

Quality report of the
third wave of the
European Health
Interview Survey

2022 edition



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Table of contents

Introduction	7
The European Health Interview Survey (EHIS).....	8
2.1. Legal basis	8
2.2. Methodological manual	9
2.3. The EHIS wave 3 modules	9
Overview of the survey methodology in EHIS wave 3	10
3.1. Target population	10
3.2. Sampling design	12
3.2.1. Sampling frame	12
3.2.2. Sampling units	13
3.2.3. Sampling design	15
3.2.4. Sample size	16
3.2.5. Source data	19
Overview of survey implementation in EHIS wave 3.....	21
4.1. Development of questionnaires	21
4.1.1. Order of modules and submodules	21
4.1.2. Languages in which the survey was carried out	21
4.1.3. Pre-testing and pilot field testing	22
4.2. Data collection	23
4.2.1. Mode of data collection	23
4.2.2. Topics administered via a self-completion questionnaire	25
4.2.3. Interviewers	26
4.2.4. Fieldwork (data collection) period	28
Quality assessment	31
5.1. Quality management	31
5.1.1. Method of pre-notification	31
5.1.2. Incentives	31
5.1.3. Duration of interviews	32
5.1.4. Methods used for quality control	33
5.2. Accuracy and reliability	34
5.2.1. Overall accuracy	34
5.2.2. Sampling errors	34
5.2.3. Non-sampling errors	40
Coverage errors	40
Measurement errors	41
Non-response error	44
Processing error	49
5.3. Timeliness and punctuality	49
5.4. Comparability	49
5.4.1. Conceptual deviations	49
5.4.2. Problematic modules or questions	51
5.4.3. Cross-country comparability	52

5.4.4. Comparability over time	52
5.5. Coherence	52
Conclusions.....	53
Annexes	56
Annex 1 : Sampling design.....	56
Annex 2 : Mode of data collection and use of administrative data	59
Annex 3 : List of abbreviations and symbols.....	63

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 provide 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, in 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 third wave of EHIS was conducted in 2019. All MSs participated in the EHIS wave 3 in accordance with Commission Regulation (EU) No. 2018/255. A derogation regarding the data collection period was granted to some countries: the data collection period was 2018 for Belgium, 2018-2019 for Austria and 2019-2020 for Malta and Germany.

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 to persons living in collective households and in institutions. In those limited cases where countries expanded the survey population to younger age groups, persons 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 16 countries), was integrated into another survey (in twelve countries) or was designed as a follow-up of another survey (in one country). The same set of variables was collected in all countries in accordance with Commission Implementing Regulation on EHIS. However, data were collected using national questionnaires, which sometimes comprised questions additional to those specified in the Commission Regulation, required for national purposes. Following Eurostat's recommendations, most countries did not change the order of the submodules or questions in their national questionnaires.

Various types of sampling frames were used; notably population census (seven countries), population registers (15 countries), dwelling registers (five countries) or other frames (two countries). Most 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. Twelve countries made use of single stage sampling. When the survey was based on a sample of households, national practises were very diverse, with countries interviewing all households members, others only one or two.

The data collection period was spread over 2018 and 2020 for EHIS wave 3. In all countries, the data collection lasted for at least three months, covering at least one month of the autumn season (September – November). On average, the data collection period lasted eight months. Overall, the vast majority of responses were collected during the autumn season, followed by the winter (December – February), the spring (March – May) and the 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, 22 countries used a combination of those modes, while five countries used face-to-face interviews only, two countries used telephone interviews only and none of them used 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 implemented validation, calibration, non-response adjustments procedures to minimize the effect of all potential sources of sampling and non-sampling errors. Standard errors, as key indicators commonly used as a measure of the reliability of data collected through sample survey, were provided for the three key indicators based on the Minimum European Health Module (MEHM), namely the proportion of persons in good or very good health (variable code HS1), the proportion of persons with a longstanding illness (variable code HS2) and the proportion of persons severely limited in activities people usually do because of health problems for at least the past six months (variable code HS3), as well as for the proportion of persons declaring having been hospitalized in the past twelve months (variable code HO12) and for the proportion of persons who are obese

⁽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 68/2014).

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

(BMI \geq 30).

In order to reduce the risk for measurement and processing errors, pre-testing and pilot testing were used by 18 countries to optimize the data collection process and identify potential problematic issues. Another potential source of measurement error is the use of proxy interviews, i.e. when a person provides answers on another person's behalf. Proxy interviews were allowed in all but nine countries. From the 20 countries that permitted the use of proxy interviews, most countries limited their use to the questions specified in the guidelines, while five countries allowed their use for the whole set of questions.

All countries made significant efforts to achieve high response rates (for example: advance notification letters, at least three attempts for contacting selected persons before receiving a refusal for participation, three to five subsequent reminders). In a 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 varied significantly between countries, from 12% to about 78%, with the respective rate not exceeding 40% in 15 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" (variable code 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, output harmonisation is aimed at with the implementing regulation and with some standardised elements of input in the methodological guidelines. So, beyond the common regulatory framework, a model questionnaire, variable definitions, conceptual guidelines and the proposed protocol for translation serve for 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 3.

1

Introduction

The present document constitutes the European quality report of the third wave of the European Health Interview Survey (EHIS wave 3) conducted by the EU Member States (MS) between 2018 and 2020. This quality report makes a synthetic assessment of the quality of EHIS wave 3 data. Information along the EU quality criteria as well as a description of the characteristics of the national surveys as well as the statistical processes adopted at country level are provided. 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 3 was carried out in all EU MS as well as in Iceland, Norway, and Serbia (Iceland and Turkey participated in the data collection of EHIS wave 3, but did not provide a national quality report to Eurostat in 2021). 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 29 countries that provided to Eurostat microdata from their EHIS wave 3 surveys together with a national quality report.

2

The European Health Interview Survey (EHIS)

The European Health Interview Survey (EHIS) was developed between 2003 and 2006 with the general 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 Member States (MS) ⁽⁴⁾, 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 Commission Regulation on the implementation of EHIS wave 2 at the beginning of 2013.

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 ⁽⁵⁾, ⁽⁶⁾. 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 ⁽⁷⁾ granted derogations to certain countries with regard to the transmission of certain statistics.

