Quality report of the second wave of the European Health Interview survey

2018 edition

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Authors: Anais Santourian & Stella Kitromilidou: Agilis SA Statistics & Informatics, w: www.agilis-sa.eu - p: P.O. BOX 78609, Tavros 177 01, GR - t: +30 211 100 3310 - e: contact@agilis-sa.eu

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Executive summary

The European Health Interview Survey (EHIS) is a general population survey providing statistical information on health status, health determinants and healthcare activities in the European Union (EU). EHIS aims to providing statistical data, on a harmonized basis and with a high degree of comparability across EU Member States (MS), supporting the monitoring of health policies on social inclusion and protection, health inequalities and healthy ageing.

The collection of EHIS statistics at national level was launched for the first time (wave 1) between 2006 and 2009 under a gentlemen's agreement. It was implemented in 17 EU MSs, completed by Switzerland and Turkey. The second wave of EHIS (wave 2) was conducted between 2013 and 2015 in the 28 EU MS as well as in Iceland, Norway and Turkey under the Commission Regulation (EU) No 141/2013[(1),(2)], while the Commission Implementing Decision of 19th February 2013[(3)] granted derogations to certain countries with regard to the transmission of certain statistics. The survey will subsequently be run in 2019, followed at regular six-year interval (2025, 2031, etc.).

The general coverage of the survey is the population aged 15 and over living in private households residing in the territory of the country at the time of data collection. In the national implementation of EHIS, countries could expand the survey population to younger age groups or persons living in collective households and in institutions. In those limited cases where countries expanded the survey population to younger age groups, respondents from these age groups were excluded when calculating the respective effective sample size and when deriving the EHIS statistical indicators. In all countries persons living in collective households and institutions were excluded from the target population.

EHIS was nationally organized; it was conducted either as a stand-alone survey (in 20 countries), or as an element of another survey (in eight countries) or as a follow-up of another survey (in two countries). Across countries, the same set of variables was collected following the Commission implementing Regulation on EHIS. However, data were collected using national questionnaires, which sometimes comprised additional questions than those specified in the Commission Regulation, for national purposes. This was the case in 10 countries. Following Eurostat's recommendations, most countries did not change the order of submodules or questions in their national questionnaires.

Various types of sampling frames were used; notably results of a population census (five countries), population registers (15 countries), dwelling registers (three countries) or other statistical sources (seven countries). All countries made use of probability sampling with more than half of them making use of multi-stage sampling — with different sampling techniques applied within each sampling stage. 14 countries made use of single stage sampling. The number of interviews conducted within the household varied from one respondent to all household members.

The data collection period (reference year) was spread over 2013 and 2015. In all countries, the data collection lasted at least three months, covering at least one month of the autumn season (September – November). On average, the data collection period across all countries lasted 8 months. Overall, the vast majority of responses were collected during the autumn season, followed by winter (December – February), spring (March – May) and summer (June – August) season.

Different data collection modes were used. Data were obtained through postal questionnaires, face-to-face interviews, telephone interviews or web questionnaires, or a combination of these modes. In fact, 14 countries used a combination of those modes, while 12 countries used face-to-face interviews only, two countries used telephone interviews only and another two postal questionnaires only.

With regard to the overall accuracy of the survey results, most countries stated that they followed Eurostat's guidelines for the implementation of the survey. They also undertook required practices (e.g. validation, calibration, non-response adjustments, etc.) to minimize the effect of all potential sources of sampling and non-

(1) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:047:0020:0048:EN:PDF

(2) The Commission Regulation was amended in 2014 to take into account the accession of Croatia in the EU (Commission Regulation (EU) No 68/24.

(3 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013D0097

sampling errors. Standard errors, as key indicators commonly used as a measure of the reliability of data collected through sample survey, were provided by MSs for the three key indicators based on the Minimum European Health Module (MEHM), namely proportion of respondents in good or very good health (HS1), proportion of respondents with a longstanding illness (HS2) and proportion of respondents severely limited in activities people usually do because of health problems for at least the past 6 months (HS3), as well as proportion of respondents declaring having been hospitalized in the past 12 months (HO1) and proportion of respondents who are obese (BMI>=30).

In order to reduce the risk for measurement and processing errors, pre-testing and pilot testing were used by 22 countries for optimizing the data collection process and identifying potential sources of problems. Another potential source of introducing measurement error is the use of proxy interviews, i.e. when a person provides answers on another's behalf. Proxy interviews were not allowed in all but 12 countries. From the 18 countries that permitted the use of proxy interviews, those were limited to the questions specified in the guidelines, with the exception of four countries, where proxy interviews were allowed for the whole set of questions.

All countries made significant efforts to achieve high response rates (advance notification letters, at least three attempts for contacting selected persons before receiving a refusal for participation, three to five subsequent reminders). In few countries, non-respondents were substituted, while in a couple of countries, non-respondents were re-contacted through different modes than the ones initially used (e.g. through telephone or personal contact). The unit non-response rate ranged significantly across the MSs, from 16 % to about 70 %, with the respective rate not exceeding 40 % in 17 countries.

Concerning item non-response, some variables, such that "need to receive help or more help with one or more self-care activities" (PC3), "time spent on doing sports, fitness or recreational physical activities in a typical week" (PE7), "time spent on bicycling to get to and from places on a typical day" (PE5), "need for help or more help with one or more domestic activities" (HA3) and "net monthly equivalised income of the household" (HHINCOME) recorded a non-response rate higher than 10 % in more than nine countries.

Especially "net monthly equivalised income of the household" (HHINCOME) was frequently reported as a problematic variable, since respondents found it difficult to provide that information or considered the question sensitive. Similar issues were mentioned for variables concerning physical activity/exercise (PE), alcohol consumption (AL), mental health (MH), use of inpatient and day care (HO), chronic diseases (CD) and preventive services (PA).

Overall, achieving an input standardisation is aimed at for EHIS by the instruments of the implementing regulation and the methodological guidelines. So, the common regulatory framework, variable definitions, conceptual guidelines and the proposed protocol for translation serve the basis to ensure comparability of the statistics among the participating countries. The vast majority of countries reported that the guidelines and the Commission implementing Regulation on EHIS have been closely followed. As consequence, it resulted in an overall sufficient or even good comparability across countries of the data and indicators from EHIS wave 2.

1 Introduction

The present document constitutes the quality report of the second wave of the European Health Interview Survey (EHIS wave 2) conducted by the EU Member States (MS) between 2013 and 2015. This quality report makes a synthetic assessment of the quality of EHIS wave 2 data following the quality components and is further complemented by additional sections describing the characteristics of the national surveys as well as the statistical processes adopted at country level. The quality concept applied in this report is in conformity with the definition developed by the European Statistical System (ESS). It covers aspects of quality as presented in the quality report template developed by Eurostat including the following components: quality management, accuracy and reliability, timeliness and punctuality, coherence and comparability.

EHIS wave 2 was carried out in all EU MS as well as in Iceland, Norway and Turkey. The individual quality reports that were delivered to Eurostat constitute the main source of information for the compilation of the present report. The document covers all 30 countries[(4)] that provided to Eurostat microdata from their EHIS wave 2 surveys together with a national quality report.

([4]) Turkey delivered microdata to Eurostat, but a quality report was not made available.

2 The European Health Interview Survey (EHIS)

The European Health Interview Survey (EHIS) was developed between 2003 and 2006 with the goal of providing comparable cross-national data on health status, healthcare activities and health determinants. EHIS is a major EU reference source for evidence supporting health-related policies regarding healthy lifestyles, healthy ageing and well-being, health inequalities, healthcare access, quality of healthcare services, etc.

The collection of EHIS statistics at national level had been launched for the first time (wave 1) between 2006 and 2009 under a gentlemen's agreement. It was fully or partly implemented in 17 EU MS[5], Switzerland and Turkey. This first wave was driven by an input-harmonised approach with a model questionnaire, conceptual guidelines and a common translation protocol.

Based on the outcomes of the data collection process undertaken under EHIS wave 1, Eurostat initiated a review process over the period 2010–2012 in order to improve and refine the survey instrument and facilitate the collection of comparable data on health topics related to the individual characteristics of the population. The results of the review process followed by detailed discussions held by the European Statistical System (ESS) bodies (ESS includes EFTA / EEA countries, but not EU Candidate Countries) led to the adoption of the adoption of the Commission Regulation on the implementation of EHIS wave 2 in the beginning of 2013.

2.1. Legal basis

The second wave of the EHIS (wave 2) was conducted between 2013 and 2015 in the 28 EU MS as well as in Iceland and Norway under the Commission Regulation (EU) No 141/2013[6],[7]. Detailed specifications on the data and metadata to be collected under EHIS are pursuant to the Commission Regulation (EU) No 141/2013, while the Commission Implementing Decision of 19th February 2013[8] grants derogations to certain countries with regard to the transmission of certain statistics.

2.2. Methodological manual

The EHIS wave 2 methodological manual[9] drafted by Eurostat provided / included / gave specific guidance to countries for the planning and the implementation of EHIS wave 2. The methodological manual includes conceptual guidelines and interviewer instructions for all variables as well as statistical survey guidelines. It also gives instructions on

([5]) Belgium, Bulgaria, Czech Republic, Germany, Estonia, Greece, Spain, France, Cyprus, Latvia, Hungary, Malta, Austria, Poland, Romania, Slovenia and Slovakia.

([6]) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:047:0020:0048:EN:PDF. The Commission Regulation was amended in 2014 to take into account the accession of Croatia in the EU (Commission Regulation (EU) No 68/2014).

([7]) The Commission Regulation applies to the EU-28 MSs as well as Iceland and Norway. Turkey is concerned by the Regulation implementing EHIS via the monitoring of the compliance of the enlargement countries with the EU acquis in the field of statistics. Turkey delivered microdata to Eurostat although a national quality report was not made available.

([8]) http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013D0097

([9]) http://ec.europa.eu/eurostat/documents/3859598/5926729/KS-RA-13-018-EN.PDF/26c7ea80-01d8-420e-bdc6-e9d5f6578e7c

the data processing and transmission.

A model questionnaire was given in the Annex of the methodological manual. In general, the order of modules, sub-modules and questions is given in the model questionnaire.

2.3. The EHIS wave 2 modules

The survey is composed of three broad public health areas, named modules; the **European Health Status Module (EHSM)**, the **European Health Determinants Module (EHDM)** and the European **Health Care Module (EHCM)**, as well as of a set of core demographic and socio-economic variables.

Each module consists of health-related sub-modules. In total EHIS wave 2 consists of 21 health-related sub-modules, as follows:

- European Health Status Module (EHSM). The module on health status is a central point of the survey. It allows the measurement of the health status of the population in general and not only in relation with specific health problems. It covers different aspects and dimensions of health such as health status (HS), having specific diseases and chronic conditions (CD), occurrence of accidents and injuries (AC), absence from work (due to health problems) (AW), physical and sensory functional limitations (PL), difficulties with personal care activities (PC), difficulties with household activities (HA), having pain (PN) and specific aspects of mental health (MH).
- European Health Care Module (EHCM): The ECHM collects data on the use of health care services and the unmet needs for health care. It permits the collection of information on health care consumption that is comparable across countries and enables the linking of the data with characteristics of health status, health determinants and socioeconomic characteristics. It includes aspects such as use of inpatient and day care services (HO), use of ambulatory and home care (AM), medicine use (MD), use of preventive services (PA), and unmet needs for health care (UN).
- European Health Determinants module (EHDM): The focus of this module is to the measurement of aspects in the lifestyles or health-related behaviors of Europeans. It covers aspects such as weight and height (BM), performing physical activity / exercise (PE), consumption of fruits and vegetables (FV), smoking behavior (SK), alcohol consumption (AL), social support (SS) and provision of informal care or assistance (IC).

3 Overview of the survey methodology in EHIS wave 2

3.1. Target population

According to the Commission Regulation implementing EHIS, the target (reference) population shall include individuals aged 15 and over living in private households residing in the territory of the MSs at the time of the data collection. In the national implementation of EHIS, countries could expand the survey population to younger age groups or persons living in collective households and in institutions. In those cases, these additional respondents should be excluded when calculating the respective effective sample sizes.

Persons living in collective households or institutions were generally excluded from the target population. A few examples of definitions for collective households and institutions used in some countries are provided below:

In Austria, institutions covered homes for the elderly, nursing homes, psychiatric institutions, institutions for mentally handicapped, boarding schools, monasteries, prisons and homes for refugees, in Croatia, institutions included dormitories, rest homes, eventide homes, day care centres, orphan's homes, prisons, barracks, hotel-motel guest houses, houses of army members and stay in pay hospitals, whereas in Lithuania and Estonia institutions covered care institutions for the elderly and disabled people, child care and imprisonment institutions. Latvia considered as institutions correctional and penal institutions, student's hostels, social welfare institutions, municipal (night) shelters for the homeless, boarding schools and specialized boarding schools, addiction and psychiatric institutions and religious institutions.

In Romania, institutionalized persons were those who lived in elderly homes, centres for disabled persons, penitentiaries, closed facilities for young persons and care homes. On the other hand, Slovakia, assumed that institutions covered all dwellings other than private households. By definition, in Germany, homeless people and people travelling during the time of data collection are not included in the survey. In Ireland, institutions include educational establishments, nursing/children's homes, hospitals, prison, shelters/refuges (including accommodation for homeless persons), other types of establishment, while in Italy, those include public or private facilities that provide residential social and/or health care services.

Refugees, hospitals, homes for the elderly, schools, hotels and hostels, institutions for disabled people, prison and rehabilitation centres are defined as institutions in Malta. Similarly, in Belgium, institutionalized people covered prisoners, patients of psychiatric institutions and large monasteries. Finally, the United Kingdom covers exclusively the population living in private households, with a couple of notable exceptions, i.e. Communal Establishments (CE). Furthermore, in the United Kingdom household members aged 16 and over were eligible to participate in EHIS.

Following the Commission Regulation implementing EHIS, small parts of the national territories of certain countries were excluded from the survey. In detail, in the Netherlands, persons living in Caribbean Islands and the West Frisian Islands (with the exception of Texel) were excluded from the survey. France did not include persons living in Overseas Departments and territories. In the United Kingdom households of Scotland north of the Caledonian Canal and the Scilly Islands were excluded from the sampling frame. In Ireland, all offshore islands with the exception of Achill, Bull, Cruit, Gorumna, Inishnee, Lettermore, Lettermullan and Valentia were excluded.

Table 1 presents the figures for the target and non-target population across countries.

Table 1. Target and non-target population in EHIS wave 2

	Target population	Non-target population	
		Number of individuals younger than 15	Number of individuals living in institutions
BE ([1])	9 214 798	:	:
BG	6 204 002	998 196	:
CZ ([2])	8 933 025	1 591 000	168 000
DK	4 697 098	959 592	:
DE	69 821 396	10 686 723	886 044
EE	1 107 791	209 596	13 000
IE	3 608 662	920 693	62 383
EL	9 150 412	:	:
ES	38 959 700	6 500 000	250 000
FR ([2])	51 009 842	11 810 093	1 384 312
HR	3 604 266	652 428	38 576
IT	52 068 782	8 383 122	367 485
CY ([3])	703 511	:	:
LV	1 670 644	295 348	26 175
LT	2 500 517	430 100	23 700
LU	423 716	88 637	:
HU	8 267 203	1 417 000	141 000
MT	345 606	61 728	8 649
NL	13 979 215	2 850 074	249 942
AT	7 235 423	1 200 000	122 000
PL	32 370 934	5 746 084	3 61 584
PT	8 884 581	1 490 241	125 000
RO ([2])	16 835 792	3 069 095	71 318
SI	1 758 564	302 520	:
SK	4 591 168	830 000	180 000
FI	4 487 327	:	:
SE ([4])	7 901 091	1 682 033	:
UK ([5])	49 937 000	12 100 000	1 119 000
IS	249 773	66 742	:
NO	4 233 409	933 955	38 500

([1]) Persons living in institutions, although not eligible, are included in the sampling frame. Selected non-eligible persons are then substituted.

([2]) Figures on the population living in institutions refer those aged 15 years and over.

([3]) The number of persons in the non-target population cannot be calculated since the sampling frame consists of households.

([4]) Figures under the field “number of individuals younger than 15 years” refer to the total non-target population.

([5]) Persons aged less than 16 years.

: Information not available.

3.1. Sampling design

3.1.1. Sampling frame

Three main types of sampling frames were used; notably results from the most recent population census, population registers and dwelling registers (see Table 2). Therefore, countries can be classified into the following groups based on the sampling frame used:

- **Population register**: In 15 countries, namely, Belgium, Denmark, Germany, Estonia, Spain, Italy, Lithuania, Hungary, Malta, the Netherlands, Slovenia, Finland, Sweden, Iceland and Norway a population register is used as a data source for building the sampling frame.
- **Dwelling register**: Poland, Portugal and Slovakia used data coming from a dwelling register as a sampling frame.
- **Population census**: Countries using the most recent population census data as a sampling frame were: Bulgaria, Ireland, Greece, Croatia and Cyprus.
- **Other:** In the Czech Republic, France, Latvia, Luxembourg, Austria, Romania and the United Kingdom, the following sources are used:
    - Czech Republic: the sampling frame is the sample of the 5th wave respondents of LFS. The LFS sample is drawn from Census Enumeration Units and the Building Register.
    - France: the sample frame is made of registers of beneficiaries from the national health insurance schemes.
    - Latvia: the Demographic Statistics Data Processing System, which contains data from the Population Register and the National Real Estate Cadastre, was the main source for the compilation of the sampling frame. Population census statistics were used for making adjustments to the sampling frame (exclusion of persons that, most likely, are not national residents).
    - Luxembourg: the sample was drawn from the National Health Insurance Database (IGSS) which covers 95 % of the population.
    - Austria: the LFS sample is used for the recruitment of respondents for EHIS. The sample frame of the LFS is the Central Register of Residence.
    - Romania: for all household surveys a master sample is used, namely the Multifunctional Sample of Territorial Areas (EMZOT), which is derived as a sample of geographical areas. EMZOT was built based on the Population and Housing Census in March 2002, was operational in early 2004 and was updated in 2006 and 2015.
    - United Kingdom: EHIS wave 2 for Great Britain was a follow-up of the LFS. The sample was drawn from LFS respondents who consented to participate also to other surveys. For Northern Ireland, the Land and Property Services Agency gazetteer listing private households was used for deriving the sample.

Table 2. Data source for building the sampling frame for EHIS wave 2

	Population register	Dwelling register	Population census	Other
BE	**YES**	NO	NO	NO
BG	NO	NO	**YES**	NO
CZ	NO	NO	**YES**	**YES**
DK	**YES**	NO	NO	NO
DE	**YES**	NO	NO	NO
EE	**YES**	NO	NO	NO
IE	NO	NO	**YES**	NO
EL	NO	NO	**YES**	NO
ES	**YES**	NO	NO	NO
FR	NO	NO	NO	**YES**
HR	NO	NO	**YES**	NO
IT	**YES**	NO	NO	NO
CY	NO	NO	**YES**	NO
LV	NO	NO	NO	**YES**
LT	**YES**	NO	NO	NO
LU	NO	NO	NO	**YES**
HU	**YES**	NO	NO	NO
MT	**YES**	NO	NO	NO
NL	**YES**	NO	NO	NO
AT	**YES**	NO	NO	**YES**
PL	NO	**YES**	NO	NO
PT	NO	**YES**	NO	NO
RO	NO	NO	NO	**YES**
SI	**YES**	NO	NO	NO
SK	NO	**YES**	NO	NO
FI	**YES**	NO	NO	NO
SE	**YES**	NO	NO	NO
UK	NO	NO	NO	**YES**
IS	**YES**	NO	NO	NO
NO	**YES**	NO	NO	NO

3.1.2. Sampling units

In accordance with the methodological guidelines, the statistical unit in EHIS is the individual. In practice, the sampling unit was the dwelling, the household or the individual, depending on the design chosen by the country and the sampling frame used for selecting the sample.

As shown in Table 3, in 21 out of 30 countries the **ultimate sampling unit**[10] is the individual. Additional five countries selected a sample of households while another four countries selected a sample of dwellings.

([10]) The last stage of sampling (regardless of its number) is called an ultimate sampling unit (USU).

