National nutrition surveys in Europe: a review on the current status in the 53 countries of the WHO European region

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Abstract

Objectives: The objectives of this study were (1) to determine the coverage of national nutrition surveys in the 53 countries monitored by the World Health Organization (WHO) Regional Office for Europe and identify gaps in provision, (2) to describe relevant survey attributes and (3) to check whether energy and nutrients are reported with a view to providing information for evidence-based nutrition policy planning.

Design: Dietary survey information was gathered using three methods: (1) direct email to survey authors and other relevant contacts, (2) systematic review of literature databases and (3) general web-based searches. Survey characteristics relating to time frame, sampling and dietary methodology and nutrients reported were tabulated from all relevant surveys found since 1990.

Setting: Fifty-three countries of the WHO Regional Office for Europe, which have need for an overview of dietary surveys across the life course.

Subjects: European individuals (adults and children) in national diet surveys.

Results: A total of 109 nationally representative dietary surveys undertaken post-1990 were found across 34 countries. Of these, 78 surveys from 33 countries were found post-2000, and of these, 48 surveys from 27 countries included children and 60 surveys from 30 countries included adults. No nationally representative surveys were found for 19 of 53 countries, mainly from Central and Eastern Europe. Multiple 24hr recall and food diaries were the most common dietary assessment methods. Only 22 countries reported energy and nutrient intakes from post-2000 surveys; macronutrients were more widely reported than micronutrients.

Conclusions: Less than two-thirds of WHO Europe countries have nationally representative diet surveys, mainly collected post-2000. The main availability gaps lie in Central and Eastern European countries, where nutrition policies may therefore lack an appropriate evidence base. Dietary methodological differences may limit the scope for inter-country comparisons.

Keywords: national diet surveys; WHO European region; dietary assessment methodologies; scoping review – gaps; multi-criteria analysis; nutritional epidemiology
burden. Other risk factors include alcohol, tobacco misuse and physical inactivity (2). In Europe, the four most common NCDs account for 77% of disease and almost 86% premature mortality (1).

NCDs and related conditions, including overweight and obesity, have significant and growing economic and social costs (1), which traditional clinical approaches are increasingly unable to address (3). Mozaffarian et al. (3) call for a shift in emphasis from such pharmacological treatments to primary prevention through addressing lifestyle risk factors such as dietary patterns in order to reduce cardiovascular risk and NCD-associated problems.

Dietary surveys thus have an important role in assessing dietary patterns in the whole population. Nutrition and health surveys formed the main source of information for dietary risk factors and physical inactivity in a systematic analysis of disease risk in 21 regions worldwide across two decades (4). Such surveys can provide a means of monitoring trends, identifying areas of concern and inequality and evaluating policy impact, thereby ultimately contributing to the promotion of best practice across the region (1). The WHO European Food and Nutrition Action Plan (1) explicitly encourages member states to ‘strengthen and expand nationally representative diet and nutrition surveys’.

Many western European countries currently have established dietary surveys that assess food and nutrient intake. A global review of country-specific surveys from 1990 to 2010 only reported dietary fat and oil intake (5). A comprehensive, updated review of total nutrient and food intakes across different populations and subgroups in Europe is needed, the results of which could identify where in Europe there is a need to improve diets and whether inequalities exist. This paper makes the first step in this regard, establishing which countries have nationally representative dietary surveys and highlighting gaps in nutrition survey provision across Europe.

This review aims to identify which of the 53 countries in the WHO European region have conducted nationally representative dietary surveys of whole diets at an individual level and those that have not. It identifies key characteristics, centred on time frame, sampling and dietary methodology, of known surveys undertaken since 1990 for adults and children and aims to lay the foundations in establishing a clear picture of the current situation. Following this, future papers will examine energy and nutrient intakes in different population groups across Europe to better assess where both gaps in knowledge and dietary inadequacies lie. Information from dietary surveys can be used as a means for governments and health bodies to monitor and reduce the diet-related risk of NCDs and related conditions across Europe, thereby contributing to the goals set out in the WHO action plan.

Methods
We used three key approaches to identifying national diet surveys: (1) contacting authors of surveys, (2) systematic literature review and (3) general web-based searches.

Identifying authors of national diet surveys
We identified authors of national surveys within the WHO Europe remit using listed contact names and other information from two main reports of national dietary surveys (5, 6). If no response was obtained from those authors, Internet searches of nutrition organisations by country and the survey titles listed in the review of 1990–2010 surveys (5) and the European Food Consumption Survey (6) were carried out to find other potentially useful contact details. For countries where this approach did not yield usable contact details, Internet searches using various search terms were performed on organisations specialising in nutrition, including known government and public health agencies. WHO also provided contact details for some of those countries for which they had relevant associates. Contacts identified were asked to complete a questionnaire (Appendix 1) to provide information on nationally representative dietary surveys conducted at an individual level since 1990, including links or references to relevant reports.

Systematic database search
For countries where no contact could be identified, systematic searches were undertaken across Web of Science, Medline and Scopus for nationally representative dietary surveys that collected data at an individual level from 1990 to June 2016. The following query terms were run without language restrictions: (survey* OR research* [TS]) AND (nutrition* OR diet* OR food* [TS]) AND (list of countries).

The title of each paper generated by the database searches was screened for relevance according to the criteria in Table 1; those that are not relevant were excluded. The remaining papers were screened by title and abstract, and full article where available, and their appropriateness for inclusion was checked by a second reviewer. Further surveys, related papers and nutrition expert contact names were gathered by general Internet searching to capture any recently released information, targeting known government and public health agencies using various search term combinations in order to maximise returns. Although there were no language restrictions in the initial search, the WHO Regional Office for Europe, Division of Noncommunicable Diseases and Promoting Health through the Life-Course, conducted an additional database search of papers in the Russian language as an extra check to maximise returns in the 12 Central and Eastern European countries where Russian is an official or widely spoken language.
Survey inclusion and exclusion criteria

| Included                                                                 | Excluded                                                                 |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Surveys conducted at an individual level                                  | Surveys collected at group, that is, household level                      |
| Nationally representative surveys                                        | Non-nationally representative, regional only surveys                      |
| Results of surveys reported by published and unpublished reports, academic journals and websites | Surveys with data collected prior to 1990                                 |
| Surveys that included individuals >2 years                                | Surveys with samples exclusively <2 years                                 |
| Surveys based on whole diet rather than specific food groups             | Surveys with incomplete food group coverage                               |
|                                                                         | Surveys with small sample sizes (n < 200)                                 |

(Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan). However, no papers or reports that met the inclusion and exclusion criteria were found. The databases searched were PubMed, Web of Science and Google Scholar, using the search terms mentioned above, translated into Russian. Further searches with these terms were undertaken in three specific Russian language databases: Kazakh Academy of Nutrition; 1st Moscow Medical Academy named after Sechenov and Electronic Scientific Library in Russian.

Database extraction
Where long-running surveys had multiple collection waves, for example, the French INCA 1 and INCA 2 or UK NDNS 2000–1 and NDNS 2008–12, each collection wave was counted as a separate survey (see Table 2). Survey characteristics were extracted and tabled from the relevant publications, which were accessed in various forms, including summary reports, academic articles and completed questionnaires (see Table 2). The survey characteristics included the following: country name, survey name, year of survey (data collection), information source, sample size and age range, dietary methodology, nutrient composition database and reference. The availability of energy and selected nutrients from the latest surveys collected after 2000 are listed in Appendices 1 and 2.

Results

Data extracted
A total of 109 nationally representative surveys that obtained data on whole diets (rather than focusing only on certain foods) at an individual level since 1990 were found for 34 out of the 53 countries in the WHO office region. Table 2 shows the characteristics of these surveys and that the majority of countries with national dietary surveys (NDS) had conducted multiple surveys. Of the 34 countries with NDS, almost half (n = 16) had long-running surveys with waves conducted over various years; 10 of these also had stand-alone surveys (Table 2). Countries for which relevant survey characteristics were gathered are Andorra, Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Kazakhstan, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, the former Yugoslav Republic of Macedonia, Turkey and the United Kingdom.

Of the 109 nationally representative surveys found, 78 were conducted since 2000, covering 33 countries – those listed previously, excluding Slovakia. Reports of energy and nutrient intakes were not found for each of these surveys. Only 28 surveys from 22 countries were found with post-2000 survey reports of energy and nutrient intakes.

