations for the updated guidance. Moreover, we advise EFSA to reconsider broadening the scope of the guidance towards data handling, analyses and reporting of results. This would result in less differences in procedures between EFSA and national countries. Similarly, we advise not only focussing on dietary exposure assessment but also the diet in a broader scope: on nutritional intake from and environmental impact of the diet. For these purposes, European standardised databases of foods' nutritional composition and environmental impact indicators that are kept up to date would be beneficial.

Apart from updating the guidance documents, we recommend EFSA also to update the tender specifications, to employ strategies for capacity building in countries with fewer means and experiences in conducting national dietary surveys, and to organise and actively maintain a digital environment where (links to) protocols, best practices, materials, scripts, and relevant data can be found, and to help countries to implement the guidance. These additional activities will supplement and support the updated guidance for a better quality and better harmonised EU Menu phase 2.

It is recommended to develop and pilot test new materials, and details of the updated guidance or procedures that are needed before a new round of EU Menu surveys begins. If the recommendations in the current advice are followed, this would include:

- a list of facets that are relevant for food specification and the food group level;
- a list of features and validation procedures for software tool validation;
- a base food propensity questionnaire;
- a list of data quality indicators that coordination teams should use to monitor the survey;

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- a revised reporting template, potentially in the form of a questionnaire;
- a revised list with mandatory and optional variables and their response options;
- a digital space for sharing protocols, materials, lessons learned, etc.

Publishing a guidance is no guarantee that it will be followed in practice. Sufficient financial incentives, procedures that are easy to employ (e.g., on data transfer or FoodEx2 coding) are important supportive actions. Also aligning the guidance with requirements for other purposes (e.g., metadata requirements for GIFT and Global burden of disease) is recommended in this respect.

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Glossary and abbreviations

ASA24	Automated self-administered 24-hour dietary assessment tool
BMI	Body mass index
CAAFE tool	Food Intake and Physical Activity of Schoolchildren tool
CAPI	Computer Assisted Personal Interviewing
CATI	Computer Assisted Telephone Interviewing,
COVID-19	Coronavirus disease
DAP	Diet Assess & Plan
EFSA FCD Network	EFSA Network on Food Consumption Data
EFTA	The European Free Trade Association. (EFTA is the intergovernmental organisation of Iceland, Liechtenstein, Norway and Switzerland. It was set up in 1960 by its then seven Member States for the promotion of free trade and economic integration between its members. With EEFTA countries these countries are meant).
ERA EU Menu	Evaluation, Review and Advice on methods and tools for EU Menu phase 2
EU MENU	Project focussing on collection of national food consumption data in the view of a pan-European dietary survey
FAIR	FAIR data are data which meet principles of findability, accessibility, interoperability, and reusability.
FAO	Food and Agricultural [2]Organisation of the United Nations
GIFT	Global Individual Food consumption data Tool (FAO/WHO). This platform contains quantitative individual food consumption data from countries around the world, collected through both large nationwide and small-scale surveys.
GloboDiet	A computerised standardised 24-hour dietary recall tool, developed by IARC
GPDR	General Data Protection Regulation. The General Data Protection Regulation (Regulation (EU) 2016/679, abbreviated GDPR) is a European Union regulation on information privacy in the European Union (EU) and the European Economic Area (EEA)
HHMS	Household measures
ICDAM	The International Conference on Diet and Activity Methods
IPA	Instrument for Pre-Accession. IPA offers funds to both EU candidate countries (Albania, Moldova, Montenegro, North Macedonia, Serbia, Turkey,

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	Ukraine) and potential candidates (Bosnia and Kosovo*[3]). With IPA countries, these countries are meant.
PANCAKE	Pilot study for Assessment of Nutrient intake and food Consumption Among Kids in Europe. This project was to develop, test, and evaluate tools and procedures for a future harmonised pan-European food consumption survey (EU Menu) among infants, toddlers, children (up to ten years), and breastfeeding women
PILOT-PANEU	Pilot study in the view of a European dietary survey. The project was performed in the context of EFSA's plan for a pan-European data collection, namely. "What's on the Menu in Europe" ("EU Menu") survey. The goals of the PILOT-PANEU project were to develop, test and evaluate the applicability of tools and procedures for conducting a dietary survey including adolescents, adults and elderly people, based on 2 x 24-hour recall performed with EPIC-Soft methodology.
PSMAs	Portion size measurement aids
RSE	Relative standard error

*Kosovo – this designation is without prejudice to positions on status and is in line with United Nations Security Council Resolution 1244 and the International Court of Justice Opinion on the Kosovo Declaration of Independence.