The sampling unit used by countries relies heavily on the frame used for selecting the sample. For instance, in all countries that used a population register as a sampling frame (see Table 2), except for Belgium and Italy, a sampling of persons of age 15 and over was selected at the final stage of sampling (regardless of its number). Instead, in countries where the population census results were used as a data source for the sampling frame, dwellings or households were selected (Bulgaria, the Czech Republic, Greece, Cyprus and Croatia). Similarly, Poland, Portugal, Romania and Slovakia selected a sample of dwellings since the sampling frame was the dwelling register.

Table 3. Sampling units in EHIS wave 2

	Dwelling	Household	Individual
BE	NO	**YES**	NO
BG	NO	**YES**	NO
CZ	NO	NO	**YES**
DK	NO	NO	**YES**
DE	NO	NO	**YES**
EE	NO	NO	**YES**
IE	NO	**YES**	**YES**
EL	NO	**YES**	**YES**
ES	**YES**	**YES**	**YES**
FR	NO	**YES**	**YES**
HR	**YES**	NO	NO
IT	NO	**YES**	NO
CY	NO	**YES**	NO
LV	NO	NO	**YES**
LT	NO	NO	**YES**
LU	NO	NO	**YES**
HU	NO	NO	**YES**
MT	NO	NO	**YES**
NL	NO	NO	**YES**
AT	NO	NO	**YES**
PL	**YES**	NO	NO
PT	**YES**	NO	NO
RO	**YES**	NO	NO
SI	NO	NO	**YES**
SK	**YES**	NO	**YES**
FI	NO	NO	**YES**
SE	NO	NO	**YES**
UK	NO	**YES**	NO
IS	NO	NO	**YES**
NO	NO	NO	**YES**

3.1.3. Sampling design

The national sampling designs in the EHIS wave 2 implementation varied (see Table 4).

The most common design was a two or three stage stratified or systematic (cluster) sampling, selecting more frequently in the first stage census enumeration areas, or otherwise municipalities, blocks of households or administrative districts:

- Two-stage sampling (Bulgaria, Germany, Croatia, Italy, Latvia (CAPI data collection mode), Hungary, the Netherlands, Poland, Romania and Slovenia),
- Three-stage sampling (Belgium, the Czech Republic, Ireland, Greece, Spain, Portugal and Slovakia).

Denmark, Estonia, France, Cyprus, Latvia (CATI data collection mode), Lithuania, Luxembourg, Malta, Austria, Finland, Sweden, the United Kingdom (for Northern Ireland), as well as Iceland and Norway used a single stage sampling, i.e. either a simple random, or stratified, systematic or cluster sampling design.

In Latvia, a combination of two sampling designs was used; the population frame was split in two primary strata (CAPI and CATI) depending on the availability of information of a phone number. Then a two-stage sampling design was used for CAPI data collection mode and one-stage sampling design was used for CATI data collection mode.

Especially, in the Czech Republic and Austria, where EHIS was conducted as a follow-up of the LFS, the sample was drawn from the pool of respondents that were successfully interviewed during the 5th LFS wave (normally the last visit) and that were also willing to participate in EHIS. Similarly, in the United Kingdom (for Scotland and Wales), a random sample, stratified by country, was drawn from the final-wave households participating in LFS. Only those aged 16 or over who were willing to participate in future surveys were selected for EHIS.

Table 4. Sampling design in EHIS wave 2

Sampling unit	Sampling design	Country
Dwelling	Systematic multistage cluster sampling	PT
	Stratified multistage (cluster) sampling	PL, ES, HR, RO, SK
Household	Systematic multistage cluster sampling	BG
	Stratified multistage (cluster) sampling	BE, EL, IE
	Multistage sampling with probability proportional to size	IT
	Systematic sampling	UK ([2])
	Stratified sampling	CY
	Simple random sampling	UK ([2])
Individual	Systematic stratified multistage sampling	LV (CAPI)
	Multistage random sampling	HU
	Multistage stratified sampling	CZ ([1]), DE, NL, SI
	Simple random sampling	DK, LT, FI, IS
	Cluster sampling	FR
	Systematic stratified sampling	EE
	Stratified sampling	LV (CATI), LU, MT, AT, SE, NO

([1]) The description refers to the selection of a sample for LFS (PSUs and SSUs) and a follow-up selection of individuals from households participating in 5th wave of LFS for EHIS (TSU). Individuals for EHIS were selected using Simple Random Sampling.

([2]) In Scotland and Wales a sample, stratified by country, was drawn from the final-wave LFS households. As a follow-up survey, only those aged 16 or over who had not objected to take part in future surveys were selected for EHIS. The LFS sample is selected using systematic sampling from the postcode address file (PAF) ordered by postcode. For Northern Ireland, a simple random sample of households from the Land and Property Services Agency gazetteer was selected.

As a general note, it can be mentioned that most countries that applied a single stage sampling have used a frame different from a population register for drawing their samples. Instead, Denmark, Estonia, Lithuania, Malta, Finland, Sweden as well as Iceland and Norway have drawn their sample using a single stage design, although a population register has been used as a sampling frame.

Annex 2 (Table 25) of the present document provides a more detailed presentation of the sampling designs, the sampling units in each sampling stage as well as the probability used to draw the sample across countries.

3.1.4. Sample size

Table 5 presents the reached sample size, the reached effective sample size, the minimum effective sample size as specified in the Commission Regulation implementing EHIS, as well as the ratio of the reached effective sample size to the minimum effective sample size.

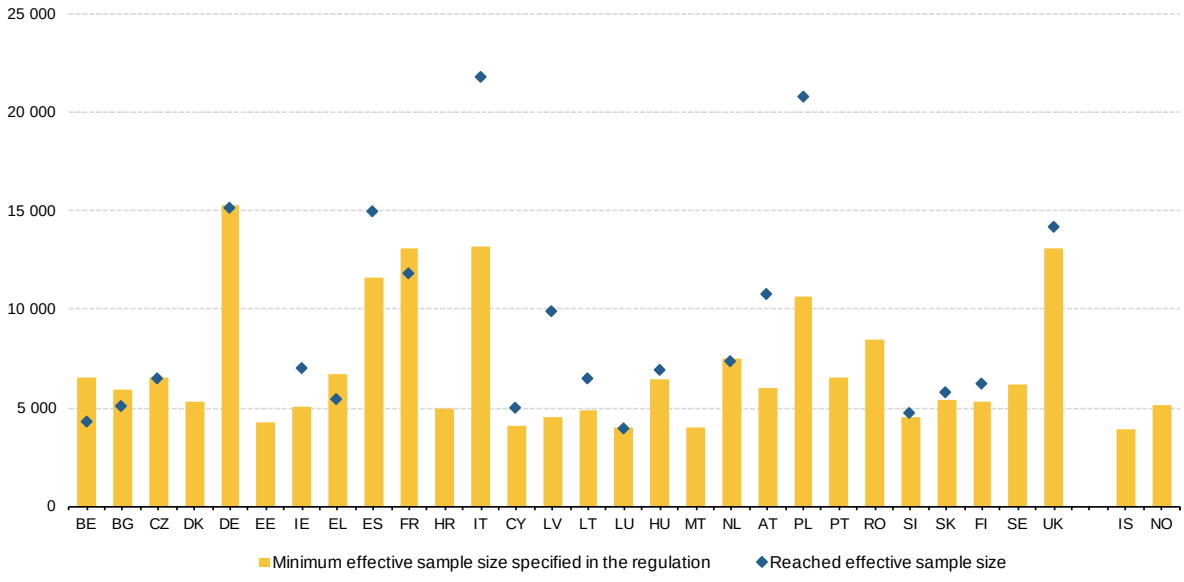
In methodological manual for EHIS, for the minimum effective sample size, the reference is to the effective sample size of persons, which is the size required if the survey was based on simple random sampling (design effect in relation to the "percentage of people severely limited in daily activities" variable=1.0)[11]. The actual sample sizes should be larger to the extent that the design effects exceed 1.0 and to compensate for all kinds of non-response.

For the reached sample size, the actual response cases have been taken into consideration. The reached effective sample size was derived by dividing the reached sample size to the design effect provided in the national quality reports for the variable on "general activity limitation" (HS3).

The reached effective sample size in comparison to the minimum effective sample size is depicted in Figure 1. The ratio of the reached effective sample size to minimum effective sample size ranged from 0.66 (Belgium) to 2.17 (Latvia).

Especially in Malta and Sweden, the required sample size was determined by increasing the minimum sample size specified in the Commission Regulation implementing EHIS by an anticipated non-response rate, whereas Portugal assumed anticipated non-response rate of 25 % and a design effect of 1.5.

Figure 1. Minimum effective sample size and reached effective sample size in EHIS wave 2



Note: Data not available for the reached effective sample size for Denmark, Estonia, Croatia, Malta, Portugal, Romania, Finland, Sweden, Iceland and Norway.

([11]) Following the specifications in the methodological manual, the variable on "general activity limitation" (HSE3), i.e. the "percentage of people severely limited in daily activities" has been taken as the most critical variable for determining the required sample size in terms of the precision requirements.

Table 5. Sample size in the national EHIS wave 2

	Reached sample size	Design effect for HS3 variable	Reached effective sample size	Minimum effective sample size	Ratio of the reached effective sample size to minimum effective sample size
BE	9 113	2.1	4 297	6 500	0.66
BG	6 410	1.3	5 008	5 920	0.85
CZ	6 737	1.0	6 478	6 510	1.00
DK (1)	5 811	:	:	5 350	:
DE	24 824	1.6	15 146	15 260	0.99
EE (1)	5 452	:	:	4 270	:
IE	10 323	1.5	6 928	5 057	1.37
EL	8 223	1.5	5 367	6 667	0.81
ES (1)	22 842	1.5	14 929	11 620	1.28
FR	15 729	1.3	11 826	13 110	0.90
HR	5 446	0.0	:	5 000	:
IT	25 325	1.2	21 776	13 180	1.65
CY	4 958	1.0	4 948	4 095	1.21
LV	7 077	0.7	9 870	4 555	2.17
LT	5 205	0.8	6 426	4 850	1.32
LU	4 004	1.0	3 931	4 000	0.98
HU	5 826	0.8	6 905	6 410	1.08
MT (1)	4 086	:	:	3 975	:
NL	7 653	1.1	7 289	7 515	0.97
AT	15 771	1.5	10 729	6 050	1.77
PL	24 156	1.2	20 824	10 690	1.95
PT (1)	18 204	:	:	6 515	:
RO (1)	16 605	:	:	8 420	:
SI	6 262	1.3	4 673	4 486	1.04
SK	5 490	1.0	5 719	5 370	1.06
FI	6 183	1.0	6 183	5 330	1.16
SE (1)	6 292	:	:	6 200	:
UK	20 161	1.4	14 130	13 085	1.08
IS (1)	4 001	:	:	3 940	:
NO (1)	8 164	:	:	5 170	:

(1) Information not available for the design effect of HS3 variable.

: Information not available.

Table 6 presents summary statistics on the distribution of weights in the microdata files transmitted by MSs to Eurostat. As expected, the range of weights is higher for countries that the target population is relatively larger (Germany, Spain, France and the United Kingdom). High variability is observed in the distribution of weights for Belgium, although the target population is, relatively, not large, while the opposite holds for Austria, Poland and Portugal.

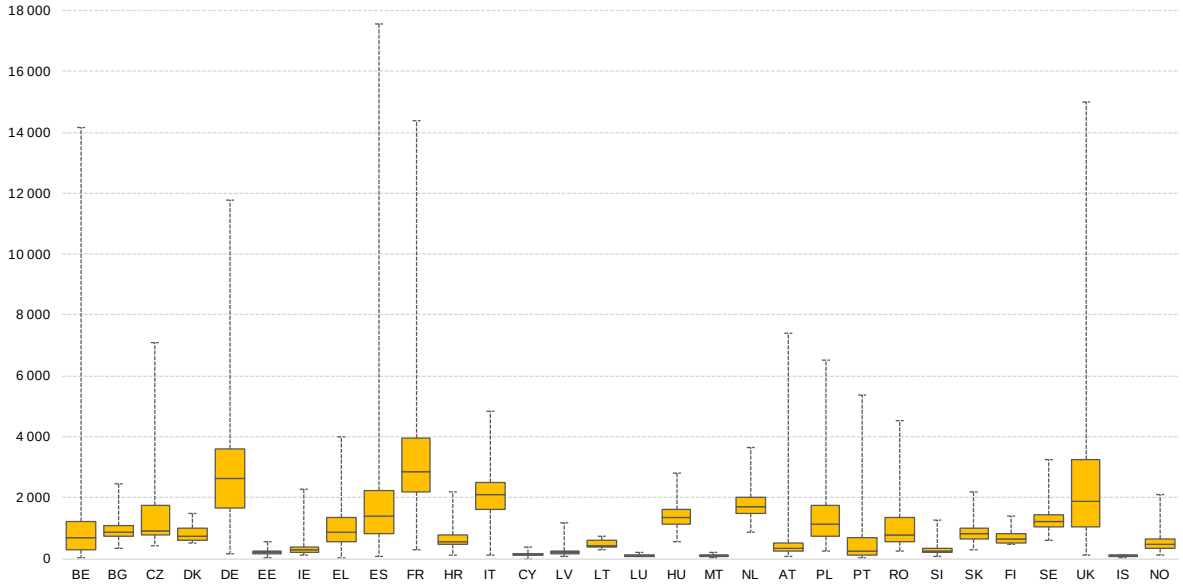
Table 6. Summary statistics on the distribution of weights in EHIS wave 2

	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum
BE	15	306	684	927	1 230	14 150
BG	357	755	889	968	1 110	2 466
CZ	442	791	934	1 326	1 768	7 100
DK	516	582	740	808	987	1 505
DE	179	1 671	2 616	2 813	3 616	11 770
EE	18	167	199	201	237	546
IE	120	213	275	351	366	2 284
EL	51	560	853	1 113	1 372	4 000
ES	59	845	1 397	1 706	2 253	17 560
FR	308	2 197	2 860	3 243	3 948	14 370
HR	136	456	576	662	776	2 172
IT	108	1 617	2 094	2 056	2 503	4 835
CY	2	97	133	142	177	392
LV	53	180	220	236	269	1 164
LT	278	392	448	480	594	735
LU	75	85	95	101	112	186
HU	560	1 155	1 370	1 419	1 632	2 800
MT	33	61	86	87	101	186
NL	859	1 503	1 729	1 793	2 016	3 667
AT	53	253	355	459	524	7 391
PL	256	728	1 143	1 337	1 741	6 521
PT	13	113	244	488	679	5 393
RO	256	559	791	1 014	1 350	4 526
SI	76	210	264	281	335	1 257
SK	300	644	819	837	994	2 173
FI	463	536	641	723	842	1 399
SE	613	1 065	1 236	1 282	1 460	3 234
UK	118	1 063	1 888	2 548	3 254	15 000
IS	41	53	58	62	65	116
NO	107	319	474	525	644	2 092

Source: Calculations based on national EHIS microdata files.

A boxplot on the distribution of weights is presented in Figure 2 providing an overview of their range and variability.

Figure 2. Boxplot of the distribution of weights in EHIS wave 2



Source: Calculations based on national EHIS microdata files.

3.1.5. Source data

As shown in Table 7, EHIS was implemented as a stand-alone survey, i.e. it did not form part of or was not combined with another survey / questionnaire in 20 countries as well as the United Kingdom as far as Northern Ireland is concerned. Especially, in Finland, although EHIS was carried out as an independent survey, the same procedures and service providers as for the regional health and well-being survey were used.

Table 7. Source data in EHIS wave 2

	Survey name	EHIS is a stand-alone survey	EHIS is combined with another survey	EHIS is a follow-up of another survey
BE	Health Interview Survey	NO	**YES**	NO
BG	European Health Interview Survey	**YES**	NO	NO
CZ	European Health Interview Survey 2014	NO	**YES**	**YES**
DK	European Health Interview Survey	**YES**	NO	NO
DE	German Health Update	NO	**YES**	NO
EE	Estonian Health Interview Survey	NO	**YES**	NO
IE	Irish Health Survey	NO	**YES**	NO
EL	Health Survey	**YES**	NO	NO
ES	European Health Interview Survey in Spain	**YES**	NO	NO
FR	Health, Healthcare and Insurance Survey (ESPS)	NO	**YES**	NO
HR	European Health Interview Survey - wave 2	**YES**	NO	NO
IT	European Health Interview Survey	**YES**	NO	NO
CY	European Health Interview Survey 2014	**YES**	NO	NO
LV	European Health Interview Survey	**YES**	NO	NO
LT	Health Interview Survey	**YES**	NO	NO
LU	National Health Survey	**YES**	NO	NO
HU	European Health Interview Survey	**YES**	NO	NO
MT	European Health Interview Survey	**YES**	NO	NO
NL	Health Interview Survey	NO	**YES**	NO
AT	Austrian Health Interview Survey 2014	NO	NO	**YES**
PL	European Health Interview Survey	**YES**	NO	NO
PT	National Health Survey 2014	**YES**	NO	NO
RO	European Health Interview Survey	**YES**	NO	NO
SI	Health Interview Survey 2014	**YES**	NO	NO
SK	European Health Interview Survey 2014	**YES**	NO	NO
FI	European Health Interview Survey	**YES**	NO	NO
SE	European Health Interview Survey	**YES**	NO	NO
UK ([1])	European Health Interview Survey	**YES**	NO	**YES**
IS	Health Interview Survey	**YES**	NO	NO
NO	Survey of Living Conditions - Health, Care, Social Relations	NO	**YES**	NO

([1]) In Great Britain, EHIS was conducted as a follow-up to LFS, while in the Northern Ireland the survey was stand-alone.

On the other hand, EHIS has been embedded in an existing survey conducted for national purposes in eight countries: Belgium (Health Interview Survey), the Czech Republic (Health Examination Survey), Germany (Health Interview Survey), Estonia (Health Interview Survey), Ireland (Quarterly National Household Survey), France (Health Interview Survey) and the Netherlands (Health Interview Survey) as well as Norway (Living Conditions Survey). Particularly in Croatia, the EHIS questionnaire was followed by a separate questionnaire "Tobacco questions for surveys" for the Centre for Disease Control and Prevention (CDC) and the World Health Organisation (WHO).

In the Czech Republic, EHIS was carried out as a follow-up of the Labour Force Survey (LFS), as was the case in Austria and in the United Kingdom (as far as Great Britain is concerned).

4 Overview of survey implementation in EHIS wave 2

4.1. Development of questionnaires

4.1.1. Order of modules and submodules

The recommended order of modules and submodules was followed by all countries, except for Belgium, Greece, Estonia, France, Italy, the Netherlands and Norway. More specifically, Belgium integrated EHIS questions in the HIS questionnaire in accordance with the guidelines regarding the order for the modules. Greece moved the questions on income at the end of the questionnaire due to their sensitivity. Estonia changed the order of certain questions (AC2, HA2, HA3, PA1, PE7, AL3 and AL5) in order to be in line with the 2006 national questionnaire. Finally, France separated PL2 to PL5 questions in order to be in line with the National Health, Health Care and Insurance Survey (ESPS).

Italy moved the sub-module on absence from work due to health problems (AW) at the end of the questionnaire, while in the Norwegian questionnaire, the same sub-module was moved from the Health Status Module (EHSM) to the Health Care Module (EHCM). Also, questions on provision of informal care or assistance were moved from the Health Determinants Module (EHDM) to the Health Care Module (EHCM). In Austria, the sub-module on physical activity (PE) was part of the self-administered questionnaire, sent to respondents by post after the completion of the telephone interview.

The Czech Republic, Greece, Croatia, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Austria and Sweden mentioned that additional questions were included for national purposes. Additionally, Poland incorporated in the questionnaire additional questions for adults and a separate questionnaire for children aged 0–14.

Additional information on the modifications introduced in the national questionnaires is provided under Section 5.4.1.

4.1.2. Languages in which the survey was carried out

In 14 countries (Belgium, Estonia, Ireland, Spain, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Finland, Sweden as well as Iceland and Switzerland) the survey was undertaken into more than one official languages (Table 8). In total, 27 languages were used, ten of which were common in more than one country.