The majority of the surveys were found via Internet searches or emailing contacts gathered by the methods discussed. Current contact details were found for the following 30 countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Malta, the Netherlands, Poland, Portugal, Romania, Russian Federation, Slovakia, Spain, Sweden, Switzerland and the United Kingdom. WHO provided details for Andorra, Kazakhstan and the former Yugoslav Republic of Macedonia. Contact details were not available for the following 20 countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kyrgyzstan, Luxembourg, Monaco, Montenegro, Republic of Moldova, San Marino, Serbia, Slovenia, Turkey, Turkmenistan, Ukraine and Uzbekistan. For countries where no contact could be identified, the original systematic literature search returned 6,654 papers across the three databases, but only eight of these met the inclusion criteria. Of the 78 surveys undertaken since 2000, 30 papers or reports relating to them were acquired through email contacts, 4 from information extracted by WHO from the WHO Global Nutrition Policy Review 2017, 35 via Internet searching, 2 via the systematic literature search, 18 via the Micha review (5) and 1 from the EFCOSUM survey (6); 11 reports had multiple sources. See Fig. 1 for the full dietary survey screening and Table 2 for the characteristics of all dietary surveys conducted since 1990.
| Country          | Survey name                                                                 | Survey year | Source ** | Sample size | Sample age | Dietary methodology                                                                 | Nutrient reference database† | Energy intake graphedY/N‡ | Reference |
|------------------|------------------------------------------------------------------------------|-------------|-----------|-------------|------------|-------------------------------------------------------------------------------------|-----------------------------|--------------------------|-----------|
| Albania          | None found                                                                   |             |           |             |            |                                                                                     |                             |                          |           |
| Andorra          | Evaluation of the nutritional status of the Andorran population              | 2004–2005   | 6         | 900         | 12–75      | 24hr recall (×2 for 35% sample), FFQ. Face-to-face and phone interview.             | CESNID. *Tablas de composición de alimentos*. Barcelona: Edicions Universitat de Barcelona-Centre d’Ensenyament Superior de Nutrició i Dietètica, 2002 | Y           | (32)      |
| Armenia          | Austrian nutrition report 2012 (OSES)                                       | 2010–2012   | 3         | 1,002       | 7–14; 18–80| 3-day diary (consecutive) (children); 2×24hr recall (adults). Face-to-face and phone interview. | Analysis run with software ‘(nut.s) science’ based on Bundeslebensmittelschlüssel 3.01/Goldberg cut-offs for data cleaning. | Y           | (33)      |
| Austria*         | Austrian study on nutritional status 2007                                   | 2007        | 4         | 2,472       | 7–100      | Single dietary diary.                                                              |                             | N           | (34)      |
| Austrian study on nutritional status (ASNS) apoptosis       | 1993–1997                                      | 5           | 2,065     | 19–95       | 24hr recall, diet history.                                                        |                             | N           | (35)      |
| Austrian study on nutritional status (ASNS) apoptosis       | 1991–1994                                      | 5           | 2,173     | 6–18        | 7-day diary.                                                                       |                             | N           | (36)      |
| Azerbaijan       | None found                                                                   |             |           |             |            |                                                                                     |                             |                          |           |
| Belarus          | None found                                                                   |             |           |             |            |                                                                                     |                             |                          |           |
| Belgium*         | Belgium national food consumption survey (BNFCS) 2014                       | 2014–2015   | 2/3       | 3,146       | 3–64       | 2×24hr recall. Face-to-face electronic interview.                                  | The NIMS Belgian Table of Food Composition (Nubel); Dutch NEVO            | Y           | (37, 38) |
| Bosnia and Herzegovina | Belgium national food consumption survey (BNFCS) 2004                | 2004        | 3/4       | 3,245       | 15–100     | 2×24hr recall. Face-to-face interview. FFQ.                                        |                             | N           | (39)      |
| Bulgaria         | National survey on nutrition of infants and children under 5 and family child rearing, 2007 | 2007        | 3         | 1,723       | 0–5        | 2×24hr recall via mother (non-consecutive). Face-to-face interview with the mother. | FCTBL_BG (Food Composition Tables – Bulgaria)                             | Y           | (40–42)  |
| Croatia          | National nutrition survey                                                   | 2004        | 4         | 853         | 20–100     | Single dietary diary.                                                              |                             | N           |           |
| Cyprus           | A study of the dietary intake of Cypriot children and adolescents aged 6–18 years | 2009–2010   | 3         | 1,414       | 6–18       | 3-day food record (consecutive inc 1 weekend). Self-completed.                      | USDA Nutrient Database for Standard Reference and Research               | Y           | (43)      |

Continued
| Country* | Survey name | Survey year | Source *** | Sample size | Sample age | Dietary methodology | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------|-------------|------------|-------------|------------|---------------------|---------------------------|---------------------------|-----------|
| Czech Republic | Individual food consumption study (SISP04) | 2003–2004 | 2 | 2,590 | 4–90 | 2×24hr recall. Face-to-face interview. | N | (44, 45) |
| | Czech Post-MONICA Study | 1997–1998 | 4 | 2,158 | 19–64 | Single dietary diary. | N | |
| Denmark | Danish national survey of diet and physical activity (DANSDA) 2011–2013 | 2011–2013 | 3 | 3,946 | 4–75 | 7-day diary (consecutive). Self-completed. | N | (46) |
| | Danish national survey of diet and physical activity (DANSDA) 2003–2008 | 2003–2008 | 3 | 4,431 | 4–75 | 7-day diary (consecutive). Self-completed. | N | (47) |
| | Dietary Habits of Denmark 2000–2002 | 2000–2002 | 4 | 4,120 | 4–75 | 7-day diary. | N | (48) |
| Estonia | National dietary survey | 1995 | 5 | 3,098 | 1–80 | 7-day diary | N | (49) |
| | | 2014–15 | 2 | 4,906 | 4 months to 74 years | 2×24hr recall (age >10); 2×24hr food diary (age <10); FFQ (age >2). Face-to-face electronic interview. | N | Not yet available. |
| | Nutrition and lifestyle in the Baltic Republics | 1997 | 1/4 | 2,015 | 16–64 | 24hr recall + questionnaire | N | (50, 51) |
| Finland* | The National FINDIET 2012 survey | 2012 | 3 | 1,708 | 25–74 | 48hr recall. Face-to-face interview. | Fineli 7 Food Composition Database | Y | (52) |
| | FINDIET 2007 | 2007 | 2/3/4 | 2,039 | 24–74 | 48hr recall. Face-to-face interview. | N | (53, 54) |
| | FINDIET 2002 | 2002 | 3 | 13,437 | 25–34, 35–44, 45–54, 55–64, 65–74 | 48hr recall. Face-to-face interview. | N | (55) |
| | FINDIET 1997 | 1997 | 5 | 3,152 | 25–74 | 24hr recall | N | (56) |
| | FINDIET 1992 | 1992 | 4/5 | 1,861 | 25–64 | 3-day diary | N | (57) |
| France* | ESTEBAN | 2015–16 | 2 | 3,617 | Children 6–17 1,108; adults 18–74 2,509. | | | |
| | Enquête Nutri-Bébé 2013 | 2013 | 3 | 1,184 | 15 d–35 m | 3-day weighed diary (non-consecutive). Face-to-face interview. | N | (58) |
| | Individual national food consumption survey (INCA2) | 2006–2007 | 3 | 4,079 | 3–79 | 7-day diary (consecutive). Self-completed. | Food Composition Database of CIQUAL of Afssa. | Y | (59) |
| Country* | Survey name                                                                 | Survey year | Source ** | Sample size | Sample age | Dietary methodology                                                                 | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|------------------------------------------------------------------------------|-------------|-----------|-------------|------------|--------------------------------------------------------------------------------------|----------------------------|--------------------------|-----------|
| France   | Etude nationale nutrition sante (ENNS); National nutrition and health survey | 2006–2007   | 2/4       | 4,780       | Children 3–17, adults 18–74, 3,115.                                                 | 3×24hr recall (non-consecutive) | N                        | (60)      |
|         | Enquête Nutri-Bébé 2005                                                      | 2005        | 3         | 706         | 1–36 m     | 3-day weighed diary (non-consecutive inc weekend). Face-to-face interview.           | N                          | (61)      |
|         | Individual national food consumption survey (INCA)                          | 1998–1999   | 5         | 1,018,985   | 3–1415+    | 7-day diary.                                                                        | N                          | (62)      |
|         | Enquête Nutri-Bébé 1997                                                     | 1997        | 3         | 660         | 0–30 m     | 3-day weighed diary. Face-to-face interview.                                         | N                          | (63)      |
|         | National food consumption survey (ASPC)                                      | 1993–1994   | 5         | 1,500       | 2–85       | 7-day diary.                                                                        | N                          | (64)      |
| Georgia  | None found                                                                  |             |           |             |            |                                                      |                            |                         |           |
| Germany  | German national nutrition survey (Nationale Verzehr-studie) II (NVSII)        | 2005–2007   | 2/4       | 15,371      | 14–80      | DISHES diet history interview. 24hr recall, diet weighing diary (2×4 days). Face-to-face electronic interview. | Bundeslebensmittelschluss (BLS) | Y          | (65, 66) |
|         | Der Kinder- und Jugendgesundheitssurvey (KiGGS)                             | 2003–2006   | 3         | 17,641      | 0–17       | Questionnaire.                                                                     | N                          | (67)      |
|         | German nutrition survey 1998                                                | 1997–1999   | 4/5       | 3,861       | 20–79      | FFQ                                                                                 | N                          | (68)      |
| Greece   | HYDRIA -- Greek national diet and health survey                              | 2013–14     | 2         | 4,011       | 18+        | 2×24hr recall, food propensity questionnaire. Face-to-face interview.              | N                          | (69, 70) |
|         | Nutrient intakes of toddlers and pre-schoolers in Greece: The GENESIS study | 2003–2004   | 3         | 2,374       | 1–5        | 3-day diary (includes nutrient data). Face-to-face interview.                       | N                          | (71)      |
| Hungary* | Hungarian diet and nutritional status survey (OTÁP 2014)                    | 2014        | 2         | 857         | 18–34, 35–64, 64+                     | 3-day diary (non-consecutive). Self-completed.                                     | N                          | Not yet available. |
|         | Hungarian diet and nutritional status survey (OTÁP 2009)                    | 2009        | 2         | 1,165       | 18–34, 35–64, 64+                     | 3-day diary (non-consecutive). Self-completed.                                     | Nutricomp.                  | (72)      |
|         | Hungarian dietary survey 2009                                               | 2009        | 3         | 3,077       | 19–30, 31–60, 60+                     | 3-day diary (non-consecutive). FFQ, self-completed.                               | Új tápanyagtáblázat.         | Y          | (73, 74) |