2.1. Legal basis

EHIS wave 3 was conducted in all EU Member States and in Iceland, Norway, Serbia and Turkey between 2018 and 2020, in accordance with Commission Regulation 2018/255 as regards statistics based on the European Health Interview Survey (EHIS). A Commission Implementing Decision (EU) 2018/257 granted derogations to certain Member States as regards the transmission of statistics for selected variables.

⁽⁴⁾ Belgium, Bulgaria, Czech Republic, Germany, Estonia, Greece, Spain, France, Cyprus, Latvia, Hungary, Malta, Austria, Poland, Romania, Slovenia and Slovakia.

⁽⁵⁾ <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).

⁽⁶⁾ 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.

⁽⁷⁾ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013D0097>

2.2. Methodological manual

The EHIS wave 3 methodological manual ⁽⁸⁾ drafted by Eurostat provides specific guidance to countries for the planning and the implementation of EHIS wave 3. The methodological manual includes conceptual guidelines and interviewers' instructions for all variables as well as statistical survey guidelines. It also gives instructions on the data processing and transmission.

A model questionnaire including the order of modules, sub-modules and questions is provided in the Annex of the methodological manual.

2.3. The EHIS wave 3 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 of the three main modules consists of health-related sub-modules. In total EHIS wave 3 consists of 21 health-related sub-modules, as follows:

- **European Health Status Module (EHSM)**: The module on health status is a first central point of the survey. It allows the measurement of the health status of the population in general, 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 potential unmet needs for health care. It permits the collection of information on health care consumption that is comparable across countries and enables linking 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 services (AM), medicine use (MD), use of preventive services (PA), and potential unmet needs for health care (UN).
- **European Health Determinants module (EHDM)**: The focus of this third main module is directed to the measurement of lifestyles or health-related behaviours of Europeans. It covers aspects such as weight and height (BM), performing physical activity / exercise (PE), dietary habits (DH), smoking behaviour (SK), alcohol consumption (AL), social support (SS) and provision of informal care or assistance (IC).

⁽⁸⁾ <https://ec.europa.eu/eurostat/documents/3859598/8762193/KS-02-18-240-EN-N.pdf/5fa53ed4-4367-41c4-b3f5-260ced9ff2f6?t=1521718236000>

3

Overview of the survey methodology in EHIS wave 3

3.1. Target population

According to the EHIS Commission Regulation implementing, the target (reference) population shall include individuals aged 15 and over living in private households and 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 to persons living in collective households and in institutions. In those cases, these additional respondents are excluded when calculating the respective effective sample sizes for Eurostat.

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 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 Serbia, institutionalized persons were those who lived in collective households, like students' and pupils' dormitories, homes for children and youth with developmental disabilities, homes for socially vulnerable children, retirement homes, homes for disabled adults, and monasteries. On the other hand, Slovakia, assumed that institutions covered all dwellings other than private households. In Italy, collective households include public or private facilities that provide residential social and/or health care services and in the Netherlands, institutions are defined as household consisting of two or more people living in one accommodation whose housing and daily needs are provided professionally.

In accordance with the EHIS Commission Regulation implementing, 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 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 3

	Target population (persons aged 15+ living in private households)	Non-target population	
		Number of individuals younger than 15	Number of individuals living in institutions
AT	7 417 876	1 277 500	133 700
BE ⁽¹⁾	9 448 000	:	:
BG	5 949 224	1 002 000	:
CY ⁽³⁾	730 213	:	:
CZ	8 746 079	1 710 000	238 000
DE	71 775 452	11 391 259	868 589
DK ⁽⁴⁾	4 859 854	954 607	:
EE	1 107 397	194 370	2 890
EL	8 916 394	1 513 425	234 631
ES	39 974 100	6 874 546	444 101
FI	4 654 256	:	:
FR ⁽²⁾	52 375 000	10 830 000	1 390 000
HR	3 480 478	549 670	31 636
HU	8 185 957	1 419 309	134 125
IE	3 755 313	:	:
IT	51 913 934	7 980 460	345 479 ⁽⁵⁾
LT	2 372 327	397 800	24 100
LU	494 744	95 923	:
LV	1 584 569	304 355	22 740
MT	436 260	:	:
NL	14 337 312	2 739 819	238 651
PL	31 040 892	5 833 791	344 438
PT	8 898 924	1 402 785	125 000
RO	16 417 001	2 935 737	64 500
SE ⁽⁴⁾	8 477 506	:	:
SI	1 767 202	313 706	20 000
SK	4 594 153	1 043 720	44 647
NO	4 435 811	934 958	43 700
RS	5 952 646	:	:

⁽¹⁾ Estimation Eurostat; figures could not be provided by BE (sample used in survey is sample of reference persons; all (up to 4) members of household were eligible for the interview")

⁽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" includes also individuals living in institutions.

⁽⁵⁾ Number of individuals living in institutions aged 18 years and over.

: Information not available.

3.2. Sampling design

3.2.1. 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, Austria, Belgium, Denmark, Estonia, Greece, Spain, Finland, Hungary, Lithuania, Luxembourg, Malta, the Netherlands, Sweden, Slovenia and Norway, a population register is used as a data source for building the sampling frame.
- **Dwelling register:** France ⁽⁹⁾, Latvia, 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, Cyprus, Croatia, Ireland, Italy ⁽¹⁰⁾, Romania ⁽¹¹⁾ and Serbia.
- **Other:** In Czechia and Germany, the following sources are used:
 - Czechia: EHIS is a subsample of the Labour Force Sample Survey (LFS). The LFS sample is drawn from Register of Census Districts and Buildings.
 - Germany: Telephone sample based on dual-frame method with two selection populations: mobile phone numbers and landline phone numbers; Kish Selection Grid to randomly select prospective respondents in the case of the landline-sample.

⁽⁹⁾ The sample frame is Fideli - demographic file for dwellings and individuals.

⁽¹⁰⁾ Household register - municipalities <1,000 inhabitants: LAC; other -municipalities 1,000+ inhabitants: Master Sample of CENSUS 2018.

⁽¹¹⁾ 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 (according with results from the 2011 Census).

Table 2. Data source for building the sampling frame for EHIS wave 3

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

3.2.2. 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 22 out of 29 countries the **ultimate sampling unit** ⁽¹²⁾ is the individual. Four countries (Bulgaria, Cyprus, Italy and Serbia) selected a sample of households while another three countries (Croatia, Poland and Romania) selected a sample of dwellings.