Table 8. Language in which the survey was carried out in EHIS wave 2

	Language		Language
BE	Dutch / French / German	**LU**	German / French / Portuguese / English
BG	Bulgarian	**HU**	Hungarian
CZ	Czech	**MT**	Maltese / English
DK	Danish	**NL**	Dutch
DE	German	**AT**	German
EE	Estonian / Russian	**PL**	Polish
IE	English / Irish (upon request)	**PT**	Portuguese
EL	Greek (in some areas such as Rodopi and Xanthi survey was carried out using translators)	**RO**	Romanian
ES	Spanish / Regional official languages (Catalan, Valenciano, Euskera, Gallego) / English	**SI**	Slovene
FR	French	**SK**	Slovak
HR	Croatian	**FI**	Finnish / Swedish
IT	Italian, Slovene, German (South Tyrolean)	**SE**	Swedish / English
CY	Greek / English	**UK**	English
LV	Latvian / Russian	**IS**	Icelandic / English
LT	Lithuanian / Russian / Polish	**NO**	Norwegian / English

Almost all countries used the translation protocol proposed by Eurostat except for Belgium, Spain, France, Lithuania, the Netherlands, Iceland and Norway. In Belgium, the translation of the questionnaire was made by a team consisting of experts (Dutch / French), whereas the administration of the German community translated the French version into German. Cyprus followed the protocol for the Greek version of the questionnaire, while in Spain a private company translated the questionnaire in the regional official languages. Experts translated the Lithuanian questionnaire into Russian and Polish, and similarly in Ireland, experts within the NSI in cooperation with health specialists translated the English version of the questionnaire into Irish. In the Netherlands, the Flemish version of the questionnaire used under wave 1 was adapted to reflect the specificities of the Dutch language, whereas in Norway, the questionnaire was translated by an expert who was in close cooperation with the health division. Moreover, where possible, questions on health were harmonized with the corresponding questions in the EU-SILC questionnaire.

4.1.3. Pre-testing and pilot field testing

The questionnaire was simply tested or reviewed by experts in the Czech Republic, Germany, Estonia, Ireland, France, Croatia, Lithuania (Lithuanian version only), Hungary, Malta, Austria, Slovenia and Sweden, Iceland and Norway.

Cognitive testing was carried out by Cyprus (Greek version), the Netherlands (for selected variables), Poland (Polish version only) and Slovakia (except for core variables).

Especially Iceland, Italy (Italian version only) and Latvia tested the questionnaire not only through simple but also by cognitive testing. In France, a self-administered questionnaire was tested on a sample of 100 persons for the health module, while in the United Kingdom, the questionnaire was tested by the staff of the NSI.

The questionnaire was not pre-tested at all in Belgium, Bulgaria, Denmark, Greece, Spain, Luxembourg, Portugal, Romania and Finland.

However, in Belgium a convenience sample was drawn for pilot field testing (e.g. wording ambiguities, filters), whereas Luxembourg invited 1 000 persons to participate in the field testing for verifying the quality of the questionnaire, technical issues (e.g. computer programs) as well as familiarising the survey staff with potential practical problems.

A pilot field testing was conducted in Germany during October 2013 and June 2014 in order to optimize its incentive and contact strategies, while in the United Kingdom, a small-scale telephone survey to 200 households in combination with 52 face-to-face interviews was undertaken with the view to test the routing of the questionnaire and to identify potential issues with the comprehension of the questions. Similarly, a pilot field testing exercise to 31 participants was conducted in Norway with the view to identify potential issues with the wording of the questions, to test the routing of the questionnaire and to record the time required for the completion of the questionnaire.

4.2. Data collection

4.2.1. Mode of data collection

In the national EHIS implementation, countries could use various modes of data collection (including combinations of them), namely face-to-face interviews, telephone interviews, postal or web interviews. Whether postal and web modes for data collection were applied, self-administered questionnaires were used.

Table 9 shows the data collection mode used in the national EHIS implementation. The table also presents in its last column whether any EHIS variables (including technical and core social ones) were completed from administrative data sources.

A more detailed presentation of the data collection modes used is presented in Annex 2 (Table 25).

Of the 30 countries, 12 countries used face-to-face interviews as the only mode of data collection (Belgium, Bulgaria, Greece, Spain, Italy, Cyprus, Lithuania, Hungary, Malta, Poland, Romania and Slovakia) but seven of them (Belgium, Bulgaria, Italy, Lithuania, Malta, Romania and Slovakia) used a self-administered mode for some parts of the questionnaire.

Austria, Iceland and Norway used telephone interviews as a mode for data collection. Notwithstanding, in Sweden, a sample of those who did not respond to the self-administered survey was called and interviewed by phone, while in Austria a paper questionnaire was sent by post to the respondents of the telephone survey for the completion of the sub-module on physical activity (PE).

In the Czech Republic, France, Croatia, Latvia and the United Kingdom, a combination of personal visits and telephone interviews was applied. From the latter five countries, all but Croatia and the United Kingdom used also self-administered questionnaires. Especially in France, core social variables and questions on unmet needs were collected through face-to-face or telephone interviews, while a paper questionnaire was sent by post to the respondents for the completion of the health questions.

Another group of countries, namely, Estonia, Portugal and Slovenia, used a combination of face-to-face interviews and self-administered web questionnaires as modes of data collection. In the Netherlands, an attempt for a face-to-face interview was made if the no response was received after two reminders.

Finally, Denmark, Germany, Ireland, Luxembourg and Finland used exclusively self-administered questionnaires as a mode for data collection, as opposed to Greece, Spain, Croatia, Cyprus, Hungary, Poland, the United Kingdom, Iceland and Norway that did not use a self-administered questionnaire at all.

With regard to the use of administrative data, 14 countries, namely, Belgium, Denmark, Germany, Estonia, France, Latvia, Lithuania, the Netherlands, Slovenia, Finland, Sweden, the United Kingdom, Iceland and Norway derived information from administrative sources for the compilation of certain EHIS variables concerning the socio-demographic characteristics of the respondents (see Annex 2 (Table 25)). As a general remark, it can be stated that in countries where a population or the social security register was used as a sampling frame, administrative data were used for the derivation of certain EHIS variables.

Table 9. Mode of data collection used in EHIS wave 2

	Face-to-face interviews	Telephone interviews	Self-administered questionnaire	Use of administrative data
BE	**YES**	NO	**YES**	**YES**
BG	**YES**	NO	**YES**	NO
CZ	**YES**	**YES**	**YES**	**YES**
DK	NO	NO	**YES**	**YES**
DE	NO	NO	**YES**	**YES**
EE	**YES**	NO	**YES**	**YES**
IE	NO	NO	**YES**	NO
EL	**YES**	NO	NO	NO
ES	**YES**	NO	NO	NO
FR ([1])	**YES**	**YES**	**YES**	**YES**
HR	**YES**	**YES**	NO	NO
IT	**YES**	NO	**YES**	NO
CY	**YES**	NO	NO	NO
LV ([2])	**YES**	**YES**	**YES**	**YES**
LT	**YES**	NO	**YES**	**YES**
LU	NO	NO	**YES**	NO
HU	**YES**	NO	NO	NO
MT	**YES**	NO	**YES**	NO
NL ([3])	**YES**	NO	**YES**	**YES**
AT	NO	**YES**	**YES**	**YES**
PL	**YES**	NO	NO	NO
PT ([3])	**YES**	NO	**YES**	NO
RO	**YES**	NO	**YES**	NO
SI	**YES**	NO	**YES**	**YES**
SK	**YES**	NO	**YES**	NO
FI	NO	NO	**YES**	**YES**
SE ([4])	NO	**YES**	**YES**	**YES**
UK	**YES**	**YES**	NO	**YES**
IS	NO	**YES**	NO	**YES**
NO	NO	**YES**	NO	**YES**

([1]) Core social variables and variables on unmet needs are filled in during face-to-face or telephone interviews using electronic version (CAPI/CATI). Health variables are filled via paper self-administered questionnaire. Corsica was surveyed only by telephone.

([2]) The use of a web self-administered questionnaire was not allowed those aged between 15 and 17. Self-administered questionnaires were not used in face-to-face interviews.

([3]) A letter was sent asking persons to complete the self-administered electronic questionnaire. If after two reminders no response was received, an attempt for a personal interview was made.

([4]) An invitation to participate to the online survey was sent to a group of the sampled persons. A strategic sample of those who did not respond to the self-administered survey was further approached for a telephone interview.

In recent years, web surveys are increasingly used due to the advantages they offer (reduced cost, speed of data collection, easiness of implementation). Respondents can answer the questionnaire at their own pace, whereas studies have shown that respondents tend to provide more reliable answers to sensitive questions when a self-administered mode is used. However, the risk for measurement errors is higher (e.g. questions may be misunderstood). Another consideration is that part of the target population may not have access to Internet and therefore, bias might be introduced.

Finland for example used postal non-electronic questionnaires. As stated in the quality report, this mode of data collection resulted in a relatively higher item non-response rate and no severe errors were detected during the data processing stage, although incoherent answers were identified in many cases.

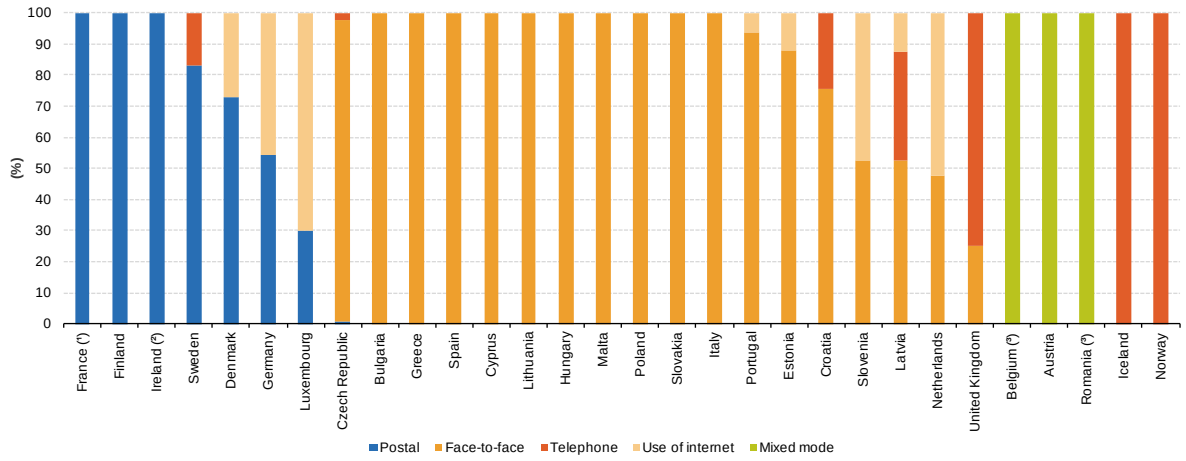
On the other hand, the use of a face-to-face or telephone interviews provides the opportunity to respondents to ask for clarifications in questions, while real time validation may be also implemented when an electronic version is used. Again, one may consider interviewer bias, or measurement errors due to the presence of an interviewer.

The use of administrative data sources reduces the overall response burden provided that required data follow the same definitions, concepts, reference period, etc.

Given all the above, and taking into consideration the peculiarities of the EHIS survey (e.g. sensitive questions, necessity for further explanations), most countries used a multimode data collection.

Figure 3 presents the distribution of responses by mode of data collection based on the information derived from EHIS microdata.

Figure 3. Distribution of responses by mode of data collection in EHIS wave 2
(%)



(1) Main mode of data collection is postal since only the core social variables and variables on unmet needs were collected via face-to-face or telephone interviews.

(2) Very limited number of responses were received through the web questionnaire.

(3) Face-to-face interviews in combination with paper self-completion questionnaires during the interview were used.

Source: Calculations based on national EHIS microdata files.

With regard to the mode of administration of the survey, three countries used solely Computer Assisted Personal Interviews (CAPI), seven used solely Paper-and-Pencil Interviews (PAPI), two used solely Computer Assisted Telephone Interviews (CATI), another six used a combination of CAPI / CATI / PAPI, while another 10 countries used a combination of CAPI / PAPI / CATI / CAWI and finally another two used a combination of PAPI / CAPI and Telephone, non-electronic version.

Overall, the mode administration of the survey, following the mode of data collection is summarized below.

A more detailed presentation is provided in Annex 2 (Table 25).

- Face-to-face interviews: From the 21 countries that used face-to-face interviews at least as one of their methods for data collection, 11 of them used CAPI, seven used PAPI and the remaining three of them

used a mixed method of PAPI - CAPI.

- Telephone interviews: Seven (France (only for core social variables and variables on unmet needs), Latvia, Austria, Sweden, the United Kingdom, Iceland and Norway) out of nine countries that used telephone interviews as one of their modes for the collection of data used CATI.
- Self-administered questionnaire: The majority of countries used a self-administered mode either for some parts of the questionnaire or for the whole questionnaire:
    - Paper questionnaire: Eight countries used paper questionnaires either sending them by post (Denmark, Germany, Ireland, France, Luxembourg, Austria (only for variables on physical exercise), Finland and Sweden) or giving directly to respondent the paper questionnaire to reply specific questions (Belgium, Bulgaria, the Czech Republic, Italy, Lithuania, Malta, the Netherlands, Romania, Slovakia).
    - Use of internet: Six countries (Estonia, Ireland, Latvia, the Netherlands, Portugal and Slovenia) used Computer-assisted web interviewing (CAWI) for self-administered questionnaires.
    - Paper questionnaire and use of internet: Denmark, Germany and Luxembourg and Sweden used a mixed method of data collection of the self-administered questionnaires. More specifically, Luxembourg and Sweden sent an invitation letter and the respondents had two options: (a) answering an electronic questionnaire based on the instructions sent in the invitation letter or (b) completing a paper questionnaire.

TOPICS ADMINISTERED VIA A SELF-COMPLETION QUESTIONNAIRE

13 countries allowed respondents to fill-in themselves sub-modules or variables when a mode other than a self-administered one was used. In Denmark, Germany, Luxembourg and Finland, all questions could be administered by the respondents via a self-completion questionnaire.

A group of countries, namely, Bulgaria, Italy, Lithuania, Malta, Romania and Slovakia allowed for a self-administered mode for variables concerning smoking (SK) and alcohol consumption (AL), while the same holds for the Netherlands as far as alcohol consumption sub-module was concerned. In France and Ireland, a self-administered mode was allowed for all variables except for unmet needs for health care (UN) and accidents and injuries (AC), respectively.

Belgium allowed for self-reports on health status (HS), alcohol consumption (AL), mental health (MH), physical exercise (PE), smoking (SK) and social support (SS) sub-modules. In Austria, a paper questionnaire was sent by post to the respondents of the telephone survey for the completion of the sub-module on physical activity (PE). On the contrary, France permitted self-completion to all questions except for those under the module on the unmet needs for health care (UN).

4.2.2. Interviewers

In 13 countries, namely, Bulgaria, the Czech Republic, Estonia, Ireland, Latvia, Lithuania, Hungary, the Netherlands, Poland, Slovakia, the United Kingdom as well as Iceland and Norway, the interviews have been undertaken by the staff of the NSI that was experienced in health or social surveys (Table 10).

In Belgium, France, Croatia, Italy, Malta, Austria and Portugal, external staff experienced in health / social surveys was recruited, whereas in Romania and Sweden, the interviewers have participated in other household surveys. In Greece and Cyprus interviewers and supervisors are recruited on a seasonal basis and were selected based on their qualifications and previous experience, while in Slovenia, external staff was employed about three quarters of which had some previous experience in social surveys. The rest of the interviewers were beginners and thus, had undergone an extensive training.

In Denmark, Germany, Luxembourg and Finland, no interviews have been undertaken, since a self-administered mode was used for the data collection.

Table 10. Interviewers qualifications and ratio of interviews per interviewer in EHIS wave 2

	Ratio interviews / interviewers	Internal staff experienced in health / social surveys	External staff experienced in health / social surveys	External staff experienced in household or other surveys
BE	50:1	NO	**YES**	NO
BG	53:1	**YES**	NO	NO
CZ	36:1	**YES**	NO	NO
DK ([3])	-	NO	NO	NO
DE ([3])	-	NO	NO	NO
EE	77:1	**YES**	NO	NO
IE ([4])	208:1	**YES**	NO	NO
EL ([1])	8 - 55:1	NO	NO	**YES**
ES ([2])	15:1	**YES**	**YES**	NO
FR	14:1 (Face-to-face) 63:1 (Telephone)	NO	**YES**	NO
HR	67:1	NO	**YES**	NO
IT	24:1	NO	**YES**	NO
CY	248:1	NO	NO	**YES**
LV	157:1	**YES**	NO	NO
LT	61:1	**YES**	NO	NO
LU ([3])	-	NO	NO	NO
HU	22:1	**YES**	NO	NO
MT	102:1	NO	**YES**	NO
NL	27:1	**YES**	NO	NO
AT	15:1	NO	**YES**	NO
PL	22:1	**YES**	NO	NO
PT	100:1	NO	**YES**	NO
RO	32:1	NO	NO	**YES**
SI	27:1	NO	**YES**	NO
SK	40:1	**YES**	NO	NO
FI ([3])	-	NO	NO	NO
SE	:	NO	NO	**YES**
UK	33:1	**YES**	NO	NO
IS	111:1	**YES**	NO	NO
NO	57:1	**YES**	NO	NO

([1]) The number of questionnaires assigned to each interviewer depends on the sample in its region and on the maximum number of interviews that each interviewer may undertake as defined by the NSI.

([2]) The ratio of interviews to interviewers is provided on a weekly basis.

([3]) A self-administered mode has been used for the data collection. No interviews have been undertaken.

([4]) The ratio of interviews to interviewers has been calculated as average per quarter.

: Information not available; -: Not applicable.

All countries organized a special training session of the interviewers, who received instructions about the scope of the survey, the content of the questionnaire, the modules included in the questionnaire, practicing in filling-in the questionnaire and responding to questions. In most countries, interviewers were also provided with manuals and training material.

The average interviewer workload, i.e. the ratio of interviews per interviewer, varied significantly across countries, with the lowest ratio being recorded for Austria (15 to 1) and the largest one to Cyprus (248 to 1).

4.2.3. Fieldwork (data collection) period

According to article 4.3 of the Commission Regulation implementing EHIS, the data collection period should be spread over at least three months, including at least one month of the autumn season.

Figure 4 shows the duration of the EHIS fieldwork / data collection period. In Cyprus, Estonia, Lithuania, Luxembourg, Hungary, the Netherlands, Poland, Portugal, Romania, Slovenia and Slovakia, the data collection has taken place in 2014 covering at least three or four months including the autumn season.

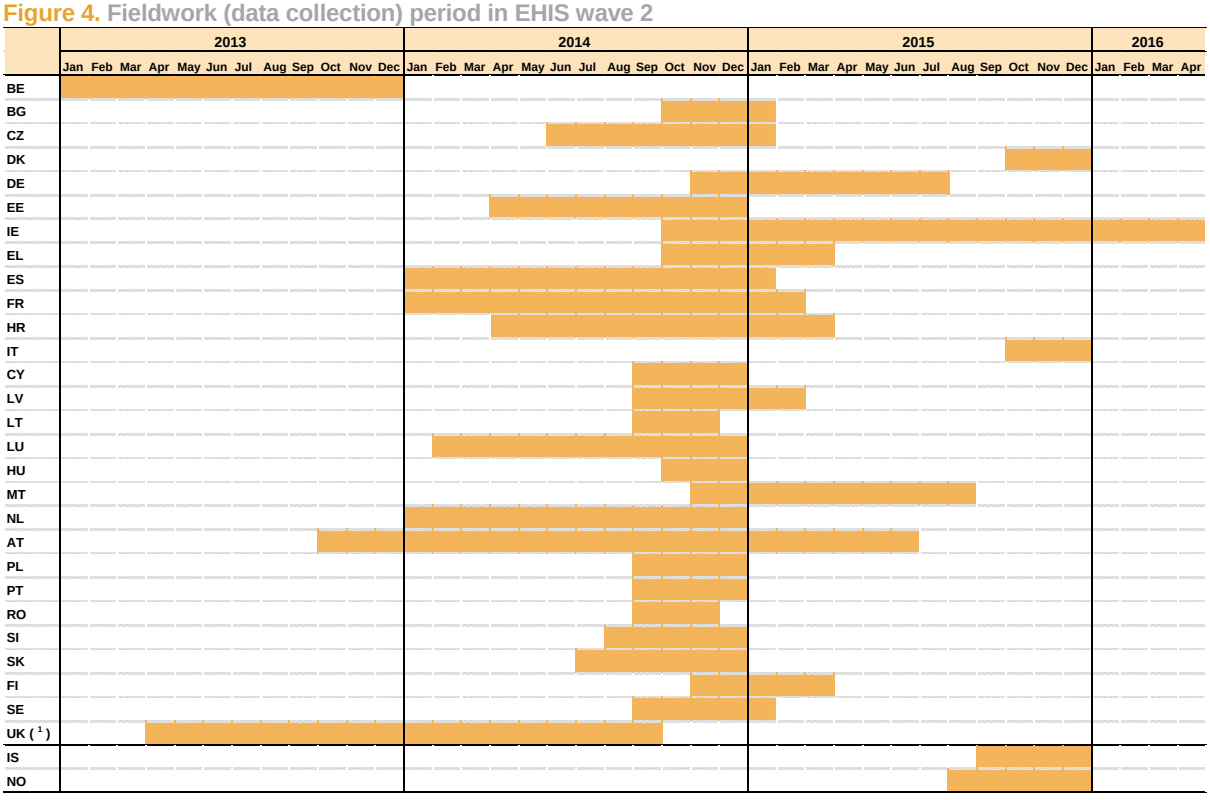
In Bulgaria, the Czech Republic, Germany, Greece, Spain, France, Croatia, Latvia, Malta, Finland and Sweden the fieldwork started during 2014 and was completed in 2015, while in Austria the data collection was launched in October 2013 and was completed in June 2015. On the other hand, in Belgium, the data collection has taken place in 2013.