Continued
Table 2. Continued

| Country* | Survey name | Survey year | Source *** | Sample size | Sample age | Dietary methodology | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------|-------------|------------|-------------|------------|---------------------|----------------------------|----------------------------|-----------|
| 3rd National Hungarian survey | 2003 | 4 | 3.633 | 18–100 | Multiple dietary diary. | N | (75) |
| 2nd National Hungarian survey | 1992–1994 | 4/5 | 2.559 | 18–100 | 3×24hr recall + FFQ | N | (76) |
| Iceland* | The diet of Icelanders – a national dietary survey 2010–2011 | 2010–2011 | 2 | 1.312 | 18–80 | 2×24hr recall + FFQ. Telephone interview. | Icelandic Database of Food Ingredients (ISGEM); Public Health Institute for Raw Materials in the Icelandic Market. | Y | (77–79) |
| Iceland* | The diet of Icelanders, dietary survey of the Icelandic nutrition council 2002 | 2002 | 4 | 1.118 | 15–80 | Single dietary diary. | N | (80) |
| Iceland* | Dietary survey of the Icelanders | 1990 | 4/5 | 1.240 | 15–80 | Diet history. | N | (81) |
| Ireland* | National pre-school nutrition survey | 2010–2011 | 2 | 500 | 1–4 | 4-day weighed food diary (consecutive). Self-completed (by carer). | McCance and Widdowson's The Composition of Foods 5&6 editions | Y | (82) |
| Ireland* | National adult nutrition survey 2011 (NANS) | 2008–2010 | 2 | 1.500 | 18–90 | 4-day semi-weighted food diary (consecutive). Self-completed. | McCance and Widdowson's The Composition of Foods 5&6 editions | Y | (83, 84) |
| Ireland* | Survey of lifestyle, attitudes and nutrition in Ireland (SLAN), 2007 | 2007 | 3/4 | 9,223 | 18+ | FFQ. Face-to-face interview. | N | (85, 86) |
| Ireland* | National teens’ food survey | 2005–2006 | 2 | 441 | 13–17 | 7-day semi-weighted food diary (consecutive). Self-completed. | McCance and Widdowson’s The Composition of Foods 5&6 editions | Y | (87) |
| Ireland* | National children’s food survey. | 2003–2004 | 2 | 594 | 5–12 | 7-day weighed food diary (consecutive). Self-completed. | McCance and Widdowson’s The Composition of Foods 5&6 editions | Y | (88) |
| Ireland* | SLAN 2002 | 2002 | 3 | 5,992 | 18+ | Semi-quantitative FFQ. | N | |
| Ireland* | SLAN 1998 | 1998 | 3 | 6,539 | 18+ | Semi-quantitative FFQ. | N | |
| Ireland* | North-South food consumption survey | 1998 | 5 | 1,379 | 18–64 | 7-day diary. Self-completed. | N | (89) |
| Ireland* | Irish national nutrition survey | 1990 | 5 | 1,214 | 8–18+ | Diet history. | N | (90) |
| Country* | Survey name | Survey year | Source ** | Sample size | Sample age | Dietary methodology | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------|-------------|-----------|-------------|------------|---------------------|-------------------------------|---------------------------|-----------|
| Israel*  | Mabat national health and nutrition survey of the Elderly (Zahav) | 2005–2006 | 4          | 1,782       | 65–100     | Single dietary diary. | N                             |                          |           |
|          | Mabat first Israeli national health and nutrition survey | 1999–2001 | 4          | 3,240       | 25–64      | Single dietary diary. | N                             |                          |           |
| Italy    | The third Italian national food consumption survey INRAN-SCAI 2005-2006 | 2005–2006 | 3          | 3,323       | 0.1–97.7   | 3-day diary (consecutive). Self-completed. | Banca Dati di Composizione degli Alimenti. INRAN-DIARIO 3.1 | Y          | (91)     |
|          | INN-CA 1994–1996 | 1994–1996 | 4/5        | 2,734       | 0–94       | 7-day weighed diary. Self-completed. | N                             |                          | (92)     |
| Kazakhstan | Nutritional and health status survey of the population in Kazakhstan | 2008      | 6          | 3,526       | 15–59      | 2×24hr recall        | N                             |                          |           |
| Kyrgyzstan | None found |             |           |             |            |                     |                               |                          |           |
| Latvia   | National diet survey 2012–14 | 2012–2014 | 2          | 3,418       | 0–74       | 2×24hr recall (non-consecutive), FFQ, dietary diary | N                             | Results not yet available |           |
|          | Latvian national food consumption survey 2007–2009 | 2008      | 2          | 1,949       | 7–64       | 2×24hr recall (non-consecutive), FFQ, Face-to-face interview. | Latvian National Food Composition Data Base 2009 | Y          | (93)     |
|          | Nutrition and lifestyle in the Baltic Republics | 1997      | 1/4        | 2,299       | 19–64      | 24hr recall + questionnaire | N                             | (50, 51)     |           |
| Lithuania | Study of actual nutrition and nutrition habits of Lithuanian adult population | 2013–2014 | 2          | 2,513       | 19–75      | 24hr recall + questionnaire. Face-to-face interview, | EuroFIR Food Classification | Y          | (94)     |
|          | Food consumption survey in adult Lithuanian population | 2007      | 1/2        | 1,936       | 19–65      | 24hr recall.         | N                             | (95, 96)     |           |
|          | Nutrition and lifestyle in the Baltic Republics | 1997      | 1/4/5      | 2,094       | 20–65      | 24hr recall + questionnaire | N                             | (50, 51)     |           |
| Luxembourg | None found |             |           |             |            |                     |                               |                          |           |
| Malta    | None found |             |           |             |            |                     |                               |                          |           |
| Monaco   | None found |             |           |             |            |                     |                               |                          |           |
| Montenegro | None found |             |           |             |            |                     |                               |                          |           |
| Netherlands* | Dutch national food consumption survey 2012–2016 (DNFCS 2012–16) | 2012–2016 | 2          | 4,340       | 1–79       | 2×24hr recall and 1-day food diary (some age groups), FFQ. | N                             | Not yet available: (97) |           |