⁽¹²⁾ 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 and Annex 1: Austria, Belgium, Denmark, Estonia, Greece, Spain, Finland, Hungary, Lithuania, Luxembourg, Latvia, Malta, the Netherlands, Sweden, Slovenia, Norway), 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, Cyprus, Croatia, Ireland, Italy, Romania and Serbia)..

Table 3. Ultimate sampling unit in EHIS wave 3

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

3.2.3. Sampling design

The national sampling designs in the EHIS wave 3 implementation varied (see Table 4).

The most common design was multi-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, in countries like Belgium, Bulgaria, Czechia, France, Greece, Spain, Croatia, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, Slovenia, Slovakia and Serbia.

Austria, Cyprus, Denmark, Estonia, Finland, Lithuania, Luxembourg, Malta, Sweden, as well as 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; stratified sampling with five strata and two-stage sampling for first four strata and single stage sampling for 5th stratum. Hungary used a combination of designs as well: while stratified one-stage sampling was applied for certainty PSUs (population of larger towns), stratified two-stage sampling was applied where PSUs were the localities (population of smaller localities).

Especially in Czechia, 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 6th LFS wave (normally the last visit) and that were also willing to participate in EHIS.

Table 4. Sampling design in EHIS wave 3

Sampling unit	Sampling design	Country
Dwelling	Multi-stage sampling	HR, PL, RO
Household	Multi-stage sampling	BG, IT, RS
	Stratified sampling	CY
Individual	Two-stage sample design	IE
	Stratified sampling with five strata and two-stage sampling for first four strata & single stage sampling for 5 th stratum	LV
	Stratified multi-stage sampling	EL, ES, SI, SK
	Simple random sampling	DK, FI
	Telephone sample based on dual-frame method with two selection populations	DE
	Multi-stage sampling	BE, CZ ⁽¹³⁾ , FR, NL, PT
	Systematic stratified sampling	EE
	Stratified sampling	AT, HU, LT, LU, MT, SE, NO

⁽¹³⁾ 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 6th wave of LFS for EHIS (TSU). Individuals for EHIS were selected using Simple Random Sampling.

As a general note, it can be mentioned that most countries that applied a single stage sampling have used a frame from a population register for drawing their samples. 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.

3.2.4. Sample size

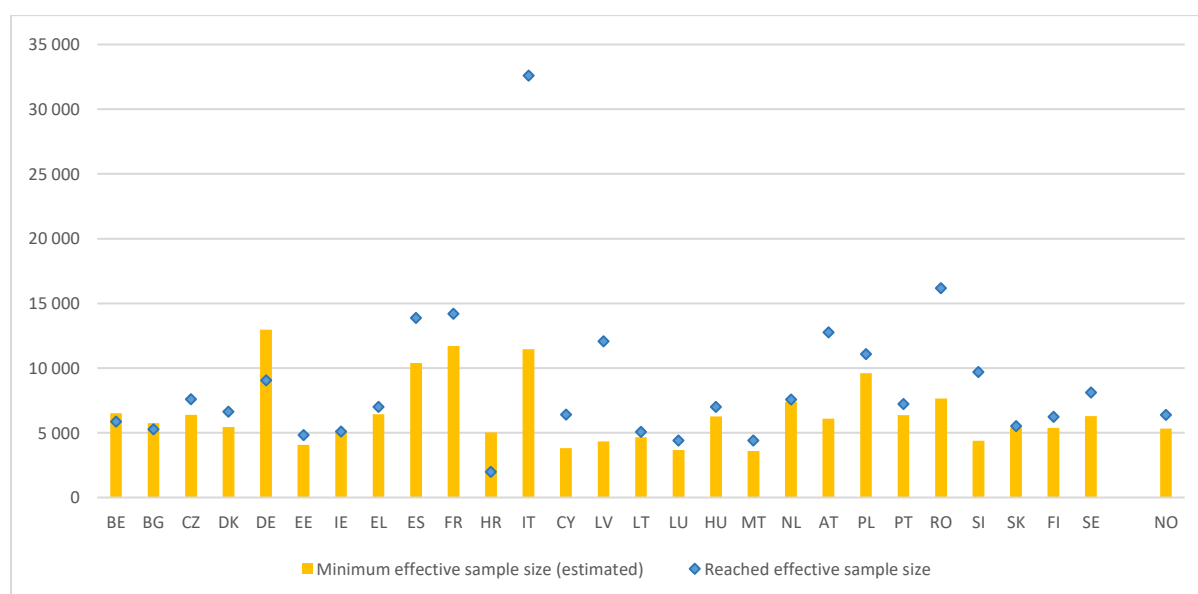
Table 5 presents the achieved sample size, the achieved effective sample size, the minimum effective sample size, as well as the ratio of the achieved effective sample size to the minimum effective sample size.

In EHIS wave 3, precision requirements were not anymore expressed in terms of the minimum effective sample size but in standard errors and defined as continuous functions of the actual estimates and of the size of the statistical population in a country. Nevertheless, Eurostat estimated the minimum effective sample size using the formula of the continuous function. The effective sample size 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 usual activities” variable=1.0) ⁽¹⁴⁾. 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 achieved sample size, the actual response cases have been taken into consideration. The achieved effective sample size was computed by dividing the achieved sample size with the design effect provided in the national quality reports for the variable “Limitation in activities because of health problems” (HS3).

The achieved effective sample size in comparison to the minimum effective sample size is depicted in Figure 1. The ratio of the achieved effective sample size to minimum effective sample size ranged from 0.39 (Croatia) to 2.79 (Latvia).

Figure 1. Minimum effective sample size and achieved effective sample size in EHIS wave 3



Note: Achieved sample size instead of achieved effective sample size for France, Malta and Romania

⁽¹⁴⁾ The variable known as GALI (Global Activity Limitation Indicator, code HS3) has been taken as the most critical variable for determining the precision requirements.