Denmark, Italy and Norway carried out the fieldwork during the last months of 2015. Just in Ireland the fieldwork started in 2014 and lasted until the first four months of 2016.

Additionally, in most countries, the data collection period lasted more than three months. It ranged from three (Denmark, Italy, Lithuania, Hungary, Romania) peaking at 19 months (Ireland) and 21 months (Austria).

On average, the data collection period across all countries lasted 8 months.

Figure 4. Fieldwork (data collection) period in EHIS wave 2



(1) The fieldwork was carried out during April 2013 – March 2014 as far as Great Britain is concerned and during April 2014 – September 2014 as far as Northern Ireland is concerned.

Based on calculations made on the microdata files transmitted to Eurostat, the distribution of responses over the reference years is presented in Table 11.

Table 11. Distribution of responses over the reference years in EHIS wave 2
(number of respondents, %)

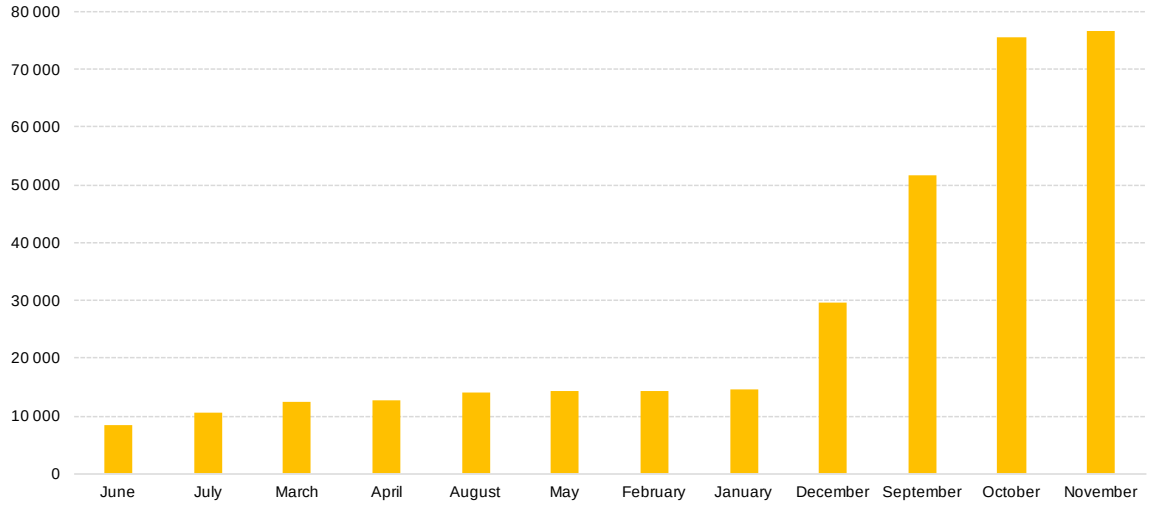
	Number			%		
	2013	2014	2015	2013	2014	2015
BE	9 113	0	0	100.0	0	0
BG	0	6 347	63	0	99.0	1.0
CZ	0	6 498	239	0	96.5	3.5
DK	0	0	5 811	0	0	100.0
DE	0	9 375	15 449	0	37.8	62.2
EE	0	5 452	0	0	100.0	0
IE	0	2 015	8 308	0	19.5	80.5
EL	0	8 223	0	0	100.0	0
ES	0	21 163	1 679	0	92.6	7.4
FR	0	15 397	332	0	97.9	2.1
HR	0	4 110	1 336	0	75.5	24.5
IT	0	0	25 325	0	0	100.0
CY	0	4 958	0	0	100.0	0
LV	0	4 426	2 651	0	62.5	37.5
LT	0	5 205	0	0	100.0	0
LU	0	4 004	0	0	100.0	0
HU	0	5 826	0	0	100.0	0
MT	0	1 340	2 746	0	32.8	67.2
NL	0	7 653	0	0	100.0	0
AT	3 566	7 796	4 409	22.6	49.4	28.0
PL	0	24 156	0	0	100.0	0
PT	0	18 204	0	0	100.0	0
RO	0	16 605	0	0	100.0	0
SI	0	6 262	0	0	100.0	0
SK	0	5 490	0	0	100.0	0
FI	0	5 268	915	0	85.2	14.8
SE	0	6 248	44	0	99.3	0.7
UK	14 062	6 099	0	69.7	30.3	0
IS	0	0	4 001	0	0	100.0
NO	0	0	8 164	0	0	100.0

Source: Calculations based on national EHIS microdata files.

As expected, in Estonia, Cyprus, Lithuania, Luxembourg, Hungary, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia, as well as the United Kingdom, all interviews have been undertaken during 2014. Just in Greece, the (official) data collection fieldwork lasted until April 2015, although all data were collected during 2014. In Belgium, responses were collected in 2013, whereas in Denmark, Italy and Norway in 2015. In the United Kingdom, the data collection was undertaken during 2013–2014 with the main bulk of responses being collected in 2013, while in Austria, the data collection was spread over the three-year period 2013–2015, with the highest proportion of responses being collected in 2014. In the rest of the countries, the data were collected during 2014 and 2015.

Figure 5 shows the overall distribution of response over the reference months of the survey (independently of the year that the survey was undertaken in each country). The majority of responses were collected during September (15.4 %), October (22.5 %) and November (22.9 %). Overall, as also shown in Figure 5, less responses were collected during the spring and summer periods.

Figure 5. Distribution of response over the reference months
(number of respondents)



Source: Calculations based on national EHIS microdata files.

5 Quality assessment

5.1. Quality management

5.1.1. Method of pre-notification

As shown in Table 12, all countries used a letter to pre-notify the selected persons about the launch of the survey and their inclusion in the sample, except for Ireland that made a doorstep contact for the announcement of the survey.

Except for the dispatch of the pre-notification letter Austria, Belgium, the Czech Republic and Latvia also contacted the selected persons via telephone. The latter three countries together with Ireland, Croatia, the Netherlands, Poland and Slovenia also attempted to make a contact at the door. Especially Estonia, sent pre-notifications emails, in addition to the paper letters.

Table 12. Method used for pre-notification of respondents for the launch of the survey in EHIS wave 2

 Letter	Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Greece, Spain, Croatia, France, Italy, Cyprus, Lithuania, Latvia, Luxembourg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Romania, Slovenia, Slovakia, Finland, Sweden, United Kingdom, Iceland, Norway.
 Telephone	Belgium, Czech Republic, Latvia, Austria.
 Personal contact at doorstep	Belgium, Czech Republic, Ireland, Croatia, Latvia, Netherlands, Poland, Slovenia.
 Email	Estonia.

All countries, except for Germany and Luxembourg, made at least three attempts for contacting the selected persons before receiving a refusal for participation. Moreover, the Netherlands used personal contacts at doorstep only for those who have not replied after the dispatch of two notification letters.

5.1.2. Incentives

Seven countries offered incentives to the respondents to encourage them to participate in the survey. In Malta and Austria shopping vouchers and gift vouchers were offered, respectively. In Belgium, each participating household has been paid 10 Euros, while in the Czech Republic a reflective tape and a shopping cart chip with EHIS logo was offered. In Slovakia and Estonia each respondent received a pen and reflectors and key-holders, respectively. Finally, Germany launched two incentive strategies: a shopping voucher of 10 Euros was given to respondents aged 15 to 34, while respondents aged more than 34 could win the lottery shopping voucher of 50 euros.

5.1.3. Duration of interviews

Table 13 presents the duration of interviews by mode of data collection. It should be however highlighted that is not always clear from the information provided in the national quality reports whether the figures provided refer to the interview duration for EHIS variables only or for the whole questionnaire that might include additional questions for national purposes.

The average duration of completion of the face-to-face interviews varied from 20 (Spain) to 45 minutes (Greece and Cyprus) and peaking at 47 minutes in Malta, while the average duration for the telephone interviews varied from 20 (Austria) to 65 minutes (Estonia for CAPI interviews).

Concerning the self-administered questionnaires, the average duration ranged from 10 (Estonia) to 46 minutes (Latvia). In Finland, it is estimated — since only self-administered questionnaires were used — that it took about 40 to 60 minutes for the respondents to complete the whole questionnaire.

However, Bulgaria, the Czech Republic, Lithuania, Romania, Slovenia and Sweden did not mention explicitly in their national quality reports the average duration of the interviews by mode of data collection.

It is also notable that in Bulgaria, France, Croatia, Italy, Cyprus, Poland and Romania all persons aged 15 and over in the same household have been surveyed. This signifies that the completion time is multiplied in each household. On the other hand, in Greece and the Czech Republic only one person has been surveyed in the household.

Additionally, the use of administrative data by some countries (see Annex 2, (Table 25)) for the derivation of some variables has probably resulted in the reduction of the overall average time of completion of the questionnaire.

In some countries, various data collection modes are in place. From the available information, it can be deducted that electronic modes of data collection tend to reduce the time of completion of the questionnaire. Portugal is an exception (41 minutes required for CAWI and 34 minutes for paper questionnaire).

Table 13. Average duration of interviews (in minutes) in EHIS wave by mode of data collection (minutes)

	Face-to-face	Telephone	Self-administered questionnaire	Undefined mode of data collection ([1])
BE	:	-	:	:
BG ([2])	30	-	:	
CZ ([3])	:	:	:	43
DK	-	-	:	-
DE ([4])	-	-	35	-
EE	65	:	10	:
IE	:	-	:	:
EL ([3])	45	-	-	-
ES	5-20	-	-	-
FR	27	21	20	-
HR	25	22	-	-
IT	58	-	-	-
CY	30-45	-	-	-
LV	27	24	46	-
LT	35	-	-	-
LU ([5])	-	-	27	-
HU	:	-	-	-
MT	47	-	-	-
NL	31	-	31	-
AT	-	20	:	-
PL	30	-	-	-
PT	34	-	41	-
RO ([2])	:	-	:	31
SI	:	-	:	30
SK	:	-	:	:
FI ([4])	-	-	20-60	-
SE	-	:	:	25
UK	46	38	-	-
IS	-	25	-	-
NO	-	34	-	-

([1]) No explicit reference in the quality reports on the interview duration by mode of data collection.

([2]) All persons aged more than 15 years in the same household have been surveyed.

([3]) Only one person per household has been surveyed.

([4]) Based on NSI's estimation.

([5]) Information refers to the web survey using an electronic questionnaire. Information about the duration of interviews where a paper questionnaire was used is not available.

: Information not available; -: Not applicable mode of data collection.

5.1.4. Methods used for quality control

In order to safeguard that the interviews have been indeed undertaken by the interviewers and to receive feedback on the quality of the interview (e.g. interviewer's behavior, duration of interview), most countries contacted, usually via telephone, a sample of randomly selected respondents (see Table 14). The ratio of interviewers to field supervisors varied from 2 to 1 (Italy), 4 to 1 (Bulgaria, Croatia, Cyprus) to 70 to 1 (Belgium).

Table 14. Method for quality control of the data collection and ratio of interviewers to field supervisors in EHIS wave 2

	Ratio interviewers / field supervisors	Contacts with respondents for quality control	Contact method
BE	70:1	**YES**	Contact (via letter) requesting for an assessment of the interview.
BG	4:1	NO	
CZ	13:1	**YES**	Telephone contacts by the regional coordinators to selected respondents.
DK ([1])	NO	NO	
DE ([1])	NO	NO	
EE	12:1	**YES**	Letters sent to respondents requesting for feedback on the survey.
IE	9:1	NO	
EL	1 supervisor per regional office	NO	
ES	5-6:1	**YES**	Telephone contacts (18 %) and personal visits (10 %) to selected persons.
FR	15:1 (Face-to-Face) 7:1 (Telephone)	**YES**	112 respondents whose interview duration lasted less than 10 min. were called back.
HR	4:1	**YES**	Telephone contacts with 10 % randomly selected respondents.
IT	2:1	NO	
CY	4:1	**YES**	Telephone contacts to randomly selected households.
LV	11:1	**YES**	Telephone contacts, personal visits or mails dispatched to 5 % of addresses.
LT	7:1	**YES**	Telephone contacts to 26 % randomly selected respondents.
LU ([1])	NO	NO	
HU	13:1	**YES**	Telephone contacts to 10% randomly selected respondents
MT	10:1	**YES**	Checks conducted by the NSI's staff concerning the duration of the interview for a sample of randomly selected questionnaires (15 % of filled-in questionnaires) per interviewer.
NL	13:1	**YES**	Telephone contacts (7.4 %) undertaken under the framework of the Dutch HIS.
AT	15:1	NO	
PL	5:1	NO	
PT	9:1	**YES**	Telephone contacts to 3 % randomly selected respondents.
RO	8:1	**YES**	Direct contacts with households.
SI	50:1	**YES**	Telephone contacts of at least 10 % randomly selected respondents per interviewer. Mails were also sent raising a number of questions on the conducting of the interview, length of the questionnaire, use of show cards, etc.
SK	17:1	NO	
FI	NO	NO	
SE ([2])	:	NO	
UK	10:1 (Face-to-face) 20:1 (Telephone)	NO	
IS	18:1	NO	
NO	14:1	NO	

([1]) The survey was primarily conducted via a self-administered mode.

([2]) The survey was primarily conducted via a self-administered mode. Telephone interviews were conducted to those who did not reply the self-administered questionnaire.

5.2. Accuracy and reliability

5.2.1. Overall accuracy

With regard to the overall accuracy of the survey results, most countries stated that they followed Eurostat's guidelines for the implementation of the survey and undertook required practices (e.g. validation, calibration, non-response adjustments, etc.) to minimize the effect of all potential sources of non-sampling errors.

The Czech Republic and Finland referred to specific factors that might have affected the accuracy of the results. In detail, the Czech Republic reported that since the sample was derived from the LFS, interviewers may have been used to cooperate with a certain person within household, which was not selected to participate also in EHIS. Additionally, in the national version of the questionnaire, additional chronical diseases have been added in the list proposed by Eurostat under the chronic conditions (CD) section, which might have affected the results. Care should be also given to the fact that some concepts did not have the same meaning at national level (e.g. hospitalization which is a term not commonly used in the national health care system). The latter may have impact on the responses for one-day cases of hospitalization.

In Finland, the use of a self-administered questionnaire resulted in higher item nonresponse rate, whereas invalid and incoherent values were also identified. Although no severe errors were detected during the data processing phase, the accuracy of the results might have been affected.

Moreover, France and Luxembourg stated that some sociodemographic groups of the population were underrepresented (see Section on Coverage errors).

5.2.2. Sampling errors

Sampling errors are in place only in sample surveys and arise from the fact that not all units of the population frame are surveyed. Surveys, like EHIS, are based on probability sampling. This makes it possible to quantify the sampling errors, which can be expressed in terms of standard errors and confidence intervals.

Table 15 provides the estimates, the standard errors, the 95 % confidence limits and the design effect for the proportion of respondents aged 15 years or over who were in good or very good health (HS1).

Table 15. Sampling errors — Respondents aged 15 years or over in good or very good health (HS1)

	Number of respondents — n	Estimated proportion — *p*	Standard error — SE	95 % confidence interval	Design effect — deff
BE	5 024	77.9	0.70	76.5 - 79.3	1.92
BG	3 568	66.6	0.80	65.1 - 68.2	1.69
CZ	3 892	68.4	0.66	67.1 - 69.7	1.16
DK	4 211	75.3	0.57	74.2 - 76.4	:
DE	24 707	70.9	0.38	70.1 - 71.6	1.75
EE	3 116	59.1	0.70	57.7 - 60.4	:
IE	7 979	81.4	0.72	79.9 - 82.9	1.63
EL	5 419	74.8	0.60	73.6 - 75.9	1.47
ES	15 388	71.0	0.65	69.7 - 72.3	4.73
FR	10 778	69.4	0.41	68.6 - 70.2	1.26
HR ([1])	2 839	60.4	0.74	58.9 - 61.8	0.01
IT	17 416	70.4	0.34	69.7 - 71.1	1.41
CY	3 640	76.4	0.60	75.2 - 77.6	1.07
LV	6 780	49.0	0.50	48.0 - 50.0	0.74
LT	2 259	50.3	0.57	49.4 - 51.3	0.82
LU	2 736	69.6	0.72	68.2 - 71.0	0.96
HU	3 547	61.4	0.53	60.4 - 62.4	0.68
MT	3 152	81.6	0.61	80.4 - 82.8	:
NL	5 903	77.3	0.48	78.2 - 76.4	1.05
AT	12 669	78.6	0.40	77.8 - 79.4	1.22
PL	22 363	62.8	0.37	62.0 - 63.5	1.33
PT	8 091	51.3	0.51	50.3 - 52.3	:
RO	11 109	72.7	0.61	71.5 - 73.9	:
SI	4 070	65.8	0.64	64.5 - 67.1	1.13
SK	3 330	65.7	0.64	64.5 - 67.0	1.01
FI	6 130	59.4	0.60	58.1 - 60.6	1.00
SE	4 788	25.1	0.55	23.8 - 26.0	:
UK ([2])	12 776	75.8	0.42	74.9 - 76.6	1.70
IS	2 886	74.3	0.70	72.9 - 75.7	:
NO	6 534	79.3	0.52	78.3 - 80.3	:

([1]) Coefficient of variation instead of design effect.

([2]) Figures refer to the population aged 16 and over.

: Information not available.

Table 16 provides the estimates, the standard errors, the 95 % confidence limits and the design effect for the proportion of respondents aged 15 years or over with a longstanding illness or health problem (HS2).

Table 16. Sampling errors — Respondents aged 15 years or over with a longstanding illness or health problem (HS2)

	Number of respondents — n	Estimated proportion — *p*	Standard error — SE	95 % confidence interval	Design effect — deff
BE	1 953	28.3	0.80	26.8 - 29.9	2.10
BG	3 110	44.6	0.80	42.8 - 46.3	2.04
CZ	4 649	60.5	0.75	59.1 - 62.0	1.26
DK	2 055	33.3	0.62	32.1 - 34.6	:
DE	24 645	44.9	0.42	44.0 - 45.7	1.77
EE	3 582	64.9	0.70	63.6 - 66.3	:
IE	3 791	30.7	0.54	29.2 - 32.3	1.40
EL	4 589	49.3	0.80	48.1 - 51.3	2.14
ES	14 734	62.0	0.59	61.1 - 63.4	3.40
FR	5 747	37.7	0.44	36.9 - 38.6	1.26
HR ([1])	2 183	36.7	0.71	35.3 - 38.0	0.02
IT	8 127	31.6	0.45	30.7 - 32.5	2.3
CY	2 350	42.5	0.70	41.1 - 44.0	1.13
LV	7 072	45.9	0.50	44.9 - 46.9	0.77
LT	3 052	52.8	0.59	51.7 - 54.0	0.87
LU	1 322	33.3	0.74	31.9 - 34.8	0.97
HU	2 644	45.1	0.58	44.0 - 46.2	0.78
MT	1 530	33.8	0.74	32.3 - 35.2	:
NL	2 641	33.9	0.54	35.0 - 32.8	1.06
AT	5 626	36.0	0.50	35.0 - 36.9	1.31
PL	24 156	56.7	0.37	56.0 - 57.4	1.31
PT	11 134	56.4	0.61	55.2 - 57.6	:
RO	5 838	29.8	0.67	28.5 - 31.2	:
SI	2 483	39.2	0.67	37.9 - 40.6	1.17
SK	3 199	53.7	0.70	52.4 - 55.1	1.10
FI	6 059	48.5	0.60	47.3 - 49.8	1.00
SE	2 084	35.1	0.61	33.7 - 36.1	:
UK ([2])	10 679	45.1	0.49	44.2 - 46.1	1.92
IS	1 204	29.1	0.70	27.6 - 30.5	:
NO	2 769	33.8	0.59	32.6 - 34.9	:

([1]) Coefficient of variation instead of design effect.