Continued
Table 2. Continued

| Country† | Survey name                                           | Survey year | Source *** | Sample size | Sample age | Dietary methodology                                                                 | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------------------------------------------------|-------------|------------|-------------|-----------|--------------------------------------------------------------------------------------|-----------------------------|---------------------------|-----------|
|          | Dutch national food consumption survey 2007–2010 (DNFCS 2007–10) | 2007–2010   | 2/3        | 3,819       | 7–69      | 2×24 hr recall. Telephone (adults)/face-to-face (children) interview, FFQ.            | Dutch Food Composition Database (NEVO) | Y (98–100)               |           |
|          | Dutch national food consumption survey – young children (DNFCS 2008) | 2005–2006   | 2          | 1,279       | 2–6       | 2-day diary (non-consecutive). Self-completed (by adult), FFQ.                        | Dutch Food Composition Database (NEVO) | Y (101)                  |           |
|          | Dutch national food consumption survey (DNFCS 2003) | 2003        | 2/4        | 750         | 19–30     | 2×24 hr recall (non-consecutive, telephone).                                        | N (102)                     |                           |           |
|          | Dutch national food consumption survey (DNFCS-3) 1997–1998 | 1997–1998   | 2/4/5      | 6,250       | 1–97      | 2-day diary.                                                                        | N (103)                     |                           |           |
|          | Dutch national food consumption survey (DNFCS-2) 1992 | 1992        | 2/4/5      | 6,218       | 1–92      | 2-day diary.                                                                        | N (103)                     |                           |           |
| Norway*  | UNGKOST 3                                             | 2015–2016   | 2          | 1,721       | 4–13      | 4-day online diary plus FFQ (consecutive). Self-completed via web.                   | The Norwegian Food Composition Tables | Y (104, 105)            |           |
|          | Norwegian national diet survey NORKOST3              | 2010–2011   | 3          | 1,787       | 18–70     | 2×24 hr recall and FFQ, Telephone interview.                                        | The Norwegian Food Composition Tables | Y (106)                 |           |
|          | Sub-sample of NOWAC (component of EPIC)              | 2002        | 1          | 2,000 (female) | 46–75 | FFQ                                                                                  | N (107)                     |                           |           |
|          | UNGKOST-2000                                          | 2000        | 3          | 3948151,009 | 4, 9 and 13 | 4-day diary, self-completed.                                                         | N (108)                     |                           |           |
|          | Norwegian national dietary survey (NORKOST 1997)     | 1997        | 4/5        | 2,672       | 16–79     | FFQ                                                                                  | N (109)                     |                           |           |
|          | Norwegian national diet survey (NORKOST 1993–1994).  | 1993–1994   | 1/5        | 3,144       | 16–79     | FFQ                                                                                  | N (110)                     |                           |           |
|          | UNGKOST-1993                                         | 1993        | 5          | 1,7051,564  | 1318      | FFQ                                                                                  | N (111)                     |                           |           |
|          | Pilot study                                           | 1992        | 1          | 1,200       | 16–79     | FFQ                                                                                  | N (110)                     |                           |           |
| Poland*  | WOBASZ II study                                       | 2013–2014   | 3          | 6,170       | 20+       | 24hr recall and FFQ, Face-to-face interview.                                        | N (112)                     |                           |           |
|          | WOBASZ-national multicentre health survey             | 2003–2005   | 4          | 6,661       | 20–74     | Single dietary diary                                                               | N                           |                           |           |
|          | Sub-sample of the household food consumption and anthropometric survey | 2000 | 4/5 | 4,200 | 1–100 | 24 hr recall, face-to-face interview.      | N (113)                     |                           |           |

Continued
| Country* | Survey name | Survey year | Source *** | Sample size | Sample age | Dietary methodology | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------|-------------|------------|-------------|------------|---------------------|-----------------------------|---------------------------|-----------|
| Portugal | National food and physical activity survey (IAN-AF) | 2015–2016 | 6 | 4,221 | 3 m–84 y | 2×24hr recall (non-consecutive) and FPQ (electronic interview), 2-day food diary for children <10 years. Face-to-face electronic interview. | Portuguese Food Composition Table (INSA) | Y | (116, 117) |
|          | Dietary calcium and body mass index in Portuguese children | 2002–2003 | 3 | 4,511 | 7–9 | 24hr recall, face-to–face interview. |  | N | (118) |
| Republic of Moldova | None found | | | | | | | | |
| Romania | National synthesis, 2006 | 2006 | 4 | 1,036 | 19–100 | FFQ |  |  | (119) |
| Russian federation* | The Russia longitudinal monitoring survey – higher school of economics (RLMS-HSE) | 2011–2012 | 2/3 | 21,686 | 0–102 | 24hr recall. |  | N | (120) |
|          | The Russia longitudinal monitoring survey – higher school of economics (RLMS-HSE) | 1994, 1995, 1996, 1998, 2000, 2001, 2002, 2003, 2004, 2005 | 2 | 1994–11,295, 1995–10,632, 1996–10,448, 1998–10,663, 2000–10,969, 2001–12,100, 2002–12,489, 2003–12,634, 2004–12,639, 2005–12,228, | 0–102 | 24hr recall. |  | N | (120) |
| San Marino | None found | | | | | | | | |
| Serbia | None found | | | | | | | | |
| Slovakia**:‡‡ | Nutrient intake in the adult population of the Slovak Republic | 1991–1994 & 1995–1999 | 1 | 4,018 | 19–80 | 24hr recall. Face-to-face interview. |  | N | (121, 122) |
|          | Nutrient intake in children and adolescents in Slovakia | 1991–1999 | 5 | 3,374,556 | 11–1415–18 | 24hr recall and FFQ. |  | N | (122) |
| Slovenia | Dietary intake of macro– and micronutrients in Slovenian adolescents | 2012 | 3 | 2,224 | 15–16 | FFQ, self-completed. |  | N | (123) |

Continued
| Country* | Survey name | Survey year | Source *** | Sample size | Sample age | Dietary methodology | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------|-------------|------------|-------------|------------|---------------------|-----------------------------|---------------------------|-----------|
| Slovenia | Dietary habits of the adult population Slovenia in health protection | 2007–2008 | 2 | 1,193 | 18–65 | 2×24hr recall (non-consecutive), FFQ, Face-to-face interview. | Nutrient intake data not yet available. | N | (124) |
| Spain*  | ENALIA 2 study | 2014–2015 | 3 | 933 plus 157 pregnant women. | 18–74 | 2×24hr recall, FFQ. Face-to-face electronic interview. | Nutrient intake data not yet available. | N | (125) |
|         | ENALIA study | 2012–2014 | 3 | 1,780 | 6 m–17 | 2×1-day diary (<11 years); 2×24hr recall (11+); FFQ (all). | Nutrient intake data not yet available. | N | (126) |
|         | ANIBES study | 2013 | 3 | 2,285 | 9–75 | 3-day diary + 24hr recall (consecutive). Face-to-face interview, telephone (interview), tablet and camera (self-report). | Tablas de Composición de Alimentos, 15º ed | Y | (children only) (28–30) |
|         | ENIDE study (Sobre datos de la Encuesta Nacional de Ingesta Dietética) | 2009–2010 | 3 | 3,000 | 18–24; 25–44; 45–64 | 3-day diary + 24hr recall (consecutive). Interview and self-completed. | Base de Datos Española de Composición de Alimentos – RedBEDCA | Y | (127–130) |
|         | The Catalan nutrition survey (ENCAT 2002–2003) | 2003 | 4 | 1,923 | 10–100 | 2×24hr recall (non-consecutive), face-to-face interview, FFQ. | Nutrient intake data not yet available. | N | (131, 132) |
|         | EnKID study | 1998–2000 | 3 | 3,534 | 2–24 | 24hr recall (>2 in 25% sample), face-to-face interview, FFQ. | Nutrient intake data not yet available. | N | (131, 132) |
| Sweden* | Riksmaten adolescents | 2016–2017 | 2 | ? | 11–12; 14–15; 17–19 | 2×24hr recall. | Nutrient intake data not yet available. | N | (133) |
|         | Riksmaten 2010–2011 Swedish adults dietary survey | 2010–2011 | 3 | 1,797 | 18–80 | 4-day food diary (consecutive). Self-completed via web. | NFA Food Composition Database | Y | (134) |
|         | Riksmaten-barn 2003 Swedish children's dietary survey | 2003 | 3 | 590, 889, 1,016 | 4 y, 8–9, 11–12 | 4-day food diary (consecutive), self-completed >4 years, by adult 4 years. | NFA Food Composition Database | N | (135) |
| Switzerland | Riksmaten 1997–1998 MenuCH | 1997–1998 | 4/5 | 1,214 | 18–74 | 7-day diary. | Nutrient intake data not yet available. | N | (135) |
|         | National nutrition survey Switzerland (NANUSS), Pilot for MenuCH. | 2014–2015 | 2 | ? | 11–12; 14–15; 17–19 | 2×24hr recall. | Nutrient intake data not yet available. | N | (133) |
| Tajikistan | None found | | | | | | | | |

Continued
Table 2. Continued

| Country* | Survey name | Survey year | Source ** | Sample size | Sample age | Dietary methodology | Nutrient reference database† | Energy intake graphed Y/N‡ | Reference |
|----------|-------------|-------------|-----------|-------------|------------|--------------------|----------------------------|--------------------------|-----------|
| The former Yugoslav Republic of Macedonia | First Macedonian food consumption survey | 2015 | 6 | 504 | 16+ | 2×24hr recall. Interview. | N | Report not yet available. | (136, 137) |
| Turkey | Turkey nutrition and health survey 2010 (TNHS) | 2010 | 3 | 14,248 | 0–100 | 24hr recall, FFQ. Face-to-face interview. | BEBS Nutritional Information System Software; Turkish Food Composition Database | Y | (136, 137) |
| Turkmenistan | None found | | | | | | | | |
| United Kingdom* | National diet and nutrition survey rolling programme Y5–6 (NDNS RP 2012–2014) | 2012–2014 | 3 | 2,546 | 1.5–94 | 4-day diary (consecutive). Self-completed. | N | (138) |
| | National diet and nutrition survey rolling programme (NDNS RP 2008–2012) | 2008–2012 | 3 | 6,828 | 1.5–94 | 4-day diary (consecutive). Self-completed. | McCance and Widdowson’s The Composition of Foods integrated dataset | Y | (139) |
| | Low income diet and health survey (LIDNS) | 2003–2005 | 4 | 2–100 | 4×24hr recall. | N | (140) |
| | NDNS 2000–2001 adults | 2000–2001 | 4 | 1,724 | 19–64 | 7-day weighed dietary diaries. | N | (141) |
| | NDNS 1997 children | 1997 | 1,701 | 4–18 | 7-day weighed dietary diaries. | N | (142) |
| | NDNS 1994–1995 65 years and over | 1994–1995 | 4 | 1,275 | 65–100 | Single dietary diary. | N | (143) |
| Ukraine | None found | | | | | | | | |
| Uzbekistan | None found | | | | | | | | |