Table 5. Sample size in the national EHIS wave 3

	Achieved sample size for HS3	Design effect for HS3 variable	Achieved effective sample size for HS3	Minimum effective sample size ⁽³⁾	Ratio of the achieved effective sample size to minimum effective sample size
AT	15 461	1.21	12 778	6 104	2,09
BE	9 644	1.64	5 880	6 502	0,90
BG	7 540	1.43	5 273	5 738	0,92
CY	6 156	0.96	6 413	3 829	1,67
CZ	7 993	1.05	7 612	6 391	1,19
DE	23 001	2.54	9 056	12 963	0,70
DK	6 629	1.00	6 629	5 442	1,22
EE	4 881	1.01	4 833	4 063	1,19
EL	8 125	1.16	7 004	6 437	1,09
ES	22 072	1.59	13 882	10 390	1,34
FI	6 251	1.00	6 251	5 384	1,16
FR ⁽¹⁾	14 192	:	:	11 705	:
HR	5 461	2.75	1 986	5 041	0,39
HU	5 603	0.80	7 004	6 268	1,12
IE	7 621	1.49	5 115	5 169	0,99
IT	45 962	1.41	32 597	11 449	2,85
LT	4 923	0.97	5 075	4 648	1,09
LU	4 504	1.02	4 416	3 661	1,21
LV	6 033	0.50	12 066	4 325	2,79
MT ⁽¹⁾	4 413	:	:	3 583	:
NL	8 194	1.08	7 587	7 376	1,03
PL	19 959	1.80	11 088	9 603	1,15
PT ⁽²⁾	14 617	2.02	7 236	6 374	1,14
RO ⁽¹⁾	16 186	:	:	7 656	:
SE	9 757	1.20	8 131	6 280	1,29
SI	9 900	1.02	9 706	4 395	2,21
SK	5 527	1.00	5 527	5 372	1,03
NO	7 913	1.24	6 381	5 315	1,20
RS	13 178	:	:	5 731	:

⁽¹⁾ Information not available for the design effect of HS3 variable. In France, simulations realised during the construction of the new master sample showed that the design effect could be small and the assumption was that 12 000 respondents would be sufficient to fulfill the precision requirements set by the regulation.

⁽²⁾ Average design effect calculated for HS3 at NUTS II level around 1,4; design effect calculated for HS3 at national level: 2,02.

⁽³⁾ Estimated by Eurostat using the formula $a\sqrt{N} + b$, from Annex II *Precision requirements* of [Commission Regulation \(EU\) No 2018/255](#) of 19 February 2018, where $a=1200$, $b=2800$ and N is the population aged 15 or over residing in private households, in million persons and rounded to 3 decimal digits (data for the 2019 reference year used in the computation, [demo_pjanbroad](#)).

: Information not available.

Table 6 gives summary statistics on the distribution of weights in the microdata files transmitted to Eurostat. As expected, the range of weights is higher for countries with a relatively larger target population (Germany, Spain and France). High variability is observed in the distribution of weights for Belgium and Romania, although the target population is relatively not so large, while the opposite holds for Austria and Portugal.

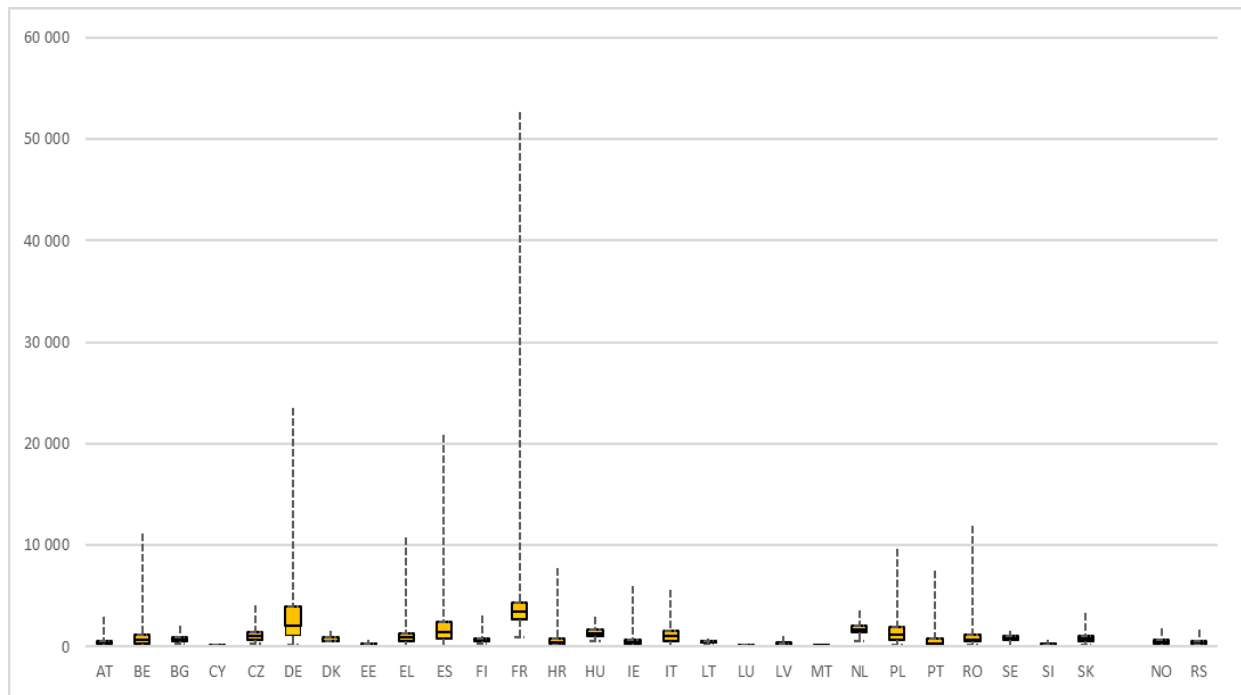
Table 6. Summary statistics on the distribution of weights in EHIS wave 3

	Minimum	1 st Quartile	Median	Mean	3 rd Quartile	Maximum
AT	55	267	401	480	593	2 986
BE	14	335	700	946	1 246	11 100
BG	258	573	734	789	942	2 016
CY	15	77	108	119	153	350
CZ	244	632	1 017	1 094	1 416	4 087
DE	68	994	1 909	3 120	3 838	23 427
DK	495	538	587	731	905	1 529
EE	22	179	219	224	269	631
EL	48	603	923	1 097	1 352	10 739
ES	59	775	1 492	1 811	2 488	20 874
FI	361	497	646	745	870	3 113
FR	992	2 735	3 477	3 690	4 325	52 701
HR	152	365	433	635	749	7 753
HU	500	1 086	1 355	1 461	1 744	3 000
IE	57	255	415	515	640	5 955
IT	32	606	1 022	1 132	1 579	5 650
LT	211	388	469	482	556	870
LU	77	100	106	117	126	223
LV	44	199	264	263	325	1 009
MT	33	61	86	87	101	186
NL	601	1 406	1 703	1 750	2 036	3 575
PL	164	709	1 131	1 527	1 983	9 619
PT	10	124	285	609	800	7 528
RO	179	505	706	1 014	1 214	11 851
SE	28	712	911	869	1 062	1 555
SI	59	135	166	179	209	653
SK	179	539	755	831	1 008	3 393
NO	109	327	475	545	696	1 824
RS	120	292	403	452	553	1 744

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 3



Source: Calculations based on national EHIS microdata files.