([2]) Figures refer to the population aged 16 and over.

: Information not available.

Table 17 provides the estimates, the standard errors, the 95 % confidence limits and the design effect for the proportion of respondents aged 15 years or over that were severely limited in activities people usually do because of health problems for at least the past 6 months (HS3).

Table 17. Sampling errors — Respondents aged 15 years or over that were severely limited in activities people usually do because of health problems for at least the past 6 months (HS3)

	Number of respondents — n	Estimated proportion — *p*	Standard error — SE	95 % confidence interval	Design effect — deff
BE	371	6.1	0.40	5.3 - 7.0	2.12
BG	466	6.4	0.30	5.7 - 7.1	1.28
CZ	816	8.9	0.36	8.2 - 9.7	1.04
DK	335	5.5	0.30	4.9 - 6.1	:
DE	24 555	5.9	0.19	5.5 - 6.3	1.64
EE	597	10.5	0.40	9.7 - 11.3	:
IE	448	3.7	0.57	2.5 - 4.2	1.49
EL	1 063	10.3	0.40	9.5 - 11.1	1.53
ES	1 434	6.0	0.19	5.2 - 6.0	1.53
FR	1 183	7.8	0.25	7.3 - 8.3	1.33
HR ([1])	611	10.5	0.44	9.7 - 11.4	0.04
IT	1 190	7.8	0.20	7.4 - 8.2	1.16
CY	481	8.4	0.40	7.6 - 9.2	1.00
LV	7 069	10.4	0.30	9.7 - 11.0	0.72
LT	491	7.9	0.33	7.2 - 8.5	0.81
LU	291	7.6	0.43	6.7 - 8.4	1.02
HU	548	9.2	0.35	8.5 - 9.9	0.84
MT	310	6.8	0.39	6.0 - 7.6	:
NL	488	6.4	0.28	6.9 - 5.9	1.05
AT	968	7.0	0.30	6.5 - 7.6	1.47
PL	24 156	7.4	0.18	7.0 - 7.7	1.16
PT	1 698	8.4	0.30	7.8 - 9.0	:
RO	652	3.1	0.18	2.8 - 3.5	:
SI	500	8.3	0.41	7.6 - 9.1	1.34
SK	709	11.3	0.42	10.5 - 12.1	0.96
FI	6 030	6.3	0.30	5.6 - 6.9	1.00
SE	421	7.5	0.33	6.8 - 8.1	:
UK ([2])	1 882	7.6	0.22	7.1 - 7.9	1.42
IS	576	14.1	0.60	13.0 - 15.2	:
NO	467	6.0	0.30	5.4 - 6.6	:

([1]) Coefficient of variation instead of design effect.

([2]) Figures refer to the population aged 16 and over.

: Information not available.

Table 18 provides the estimates, the standard errors, the 95 % confidence limits and the design effect for the proportion of respondents aged 15 years or over declaring having been hospitalized in the past 12 months (HO1).

Table 18. Sampling errors — Respondents aged 15 years or over declaring having been hospitalized in the past 12 months (HO1)

	Number of respondents — n	Estimated proportion — *p*	Standard error — SE	95 % confidence interval	Design effect — deff
BE	851	9.7	0.40	8.8 - 10.6	2.07
BG	701	10.0	0.40	9.1 - 10.7	1.28
CZ	973	11.8	0.45	10.9 - 12.7	1.15
DK	537	8.4	0.37	7.7 - 9.1	:
DE	24 709	15.2	0.26	14.7 - 15.7	1.29
EE	549	9.8	0.40	9.0 - 10.6	:
IE	1 177	10.9	0.39	10.0 - 11.8	1.59
EL	904	9.7	0.40	8.9 - 10.4	1.38
ES	2 150	9.0	0.23	8.3 - 9.2	1.52
FR	1 851	12.1	0.29	11.5 - 12.6	1.28
HR ([1])	591	10.6	0.46	9.7 - 11.5	0.04
IT	2 186	8.4	0.20	8.1 - 8.8	1.25
CY	427	8.0	0.40	7.2 - 8.8	1.12
LV	7 077	11.6	0.40	11.0 - 12.3	0.85
LT	729	12.8	0.45	11.9 - 13.7	0.93
LU	461	11.7	0.52	10.6 - 12.7	1.01
HU	788	13.3	0.43	12.5 - 14.2	0.92
MT	388	8.7	0.44	7.8 - 9.6	:
NL	656	8.3	0.32	8.9 - 7.7	1.05
AT	2 293	14.8	0.30	14.1 - 15.4	1.06
PL	24 156	12.4	0.24	11.9 - 12.9	1.28
PT	1 709	9.2	0.35	8.5 - 9.9	:
RO	818	4.2	0.25	3.7 - 4.7	:
SI	701	11.1	0.42	10.3 - 11.9	1.11
SK	734	12.1	0.44	11.2 - 13.0	1.00
FI	6 117	9.9	0.40	9.2 - 10.7	1.00
SE	530	9.0	0.36	8.3 - 9.8	:
UK ([2])	1 929	8.3	0.24	7.8 - 8.8	1.58
IS	355	8.5	0.40	7.7 - 9.4	:
NO	773	9.4	0.37	8.7 - 10.1	:

([1]) Coefficient of variation instead of design effect.

([2]) Figures refer to the population aged 16 and over.

: Information not available.

Table 19 provides the estimates, the standard errors, the 95 % confidence limits and the design effect for the proportion of respondents aged 15 years or over who are obese (BMI>=30).

Table 19. Sampling errors — Respondents aged 15 years or over who are obese (BMI>=30)

	Number of respondents — n	Estimated proportion — *p*	Standard error — SE	95 % confidence interval	Design effect — deff
BE	1 229	13.7	0.60	12.7 - 14.9	2.26
BG	836	14.8	0.60	13.6 - 15.9	1.55
CZ	1 386	18.2	0.56	18.1 - 20.4	1.15
DK	872	15.1	0.49	14.1 - 16.0	:
DE	23 791	16.9	0.36	16.2 - 17.6	2.14
EE	1 108	19.6	0.60	18.5 - 20.6	:
IE	2 570	28.1	0.56	26.8 - 29.4	1.66
EL	1 361	17.4	0.60	16.3 - 18.5	1.66
ES	3 691	16.0	0.34	15.6 - 16.9	1.84
FR	2 331	14.2	0.31	13.6 - 14.8	1.21
HR ([1])	967	19.0	0.60	17.8 - 20.2	0.03
IT	2 674	10.7	0.24	10.2 - 11.2	1.52
CY	722	13.1	0.50	12.2 - 14.1	1.06
LV	6 384	21.3	0.50	20.4 - 22.3	0.88
LT	944	17.3	0.51	16.4 - 18.2	0.92
LU	600	15.1	0.57	14.0 - 16.2	0.99
HU	1 203	21.2	0.53	20.2 - 22.3	:
MT	920	26.1	0.76	24.6 - 27.6	:
NL	1 059	14.3	0.41	15.1 - 13.5	1.06
AT	2 162	14.7	0.40	13.9 - 15.4	1.41
PL	21 371	17.2	0.29	16.7 - 17.8	1.24
PT	3 196	16.4	0.40	50.3 - 52.3	:
RO	1 581	9.3	0.48	8.4 - 10.3	:
SI	1 073	18.6	0.52	17.6 - 19.6	1.07
SK	950	15.9	0.50	15.0 - 16.9	1.02
FI	6 054	18.9	0.50	17.9 - 19.9	1.00
SE	774	13.4	0.44	12.5 - 14.2	:
UK ([2])	3 615	20.1	0.41	19.3 - 20.9	1.78
IS	718	19.0	0.40	17.7 - 20.3	:
NO	1 026	12.9	0.44	12.1 - 13.8	:

([1]) Coefficient of variation instead of design effect.

([2]) Figures refer to the population aged 16 and over.

: Information not available.

5.2.3. Non-sampling errors

COVERAGE ERRORS

Coverage errors arise due to divergences between the target and the frame population; they may be due to under-coverage (i.e. the frame population does not include all units of the target population), over coverage (i.e. the frame population includes units that do not belong in the target population) and misclassification (i.e. unit in the frame population which belong to the target population but are wrongly classified).

Table 20 summarises the information provided by countries on the coverage errors, in terms of the quality of the sampling frame, over-coverage and under coverage.

In some countries, certain population groups were excluded even though they belong to the sampling frame. In detail, persons with a protected address (Denmark), homeless people and persons with no permanent address (Estonia, the Netherlands, Portugal, Finland) were not covered. Particularly in Germany, Cyprus, Latvia, Luxembourg, the Netherlands and Sweden, persons for whom language was a barrier were excluded even though they would belong to the target population. Blind persons (Germany) and persons with hearing problems (Iceland) could not be captured due to the mode of data collection used. Additionally, the United Kingdom mentioned that about 80 % of the sample was initially contacted for a telephone interview and thus there is a risk that some potential respondents have not been reached.

Table 20. Under-coverage, over-coverage and overall assessment of the quality of the sampling frame in EHIS wave 2

	Under-coverage	Over-coverage	Overall quality of the sampling frame
BE	:	Unknown but quite limited	Trimestral samples were selected to reduce the lag between last update of the register and the moment of actual sampling. Non-registered households were not covered.
BG	0.5 %	0 %	The 2011 population census data was used as sampling frame. Data on deceased and emigrants were removed based on demographic statistics has been used for updates.
CZ	1.3 %	10.0 %	About 10 % of sampling units are considered useless since they are non-residential, e.g. temporarily empty flats, or recreational or commercial space. About 1.26 % of selected residential dwellings are dropped from the sample for practical reasons.
DK	<1.0 %	0 %	Sampling and coverage errors were not an issue in the survey. The Danish Civil Registration System, which is of very high quality, is used to obtain data.
DE	≈0 %	0 %	Minimal time lag between last update of the sampling frame and the moment of actual sampling is achieved due to constant update of the local registries. Geographical coverage is guaranteed.
EE	<1.0 %	3.0-4.0 %	Good quality; three months' time lag between last update of the sampling frame and the moment of actual sampling.
IE	0 %	0 %	A time lag of approximately 30 months between last update of the sampling frame and time of actual sampling. Well covered geographical coverage across the country.
EL	1.5 %	0 %	The 2011 population census data was somehow outdated thus resulting in housing units found to be empty or to be used for other purposes (e.g. secondary residences, etc.). Based on the Census 2011, the estimated undercoverage of the target population is 1.46 %, referring to individuals in collective living quarters.
ES	0 %	0 %	The sampling frame used was a list of dwellings from the 2013 population register. The percentage of empty dwellings is estimated to be about 10 %. The sample size was increased to compensate for the empty dwellings.
FR	<5.0 %	:	The ESPS sample doesn't cover institutionalized people, people living in overseas territories and non-French speaking people. For the rest, people who live in a household of which none of the senior members is insured by one of the scheme of the ESPS scope are not covered. That accounts for less than 5 % of the target population. Sickest and poorest people are

	Under-coverage	Over-coverage	Overall quality of the sampling frame
			under-covered as in all the general population surveys. Illiterate people are under-covered because of the self-administered mode.
HR	:	7.6 %	Since the 2011 population census was used as sampling frame, households created after 2011 are not well represented.
IT	<1.0 %	<1.0 %	Households were selected from the LAC (Liste Anagrafiche Comunali) register of households which was updated on January 2015. The time lag between the last update of the sampling frame and the moment of the actual sampling was six months. The frame might contain errors, such as addresses (e.g. due to recent change of the address), wrong registers (recent emigration) and missing registers (recent immigration). The sample excluded institutionalized persons.
CY	0 %	10.2 %	The 2011 population census was used as sampling frame. Thus, dwellings built between October 2011 and August 2014 were covered.
LV	:	3.5 %	Requirements of the EU Regulation and EHIS wave 2 manual were followed. Shortcomings in terms of timeliness (e.g. time lag between last update of the sampling frame and the moment of the actual sampling), geographical coverage, coverage of different subpopulations (institutionalised persons), multiple listings, etc.). The information from the Demographic Statistics Data Processing System was used to create the base for the sampling frame. The information from population statistics and population census was used to adjust the base (by excluding the persons who most likely are not the residents of Latvia). The time lag between last update of the population frame and the moment of the actual sampling is 12 days. All administrative territories are covered by the frame. Institutionalised persons do not belong to the target population, so they were excluded from the population frame (according to the available information). Multiple listings of persons practically are not possible as persons are identified by the unique personal ID code and one person can hold only one personal ID code.
LT	4.0 %	1.0 %	The sampling frame was made up using the population register. The register is updated regularly. The sampling frame used was updated one month prior the fieldwork. Additional information of deaths was available during the fieldwork. It covered the whole population of the country. Persons living in collective households and institutions were not covered. In order to adjust for under-coverage, calibration of sampling weights using the known values of age, sex and urban/rural place of residence has been applied.
LU	0 %	0 %	With 95 % population coverage, the National Health Insurance Database is considered as the most complete list of inhabitants available in Luxembourg. The 5 % remaining people are identified as being employees of the European Commission who have their own health insurance system and asylum seekers who just arrived and are on the way to be registered.
HU	0.4 %	~3.0 %	Acceptable timeliness and geographical coverage. The rate of over-coverage is about 3% (including emigrants, institutionalised persons). Selected addresses could not be located for about 0.7 % of all cases and the selected persons could not be located in the available address for about 9 % of all cases.
MT	:	:	The national population register from which the sample was drawn is based on the 2011 Census updated with deaths (monthly) and births. The time lag between census and sampling may reduce the quality of contact data, however efforts were made to collect updated contact details. The sample was drawn from a national population register with complete coverage of the total target population. The register is based on census population data updated with births and deaths. Updates are done monthly for deaths while for other updates are carried out less frequently. In general, coverage is good. The last census was conducted in 2011 so the time lag between the census and the moment of the actual sampling may result to changes in household contact details.
NL	0.2 %	<0.3 %	The Basic Municipal Registry (in Dutch Basisregistratie Personen, BRP) is used as the sample frame. This register contains all persons who are registered in municipalities, excluding the Caribbean Islands. Persons belonging to institutional households are excluded from the sampling frame

	Under-coverage	Over-coverage	Overall quality of the sampling frame
			(and from the population). The sampling frame is updated once a month. Immigrants and newborns are added to the frame, emigrants and deceased persons are deleted, and data are updated for persons who have moved to a different address. When a sample is selected, the names and addresses of the intended respondents are not known. This has to be retrieved from the BRP. This is done at most six weeks before the start of the fieldwork.
AT	0 %	0 %	The overall quality is considered to be very good and is constantly updated. The sampling frame covers the whole Austrian population.
PL	≈0 %	10.5 %	The register of addresses is used as the sampling frame.
PT	0 %	11.8 %	The sampling frame was selected from the National Dwellings Register (NDR) which comprises all private dwellings registered in the 2011 population census. The frame is updated continuously based only on the information coming from other surveys. The geographical coverage refers to the total territory, however the population living in collective dwellings or institutions (approximately 1 % of total population) is excluded.
RO	0.4 %	6.3 %	The master sample EMZOT used as a sampling frame is periodically updated from results of population surveys and the results of the micro census. From the selected dwellings 6.3 % were ineligible (seasonal or demolished). All the country is covered. Institutionalised persons, persons who had their usual residence for the last year at another address in the sample are excluded.
SI	0 %	0 %	The Central Population Register is used as a sampling frame. Its coverage is considered as good.
SK	:	:	The sampling frame has not been updated since 2011, when the last population census was performed. It consists of all dwellings, divided into occupied, not occupied and institutionalised households. Dwellings that appear not to be part of the target population or incorrectly recorded are not considered in the sample selection.
FI	≈0 %	0 %	The Population Register Centre Finland is used as sampling frame and is continuously kept up to date and it covers the population as a whole. People in institutional care and without a permanent address were removed from the sampling frame.
SE	0 %	0 %	Excellent quality of the sampling frame. The update of addresses was made at the time the survey took place and thus recently updated information was available for all individuals.
UK	2.0 %	10.0 %	98 % of individuals living in private households in the entire geographic area of the United Kingdom are included in the postcode address file (PAF) which is updated regularly. The PAF does not cover institutionalized individuals who however, are not in the target population of EHIS. To limit over-coverage, “delivery points” which receive a large amount of mail are assumed as businesses and excluded. Even after this step, approximately 10 % of the sampled addresses are typically ineligible, either because they contain businesses, are vacant, or are inhabited by individuals outside the target population. Out-of-scope households were fairly limited where the LFS was used as a frame, as, for example, businesses will already have been excluded by the LFS. There will, however, be some households where individuals have moved out. The sample was increased to account for anticipated over-coverage.
IS	:	:	No shortcomings in the sampling frame.
NO	:	1.8 %	No shortcomings in the sampling frame. The Norwegian Central Population Register (CPR) is of high quality.

: Information not available.

MEASUREMENT ERRORS

Measurement errors occur during the data collection and cause the recorded values of variables to be different from the true ones. Proxy interviews, i.e. when a person provides answers on another person's behalf, is a cost-effective solution, however, is one of the potential error sources that may contribute to measurement errors. According to the methodological guidelines, proxy answers in EHIS could be allowed for some questions only and in cases where the respondent was unable to answer for one or more of the following reasons:

1. Suffering from long term cognitive impairment
2. Suffering from long term severe debilitation
3. Suffering from a long term sensory impairment that prevents the interaction between interviewer and interviewee
4. In hospital / health or social care facility for the entire period of the fieldwork
5. Away from the household for educational or work purposes for the entire period of the field work in their area of residence
6. Other reason

Proxy interviews were not allowed at all in Denmark, Germany, Estonia, Ireland, Luxembourg, Hungary, the Netherlands, Portugal, Slovakia and Sweden as well as Norway and Iceland (see Table 21 and Figure 6).

Table 21. Proxy interviews and reasons for proxy usage in EHIS wave 2

	Proxy interviews allowed	Part of the questionnaire for which proxy usage was allowed	Reasons for proxy usage
BE ([1])	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5, 6
BG	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
CZ	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5, 6
DK	No	-	-
DE	No	-	-
EE ([2])	No	-	-
IE	No	-	-
EL	Yes	Whole questionnaire	1, 2, 4, 5
ES	Yes	Whole questionnaire	1, 2, 3, 4, 6
FR	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
HR	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5, 6
IT	Yes	Whole questionnaire	1, 2, 3, 4, 5, 6
CY	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
LV	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
LT	Yes	Limited to questions specified in guidelines	1, 2, 3
LU	No	-	-
HU	No	-	-
MT	Yes	Whole questionnaire except HS1, PC3, HA3, PN1, PN2, MH1a-h, UN1, UN2, SS1-SS3, IC1-IC3, AL1-AL6	1, 2, 3, 6
NL	No	-	
AT	Yes	Limited to questions specified in guidelines	1, 2, 3
PL	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
PT	No	-	
RO	Yes	Limited to questions specified in guidelines and to questions not related to tobacco and alcohol consumption	1, 2, 3, 4, 5
SI	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
SK	No	-	
FI	Yes	Whole questionnaire	6
SE	No	-	-
UK	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
IS	No	-	-
NO	No	-	-

([1]) Proxies were not allowed for specific modules of the face-to-face questionnaire and for the whole self-administered questionnaire.

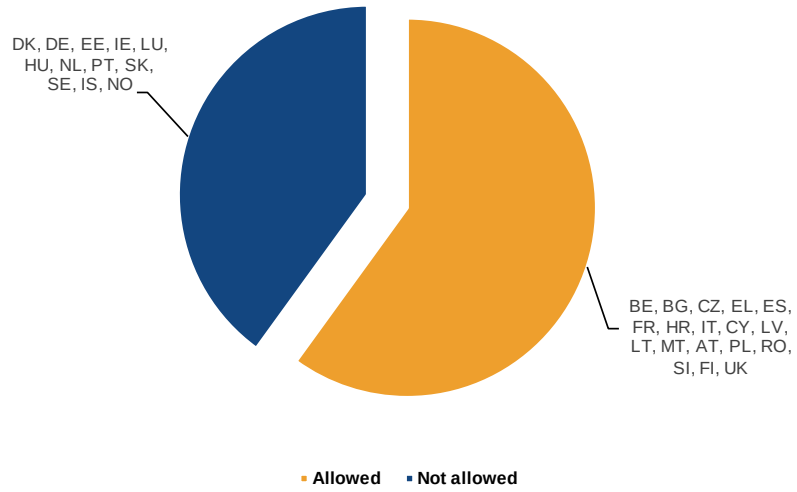
([2]) A proxy response was permitted only in an exceptional case where the selected respondent was in the final stage of disease.