*Countries conducting long-running surveys comprising of multiple collection waves.
**1 = database searches; 2 = email contacts; 3 = general Internet searches; 4 = Micha et al. (5); 5 = European Food Consumption Survey 2001 (6); 6) WHO Global Nutrition Policy Review 2017 extracted information.
†Information regarding nutrient composition databases has been added for those surveys for which energy and nutrient intakes were reported and graphed.
‡Y = energy intakes were taken from the latest survey for which they were reported; N = energy and nutrient intakes were either not reported or were not extracted because intakes for that country were available in a later survey.
‡‡The Slovakian surveys were not truly nationally representative, but were country-wide and designed to ‘recruit a diverse sample of subjects of different age categories and socio-economic background’ (121).
NB – The EFSA guidance for the standardised collection of national food consumption data was released in 2009.
No nationally representative surveys were found by any method that collected dietary intake of whole diets at individual level for 19 European countries (see Table 3 and Fig. 2). Although one survey of children was found for Croatia, it was not nationally representative (7). In addition, no nationally representative surveys have been found for Slovakia that have been conducted since 2000, and none for Bulgaria and Czech Republic since 2005. In Western Europe, no surveys have been found for Italy or Israel conducted since 2006, or for Andorra since 2005.

Of the 109 nationally representative surveys, 45 obtained dietary information on both adults and children, a further 41 surveys collected dietary information on adults aged 18+ only and 23 on children aged <18 only. For the 86 surveys that included adults, 60 across 30 countries were conducted since 2000. Of the 68 surveys that included children, 48 were conducted since 2000 and spanned 27 countries. Nationally representative surveys for children were missing in nine countries: Croatia, Finland, Hungary, Israel, Lithuania, Luxembourg, Romania, Slovakia and Switzerland. Further gaps were found for Andorran children aged <12 years; Bulgarian children aged above 5 years; Icelandic, Kazakh and Slovenian children aged <15 years; Macedonian children aged
<16 years; Polish children post-2000 and Spanish micronutrient intake in children of all ages.

Non-nationally representative dietary surveys were found for eight countries (Croatia, Czech Republic, Germany, Greece, Iceland, Luxembourg, Russia and Switzerland), but because of our exclusion criteria they were not included in the list of nationally representative surveys in Table 2. Additionally, 16 studies conducted in Central and Eastern European countries were returned from the systematic literature search in English and 49 from the WHO Russian language database search and were not included in any tables; common reasons for rejection were no or partial dietary intake collected, data not collected at individual level, duplicate and sample size too small (<200). Eight countries completed the WHO STEPSwise approach to noncommunicable disease risk factor surveillance (STEPS) adult survey (8–15). However, although these were nationally representative population-based surveys with large sample sizes, they were not included in this review because they only covered specific food groups, not whole diets, and as such did not meet our inclusion criteria.

**Dietary methodologies**

The most common dietary assessment methodologies used across the 109 nationally representative surveys were the 24hr recall and food diary. Of these surveys, 45 used 24hr recall, 35 of which were surveys conducted since 2000 (Table 2). Of the 45 surveys using 24hr recall, the range of daily recalls was 1–4; 29 surveys used multiple 24hr recalls, 26 of which were conducted post-2000. Table 2 illustrates that where countries used both 24hr recall and food diaries, this was a combination of methodological changes in waves of long-running surveys, different surveys using different methodologies or both methods being employed within the same survey for different population groups, for example, adults and children. A 2×24hr recall is the method recommended by the European Food Safety Authority (EFSA) for adults’ NDS (16). Countries with surveys conducted post-2000 using multiple 24hr recall were Austria, Belgium, Bulgaria, Czech Republic, Estonia, Finland, France, Greece, Iceland, Kazakhstan, Latvia, the Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, the former Yugoslav Republic of Macedonia and the United Kingdom. Spain calculated usual nutrient intake from 24hr recall and a 3-day dietary diary.

Food diaries were used as a primary method by 47 surveys, 33 of which were conducted post-2000. The range of diary days per survey was 1–7. Thirty-eight surveys used multiple 2×24hr recall as the primary method, and 26 of these were conducted post-2000 from the following countries: Austria, Cyprus, Denmark, France, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Sweden and the United Kingdom. The majority of these were performed over consecutive days. Weighed diaries were used as the sole method by some surveys in France, Ireland, Italy and the United Kingdom, but also as a primary method by one survey in Germany.

Food frequency questionnaires (FFQs) were used by 12 surveys, 5 of which were conducted post-2000 (Estonia, Ireland, Norway, Romania and Slovenia). FFQs were used by Ireland, Norway and Slovenia in pre-2000 surveys and as a supplementary, rather than primary, dietary assessment tool by other countries (Andorra, Belgium, Greece, Hungary, Iceland, Latvia, Lithuania, the Netherlands, Poland, Slovakia, Spain and Turkey).

Of the 28 surveys that reported energy and nutrient intakes (see Table 2 for older NDS approaches where available), 10 used interviews – these were primarily (n = 8) face-to-face rather than telephone-based, and 3 of these were electronic, for example, computer or tablet-based.

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**Table 3.** Level of nationally representative survey provision by country

| Countries with no surveys | Countries with pre-2000 surveys only | Countries with post-2000 surveys without reports of energy and nutrient intakes | Countries with post-2000 survey plus energy and nutrient intakes |
|---------------------------|-------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------|
| Albania                   | Slovakia                            | Czech Republic                                                             | Andorra                                                      |
| Armenia                   | Estonia                              | Greece                                                                     | Austria                                                      |
| Azerbaijan                | Greece                              | Israel                                                                     | Belgium                                                      |
| Belarus                   | Kazakhstan                           | Kazakhstan                                                                 | Cyprus                                                       |
| Bosnia and Herzegovina    | Poland                              | Russia Federation                                                          | France                                                       |
| Croatia                   | Romania                             | Slovenia                                                                   | Germany                                                      |
| Georgia                   | Russian Federation                  | Switzerland                                                                | Hungary                                                      |
| Kyrgyzstan                | Slovenia                            | The former Yugoslav Republic of Macedonia                                | Iceland                                                      |
| Luxembourg                | Switzerland                         | Ireland                                                                    | Italy                                                        |
| Montenegro                |                                     | Malta                                                                      | Latvia                                                       |
| Republic of Moldova       |                                     | Serbia                                                                     | Lithuania                                                    |
| San Marino                |                                     | Tajikistan                                                                 | The Netherlands                                              |
| Serbia                    |                                     | Turkmenistan                                                               | Norway                                                       |
| Ukraine                   |                                     | Uzbekistan                                                                 | Portugal                                                     |

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Citation: Food & Nutrition Research 2018, 62:1362 - http://dx.doi.org/10.29219/fnr.v62.i1362
Respondents self-completed in 11 surveys, which were all food diaries. Electronic resources were utilised in five surveys, just two of which were web-based. Five surveys used multiple approaches – these were mainly a combination of face-to-face and telephonic interviews with the exception of Spain, which used both interview forms plus a tablet and camera-photos.

**Energy and nutrient coverage**

Of the 22 countries that had post-2000 nationally representative survey reports of energy and nutrient intakes, 20 countries reported data for adults and 16 countries for children. This was provided by 28 of the latest post-2000 surveys that reported energy and nutrient data for these countries; 13 surveys included both adults and children, 8 surveyed adults only and 7 sampled children only (3 being separate surveys of children in Ireland). Table 2 identifies these 28 surveys and illustrates their differing methodological approaches.

All 28 surveys included energy and also carbohydrate, fibre, fat and protein intakes. Most surveys \((n = 25)\) included intake data on saturated fat (Germany and the Irish child and teen surveys did not): MUFAs \((n = 25)\) (Germany, Irish child and teen surveys did not) and PUFAs \((n = 24)\) (Germany, Irish child and teen surveys, and the Dutch DNFCS young children did not). See Appendix 2 and Fig. 3 for tabular and graphical summaries of the macronutrients included by each survey. The majority of surveys \((n = 21)\) included intake levels of sugars in some form, either as total sugars or as added sugars or sucrose. However, Cyprus, Germany, the Irish child and teen surveys, Latvia, the Spanish ENIDE survey and Turkey included neither. Given current concerns about sugar consumption, this is an important gap. Few surveys \((n = 6)\) included data on starch intakes and less than half \((n = 9)\) included trans-fatty acid (TFA) intakes (see Appendix 2).