3.2.5. 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 16 countries.

Table 7. Source data in EHIS wave 3

Survey name		EHIS is a stand-alone survey	EHIS is combined with another survey	EHIS is a follow-up of another survey
AT	Austrian Health Interview Survey 2019	YES	NO	NO
BE	Health Interview Survey	NO	YES	NO
BG	European Health Interview Survey	YES	NO	NO
CY	European Health Interview Survey 2019	YES	NO	NO
CZ	European Health Interview Survey 2019	NO	YES	YES
DE	German Health Update	NO	YES	NO
DK	European Health Interview Survey	YES	NO	NO
EE	Estonian Health Interview Survey 2019	NO	YES	NO
EL	Health Survey, 2019	YES	NO	NO
ES	Health Interview Survey	YES	NO	NO
FI	National Study of Health, Well-being and Service Use	NO	YES	NO
FR	European health interview survey 2019	YES	NO	NO
HR	European Health Interview Survey - Wave 3	NO	YES	NO
HU	European Health Interview Survey	NO	YES	NO
IE	Irish Health Survey	NO	YES	NO
IT	European Health Interview Survey	YES	NO	NO
LT	Health Interview Survey	YES	NO	NO
LU	Residents' Health Survey	YES	NO	NO
LV	European Health Interview Survey	YES	NO	NO
MT	European Health Interview Survey	YES	NO	NO
NL	Health Interview Survey	NO	YES	NO
PL	European Health Interview Survey	YES	NO	NO
PT	National Health Survey 2019	NO	YES	NO
RO	Health Interview Survey	YES	NO	NO
SE	Health in Sweden and Europe	YES	NO	NO
SI	National Health Interview Survey 2019	NO	YES	NO
SK	European Health Interview Survey 2019	YES	NO	NO
NO	Survey of living conditions, health, care and social relations	NO	YES	NO
RS	Serbian Health Interview Survey 2019	NO	YES	NO

On the other hand, EHIS has been embedded in an existing survey conducted for national purposes in twelve countries (i.e. the national survey existed before EHIS and the latter was 'integrated' into the national survey): Belgium (Health Interview Survey), Germany (German Health Update), Estonia (Health Interview Survey), Finland (National Study of Health, Well-being and Service Use), Croatia (European Health Interview Survey), Hungary (Health Interview Survey), Ireland (General Household Survey), the Netherlands (Health Interview Survey), Portugal (National Health Survey 2019), Slovenia (Health Interview Survey) as well as Norway (Living Conditions Survey) and Serbia (Health Interview Survey). Particularly in Croatia, the EHIS questionnaire was followed by a small health examination module consisting of two blood pressure measurements & waist circumference measurement. Czechia just used the sample of the Labour Force Sample Survey LFS to select a subsample for EHIS.

4

Overview of survey implementation in EHIS wave 3

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 Austria, Belgium, Greece, Estonia, France, Italy and Norway. More specifically, Belgium scattered the modules over the face-to-face questionnaire and the self-questionnaire. 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) to be in line with the national questionnaire. France followed the recommended order of modules and sub-modules in the questionnaire, except for three sub-modules: mental health (MH), smoking (SK) and alcohol consumption (AL). These modules were moved to the end of our questionnaire (after the sub-module IC) as France considered these three sub-modules as the most sensitive ones, and therefore decided to implement them in a separated self-completed module for CAPI interviews. Italy included the modules BM, PE and DH between HS and CD; added the module on oral health (including variable CD2) for persons aged three years and over and moved the sub-module on absence from work due to health problems (AW) at the end of the questionnaire. In the Norwegian questionnaire, the module on accidents was moved from the Health Status Module (EHSM) to the Health Care Module (EHCM). Moreover, 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.

Czechia, Greece, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary and Sweden mentioned that additional questions were included for national purposes. Additional information on the modifications introduced in the national questionnaires is provided under Section 5.2.1.

4.1.2. Languages in which the survey was carried out

In 14 countries (Belgium, Estonia, Greece, Spain, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Malta, Finland, Sweden as well as, Norway and Serbia) the survey was undertaken into more than one official languages (Table 8). In total, 29 languages were used, nine of which were common in more than one country.

Table 8. Language in which the survey was carried out in EHIS wave 3

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

Most countries used the translation protocol proposed by Eurostat except for Belgium, Spain, Finland, Italy, Lithuania, Luxembourg, Sweden and Norway. 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. In Finland the Finnish (native language) translation of the questionnaire was made by THL's population survey experts. Swedish language translation of the Finnish questionnaire was carried out by a translation agency with subject expertise of the field of public health and health care. This language translation was then re-checked by THL's survey experts.

In Italy, the new questions of EHIS 3 were translated by a translation company frequently carrying out translations of questionnaires, but not specialized in health issues. The translation was verified by mother tongue ISTAT colleagues who are expert in questionnaires. Experts translated the Lithuanian questionnaire into Russian, and similarly in Ireland, experts within the NSI in cooperation with health specialists translated the English version of the questionnaire into Irish. In Luxembourg, the translations were partially performed by a specialized translation company and through Native speakers in the Ministry of Health and based on the previous wave of EHIS. In Sweden, the translation was done by the Public Health Agency and used an authorized translation agency. 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 Austria, Cyprus, Czechia, Germany, Denmark, Hungary, Ireland, Lithuania, Latvia, Malta, the Netherlands, Poland (Polish version only), Romania, Slovenia and Slovakia, Norway, and Serbia.

Cognitive testing was carried out by Germany, France and Poland (Polish version only) and Serbia.

Especially Poland and Serbia tested the questionnaire not only through simple but also by cognitive testing. In France, the questionnaire was tested in CATI mode on a sample of 600 respondents to test the survey protocol, from the sampling phase to the interview phase, to ensure the comprehension of the questions and the response categories, and to test the feasibility of the protocol for minors and people aged 75 years or more. In Germany, a standard pre-test was carried out with a random sample of around 200 interviewees before the survey began; the German pre-test examined the following aspects and quality criteria: comprehensibility, order and logic behind the questions, filtering, questionnaire construction and sequencing, call and call-back management functionality and questionnaire duration. In the Netherlands, a health interview survey is carried out yearly in which most of the questions are equal to the EHIS; this can be considered as a kind of pilot field test.