- Proxy usage not allowed.

Regarding reasons for using proxy, most countries declared that proxy interviews were used for all five reasons mentioned above with the exception of Lithuania and Austria, where proxy was allowed only in the cases in which the respondent was not able to reply, i.e. reasons 1, 2 and 3. Moreover, in Belgium proxy interviews were also allowed in cases that the selected person refused to reply. Instead, in Spain and Malta, proxy interviews were used in cases that the selected person did not speak Spanish and Maltese or English respectively, while in Latvia proxies were used for persons in the army and sailors. In Italy, proxies were used when persons were too old and needed help, had language difficulties or were not willing to reply. Also, in Slovenia proxies were only allowed in

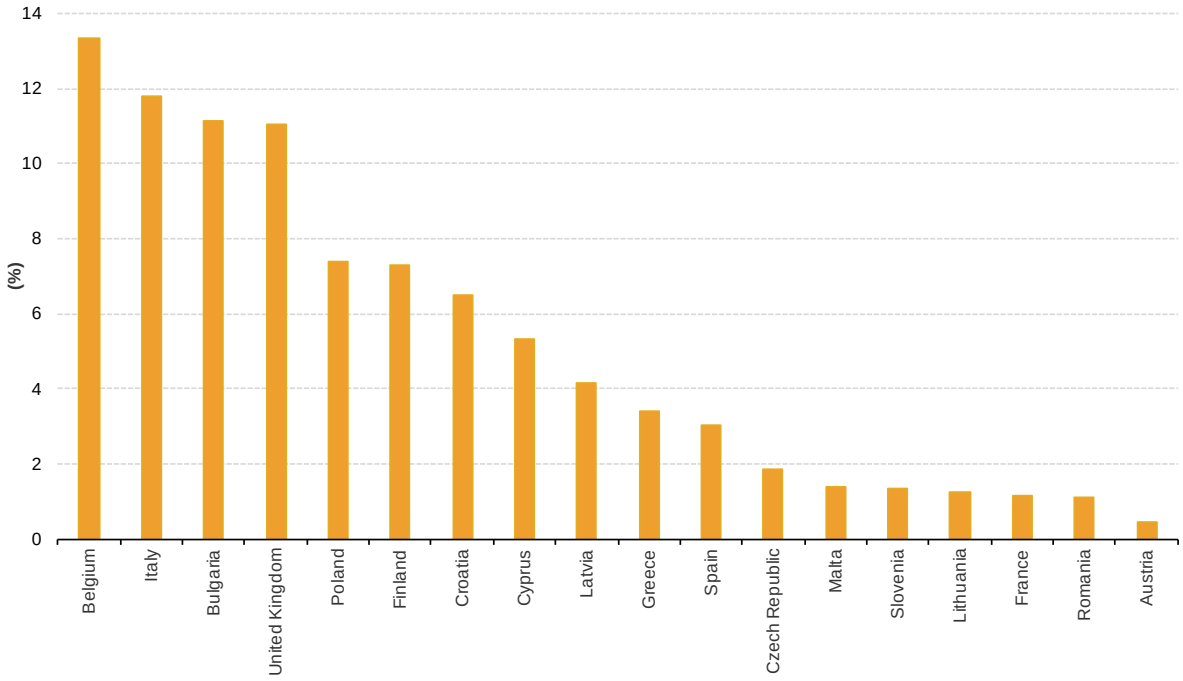
cases where respondents suffered from long-term cognitive or sensory impairment, severe deliberation, or were in hospital, health or social care facility or were away from the household for educational or work purposes for the entire period of fieldwork. Finally, in Finland, proxies were used when the selected persons or their caregivers considered it necessary. Moreover, in Belgium, proxy use was not permitted for specific sensitive questions, while in Romania, proxy was not allowed for questions related to alcohol and tobacco consumption.

Figure 6. Countries in which proxy interviews were allowed in EHIS wave 2



As Figure 7 shows, the percentage of proxy interviews varied significantly across countries, from 13.4 % in Belgium to 1.1 % in Romania and 0.5 % in Austria.

Figure 7. Percentage of proxy interviews in EHIS wave 2
(%)



Note: Proxy interviews were not allowed in Denmark, Germany, Estonia, Ireland, Luxembourg, Hungary, the Netherlands, Portugal, Slovakia, Sweden, Iceland and Norway.

Source: Calculations based on national EHIS microdata files, national quality reports.

NON-RESPONSE ERROR

Non-response is the failure of a survey to collect data on one or more survey variables, from the population units designated for data collection. The difference between the statistics computed from the collected data and those that would be computed if there were no missing values is the non-response error.

There are two types of non-response:

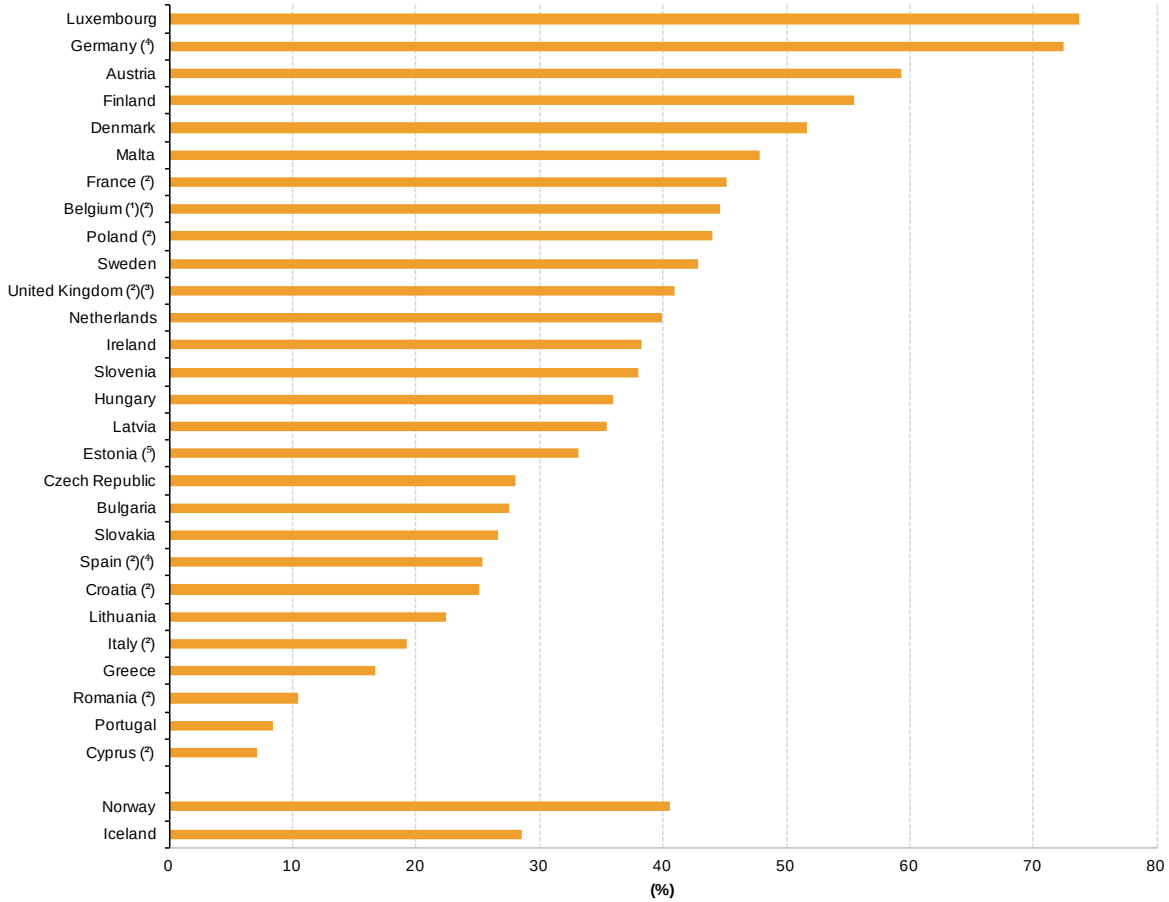
- unit non-response which occurs when no data are collected about a selected population unit;
- item non-response which occurs when data only on some but not all survey variables are collected about a selected population unit.

Unit non-response

Figure 8 presents the unit non-response rates at national level. The unweighted unit response rate was computed as the number of respondents to the sum of the number of eligible sample population and unresolved units.

The unit non-response rate was derived as: 1–response rate.

Figure 8. Unit non-response rate in EHIS wave 2 (in %)



(1) The non-response rate concerns only to face-face interviews (before substitutions).

(2) The non-response rate was derived based on figures referring to households.

(3) The figure refers to the total non-response rate. Unit non-response rate for face-to-face interviews was 38.6%, for telephone interviews was 41.5 % and 51.9 % for Northern Ireland.

Source: Reported unit non-response rates, calculations based on information provided in national quality reports.

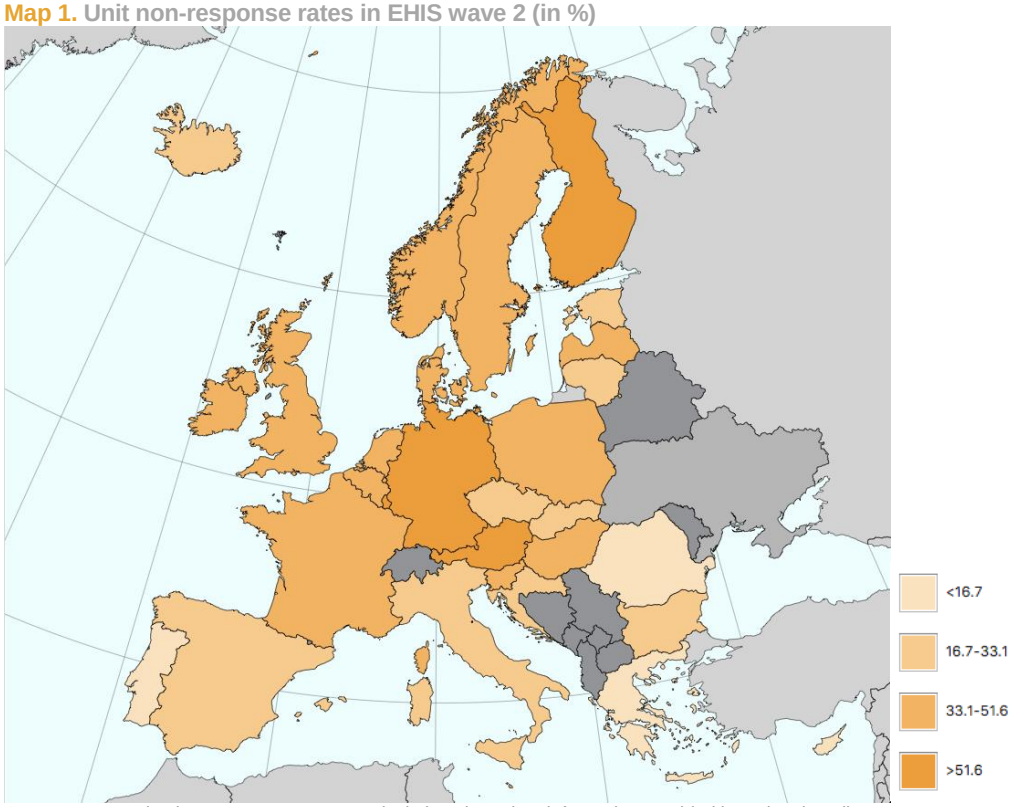
The reported unit non-response exceeded 50 % in five countries (Denmark, Germany, Luxembourg, Austria, Finland), while in Cyprus and Portugal the respective rate was less than 10 %.

It should be mentioned that it recorded its highest values in countries that solely used a self-administered mode of data collection (e.g. Denmark, Germany, Luxembourg, Finland). In the Netherlands, non-respondents to the web self-administered questionnaire were contacted for a face-to-face interview in order to reduce the high non-response rate (71.5 %).

In some countries, high non-response was recorded for certain subgroups of the population: elderly people in Austria, men and young persons in Finland and Sweden, illiterate or seriously sick people or non-French speakers, young people and employed population in urban areas in France, young people in the Czech Republic.

Map 1 shows a clustering of countries into four groups based on their unit non-response rates.

Map 1. Unit non-response rates in EHIS wave 2 (in %)



Source: Reported unit non-response rates, calculations based on information provided in national quality reports.

Methods used for reducing unit non-response

All countries sent in advance notification letters to the selected respondents, two to four weeks prior to the launch of the data collection and made multiple attempts to contact the selected respondents either by phone or through personal contacts at the doorstep at different times and days. On average, three to five subsequent reminders were made.

In Cyprus and Greece, if the interviewer could not establish contact with the interviewee in the first visit then a leaflet was left at the door with information on the next visit. The interviewer's telephone was also enclosed so as to arrange for an appointment for interview in case the interviewee could not be at home at the day and time of the next visit. In the case of Greece, substitution of the household member that could not be reached was allowed, although not recommended. In Spain, the fieldwork period was extended by two weeks and in Croatia proxy response was allowed if the respondent was absent for the entire period of the fieldwork. In Lithuania, persons selected to participate in any social survey are not selected in consecutive surveys in order to reduce the response burden. In the Netherlands and Sweden, two reminders were sent; non-respondents were then approached for a face-to-face and telephone interview, respectively. In Slovakia and Poland, survey promotion

has been conducted, whereas incentive strategies were applied (Germany) and promotional presents were given (Slovakia) to motivate respondents.

Additionally, in three countries (Belgium, Greece and Lithuania) substitutions were made in case of unit non-response. In Belgium, all non-respondents have been substituted (45.4 %), in Greece, persons who were temporarily absent, who denied participating and proxy interviews were not possible were substituted (0.46 %), while in Lithuania, persons that could not be contacted were substituted (9.2 %).

Item non-response

Table 22 presents the reported item non-response rates (unweighted and before imputation) for the health variables as well as the total unweighted item non-response, followed by a list of variable with the highest reported item response rate among those variables with an item non-response rate greater than 10 %.

Bulgaria, Denmark, Ireland, Hungary and Finland reported an item non-response rate greater than 10 % for more than ten EHIS variables.

The “Net monthly equivalised income of the household” (HHINCOME) variable recorded high non-response rates in many countries. Denmark, Estonia, Spain, France, Croatia, Luxembourg, Poland and Slovenia reported an item response rate that was below 90 % for HHINCOME, while Austria, Greece, Cyprus and Belgium stated that no difficulties were met in the recording of the variable.

Most countries did not apply item imputation with the exception of Belgium, Germany (for HHINCOME), Ireland, Italy, Latvia, Lithuania, Hungary, Austria, Romania and the United Kingdom.

Table 22. Summary information on the item non-response rates (unweighted and before imputation) in EHIS wave 2

	Item non-response rate across health variables (unweighted and before imputation) (%)			Total item non-response (%) (unweighted)	Number of variables with item response < 90 %	Variables with the highest item non-response rate among those with a rate >10 %
	Min	Average	Max			
BE	0	5.6	:	:	:	:
BG	0	6.3	15.6	8.8	55	MH1F (15.6 %)
CZ	0	0.5	0.7	0.1	0	-
DK	0.1	4.6	34.2	4.6	12	HH_ACT, HH_INACT, HHINCOME, AM6B, AC2, PC2, PC3, HA3, HO2, HO4, PE5, IC3
DE	0	1.8	15.4	2.5	2	PL4, PL5
EE	0	0.1	4.8	2.2	5	HH_ACT, HH_INACT, MARSTADEFACTO, HHINCOME
IE	0	6.4	37.8	7.9	25	HO1 (37.8 %)
EL	0	0	0	0	0	-
ES	0	0.3	3.0	0.3	1	HHINCOME (19.9 %)
FR	0.4	3.6	25.3	3.6	10	PC2, HA2, PE3, PE5, PE7, FV2, FV4, CITIZEN, HHINCOME, UN
HR	0.1	1.5	10.2	3.2	5	MARSTADEFACTO, HH_ACT, HH_INACT, HHINCOME, AM5
IT	0	1.4	7.8	1.2	0	-
CY	0	0	0	:	0	-

	Item non-response rate across health variables (unweighted and before imputation) (%)			Total item non-response (%) (unweighted)	Number of variables with item response < 90 %	Variables with the highest item non-response rate among those with a rate >10 %
	Min	Average	Max			
LV	0.1	2.4	17.1	2.2	4	IN1 (58.6 %), AM1 (12.3 %), SS2 (13.0 %), SS3 (17.1 %)
LT	0.1	0.1	4.1	0.2	0	-
LU	0.1	2.9	16.8	3.0	6	PE4, PE5, UN1B, HHINCOME, HH_ACT, HH_INACT
HU	0	0.1	1.5	:	15	MH1A, MH1F, AM1, PA1, PA3, PA5, PA8, BMI1, BMI2, PE1, PE3, AL1, SS2, SS3
MT	0	0.5	13.1	0.4	1	BMI2 (13.2 %)
NL	0	0.5	10.5	0.7	1	PA4
AT	0	:	9.4	0.4	0	-
PL	0	0.1	44.0	0.8	1	HHINCOME (19.6 %)
PT	0	0.2	2.1	0.3	0	-
RO	0	0.1	1.3	:	0	-
SI ([1])	0	:	47.5	:	:	HHINCOME
SK	0	0	1.0	0.1	0	-
FI	1.0	12.7	17.4	16.8	19	PA1, HH_ACT, HH_INACT, PN2, CD1
SE	1.0	1.9	1.9	3.1 - 7.8	5	AC1A, AC1B, AC1C, PL4, PL5
UK	0	0.2	4.7	5.3	0	-
IS	0	0.9	6.2	0.8	0	-
NO	0	0.5	9.2	0.9	0	-

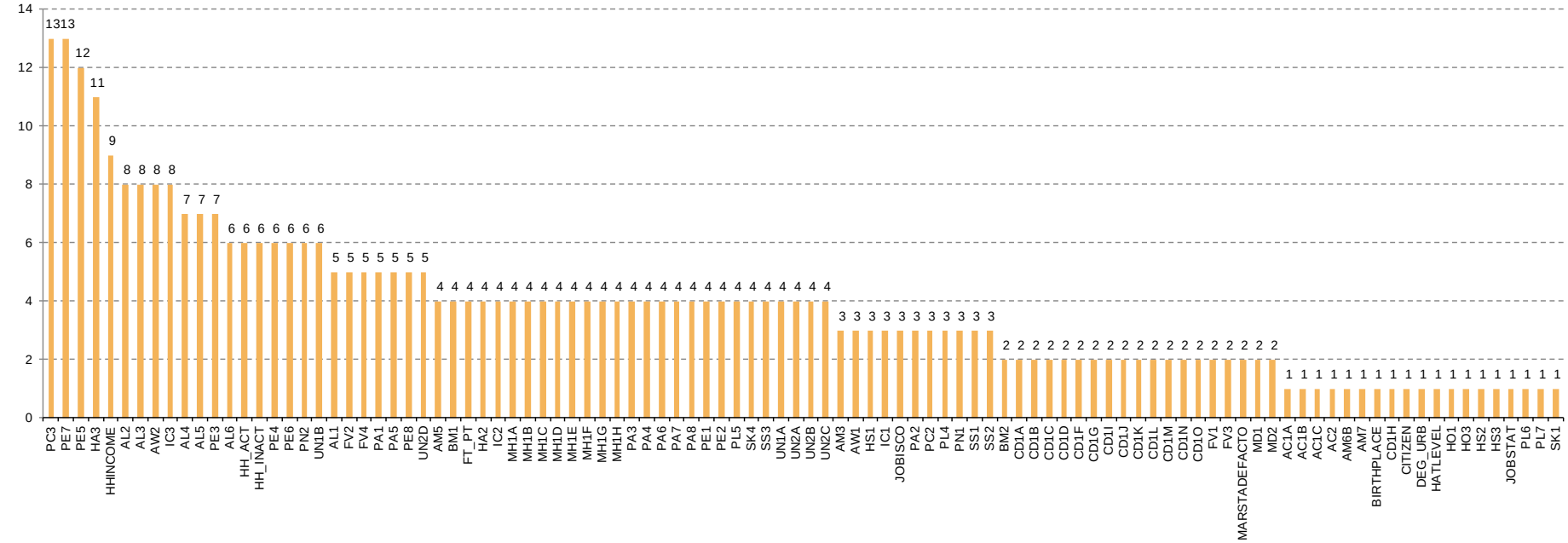
([1]) Questions for activity status of the persons in the household were not raised and thus the reference variables HH_ACT and HH_INACT recorded the highest item non-response rates.