All surveys with the exception of the Spanish ANIBES study included some micronutrients of interest (see Appendix 3 and Fig. 4). However, none of the micronutrients investigated was reported by every survey. Vitamin A, riboflavin, thiamine, vitamin B6, vitamin B12, vitamin C, vitamin D, calcium, magnesium and iron were reported by 26 or more surveys. Copper (13), iodine (13), selenium (11) and fluoride (1 – not tabled) were reported by fewer than half the surveys.

**Discussion**

**Data collection**

This report details the initial findings of a review into dietary surveys across the 53 countries within the WHO Europe remit (17). Nationally representative surveys which collected data on whole diets at individual level.
Fig. 3. Number of macronutrients reported by each national dietary survey by country*: *Where 12 is the maximum potential number of selected macronutrients of interest being reported in NDS reports: energy, protein, carbohydrate, sugars, sucrose, starches, fibre, total fat, saturated fat, monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA) and trans-fatty acids (TFA).

Fig. 4. Number of micronutrients reported by each national dietary survey by country*: *Where 19 is the maximum potential number of selected micronutrients of interest being reported in NDS reports: folate (B9), niacin (B3), vitamin A, riboflavin (B2), thiamine (B1), vitamin B12 (biotin), vitamin B6 (pyridoxine), vitamin C, vitamin D, vitamin E, calcium, magnesium, potassium, sodium, iron, copper, iodine, selenium and zinc.
since 1990 were found for only 64% of countries, the main gaps clearly lying in 17 countries in the Central and Eastern European region of the WHO Europe remit. Although eight countries without NDS had recently completed a comprehensive WHO STEPS survey, including questions on fruit and vegetable intake, salt consumption and use of fats and oils in cooking and eating, the survey does not address whole diets and only included adults; therefore, this represents a knowledge gap. However, non-nationally representative surveys were found in two countries that had no other NDS, which demonstrates that although some countries have no nationally representative surveys, other initiatives are in place and the expertise and fieldwork experience needed to conduct NDS may be present. All Western European countries had published survey information after 2000. Of countries with NDS, 16 conducted long-running surveys with multiple collection waves, which could generate important information for trends analysis. Fewer surveys were available that measured diet in children than adults; again gaps were primarily in Central and Eastern European countries. This implies that nutrition policies in this region are based on limited data, which is of concern, as overweight and obesity have tripled in some of these countries since 1980 and NCD prevalence rates are reaching those of Western Europe (1).

Emailing nutrition experts and general Internet searches were the most successful data gathering methods. A major source for contacts and survey information was a global survey review from 1990 to 2010 (5). Few academic papers met the pre-set inclusion criteria in the systematic database search performed for countries – particularly Central and Eastern countries – with no surveys or contacts mentioned in previous reviews, which also minimises the risk of bias. A possible explanation is that survey results and characteristics may be published as government or other official reports rather than academic papers. However, we also undertook wider web-based searches, targeting known government and public health agencies using various search terms to account for this. Another reason is that dietary assessment in large-scale studies like national diet surveys is costly, due to the labour-intensive nature of study preparation and data collection, and therefore may not be undertaken by some countries (18). This could explain the disproportionate concentration of gaps in survey provision in Central and Eastern European countries, which tend to have lower national incomes (19). This highlights a need to clarify major barriers and work with countries to establish mechanisms to overcome these and subsequently to devise and implement NDS.

**Dietary methodologies of post-2000 surveys**

The most common methods of collecting dietary intake used in the 78 post-2000 surveys were the 24hr recall and food diary, the majority of which were collected over multiple days. Although 24hr recalls are known for under-reporting (20), their increased use could reflect their advantage in being less onerous for respondents and potentially providing more consistent results across all age and sex groups compared with other methods (21). Retrospective dietary recalls can provide detailed information on eating patterns and exert less influence on food choice than food diaries (22), thereby generating a more accurate and realistic report on population nutrient intake. However, such short-term dietary assessment methods are associated with within-person errors and wider variation of intakes within the population, particularly when intakes of only 1 or 2 days are collected, the latter as recommended by EFSA (16). Although FFQs provide long-term assessment, they nevertheless can present inflated energy and nutrient intakes (21), which could explain why few post-2000 surveys used FFQs as the primary dietary assessment method.

Prospective weighed and non-weighed food diaries allow very detailed information to be gathered on multiple days (22) and are sometimes used to validate other methods using a small sub-sample, but have a high respondent burden and like the 24hr recall, are susceptible to under-reporting (23). Food diaries with weighed intake are particularly burdensome and prone to response bias and respondent fatigue (24) – most likely the reason why fewer studies used it as a primary assessment method and the United Kingdom moved from weighed intake to estimated intake.

Many studies used multiple tools to collect food intake. Of the 22 countries for which energy and nutrient intakes were reported, all surveys that collected dietary intake using more than one tool generated energy and nutrient intake data from a primary method and used the other method(s) as a means of validation and calibration. The exception was Spain, which was the only country that used a truly mixed methods approach. Food diaries and 24hr recalls do not provide insight into usual intakes, whereas FFQs are less accurate in estimating individuals’ absolute intakes; combining methods could help rectify these shortcomings (24). Spain, Belgium and the Netherlands estimated ‘usual’ intakes using the Statistical Program to Assess Dietary Exposure (SPADE), although the Dutch intakes presented by age group in this report reflect the average of actual intakes reported by individuals. Of the other countries employing FFQ as a supplementary method, Greece and Iceland also explicitly stated that this was used to estimate usual intake. This approach is designed to overcome within-person errors and wider intake variations when only 2 days of intake have been collected, although methodological limitations cannot be fully negated.

Of the 23 surveys that sampled children only, over half \((n = 15)\) used some form of food diary. This could
bel be because children are expected to remember less retro-
spectively, so prospective methods of capturing intake,
although subject to under-reporting and the limitations
mentioned above, are deemed preferable and more accu-
rate. This also fits with EFSA guidance on the collection of
national food consumption data, which recommends
countries ‘…use the dietary record method for infants
and children and the 24-hour recall method for adults’ (16).
EFSA further recommend data be collected on two non-
consecutive days and that they be supplemented with a
food propensity questionnaire (16). It remains to be seen
whether more countries will move towards non-consecu-
tive diaries in future surveys; at present, the majority of
multiple food diaries are conducted on consecutive days.
More detailed methodological recommendations for NDS
of children are available via the Pilot study for the Assess-
ment of Nutrient intake and food Consumption Among
Kids in Europe (PANCAKE) project (25).

Of the 28 surveys that reported energy and nutrient
intakes, Austria, Estonia, Iceland and Norway moved to
2×24hr recall in the latest NDS, perhaps to comply with
the latest EFSA guidance (16). The United Kingdom
switched from a 7-day weighed to a 4-day estimated food
diary, which is more likely a move to reduce respondent
burden. Although methodological changes make compar-
sisons problematic across survey waves, the move towards
a common approach will ease comparisons between coun-
tries in the long term and should be actively encouraged
in line with EFSA recommendations. Although this could
be logistically and financially challenging, it would assist
in making inter-country comparisons and identifying vul-
erable groups, thereby enabling the effective targeting of
policy resources.

Technology in national dietary surveys

Care is needed in any dietary assessment method to
minimise measurement error. Many dietary assessment
methods require highly skilled interviewers, which in-
creases survey costs and presents a potential barrier to
conducting NDS (24). Technology like computer-ad-
ministered interviews and image-capture could help
overcome this obstacle and also promote standardised
practices. The European Prospective Investigation into
Cancer and Nutrition (EPIC)-Soft software package de-
veloped by the EPIC Study provided uniform templates
for various aspects of NDS including conducting 24hr
recall, which has since been modified by the European
Food Consumption Validation (EFCOVAL) Study and
renamed ‘Globodiet’. It aimed for Europe-wide use, but
is limited by the need for professionals to be trained in
its use (26).

At present, none of the surveys identified used mobile
technologies to collect dietary information; although
Belgian, German and Portuguese surveys employed
electronic interviews, the Spanish ANIBES used tablets
and the Norwegian Ungkost3 and Swedish Riksmaten
used a web-based food diary. This current lack of use may
be due to the lack of validation or differential usability
across population groups. However, web-based dietary
assessments with self-administered record or recall meth-
odologies have the potential to reduce data entry expense
and allow data collection for large numbers on multiple
days over different time periods (27). They could there-
fore be more cost-effective and encourage countries for
which cost has been a significant barrier to undertake
surveys. For example, myfood24 is an online 24-hour di-
etary assessment tool that can be used for either of the
EFSA-approved (16) 24hr recall or a food diary meth-
ods (27). It employs country-specific food databases and
is currently in operation in Denmark, Germany and the
United Kingdom. Technologies like this could reduce the
onus on researchers by automatically coding food records
(27). These benefits could encourage countries that histor-
ically lack national diet survey provision to undertake sur-
veys and enable countries that already undertake surveys
to implement these at more regular intervals. This would
serve to increase the amount of dietary and nutrient in-
take data available in the WHO Europe remit, directly
contributing to the WHO objective of strengthening and
expanding nationally representative diet and nutrition
surveys WHO (1).