The questionnaire was not pre-tested in Belgium, Bulgaria, Estonia, Finland, Greece, Spain, Croatia, Italy, Luxembourg, Portugal, and Sweden.

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. Self-administered questionnaires were used for postal and web modes of data collection.

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 the socio-demographic ones) were completed from administrative data sources. A more detailed presentation of the data collection modes used is presented in Annex 2 (Table 25).

Four of the 29 countries Denmark, Finland, Luxembourg and Sweden used exclusively self-administered questionnaires as mode of data collection, resulting in either a web-interview or a paper questionnaire (see Figure 3). Czechia, Germany, Greece, Croatia, Cyprus, Spain, Poland, Slovakia, and Norway did not use a self-administered questionnaire at all.

Six countries Bulgaria, Cyprus, Greece, Ireland, Poland and Slovakia used face-to-face interviews as the only mode of data collection but in Bulgaria and Ireland, specific submodules were self-completed by respondents. Germany and Norway used telephone interviews as the only mode of data collection.

Another group of countries, namely Czechia, Spain, France, Croatia, Lithuania, Latvia and Malta, a combination of personal visits and telephone interviews was applied. Lithuania and Latvia also used web-based interviews and self-administered questionnaires (Lithuania). Another group of countries, namely Austria, Estonia, Hungary, the Netherlands, Portugal and Slovenia, used a combination of face-to-face interviews and self-administered online or web questionnaires as modes of data collection.

With regard to the use of administrative data, 10 countries 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 a social security register was used as sampling frame, administrative data were used for the derivation of certain EHIS variables.

Table 9. Mode of data collection used in EHIS wave 3

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

⁽¹⁾ For legal reasons, the use of a web self-administered questionnaire was not allowed for those aged between 15 and 17.

⁽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⁾ An invitation to participate to the online survey was sent to a group of the sampled persons. All those who did not respond to the self-administered survey was further approached with a paper-questionnaire; mixed internet-paper mode.

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 a part of the target population has not access to the Internet and therefore, bias might be introduced.

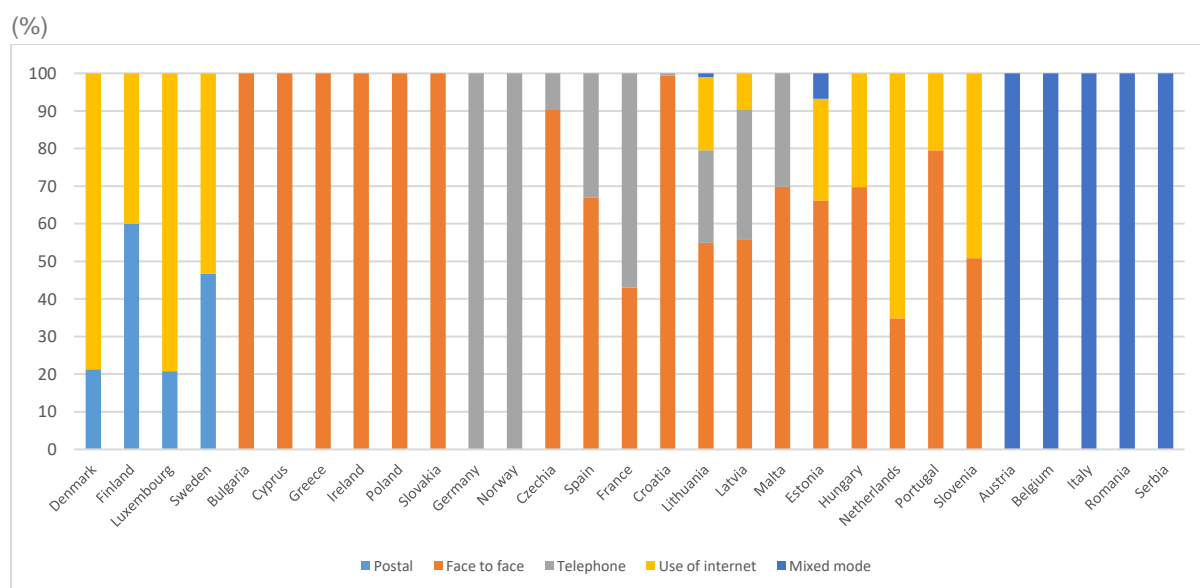
On the other hand, the use of a face-to-face or telephone interviews provides the opportunity to respondents to ask for clarifications in questions, while real time validation may be also implemented when an electronic version is used. Again, one may consider interviewer bias, or measurement errors due 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 3



Source: Calculations based on national EHIS microdata files.

4.2.2. Topics administered via a self-completion questionnaire

20 countries allowed respondents to fill-in themselves. In the eight countries Denmark, Finland, Hungary, Ireland, Lithuania, Luxembourg, the Netherlands and Sweden all questions could be administered by the respondents via a self-completion questionnaire.

In the other twelve countries, Austria, Belgium, Bulgaria, Estonia, Spain, France, Italy, Latvia, Malta, Romania, Slovenia and Serbia, for sub-modules or particular variables the self-administered mode was used. A group out of these countries, namely Bulgaria, Estonia, Italy, Romania and Serbia, allowed for self-administered mode for the variables on smoking (SK) and alcohol consumption (AL) only. In France, self-administered mode was allowed for variables on mental health (MH), smoking (SK) and alcohol consumption (AL), while in Malta the consumption of drugs, sexual health, out of pocket health expenditures and income was allowed beside alcohol consumption (AL) and Smoking (SK).

Belgium allowed self-reporting on the sub-modules of health status (HS), alcohol consumption (AL), mental health (MH), physical exercise (PE), smoking (SK), and social support (SS). 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).

4.2.3. Interviewers

In twelve countries, namely Bulgaria, Czechia, Estonia, Ireland, Greece, Cyprus, Latvia, Lithuania, the Netherlands, Poland, Slovakia and Norway, the interviews were made by NSI staff experienced in health or social surveys (Table 10).

In Belgium, Germany, France, Spain, Croatia, Italy, Hungary, Malta, Austria, Portugal, Romania, and Slovenia external staff experienced in health / social surveys was recruited. In Greece and Cyprus, interviewers and supervisors were recruited on a seasonal basis and were selected based on their qualifications and previous experience. In Slovenia, about three quarters of the external staff employed had some previous experience in social surveys. The rest of the interviewers were beginners and underwent extensive training.