: Information not available; - No variables with a rate >10 %.

Figure 9 shows the number of countries per EHIS variable for which the item non-response rate was higher than 10 %.

The variables that recorded in more than nine countries an item non-response rate greater than 10 % were “Need to receive help or more help with one or more self-care activities” (PC3), “Time spent on doing sports, fitness or recreational physical activities in a typical week” (PE7), “Time spent on bicycling to get to and from places on a typical day” (PE5), “Need for help or more help with one or more domestic activities” (HA3) and “Net monthly equivalised income of the household” (HHINCOME).

Figure 9. Number of countries for which the item non-response rate was higher than 10 %



Source: Calculations based on national EHIS microdata files.

PROCESSING ERROR

During the data collection process, data must undergo a certain processing: coding, data entry, data editing, imputation, etc. Errors introduced at these stages of the data collection process are called processing errors.

The processes adopted by countries for the data entry and coding control, the main errors detected and methods used for data cleaning and the methods of post-codification of open questions are, in summary, described below.

Regarding the **data entry and coding control process,** where a non-electronic data collection mode was used, data entry has been applied either by interviewers or by the staff of the regional statistical offices. In most cases, data coding was either done manually or using scanning.

The main **errors detected** were codification errors of questions on occupational (JOBISCO) and economic activities (LOCNACE) as well as of open questions. In most countries where an electronic mode of data collection was used, consistency checks were embedded in the questionnaire and thus data entry or coding mistakes were automatically detected and corrected.

Regarding **data validation**, Eurostat's guidelines have been widely applied and in some cases where inconsistencies were identified, questionnaires were sent back to interviewers for correction. In some countries, additional calls to respondents were made when necessary.

Open questions were used for recording the status in employment (JOBSTAT), the economic sector of employment (LOCNACE) and the occupation in employment (JOBISCO). Apart from these variables, in Spain, Croatia and Lithuania, the educational level (HATLEVEL) was also an open question. In Lithuania, post-coding was also applied for the place of birth (BIRTHPLACE), the citizenship (CITIZEN), the household income (HHINCOME), and the degree of urbanisation (DEGURBA). Post-coding of the questions regarding the place of birth (BIRTHPLACE) was applied in Poland, Romania and Slovakia.

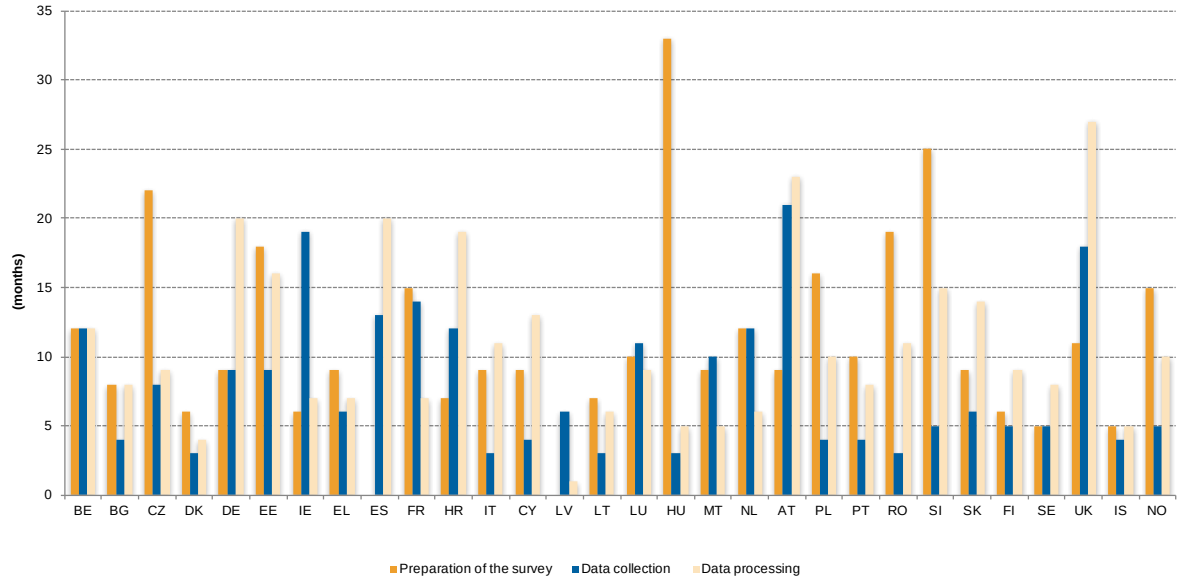
5.3. Timeliness and punctuality

According to the Commission Regulation, data shall be delivered to Eurostat by 30th September 2015, or 9 months after the end of the collection period in cases in which the survey has been carried out beyond September 2015.

The preparation of the survey started in different time periods across countries. For instance, Belgium, the Czech Republic, Estonia, France, Hungary, Slovenia and the United Kingdom started in 2012, Spain, Croatia, Luxembourg, the Netherlands, Austria, Poland, Portugal, Romania and Slovakia in 2013, while Bulgaria, Germany, Ireland, Greece, Cyprus, Latvia, Lithuania, Malta, Finland, Sweden and Norway started early in 2014.

The duration of the preparation, data collection and data process phases varied among countries (Figure 10). The majority of them provided their data to Eurostat on time (September 2015 or October 2015 at the latest). Another interesting point is that some countries (Belgium, Hungary, Lithuania and Austria) disseminated their national data before their submission to Eurostat.

Figure 10. Duration of the preparation, data collection and data processing phases in EHIS wave 2 (months)



5.4. Comparability

5.4.1. Conceptual deviations

Table 23 presents the questions which were modified in the implementation. The reported modifications may not have essentially impact in the comparability of results. In many cases the implemented adaptations (e.g. splitting answer categories or questions, wording modifications to adapt questions according to the specificities of the national languages, addition of more examples, etc.) are not envisaged to have major impact on the resulting figures.

Modifications were more frequently introduced to questions regarding preventive services (PA), physical and sensory functional limitations (PL), accidents and injuries (AC), use of ambulatory and home care (AM) and smoking (SK).

Table 23. Modifications in the national questions for EHIS variables in wave 2

	Modifications in the questions for EHIS variables in wave 2
BG	AC2, PL6, HO1, AM7, PA1, AL1, AL6
CZ	CD1, PN1, PN2, AM4, AM5, PA1, PA5, PA6, UN2, SK1: Adaptations included use of routed questions, different use of filters, small modifications in wording. Some introductory texts were skipped or extra instructions for interviewers were added.
DK	AM6, MD2, UN2D, PE1, FV1, FV2. PN1: only 5 response categories were included by mistake (and not 6 as intended). “Very mild” was not included as response category.
EE	AC2, HA2, HA3, PA1, AL3, AL5: Modifications were applied to the answer categories.
IE	HS2, CD1a,c,e,k, AC1a-c, AC2, AW1, AW2, PL3, PL6, PL7, PC1- PC3, HA1, HA3, PN1, PN2, MH1a-h, HO1-HO4, AM1-AM5, AM6a-b, AM7, PA1-PA8, UN1a-b, UN2a-d, BM2, PE1, PE8, FV1, FV2, FV3, SK2, SK3, AL1-AL6, SS1-SS3, IC1- IC3.
EL	AC2, PL1, PC2, HA2, MD2, PA1, SK1, SK4: Modifications include different wording, added subcategories and new questions. No impact on the derived variables. Questions PA9, PA10, FV5, FV6 and SK3.1 were included to cover national needs.
ES	HS1, AM1, AM2, AM4, AM7, PA1-PA8, PE1, FV1-FV4, SK1, SK4, AL2-AL5: Split of answer categories.

	Modifications in the questions for EHIS variables in wave 2
FR	Mainly UN module. Minor changes for: HS1-3, CD1, AC1, AC2, AW1, AW2, PL, PC2, PC3, HA1a,f, HA2, HA3, PN1, HO2, HO4, AM1-3,5,6a,7, MD1, PA, UN, PE1-7, FV2, FV4, SK1, SK2, SK3, AL, SS2, SS3, IC1-3
HR	PC and HA modules: no filter on age was applied. MH module: a question was added.
IT	AC2: Split into two questions to make clear the need of medical care and the type of medical care needed; HA1d-g, AM4: Examples were added; AM6b: Split into two types of professions to distinguish psychologist, psychotherapist (AM6b) and psychiatrist (AM6c); AM7: the answer "yes" was split into 3 categories to distinguish the type of assistance received; PA1: Added category to "yes" to know if people have never had a vaccination against flu. A filter has been used to have a specific question concerning the month and year when the respondent has been vaccinated in less than two years; UN1: "No" was modified to "No, I have got them without delay"; SK1: Answer category "not at all" was added to distinguish who have never smoked and who smoked in the past; SK2: Answer category "Other" was not included because it is not adaptable to Italian habits concerning tobacco product.
CY	AM2: Added "even telephone consultation" in the wording of the question. PA1: Split into 3 questions in order to make the concepts easier for the respondent. PA5, PA6, PA7, PA8: Split into 2 questions in order to make the concepts easier for the respondent.
LV	AC2: For answer category "Yes, from a doctor or nurse" additional medical personal category "physician assistant / fleshier" was added. AM6: categories have been added for national needs. PA6: the question was split.
LT	HO2, AM6b, UN2a, PE2, PE4, PE8, SK2, AL3, AL5, AL6. Two questions about illegal cigarette and strong alcohol purchases were added.
HU	CD1, AM7, PA1, FV1, FV3, SK1-SK4, AL2-AL5.
MT	HATLEVEL, HHTYPE: increased number of categories, AM2-AM5: split into questions related to private and public service provision, PE6: split by intensity of fitness/sport/recreational activity.
NL	HS3, CD1c,d, AC1b,c, AC2, AW1, AW2, PL1 (derogation for PL5-PL6), PC1a-e, PC2, PC3, HA2, HO2-HO4, AM1, AM4, AM6a, PA1-PA8, UN2a-d, PE1-PE8 (Derogation), FV1-FV4, SK1, SK2, AL2-AL5, AL6 (Derogation), IC1-IC3.
PL	PA1: major changes, PL2, PL4, PL5, PL7 AM2, AM4, MD2, PE6, SK1, AL3, AL5: minor changes.
PT	AC1a-c, AC2, AW1, PL2-PL7, PC1a-e, HA1a-g, AM7, PA1-PA8, SK1, SK4.
RO	AM1, AM2, AM4: answer categories were added; AM3, AM5: answer category "never" was introduced; AM6b: the category "Psychologist, psychotherapist or psychiatrist" was more elaborated; PA1: the specifications "in the last 12 months" and "more than 12 months ago" were highlighted separately, to explain the time-period the question was referring to; PA5, PA6, PA7, PA8: a filter question for persons who have never performed medical tests has been added; PE2, PE4, PE6, PE8: the answer category "Yes" has been added serving as a filter for persons who perform physical activities; PE4, PE5: examples of activities were included; AL3, AL5: the number of bottles / cans / glasses consumed was asked. During the data analysis, the data collected were transformed in grams of pure alcohol, according to the specifications; AL6: imputation was necessary for the answer category "2-3 days / month"; SS3: the response category "Not applicable (I do not have any neighbours)" was introduced to diminish the risk of non-response. In the microdata file, this category has been reported with the answer category "Very difficult".
SI	Questions about the household constitution were asked in more questions (similarly to the data delivery guidelines).
SK	HS01: the answer category "fair" was rephrased to "not good not bad"; AC1: accident is into the national language was translated into two terms, which represent and cover the term accident; PN: the wording of the instruction was modified from "pain you have had" to "pain you have felt"; PL6: instead of "half a km", "500 meters" was used; PC1: the specification relating to "everyday" activities was excluded; AM sub-module: questions on the use of ambulatory and home care activities were divided into two sub-modules; PA1: in case of exact specification of month and year in questionnaire we allowed only years 2013 and 2014. Answer category (code) 1 was modified to "in 2012 or earlier"; AM2, AM3: reference to "family doctor" was not included; AL3, AL5, AL6: instead of "drinks", "standard alcoholic drinks" were asked; AL6: the term "on a one occasion" was translated as "at one sitting"; IC1: the term "some age problem, chronic health condition or infirmity" was modified to "some old age, longstanding (chronic) illness or health problem or congenital or acquired infirmity"; PE8: the term "such as doing resistance training or strength exercises" was dropped; AL: the term "cocktails and premixes" was dropped.
FI	Some of the questions were slightly modified or combined in order to develop a clear and effective

	Modifications in the questions for EHIS variables in wave 2
	postal questionnaire. Some examples were also added. Also, some modifications had to be done because of lingual differences and differences in national practices (e.g. public health care related questions). Derived variables are in line with the conceptual guidelines.
SE	PA5-PA8: Different grouping than the one required in the specifications for the answer categories for the duration. Additional questions on cannabis use, sexual orientation, and e-cigarette use.
UK	HS1, CD1a-o, AC1a-c, AW1, PL1-PL7, PC1a-e, PC3, HA1a-g, MH1a-h, AM1, AM6a-b, AM7, PA1, UN2a-d, BM1, BM2, PE2, PE4-PE8, FV1, FV3, FV4, AL1, AL3, AL5, AL6.
NO	HS3, AC2, PL2, PL4-PL7, PC1a-e, HA1a-g, PN1, PN2, AM1, AM3, AM5, AM6b, AM7, MD2. PA1-PA8, UN1a-b, UN2a-d, PE4-PE8, SK1-SK4, AL1, AL6, IC3.

Note: Belgium, Germany, Luxembourg and Austria did not raise any issues. Iceland did not provide specific information.

5.4.2. Problematic modules or questions

The most common questions or modules being reported as problematic are the following:

- Physical activity/exercise (PE): Based on the reports of the countries (Bulgaria, Czech Republic, Croatia, Latvia, Slovakia) respondents had difficulties in specifying the exact time spent in physical activity mainly due to memory effects. Sweden identified misreports in some figures due to self-reporting (e.g. minutes instead of hours).
- Alcohol consumption (AL): Bulgaria, the Czech Republic, Croatia, Italy, Cyprus, Romania and Slovakia reported that respondents confronted difficulties in quantifying the exact number of drinks consumed. France asked for derogation and did not include questions regarding alcohol consumption.
- Mental health (MH): Spain, Lithuania and Slovakia stated that it was not straightforward for respondents to describe their mental health status (e.g. melancholia, loss of energy, being very nervous, etc.) and understand the conceptual meaning of some answer categories (e.g. feeling down, hopeless, etc.). In Bulgaria, the item non-response rate for the “extent of feeling bad about yourself” (MH1F) was relatively high (15.6 %).
- Use of inpatient and day care (HO): In the Czech Republic, difficulties are mentioned for capturing variables on hospitalisation. EU concepts were difficult to apply in the context of the specificities of the national health care system, since one-day hospitalisation is a term not commonly known. Also, Italy mentioned that for variables on admissions as a day patient in a hospital” (HO3, HO4) respondents had difficulties in understanding the type of the health care needed. In France, a derogation has been requested for variables on informal health care.
- Chronical diseases (CD): Slovakia mentioned that respondents found the relevant questions quite sensitive, while the Czech Republic reported that respondents could not describe exactly their disease.
- Preventive services (PA): Irish and Danish respondents had difficulties in providing information about the last time they had vaccination (PA1a and PA1b), while Slovakia mentioned that the question on last time of a mammography was considered sensitive.
- Income (HHINCOME): Respondents were reluctant to provide information for their income in (Estonia, Cyprus, Greece, Spain, Luxemburg, Latvia, Lithuania and Poland). Additionally, Denmark perceived that it was difficult for respondents to provide information on the net monthly income since a self-administered mode was used, while Ireland imputed the variable using data from EU-SILC.

5.4.3. Cross-country comparability

The common regulatory framework, variable definitions, conceptual guidelines and the proposed protocol for translation serve the basis to ensure comparability of the statistics among the participating countries. The vast majority of countries reported that the guidelines and the Commission implementing Regulation on EHIS have been adopted and closely followed.

France stated some methodological deviations in sampling method used, leading to under-coverage of people

suffering from severe handicaps. Calibration and weighting were applied to compensate for under-representation. It is useful to note that in France, EHIS was embedded in an existing national health survey (ESPS survey). In the United Kingdom, different sampling methodologies were applied in Great Britain and Northern Ireland. In Great Britain, EHIS wave 2 was conducted as a follow-up of the LFS survey, while in Northern Ireland, a simple random sample of households on the Land and Property Services Agency property gazetteer was used. Although the sample designs used for Great Britain and Northern Ireland were different, the outputs produced are considered comparable.

From the point of view of national comparability of the results, all countries mentioned that it is assured at lower territorial levels. Some additional remarks were: the region of Ahvenanmaa in Finland had few observations to assure representativeness of the results, in France, EHIS wave 2 did not cover some overseas territories included in EHIS wave 1, while in the Netherlands, Caribbean Islands and the West Frisian Islands (with the exception of Texel) were excluded from the survey, as foreseen in the Commission implementing Regulation.

5.4.4. Comparability over time

An assessment of the comparability of the variables between the two waves is in the EHIS will be undertaken in a separate Eurostat study. At national level, just France mentioned that the survey design and data collection mode between EHIS wave 1 and 2 differed. Also, the Czech Republic stated that the sampling procedure was different between the two waves and that may have impact on the comparability of the results.

5.5. Coherence

Statistical outputs have the potential to be validly combined and used jointly. Statistics produced from the EHIS shall be comparable with those from EU-SILC for the three questions of the Minimum European Health Module (MEHM) or national health surveys (cross-domain coherence). An assessment of the coherence of the MEHM variables between in EHIS wave 2 and EU-SILC will be undertaken in a separate Eurostat study. Despite that, some countries specifically referred to that in their quality reports.

Coherence with EU-LFS: Austria.

Coherence with EU-SILC (MEHM questions): Bulgaria, the Czech Republic, Cyprus, Ireland, Greece, France and Austria coherence of the EHIS variables on “Self-perceived health” (HS1) and “General activity limitation” (HS3) with those derived from SILC. Similarly, the same holds in Romania (HS1) and in France (“long standing health problems” (HS2)).

Coherence with other national surveys: Bulgaria, Spain, Poland, Finland.

6 Conclusions

Overview

The European Quality Report on EHIS outlines different aspects of data quality, including quantitative quality information, with regard to the implementation of the 2nd wave of the EHIS. Underlying issues in:

a) the methodology for the implementation of the survey at national level,

b) in the national adaptations of the EHIS model questionnaire,

c) as well as in the main characteristics and technical features of the surveys in the 28 EU member states (MSs) complemented by Iceland and Norway,

provide important information for an accurate interpretation of the EHIS statistics. Moreover, they assist users of those statistics to evaluate the degree of comparability achieved.

EHIS collects a multitude of variables on health status, health care and health determinants, which are complemented by demographic and socio-economic background variables. The survey is the main statistical tool providing harmonised statistics covering those health topics in the EU.

Similar to other cross-national surveys, the national surveys implementing the 2nd wave of EHIS were not conducted in exactly the same way. For example, there were differences in:

a) the extent of the national questionnaires and their alignment with national needs,

b) the modes of data collection and administration used,

c) the proxy participation and

d) the data collection period.

Overall, the results of the quality assessment, meet expectations with regard to the quality of survey implementation and to its performance. The countries followed Eurostat's guidelines and the Commission Regulation implementing EHIS wave 2 as much as they were able to. Important but inevitable factors that might have influenced the results are the different organizational structures of health care services on national or local level as well as adaptations in the questions' wording to better reflect the specificities of national language(s).

Survey methodology

The Commission Regulation implementing EHIS calls for a selection of nationally representative probability samples. Eurostat, in close cooperation with the MS, proposed methodological and practical recommendations and guidelines on the sampling procedure and the implementation process of the survey. Countries, based on three main types of sampling frames, selected a nationally representative probability sample of the reference population, including individuals aged 15 and over living in private households and residing in the territory of the country at the time of data collection. In limited cases, where the target population was expanded to younger age groups, respondents were excluded when calculating the respective effective sample size.