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Appendix A – ICDAM 2023 symposium - report

The International Conference on Diet and Activity Methods (ICDAM) provides a forum for the discussion of high-quality and novel research to advance methods for assessing dietary and physical activity exposures and outcomes. In June 2023 this conference was held in Limerick, Ireland. During this conference one symposium was organised by the member of the ERA-team in collaboration with EFSA. The aim of this symposium was to share the preliminary findings of this ERA-project and to discuss options for an update of guidance for harmonised food consumption surveys in Europe.

This symposium was held on 27th of June from 15:30 -17:30. About 40 persons attended the symposium. It started with an introduction about the context and aim of the symposium and continued with 3 presentations about the preliminary findings of the project. It ended with a discussion in which the participants were encouraged to be actively involved. In this appendix a summary of this symposium given.

Overall abstract of the symposium: Harmonised food consumption data collection in Europe: time to reflect and plan ahead

Dr. Marga Ocke , Dr. Sofia Ioannidou, Prof. Carla Lopes, Dr. Caroline van Rossum, Prof. Androniki Naska

Rationale. High-quality and detailed food consumption data are essential to improve accuracy of EU wide risk assessments and develop and monitor policies that promote healthier and more sustainable dietary patterns. The collection of reliable and harmonised food consumption data at European level is therefore an important goal of EFSA, the European Member States and associated countries. For this reason, a guidance on harmonisation of national dietary surveys was published in 2014 (EFSA Journal 2014;12(12):3944). Based on the thus far accumulated experience and new developments in dietary assessment methods, an update of the guidance is foreseen. This symposium aims at: 1) highlighting the importance of harmonised European food consumption data, and presenting the achievements and lessons learnt from the EU Menu framework project 'What's on the Menu in Europe?' 2) describing the methods and tools used in the EU Menu food consumption surveys, their characteristics and level of harmonisation of the data collected under the EU Menu framework. 3) sharing the findings of an umbrella literature review focused on the evaluation of new tools and methods that can potentially be used in national food consumption surveys. 4) discussing options for the next phase of harmonised food consumption surveys in Europe. After three presentations that focus on objectives 1-3, a discussion will take place that focusses on the fourth objective. Questions for the discussion will be prepared in advance. ICDAM participants are the best-informed professionals to provide input to the discussion.

Presentation 1: What's on the Menu in Europe? Harmonised food consumption data in Europe: achievements and lessons learnt

Sofia Ioannidou, Androniki Naska, Elissavet Valanou, Anastasia Livaniou

Since 2005, EFSA has closely collaborated with EU-Member States (MS) towards harmonising dietary survey methodology and building a common European food consumption database. Harmonised consumption data are the basis for improving the accuracy of EU-wide exposure assessments and can assist the needs of nutrition surveillance and diet and health-related studies. Improved risk assessments can ensure more targeted risk management and permit more accurate risk communication resulting in increased consumer confidence. In 2011 EFSA

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launched the 'What's on the Menu in Europe? - EU Menu' project to support national dietary surveys in the EU to meet the objectives above. This project focuses on collecting data from six population groups ranging from 3 to 74 years of age with a harmonised methodology (EFSA Journal 2014;12(12):3944). Using EU Menu data has increased the validity of EFSA's assessments. Furthermore, countries with limited experience in undertaking national dietary surveys adopted the methodology to enhance the potential of their data. Running such surveys is a complex task and entails many different challenges. The variability in protocols applied by EU-MS introduced uncertainty when national food consumption data were combined or compared. Response rates and data quality varied. Changes in the food environment challenge the evidence collected. Therefore, future data collection may benefit from technological advancements. However, caution is needed not to increase the burden on participants and the survey's operational team.