In Denmark, Luxembourg, Finland and Sweden, no interviews were made at all since a self-administered mode was exclusively used for the data collection.

Table 10. Interviewers qualifications and ratio of interviews per interviewer in EHIS wave 3

	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
AT	90:1	NO	YES	NO
BE	:	NO	YES	NO
BG	:	YES	NO	NO
CY	257:1	YES	NO	NO
CZ	32:1	YES	NO	NO
DE	107:1	NO	YES	NO
DK ⁽²⁾	-	NO	NO	NO
EE	59:1	YES	NO	NO
EL ⁽¹⁾	8 - 140:1	YES	YES	NO
ES	:	NO	YES	NO
FI ⁽²⁾	-	NO	NO	NO
FR	:	NO	YES	NO
HU	24:1	NO	YES	NO
HR	14:1	NO	YES	NO
IE	:	YES	NO	NO
IT	30:1	NO	YES	NO
LT	69:1	YES	NO	NO
LU ⁽²⁾	-	NO	NO	NO
LV	:	YES	NO	NO
MT	:	NO	YES	NO
NL	:	YES	NO	NO
PL	22:1	YES	NO	NO
PT	80:1	NO	YES	NO
RO	36 dwellings:1	NO	YES	NO
SE ⁽²⁾	:	NO	NO	NO
SI	60:1	NO	YES	NO
SK	38:1	YES	NO	NO
NO	72:1	YES	NO	NO
RS	103:1	NO	YES	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⁾ A self-administered mode has been used for the data collection. No interviews have been undertaken.

: Information not available; -: Not applicable.

Based on calculations made on the microdata files transmitted to Eurostat, the distribution of responses over the years 2018, 2019 and 2020 is presented in Table 11.

Table 11. Distribution of responses over the reference years in EHIS wave 3

(number of respondents, %)

	Number			%		
	2018	2019	2020	2018	2019	2020
AT	7 605	7 856	0	49.2	50.8	0
BE	9 210	434	0	95.5	4.5	0
BG	0	7 503	37	0	99.5	0.5
CY	0	6 156	0	0	100.0	0
CZ	0	7 380	613	0	92.3	7.7
DE	0	12 085	10 916	0	52.5	47.5
DK	0	6 626	3	0	100.0	0
EE	0	4 868	13	0	100.0	0.0
EL	0	8 125	0	0	100.0	0
ES	0	9 755	12 317	0	44.2	55.8
FI	0	5 361	890	0	85.8	14.2
FR	0	13 967	225	0	98.4	1.6
HR	0	5 461	0	0	100.0	0
HU	0	5 603	0	0	100.0	0
IE	0	7 620	0	0	100.0	0
IT	0	45 962	0	0	100.0	0
LT	0	4 923	0	0	100.0	0
LU	0	4 504	0	0	100.0	0
LV	0	3 125	2 908	0	51.8	48.2
MT	0	1 073	3 340	0	24.3	75.7
NL	0	8 194	0	0	100.0	0
PL	0	19 959	0	0	100.0	0
PT	0	14 321	296	0	98.0	2.0
RO	0	16 186	0	0	100.0	0
SE	0	9 738	19	0	99.8	0.2
SI	0	9 900	0	0	100.0	0
SK	0	5 527	0	0	100.0	0
NO	0	7 913	0	0	100.0	0
RS	0	13 178	0	0	100.0	0

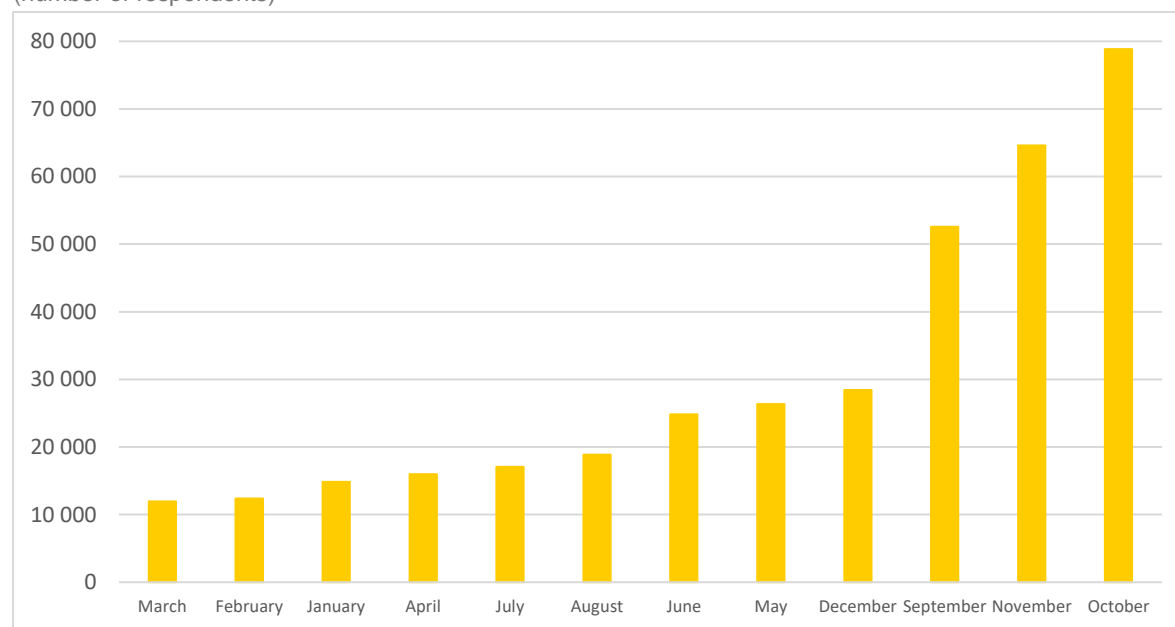
Source: Calculations based on national EHIS microdata files.

As expected, in Ireland, Greece, Croatia, Italy, Cyprus, Lithuania, Luxembourg, Hungary, the Netherlands, Poland, Romania, Slovenia, Slovakia, as well as Serbia and Norway, all interviews have been undertaken during 2019. In Belgium, responses were mainly collected in 2018, whereas in Czechia, Germany, Spain, Latvia, Malta and Finland at least 5 percent (CZ) up to more than 75 percent (MT) of all national data was collected in 2020.