In all countries persons living in collective households and institutions were excluded from the target population.

In addition, the Commission Regulation defines the minimum effective sample sizes to be achieved, i.e. the actual sample sizes shall be larger to the extent that the design effect exceeds 1.0 and to compensate for all kinds of non-response. The ratio of the reached effective sample size to the minimum effective sample size – using the design effect with regard to the indicator "percentage of people severely limited in daily activities" – exceeded 1.0 in the majority of the countries for which information was available. While no issues can be raised for the sampling design and procedure, nevertheless it shall be taken into consideration that three countries implemented the survey as a follow-up of the LFS, which might have influenced the accuracy of the results due to potential introduction of selection bias.

Survey implementation

All countries made great efforts to ensure that the questionnaire meets its purpose and that questions are well communicated, to achieve a high response rate and to monitor the quality of the data collection. More than half of countries pre-tested the questionnaire, either through simply testing or cognitive interviews, sent advance notification letters, and made at least three attempts for contacting selected persons before receiving a refusal for participation. Moreover, they received feedback on the quality of the interview, like interviewer's behavior and duration of interview, through contacts with a subset of randomly selected respondents.

A first issue of consideration is the mode of data collection and administration used at national level, given the length of the questionnaire and the complexity of the concepts used. Most countries used face-to-face interviews either as the only mode of data collection or in combination with another mode (e.g. telephone interview or web questionnaires), followed by telephone interviews and postal or web surveys as the only mode of data collection.

Overall, five countries used solely a self-administered mode. It should be noted here that a self-administered mode may offer many advantages but introduces the risk of measurement errors or selective bias. As a matter of fact, four of five countries that had used a self-administered mode, recorded relatively higher unit non-response rates. The self-administered mode also introduces in particular the issue of modifying the model questionnaire as well as adapting the instructions, examples and explanations of concepts for the different modes of data collection. So, for example, a couple of countries that had used solely a self-administered mode mentioned that the instructions and explanations were less elaborated compared to those included in the model questionnaire.

Another issue for consideration comes from the fact that some countries integrated EHIS questions in their national HIS questionnaire and included additional questions. Longer questionnaires may have resulted to higher item non-response rates, due to respondent's fatigue; or they might have an impact on the comparability of the resulted figures. It should be mentioned however, that according to Eurostat's guidelines the addition of questions in specific submodules or the introduction of new submodules was allowed under the condition that those changes do not have an impact on the results of the compulsory variables.

Following the discussion about the mode of data collection, it can be noted that the average duration of interviews varied across countries. This recorded variation is closely related to two factors:
a) the mode of data collection and administration used per country and
b) the use of administrative data for the derivation of some core social variables.
Both factors may have contributed to the reduction of the average time of completion of the questionnaire. Keeping those factors in mind, we also underline that it was not always clear from the available information whether the reported average interview durations referred only to the HIS questions or to the whole national questionnaire.

Moreover, seven countries offered incentives to the respondents to encourage them to participate in the survey. The use of incentives may be considered as another factor that could potentially have introduced selection bias, and thus influencing the accuracy of the results.

Quality assessment

With reference to the overall accuracy of the results, the vast majority of countries did not raise any significant issues. The quality of the sampling frame was high across all participating countries, since the time lag between their update and the time of actual sampling was, in most cases, narrow and the coverage was high.

The standard errors for three key indicators based on the Minimum European Health Module (MEHM), completed by one health care indicator and one health determinants indicator, namely:

- HS1: proportion of respondents in good or very good health,

- HS2: proportion of respondents with a longstanding illness,
- HS3: proportion of respondents severely limited in activities people usually do because of health problems for at least the past 6 months,
- HO1: proportion of respondents declaring having been hospitalized in the past 12 months,
- BM1, BM2: proportion of respondents who are obese (BMI>=30),

on average, did not exceed the value of 0.70. Thus, standard errors did not reveal any issues of low reliability.

Proxy use in EHIS wave 2, i.e. participation in the survey via another person in the household, was allowed in 18 out of 30 countries that participated in the survey. Four of those countries allowed the use of proxy interviews for the whole set of questions. Evidently, the usage of proxy interviews may have impact on the accuracy of the results, since such questions in particular are based on respondents' self-perception and/or refer to the experiences of the respondents. The effect of proxy use on the accuracy of the results is an issue that requires further investigation.

The overall unit non-response rate ranged in relatively low levels (less than 30 %) in 11 countries, while in five countries, the respective rate exceeded 50 %. As already mentioned, countries that used solely a self-administered mode of data collection recorded high non-response rates but it should be also considered that in those cases proxy interviews were not used at all. Similarly, the unit non-response rate was high in most countries where proxy interviews were not allowed. Another factor influencing non-response stemmed from certain subgroups of the population that were more reluctant to participate in the survey. These groups were for example elderly or young persons, illiterate people, persons in urban areas, socially excluded or wealthy households. In general, countries were hardly able to assess the associated bias with non-response.

With reference to item non-response, variables like physical activity/exercise, alcohol consumption or household income recorded more frequently high non-response rates. These were the same variables that were more frequently reported as problematic due to their very nature of asking sensitive information asked or of difficulties in understanding the concept of the question, of retrieving information for past experiences/events or of communicating or quantifying the requested information.

Regarding comparability, countries implemented modifications in some questions. Some countries shortened clarifications or examples for the concepts used. Others grouped extensive answer categories or split or merged questions. Others again adapted questions to meet the specificities in their national language. Modifications were more frequently introduced to following submodules of:

- PA: Preventive services,
- PL: Physical and sensory functional limitations,
- AC: Accidents and injuries,
- AM: Use of ambulatory and home care,
- SK: Smoking.

Some of the modifications introduced may have influenced the comparability of the results either across countries or over time. But in general, an overall good comparability level across countries of the resulting data and indicators from EHIS wave 2 was achieved.

7 Annexes

Annex 1: Sampling design

Table 24. Sampling design, sampling unit and probability to draw the sample in EHIS wave 2

	Sampling design	Sampling unit	Probability used to draw the sample	Number of selected individuals
BE	Stratified Multistage Cluster sampling	**PSU**: Municipalities in each region **SSU**: Households within each municipality **TSU**: Individuals in the selected household	Probability proportional to size (stepwise selection) Equal probability (stepwise selection) Unequal probability	Maximum 4 members per household
BG	Systematic Multistage Cluster sampling	**PSU**: Census enumeration units **SSU:** Households within each census enumeration units	Probability proportional to size (cluster sampling) Unequal probability (systematic sampling)	All household members aged 15 and over
CZ ([1])	Stratified Multistage sampling	**PSU:** Census enumeration areas **SSU:** Dwellings **TSU:** Individuals	Probability proportional to size Equal probability Equal probability	A respondent per household successfully interviewed in LFS was asked to participate in EHIS
DK	Simple random sampling	**PSU**: Individuals	Equal probability	-
DE	Stratified Multistage sampling	**PSU**: Communities **SSU**: Individuals	Probability proportional to size Equal probability per age group	-
EE	Systematic Stratified sampling	**PSU**: Individuals	:	-
IE	Stratified Multistage Cluster sampling	**PSU**: Block of households **SSU**: Households **TSU**: Individuals	Probability proportional to size Equal probability Equal probability	One household member aged 15 and over
EL	Stratified Multistage sampling	**PSU**: city blocks selected from each stratum **SSU**: Households within each city block **TSU**: Individuals from	Probability proportional to size (stratified sampling) Equal probability Equal probability (simple random sampling)	One household member

	Sampling design	Sampling unit	Probability used to draw the sample	Number of selected individuals
		each household		
ES	Stratified Multistage cluster sampling	**PSU**: Census Sections **SSU**: Dwellings **TSU**: Individuals	Probability proportional to size (stratified sampling) Equal probability Equal probability	One household member
FR	Cluster sampling	Senior beneficiaries of health insurance are selected as the reference unit	Unequal probability, proportional to the number of adults affiliated to one of the schemes of the National Health survey	All household members aged 15 and over of the selected beneficiary
HR	Stratified Multistage sampling	**PSU**: Census segments **SSU**: Dwellings selected from segments	Probability proportional to size Equal probability	-
IT	Multistage sampling	**PSU**: Municipalities **SSU**: Households	Probability proportional to size Equal probability	All members of the household aged 15 and over
CY	Stratified sampling	Households selected from the 9 geographical areas of the country (strata)	Equal probability	All members of the household aged 15 and over
LV	Stratified Multistage sampling (CAPI), Stratified sampling (CATI)	CAPI: stratification by type of municipality (4 strata): **PSU**: sampling areas **SSU**: individuals (6 in each sampling area) CATI: stratification by usage of public health services and age groups (strata). Selection of individuals in each stratum	Probabilities proportional to size Equal probabilities for SSUs Equal probabilities for individuals in the stratum	-
LT	Simple random sampling	Selection of individuals	Equal probabilities	-
LU	Stratified sampling	Selection of individuals within 36 strata (sex, age group, district)	Equal probabilities	-
HU	Multistage sampling	**PSU**: Settlements **SSU**: Individuals	Probability proportional to size Unequal probability	-
MT	Stratified sampling	**PSU**: Individuals	Probability proportional to size	-
NL	Multistage stratified sampling	**PSU**: Municipalities selected in each region **SSU**: Individuals selected from each municipality	Probability proportional to size Equal probabilities	:
AT	Stratified sampling	Individuals within each geographic area	Equal probability (systematic sampling)	-
PL	Stratified Multistage Cluster sampling	**PSU**: Census areas selected in each stratum **SSU**: Dwellings	Probability proportional to size Equal probabilities Equal probabilities	All household members
PT	Systematic	**PSU**: Census Sections	Probability proportional	One person per

	Sampling design	Sampling unit	Probability used to draw the sample	Number of selected individuals
	Multistage Cluster sampling	**SSU**: Dwellings selected from each PSU with systematic sampling **TSU**: Individual	to size Equal probabilities (systematic sampling) Equal probabilities (last birthday method)	household
RO	Multistage stratified sampling	**PSU**: group of census sections **SSU**: dwellings in each PSU	Probability proportional to size Equal probability	All households in the dwelling and all members of the household
SI	Multistage stratified sampling	**PSU**: Regions **SSU**: Individuals	Probability proportional to size Equal probabilities	-
SK	Multistage stratified sampling	**PSU**: census districts **SSU**: Dwellings random sampling **TSU**: Individuals	Probability proportional to size Equal probabilities Equal probabilities (simple random sampling)	One member per household
FI	Simple random sampling	**PSU**: Individuals	Equal probabilities	-
SE	Stratified sampling	**PSU**: Individuals (strata: age, sex, country of birth)	:	-
UK (England and Scotland) ([2])	Systematic random sampling (using the postcode address file (PAF))	**PSU**: Addresses	Unequal probability across country to allow analysis at lower levels	All members of selected households aged 16 and over were eligible to participate in EHIS. As a follow-up of the LFS, only those who had not objected to take part in future surveys were contacted.
UK (Northern Ireland) ([2])	Simple random sampling (using the Land and Property Services Agency property gazetteer)	**PSU**: Households	:	:
IS	Simple random sampling	**PSU**: Individuals	:	-
NO	Stratified sampling	**PSU**: Individuals	Equal probabilities	-

([1]) The description refers to the selection of respondents for LFS (PSU and SSU) and followed-up by the selection of individuals for EHIS (TSU).

([2]) In Scotland and Wales a sample, stratified by country, was drawn from the final-wave LFS households. As a follow-up survey, only those aged 16 or over who had not objected to take part in future surveys were selected for EHIS. The LFS sample is selected using systematic sampling from the postcode address file (PAF) ordered by postcode. For Northern Ireland, a simple random sample of households from the Land and Property Services Agency gazetteer was selected.

: Information not available; - Value/information not applicable.

Annex 2: Mode of data collection and use of administrative data

Table 25. Mode of data collection and use of administrative data in EHIS wave 2

	Data collection method & mode		Self-administered questionnaires			Variables completed from other sources	
	Method	Mode	Use of self-administered mode	Mode	Sub-modules/variables allowed	Source	Variables
BE	Face-to-face	PAPI - CAPI	Yes	Paper	HS, AL, MH, PE, SK, AL, SS	ADMIN	(1) Date of birth, (2) Sex
BG	Face-to-face	PAPI	Yes	Paper	SK, AL	-	-
CZ	Face-to-face, Telephone	PAPI - CAPI, Telephone (non-electronic version)	Yes	Paper	All (when the interviewer was giving the paper questionnaire in the household for self-completion)	LFS	(1) Sex, (2) Country of residence, (3) Birthplace, (4) Country of citizenship, (5) Region of residence, (6) Degree of urbanisation, (7) Highest level of education completed, (8) Full or part-time work, (9) Self-declared labour status, (10) Occupation in employment, (11) Economic sector in employment, (12) Number of persons living in household, (13) Type of household, (14) Number of persons aged 16 – 64 in the household who are employed
DK	Postal, Use of internet	PAPI, CAWI	Yes	Paper, Web questionnaire	All	ADMIN	(1) Country of birth, (2) Country of citizenship at time of data collection, (3) Region of residence, (4) Degree of urbanisation
DE	Postal, Use of internet	PAPI, CAWI	Yes	Paper, Web questionnaire	All	ADMIN	(1) Region, (2) Degree of urbanisation
EE	Face-to-face, Use of internet	CAPI, CAWI	Yes	Web questionnaire	All (except certain blocks)	ADMIN	(1) Level of education
IE	Postal, Use of internet	PAPI, CAWI	Yes	Paper	HS, CD, AW, PL, PC, HA, PN, MH, HO, AM, MD, PA, UN, BM, PE, FV, SK, AL, SS, IC	LFS	Demographic data
EL	Face-to-face	PAPI	No	-	-	-	-
ES	Face-to-face	CAPI	No	-	-	-	-
FR	Postal, Face-to-face,	PAPI, CAPI, CATI	Yes	Paper	All except for UN, core variables (collected via	ADMIN	(1) Sex, (2) Age

	Data collection method & mode		Self-administered questionnaires			Variables completed from other sources	
	Method	Mode	Use of self-administered mode	Mode	Sub-modules/variables allowed	Source	Variables
	Telephone				CAPI - CATI)		
HR	Face-to-face, Telephone	PAPI, Telephone (non-electronic version)	No	-	-	-	-
IT	Face-to-face	PAPI	Yes	Paper	SK, AL	-	-
CY	Face-to-face	CAPI	No	-	-	-	-
LV ([1])	Face-to-face, Telephone, Use of internet	CAPI, CATI, CAWI	Yes	Web questionnaire	All	ADMIN	(1) Sex, (2) Age, (3) Legal marital status, (4) Birthplace, (5) Country of citizenship
LT	Face-to-face	PAPI - CAPI	Yes	PAPI, CAPI	SK, AL	ADMIN	(1) Region, (2) Sex, (3) Age
LU	Postal, Use of internet	PAPI, CAWI	Yes	Paper, Web questionnaire	SK, AL, HS	-	-
HU	Face-to-face	CAPI	No	-	-	-	-
MT	Face-to-face	PAPI	No	Paper	SK, AL, HHINCOME	-	-
NL ([2])	Face-to-face, Use of internet	CAPI, CAWI	Yes	Paper	AL	ADMIN	(1) Birthplace, (2) Country of citizenship, (3) Region of residence, (4) Degree of urbanisation, (5) Legal marital status, (6) De facto Marital status, (7) Household income
AT	Telephone, Postal (only for PE)	CATI, PAPI	Yes	Paper	PE	LFS	(1) Sex, (2) Country of residence, (3) Birthplace, (4) Country of citizenship, (5) Region of residence, (6) Degree of urbanisation, (7) Highest level of education completed, (8) Full or part-time work, (9) Self-declared labour status, (10) Occupation in employment, (11) Economic sector in employment, (12) Number of persons living in household, (13) Type of household, (14) Number of persons aged 16- 64 in the household who are employed
PL	Face-to-face	PAPI	No	-	-	-	-
PT	Face-to-face, Use of	CAPI, CAWI	Yes	Web questionnaire	All	-	-

	Data collection method & mode		Self-administered questionnaires			Variables completed from other sources	
	Method	Mode	Use of self-administered mode	Mode	Sub-modules/variables allowed	Source	Variables
	internet						
RO	Face-to-face	PAPI	Yes	Paper	SK, AL	-	-
SI	Face-to-face, Use of internet	CAPI, CAWI	Yes	Web questionnaire	All	ADMIN	(1) NUTS regions, (2) degree of urbanisation
SK	Face-to-face	PAPI - CAPI	Yes	Paper	SK, AL	-	-
FI	Postal	PAPI	Yes	Paper	All	ADMIN	(1) Age, (2) Sex, (3) Marital status, (4) Living area, (5) Profession, (6) Income, (7) Education
SE ([3])	Postal, Telephone, Use of internet	PAPI, CATI, CAWI	Yes	Paper, Web questionnaire	All	ADMIN	(1) Sex, (2) Birthplace, (3) Country of citizenship, (4) Country of residence, (5) Degree of urbanisation, (6) Highest level of education completed, (7) Full or part-time work, (8) Self-declared labour status
UK	Face-to-face, Telephone	CAPI, CATI	No	-	-	ADMIN	(1) Degree of urbanization, (2) Level of education
IS	Telephone	CATI	No	-	-	ADMIN	(1) Degree of urbanization, (2) Household income
NO	Telephone	CATI	No	-	-	ADMIN	(1) Country of birth, (2) Degree of urbanization, (3) Region, (4) Citizenship, (5) Income, (6) Level of educations

([1]) Use of a self-administered questionnaire for all persons excluding those aged between 15 and 17. Self-administered mode was not used in face-to-face interviews.

([2]) A letter was sent asking persons to complete the self-administered electronic questionnaire. If after two reminders no response was received, an attempt for a personal interview was made.

([3]) A group of the sampled persons was sent an invitation to participate to the online survey. A strategic sample of those who did not respond to the self-administered survey was further approached for a telephone interview.

Note: ADMIN denotes administrative data.

- Value/information not applicable.

Annex 3: List of abbreviations and symbols

Statistical symbols

:	Not available
-	Not applicable
%	Per cent

Acronyms and abbreviations

EHIS	European Health Interview Survey
ESS	European Statistical System
CAPI	Computer-assisted personal interviews
CATI	Computer-assisted telephone interviews
CAWI	Computer-assisted web interviewing
LFS	Labour Force Survey
MEHM	Minimum European Health Module
MS	Member State
PAPI	Paper and pencil interviews
SILC	Statistics on Income and Living Conditions

Country abbreviations

BE	Belgium	**LU**	Luxembourg
BG	Bulgaria	**HU**	Hungary
CZ	Czech Republic	**MT**	Malta
DK	Denmark	**NL**	Netherlands
DE	Germany	**AT**	Austria
EE	Estonia	**PL**	Poland
IE	Ireland	**PT**	Portugal
EL	Greece	**RO**	Romania
ES	Spain	**SI**	Slovenia
FR	France	**SK**	Slovakia
HR	Croatia	**FI**	Finland
IT	Italy	**SE**	Sweden
CY	Cyprus	**UK**	United Kingdom
LV	Latvia	**IS**	Iceland
LT	Lithuania	**NO**	Norway

Submodule codes

HS	Health status	**MD**	Medicine use
CD	Chronic diseases	**PA**	Preventive services
AC	Accidents and injuries	**UN**	Unmet needs for health care
AW	Absence from work (due to health problems)	**BM**	Weight and height
PL	Physical and sensory functional limitations	**PE**	Physical activity/exercise

PC	Personal care activities	**FV**	Consumption of fruit and vegetables
HA	Household activities	**SK**	Smoking
PN	Pain	**AL**	Alcohol consumption
MH	Mental health	**SS**	Social support
HO	Health care	**IC**	Provision of informal care or assistance
AM	Use of ambulatory and home care		

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Quality report of the second wave of the European Health Interview survey

The purpose of this quality report is to provide the users of the European Union Health Statistics with a tool for assessing the quality of these statistics which are based on the European Union Health Interview Survey (EHIS). The report provides a description of the methodology of the second wave of EHIS and an overview of the survey implementation by ESS countries between 2013 and 2015. This is followed by a presentation and discussion of the main quality indicators for EHIS wave 2 which, in this report, are: instruments and characteristics of quality management, accuracy and reliability of the survey sampling, timeliness and punctuality of the survey implementation and dissemination, and comparability and coherence of the survey results. The lessons learned can be used for the next round of EHIS wave 3 that will take place in ESS countries between 2018 and 2020.

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