Presentation 2: Methods and tools used in EU Menu food consumption surveys; quality and level of harmonisation of the data collected in the EU Menu framework

Carla Lopes, Caterina Carvalho, Milton Severo, Daniela Correia, Andreia Oliveira, Caroline van Rossum, Marga Ocké, Duarte Torres

Evaluating the quality of methods and tools for collecting dietary data used in the EU Menu Surveys is crucial for further harmonisation and methodological robustness of future national surveys. The EFSA-funded ERA EU Menu project aims to map the existing surveys (n=30) and evaluate quality indicators from several dimensions, including: - sampling and recruitment, - training of interviewers, - dietary and non-dietary data collection procedures. A protocol covering 94 quality indicators and the statistical approach for evaluation was developed and the analysis is ongoing. Two sources of information were used to assess the indicators: the surveys' methodological reports and the databases provided by EFSA. For most indicators, the assessment was done through a benchmark approach by setting a reference point to which all the surveys were compared. Often, the benchmark was set through random-effects analysis, combining surveys' indicator results to reach the overall standard. Preliminary results show high compliance with EFSA guidance methodology. Some indicators denote areas for improvement: e.g., the performance of interviewers (80% of surveys with high proportion of digit preference in food amounts), 33% of surveys presented unequal distribution of interviews by weekdays/seasons, 50% of surveys did not report nutrient content, and all surveys scarcely used the advised facets for accurate food description. These results will serve as essential input for advising the EU Menu guidance update and supporting the identification of the best quality indicators for future surveys.

Presentation 3: Evaluation of self-administered tools and methods that can potentially be used in national food consumption surveys: findings from an umbrella review

Caroline van Rossum, Sovianne ter Borg, Andreia Oliveira, Catarina Carvalho, Marga Ocké

Evaluating scientific evidence regarding new and existing methods and tools that can potentially be used in national dietary surveys is important for updating the EU Menu Guidance. An umbrella review was conducted to collect evidence from systematic reviews on this topic. Publications from 2006 onwards that were either reviews with a systematic approach or meta-analyses were included. Data were extracted regarding usability from the perspective of EFSA needs, the representativeness and subject burden, the feasibility from an organisational point of view, and information about absolute or relative validity. In total,

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28 reviews of sufficient quality were identified. Most evaluated new tools were self-administered online 24-hour dietary recalls (51%), smartphone food records (42%), and automated dietary assessment through wearables (8%). These methods have advantages like reduced administration costs and flexibility in time and location, but also disadvantages such as the required e-skills, non-response bias, and investment costs. Although these methods are not yet extensively validated, they seem to have similar or slightly lower (relative) validity than conventional methods. It is concluded that online 24-hour recalls and smartphone food records are potential tools to use in European national dietary surveys. However, the collection of supplementary information is needed for further evaluation. Such information should include the level of internet access, e-skills, available data, best practices and lessons from front-runners in using these tools.

Discussion

Two topics were discussed with the audience, one regarding the advice for the software tool for dietary assessment, and one regarding the administration of a 24-hour dietary recall (see for more details below). Based on two pitches in which the pitchers did not give their personal opinions but gave some arguments in favour for an option for advice for EU menu guidance. The audience was asked to vote for option A or option B using Mentimeter. This is a cloud-based polling tool. Subsequently, the audience was asked to discuss the arguments for the options with his/her neighbour (which arguments do you disagree, which arguments against the option are a 'show-stopper'). Thereafter, the pitchers asked the audience if there is someone who can strengthen their pitch and what are the arguments.

First discussion round: Advice regarding the software tool for dietary assessment

Question: Should we advise EFSA that one specific dietary assessment software is used in the next round of EU Menu surveys, or are countries free to choose a tool that meets certain criteria?

- A – a single dietary assessment software tool for all participating countries
- B - choice of tool is free, but functionalities/food descriptions are harmonised

The following slide shows the advantages and disadvantages using a single dietary assessment software tool in every participating country (option A) versus a free choice of tools that meet the EU Menu criteria- for dietary assessment (Option B). The pitchers only mentioned the advantages of the choice they were promoting.

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Round 1) Software tool for dietary assessment

A - a single dietary assessment tool for all participating countries	B - choice of tool is free, but functionalities/food descriptions are harmonised
Most standardised data for all countries	Harmonised data rather than standardised
Makes use of expertise in all countries • to make/adapt one tool to suit EFSA needs • to maintain one tool • to develop training materials • to develop scripts for data handling and analyses	More flexibility for countries to use a tool (also) fitting national purposes and national contexts - time trends with past surveys - dietary interest not relevant for EFSA - direct links with national food databases
Less costly at European level: Less costly for countries without a tool yet	Less costly for countries that already have another tool
One governance organization, no similar activities needed in each country	Requires less governance efforts and collaboration with and between countries; changes can be made more rapidly

ERA EU-Menu | ICDAM SYMPOSIUM June 27, 2023 60

Based on the poll, 16 participants voted for option B and 14 voted for option A. Several additional arguments were mentioned by the audience.

Regarding option A.