Energy and nutrient intakes

Energy and nutrient intake provision was documented
from the latest survey collected after 2000 for each coun-
try for which we could locate intake data. For some
countries, more recent surveys had been conducted
(see Table 2), but intake data were not yet available in
all cases. An additional limitation on data availability
was the range of nutrients each survey covered. Of the
countries that specified nutrient intakes, Germany and
Belgium were the most likely to have gaps in reported
intakes of macro- and micronutrients, respectively, and
the Spanish ANIBES survey (28–30) only reported
macronutrient data (see Appendix 3). This suggests that
the reporting of nutrient intakes is inconsistent, making
it harder to assess nutrient coverage and make inter-
country comparisons.

Inconsistent age groupings across countries also make
inter-country comparisons potentially problematic. In
Andorra, the youngest age group spanned adults and
children, meaning that although children were sam-
ples, intake levels would not be valid in any compari-
sions. Future investigation could be undertaken using raw
data and consistent age groups to obtain more reliable
conclusions.

Differences in dietary methodologies may be a limit-
ing factor when making inter-country comparisons. The
relatively low levels seen in Turkish adult and child energy intakes compared to other countries could potentially be explained by methodological differences. The Turkish survey used a single 24hr recall, whereas the Belgian, Danish, German, Hungarian, Dutch, Norwegian and Spanish surveys, whilst using different methodologies (see Table 2), all collected data on multiple days. Collection on a single day is more likely to result in error due to less control over day-to-day variation (31).

Lack of alignment and completeness of national food composition databases and classification systems is a further limitation. For example, some food composition databases may not be updated to account for reformulated products, which could introduce differences and potential error in the energy and nutrient content of foods and therefore population intakes as reported in NDS. Common approaches to food composition databases are set out in more detail in the EFCOVAL study (144). Energy and nutrient intake values will be reported and discussed in more detail in future publications (145).

Strengths and limitations

The strength of the current review is that it presents a unique, current overview of dietary survey characteristics in all WHO Europe countries since 1990. The existence of newer studies such as Bel-Serrat et al. (146) illustrates the fluidity of the situation and the need for updated, comprehensive reviews. This review includes surveys covering both adults and children; therefore, it provides a full picture of the current state of dietary survey provision across the life course. It also discusses methodological insights into common methods and paving the way for future exploration of best practice and policy recommendations.

However, the surveys employed different methodologies, both between surveys and within long-running surveys with multiple collection waves, potentially making the task of comparing countries problematic. Despite this, we feel that there is still a need to use the available information to make inter-country comparisons where possible. Another limitation of the review was that we were unable to establish contact with nutrition experts or government officials who may be working in nutrition in some of the 19 countries where no surveys were found, which were mainly Central and Eastern European countries. Therefore, we cannot ascertain that these countries do not have any relevant dietary surveys. We also cannot assure that there are no other nationally representative surveys in countries where we obtained survey information from contacts. However, it is likely that these contacts would be aware of other surveys in their countries; in the distributed questionnaire, contacts were asked for details of all surveys in their country.

Conclusion

This review found that less than two-thirds of the 53 countries in the WHO European region conducted national diet and nutrition surveys since 1990, with only 22 countries reporting nutrient intake data since 2000. The main survey gaps for both adults and children lie in the Central and Eastern European countries, where nutrition policies may lack an appropriate evidence base. Differing dietary assessment methodologies may have impact on the ability to make inter-country comparisons; existing efforts to harmonise NDS across all ages, particularly guidelines set by EFSA (16), should be encouraged, including beyond Western Europe. It would therefore be beneficial to target future efforts at standardising methodologies and filling knowledge gaps for the countries that have no surveys post-2000 in order to increase the information available for evidence-based policy planning. By establishing which countries have NDS, this review lays the foundation for a future review and stratified analyses of actual nutrient intakes across population groups in Europe.

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Appendix 1. Questionnaire concerning nationally representative diet and nutrition surveys and their methodologies

Please complete one questionnaire per diet and nutrition survey (DNS) for questions 1–3; if necessary make multiple copies. If there are any questions in sections 1–3 that you cannot answer, please provide contact details of a person(s) who may be able to answer the outstanding questions.

Please email the completed questionnaire(s) to Holly Rippin fshr@leeds.ac.uk at the University of Leeds, who will be collating this information for the European Office of the World Health Organization.

Country: xxx

Contact (please provide the correct contact person if this is incorrect): Prof/Dr. xxx

1. For each DNS carried out in your country since 1990 please fill in the below information:

Please note that any survey to be included should meet the following criteria:

• The survey should collect dietary intakes across all food groups which are then converted into nutrient values.
• The survey uses national population-based samples or representative regional samples.
• The survey should not be restricted to a specific part of the population (e.g. children, occupational groups or patients).
• Preferably there should be plans to repeat the survey later, unless it already has been repeated. You can also record standalone surveys.

Survey name ...........................................
Year(s) when survey data collected..........................
Dietary assessment method/tool used.........................
Genders included in sample...................................
Age ranges included in sample..............................
Sample size (N)...........................................
National or regional ......................................
Nationally representative (yes/no)...........................
Institute responsible for the survey.........................

Key contact for survey.....................................
Email for contact person listed above.....................

2. Please provide details of any relevant publications e.g. summary reports, user guides (please provide web links)

3. Macro and micro nutrients included in your DNS (please tick all that apply):

Energy
• Total carbohydrates
• Sugars
• Sucrose
• Starches
• Fibre

Total fat
• Saturates
• MUFA
• PUFA
• Trans fatty acids

Protein

Vitamins:
• Folic acid
• Niacin
• Retinol equivalents
• Riboflavin
• Thiamine
• B12
• B6

Minerals:
• Calcium
• Magnesium
• Potassium
• Sodium
• Iron
• Copper
• Fluoride
• Iodine
• Selenium
• Zinc

THANK YOU FOR TAKING THE TIME TO ANSWER THESE QUESTIONS.
### Appendix 2. Macronutrient provision across dietary surveys

| Country        | Survey                                                                 | Year            | Energy (MJ and kcal) | Protein (g) | CHO % or E | Sugars (g) | Sucrose (g) | Starches (g) | Fibre (g) | Total fat (g) | Saturates (g) | MUFA (g) | PUFA (g) | TFA (g) |
|----------------|------------------------------------------------------------------------|-----------------|----------------------|--------------|------------|------------|------------|-------------|------------|---------------|---------------|-----------|----------|---------|
| Andorra        | Evaluation of the nutritional status of the Andorran population         | 2004–2005       | Y                    | Y            | Y          |           |            |             |            |               |               |           |          | Y       |
| Austria        | Austrian nutrition report                                              | 2010–2012       | Y                    | Y            | Y          |           |            |             | Y          | Y             | Y             | Y         |          | Y       |
| Belgium        | The Belgian food consumption survey 2014–2015                          | 2014–2015       | Y                    | Y            | Y          | Y          |             |             | Y          | Y             | Y             | Y         | Y        | Y       |
| Bulgaria       | National survey on nutrition of infants and children under 5 and family child rearing, 2007 | 2007            | Y                    | Y            | Y          |           |            |             | Y          | Y             | Y             | Y         |          | Y       |
| Cyprus         | A study of the dietary intake of Cypriot children and adolescents aged 6–18 years | 2009–2010       | Y                    | Y            | Y          |           |            |             | Y          | Y             | Y             | Y         |          | Y       |
| Denmark        | Danish dietary habits 2011–2013                                         | 2011–2013       | Y                    | Y            | Y          | Y          |             |             | Y          | Y             | Y             | Y         | Y        | Y       |
| Finland        | The national FINDIET 2012 survey                                       | 2012            | Y                    | Y            | Y          |           |            |             | Y          | Y             | Y             | Y         | Y        | Y       |
| France         | INCA2                                                                   | 2006–2007       | Y                    | Y            | Y          | Y          |             |             | Y          | Y             | Y             | Y         |          | Y       |
| Germany        | German national nutrition survey II                                    | 2005–2007       | Y                    | Y            | Y          |           |            |             | Y          | Y             | Y             | Y         | Y        | Y       |
| Hungary        | Hungarian dietary survey 2009                                          | 2009            | Y                    | Y            | Y          |           |             |             | Y          | Y             | Y             | Y         |          | Y       |
| Iceland        | The diet of Icelanders — a national dietary survey 2010–2011           | 2010–2011       | Y                    | Y            | Y          |           |             |             | Y          | Y             | Y             | Y         | Y        | Y       |
| Ireland        | National preschool nutrition survey                                    | 2010–2011       | Y                    | Y            | Y          |           |             |             | Y          | Y             | Y             | Y         | Y        | Y       |

*continued*
| Country      | Survey                                                                 | Year              | Energy (MJ and kcal) | Protein (g) | CHO@g or %E | Sugars (g) | Sucrose (g) | Starches (g) | Fibre (g) | Total fat (g) | Saturates (g) | MUFA(g) | PUFA(g) | TFA(g) |
|--------------|------------------------------------------------------------------------|-------------------|----------------------|-------------|--------------|------------|-------------|--------------|-----------|----------------|----------------|----------|---------|--------|
| Ireland      | National children’s food survey                                       | 2003–2004         | Y                     | Y           | Y            |            |             |              | Y         | Y              |                |          |         |        |
| Ireland      | National teens’ food survey                                           | 2005–2006         | Y                     | Y           | Y            |            |             |              | Y         | Y              |                |          |         |        |
| Ireland      | National adult nutrition survey                                       | 2008–2010         | Y                     | Y           | Y            | Y          | Y           | Y            | Y         | Y              | Y              | Y        |         |        |
| Italy        | The third Italian national food consumption survey, INRAN-SCAI        | 2005–2006         | Y                     | Y           | Y            | Y          | Y           | Y            | Y         | Y              | Y              | Y        |         |        |
| Latvia       | Latvian national food consumption survey                              | 2007–2009         | Y                     | Y           | Y            |            |             |              | Y         | Y              | Y              | Y        |         |        |
| Lithuania    | Study and evaluation of actual nutrition and nutrition habits of Lithuanian adult population | 2013–2014         | Y                     | Y           | Y            |            |             |              | Y         | Y              | Y              | Y        |         |        |
| Netherlands  | Dutch national food consumption survey (DNFCS)                        | 2007–2010         | Y                     | Y           | Y            |            |             |              | Y         | Y              | Y              | Y        |         |        |
| Netherlands  | Dutch national food consumption survey – young children (DNFCS 2008)  | 2005–2006         | Y                     | Y           | Y            |            |             |              | Y         | Y              | Y              | Y        |         |        |
| Norway       | Norkost3                                                               | 2010–2011         | Y                     | Y           | Y            | Y          | Y           | Y            | Y         | Y              | Y              | Y        |         |        |
| Norway       | Ungkost3                                                               | 2015–2016         | Y                     | Y           | Y            | Y          | Y           | Y            | Y         | Y              | Y              | Y        |         |        |
| Portugal     | National food and physical activity survey (IAN-AF)                  | 2015–2016         | Y                     | Y           | Y            | Y          | Y           | Y            | Y         | Y              | Y              | Y        |         |        |
| Spain        | ANIBES                                                                 | 2013              | Y                     | Y           | Y            | Y          | Y           | Y            | Y         | Y              | Y              | Y        |         |        |
| Spain        | ENIDE 2011                                                             | 2009–2010         | Y                     | Y           | Y            |            |             |              | Y         | Y              | Y              | Y        |         |        |

continued
### National Nutrition Surveys in Europe

#### Appendix 2. Continued

| Country | Survey | Year       | Energy (MJ and kcal) | Protein (g) | CHO@g or %E | Sugars (g) | Sucrose (g) | Starches (g) | Fibre (g) | Total fat (g) | Saturates (g) | MUFA (g) | PUFA (g) | TFA (g) |
|---------|--------|------------|----------------------|-------------|-------------|------------|-------------|--------------|------------|---------------|---------------|----------|----------|--------|
| Sweden  | Riksmaten 2010–2011 Swedish adult dietary survey | 2010–2011 | Y                     | Y           | Y           | Y          | Y           | Y            | Y          | Y             | Y             | Y        | Y        | Y      |
| Turkey  | Turkey nutrition and health survey 2010 (TNHS) | 2010    | Y                     | Y           | Y           | Y          | Y           | Y            | Y          | Y             | Y             | Y        | Y        | Y      |
| UK      | National diet and nutrition survey (NDNS) Years 1–4 | 2008–2012 | Y                     | Y           | Y           | Y          | Y           | Y            | Y          | Y             | Y             | Y        | Y        | Y      |
| Total   |        |            |                      | 28          | 28          | 28         | 14          | 7            | 6          | 28            | 28            | 25       | 25       | 24     | 9     |
### Appendix 3. Micronutrient provision across dietary surveys*

| Country     | Survey                                                                 | Year         | B9 (µg) | B3 (mg) | VA (µg) | B2 (mg) | B1 (µg) | B12 (µg) | B6 (mg) | VC (mg) | VD (µg) | VE (mg) | Ca (mg) | Mg (mg) | K (mg) | Na (mg) | Fe (mg) | Cu (mg) | I (µg) | Se (mg) | Zn (µg) |
|-------------|------------------------------------------------------------------------|--------------|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|
| Andorra     | Evaluation of the nutritional status of the Andorran population       | 2004–2005    | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Austria     | Austrian nutrition report                                              | 2010–2012    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Belgium     | The Belgian food consumption survey 2014–2015                          | 2014–2015    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Bulgaria    | National survey on nutrition of infants and children under 5 and family child rearing, 2007 | 2007         | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Cyprus      | A study of the dietary intake of Cypriot children and adolescents aged 6–18 years | 2009–2010    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Denmark     | Danish dietary habits 2011–2013                                         | 2011–2013    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Finland     | The national FINDIET 2012 survey                                       | 2012         | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| France      | INCA2                                                                  | 2006–2007    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Germany     | German national nutrition survey II                                    | 2005–2007    | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |
| Hungary     | Hungarian dietary survey 2009                                          | 2009         | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y      | Y      | Y      | Y      | Y      | Y      | Y      |

*continued*
### Appendix 3. Continued

| Country       | Survey                                                                 | Year          | B9 (µg) | B3 (mg) | VA (µg) | B2 (mg) | B1 (µg) | B12 (µg) | B6 (mg) | VC (mg) | VD (µg) | VE (mg) | Ca (mg) | Mg (mg) | K (mg) | Na (mg) | Fe (mg) | Cu (mg) | I (µg) | Se (mg) | Zn (µg) |
|---------------|------------------------------------------------------------------------|---------------|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|---------|--------|--------|--------|--------|-------|-------|--------|
| Iceland       | The diet of Icelanders — a national dietary survey 2010–2011           | 2010–2011     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Ireland       | National preschool nutrition survey                                     | 2010–2011     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Ireland       | National children’s food survey                                         | 2003–2004     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Ireland       | National teens’ food survey                                             | 2005–2006     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Ireland       | National adult nutrition survey                                         | 2008–2010     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Italy         | The third Italian national food consumption survey, INRAN-SCAI          | 2005–2006     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Latvia        | Latvian national food consumption survey 2007–2009                     | 2007–2009     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Lithuania     | Study and evaluation of actual nutrition and nutrition habits of Lithuanian adult population | 2013–2014     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
| Netherlands   | Dutch national food consumption survey (DNFCS) 2007–2010               | 2007–2010     | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y     | Y     |
### Appendix 3. Continued

| Country       | Survey                                                                 | Year          | B9 (µg) | B3 (mg) | VA (µg) | B2 (mg) | B1 (µg) | B12 (µg) | B6 (mg) | VC (mg) | VD (µg) | VE (mg) | Ca (mg) | Mg (mg) | K (mg) | Na (mg) | Fe (mg) | Cu (mg) | I (µg) | Se (mg) | Zn (µg) |
|---------------|------------------------------------------------------------------------|---------------|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|---------|---------|-------|--------|--------|--------|--------|--------|---------|
| Netherlands   | Dutch national food consumption survey – young children (DNFCS 2008)  | 2005–2006     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| Norway        | Norkost3                                                               | 2010–2011     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| Norway        | Ungkost3                                                               | 2015–2016     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| Portugal      | National food and physical activity survey (IAN-AF)                    | 2015–2016     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| Spain         | ANIBES                                                                 | 2013          |         |         |         |         |         |          |          |          |          |          |          |          |       |        |        |        |        |        |
| Spain         | ENIDE 2011                                                             | 2009–2010     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| Sweden        | Riksmaten 2010–2011 Swedish adult dietary survey                      | 2010–2011     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| Turkey        | Turkey nutrition and health survey 2010 (TNHS)                        | 2010          | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| UK            | National diet and nutrition survey (NDNS)                              | 2008–2012     | Y       | Y       | Y       | Y       | Y       | Y        | Y       | Y       | Y       | Y       | Y       | Y       | Y     | Y      | Y      | Y      | Y      | Y      |
| TOTAL         |                                                                        |               | 28      | 25      | 20      | 26      | 27      | 27       | 26      | 27      | 26      | 25      | 27      | 26      | 21    | 22     | 27     | 13     | 13     | 11     | 22     |
### National nutrition surveys in Europe

#### *Key*

| B9  | Folic acid   | Ca  | Calcium |
|-----|--------------|-----|---------|
| B3  | Niacin       | Mg  | Magnesium |
| VA  | Vitamin A (retinol equivalent) | K   | Potassium |
| B2  | Riboflavin   | Na  | Sodium |
| B1  | Thiamine     | Fe  | Iron |
| B12 | Vitamin B12  | Cu  | Copper |
| B6  | Vitamin B6   | I   | Iodine |
| VC  | Vitamin C    | Se  | Selenium |
| VD  | Vitamin D    | Zn  | Zinc |
| VE  | Vitamin E    |     |         |