- Nobody should be forced to use one specific tool, but it is important to set guidance in order to force compatibility between tools.
- One tool would help countries that do not have a tool or that do not have means for developing a tool;
- Databases behind software really differ and bias will be included through it, so one method is needed for country comparisons; One tool would help in the comparability.

Regarding option B:

- A lot of countries have their own methods that are implemented already;
    - It might be difficult to make countries contribute in case one tool is recommended, because countries will prefer their own methods, or because the national food consumption surveys are imbedded in other national surveys or national context.
    - If you have to change the method, trends at the national level are more complicated.
- With option B it is possible to get larger number of participants, however, food descriptors should be harmonised. In such way that everybody will describes the foods as thoroughly as they possible can.
- The argument that one tool leads to more comparable data is not always the case; If all countries use the same tool, this does not necessarily mean that the data will be comparable.
- Flexibility in the choice of a tool is important for dietary assessment of the national food consumption. Considering ethnic groups, the dietary habits, preparations, and foods consumed are very different, and thus a tool must reflect those differences and the national context. With one tool it would be hard to fit to dietary assessment of the national consumption.

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General remarks:

- Advice to EFSA not to start the process of harmonisation from scratch. A lot has been achieved in standardisation and harmonisation of the EPIC-Soft software. The lessons and best practices of this experience are important to consider.
- It is impossible to standardise on food group level and food classification.
- The next guidance should be realistic and sustainable for many years, otherwise you have the same discussion over 10 years.
- Change in methods would complicate trend analyses.
- Differences between countries must be able to be quantified.
- Differences between countries must be able to be quantified.
- There are innovations in technology and thus the new guideline must go with the new technologies available and technology compatibility.
- Give attention to the harmonisation and training of data collectors (operation standards and getting systems).

Second discussion round: Advice regarding the administration of a 24-hour dietary recall

Question: What should be the advice regarding the administration of a 24 h dietary recall?

- A – an interviewer-administered 24-hour dietary recall
- B– self-administered 24-hour dietary recall
- C – a 24-hour dietary recall, with a choice for either interviewer- or self-administration

The following slide shows the advantages and disadvantages of the different options in administration method.

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Round 2) Administration-method for dietary assessment

A. Interviewer-administration	B. Self-administration	C. Choice is free across and within countries
Similar types of measurement error in all countries /participants	Similar types of measurement error in all countries /participants	
More complete dietary assessment for easily forgotten foods	Less socially desirable answers	
Higher response rates for older adults and less digitalised countries	Higher response rates for adolescents and young adults and more digitalized countries	Higher response levels if administration method is fitted to the population, or if participants can choose themselves
	Convenient for participants - can be done whenever it suits	
	Less costly once a tool is available	

In the poll 23 participants voted for option C, 8 participants for option A and 3 participants for option B. Several additional arguments were mentioned by the audience:

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Option A:

- Bias is lower with interviewer-based methods.
  - This is the only way to guide the participant correctly.
  - Participants with less educated levels might feel embarrassed in self-reported tools.
- An interview does not need to be face-by-face, an interview via zoom or telephone is also possible. Self-reported methods would increase the bias of report.

Option B:

- Self-administered methods might be the preferred method in the future for the main part of the population.
- It might increase participation or decrease bias.
- The traditional method (interview) is very expensive, and countries cannot conduct it often. Self-administered methods could decrease this burden.
- Follow up is more necessary in self-administered surveys because people tend to forget or ignore consumed products.

Option C:

- The optimal method differs by subgroups.
  - It is important to have the option to adjust the administration method to the group you are study. Capable people tend to be frustrated with a face-to-face interview because it has a higher and probably not necessary burden. It is recommended to give countries freedom to choose. The most accurate way to do it, but with low response rate. Option A is the dream but has very bad responses rates. So, we need to adapt the method to the people in order to be representative. Elder groups /lower educated groups will not be represented in surveys with a self-administered tool; based on a feasibility study among older people with lower SES, it was concluded that they did not have access to the website, because no access to email or knowledge to use it.
  - Children see self-reported data collection as game and are more prone to participate.
- Give the option of administration method to the participants. Thus, use the same tool, but let the participant choose how to administer.
- Data collected with different methods can be comparable:
  - With the correct probing questions, the details of the data of self-administered method tends to be very similar to interviewer-based data. So, a mixture is not a problem.
  - There is literature on comparison of methods, and it seems to be "ok".

General points:

- Which option is sustainable in the future?

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