Figure 5 shows the overall distribution of response over the different months of the year (independently of the year that the survey was undertaken in each country). The majority of responses were collected during October (21.5%), November (17.6%) and September (14.3%). Overall, as also shown in Figure 5, less responses were collected during the spring and summer periods.

Figure 5. Distribution of response over the different months of the year (2018-2020)

(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

Table 12 shows that all 29 countries used a letter to pre-notify the selected persons about the launch of the survey and their inclusion in the sample. Belgium, Czechia, Greece, Croatia, Ireland, Latvia and Poland made also a doorstep contact for the announcement of the survey, while Germany, Croatia, Latvia and Norway contacted the selected persons also via telephone. Especially Denmark, Estonia, Latvia and Norway, 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 3

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

All countries, except for Germany and Luxembourg, made at least three attempts for contacting the selected persons before receiving a refusal for participation.

5.1.2. Incentives

Nine countries offered incentives to the respondents to encourage them to participate in the survey. In Austria shopping vouchers were offered. In Czechia, a case with travel first aid kit was offered. In Slovakia, each respondent and in Estonia CAPI respondent received a pen and health related pamphlets, stress balls, key holders and mint pastilles, respectively. Also in Estonia 20-euros gift cards were drawn between CAWI respondents. In Finland, Hungary and in

the Netherlands, respondents were entered into a draw for a smart phone, gift vouchers, travel vouchers or an iPad. In Norway, about 3000 lottery tickets were sent out to the respondents.

5.1.3. Duration of interviews

Table 13 presents the average interview duration. However, it should be highlighted that depending on survey methods and survey designs, there exist some limitations in measuring the duration of interviews. This needs to be taken into account when interpreting or comparing duration estimates.

The average interview duration varied from 20 (Belgium and Spain) to 66 minutes (Estonia and Poland) and peaking at 67 minutes in Greece.

It is also notable that in Bulgaria, Croatia, Italy, Cyprus, Poland, Romania and Serbia 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 Portugal only one person has been surveyed in the household, while in Czechia two persons were interviewed.

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 were in place. From the available information, it can be deduced that electronic modes of data collection tend to reduce the time of completion of the questionnaire.

Table 13. Average interview duration (in minutes)

Average duration	
AT	35
BE	20
BG	32
CY	45
CZ	31
DE	40
DK	n.a.
EE	66
EL	67
ES	20
FI	30
FR	44
HR	42
HU	33
IE	29
IT	27
LT	34
LU	29
LV	30
MT	34
NL	36
PL	66
PT	32
RO	48
SE	n.a.
SI	31
SK	35
NO	34
RS	24

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 behaviour, 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), 4-5 to 1 (Bulgaria, Cyprus, Poland and Serbia) up to 18 to 1 (Slovakia).

Table 14. Method for quality control of the data collection and ratio of interviewers to field supervisors in EHIS wave 3

	Ratio interviewers / field supervisors	Contacts with respondents for quality control	Contact method
AT	:	NO	
BE	:	YES	Evaluation form sent to a sample of participating households.
BG	4:1	NO	
CY	5:1	YES	Telephone contacts or personal visits to selected households, especially in the case of unusual answers or missing data.
CZ	18:1	YES	Telephone contacts by the regional coordinators to selected respondents.
DE	15:1	NO	
DK (1)	NO	NO	
EE	12:1	YES	Letters sent to respondents requesting for feedback on the survey.
EL	1 supervisor per regional office	YES	Telephone contacts with respondents for the provision of clarification, when needed.
ES	:	YES	
FI	:	NO	
FR	:	YES	
HR	:	NO	
HU	11:1	YES	10% of respondents were contacted. The majority by telephone, slightly more than 20% on the spot.
IE	:	YES	
IT	2:1	NO	
LT	9:1	YES	Telephone contacts to 13 % randomly selected respondents.
LU (1)	:	NO	
LV	:	YES	
MT	:	YES	At least 10% of respondents were audited via phone call from internal staff.
NL	:	YES	CATI interviews. This was not specially performed for the EHIS, but for the whole National Health Interview Survey, which incorporates respondents aged 0 years or older. In total 1241 interviews were carried out.
PL	5:1	NO	
PT	:	NO	
RO	:	YES	Direct contacts with households.
SE (1)	:	NO	
SI	:	YES	Around 4 % of the sample and 5 % of eligible units were checked (247 by control letters and 360 by phone). Four different control letters were sent depending on participation mode and age of respondent raising a number of questions on the conducting of the interview, length of the questionnaire, use of show cards, etc.
SK	18:1	NO	
NO	20:1	NO	

	Ratio interviewers / field supervisors	Contacts with respondents for quality control	Contact method
RS	4:1	YES	Quality control was also conducted through Post-evaluation survey (PES). PES was done by revisiting 10% of already surveyed households and by telephone control on a sample of 15% of surveyed households (900 households in total).

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

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 validation, calibration, non-response adjustments to minimize the effect of all potential sources of non-sampling errors.

Some of the countries referred to specific factors that might have affected the accuracy of the results. In detail, Czechia reported that, since the sample was derived from the LFS, selection bias might have occurred and therefore, socially excluded households could be underrepresented. Also, since 60.5 % of interviewers used the paper version of the questionnaire, some difficulty was registered with concepts as day care and physical activity or sensitive questions (e.g. income).

Estonia noted that, due to the presence of outliers in the alcohol consumption and physical activity questions, more automatic checks should have been used to prevent this. In Finland, the use of a self-administered questionnaire resulted in higher item nonresponse rate, whereas invalid and incoherent values were also identified.

Moreover, some countries stated that some sociodemographic groups of the population might have been excluded, although belonging to the sampling frame. This was mainly due to language constraints. For example in Cyprus, households unable to communicate due to language restrictions (the questionnaire was available in Greek and English only), in Czechia, persons who do not speak Czech or persons with severe disabilities, and in Luxembourg, those not understanding any of the 4 languages proposed, might have been excluded in some cases (see the 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 that are based on probability sampling (¹⁵), makes it possible to quantify the sampling errors, which can be expressed in terms of standard errors and confidence intervals.

(¹⁵) It is open to discussion whether EHIS in Czechia, that is a follow-up survey of the Labour Force Sample Survey (LFS), can still be regarded as a survey based on probability sampling. The same is true for Germany that relies for EHIS on a telephone sample based on dual-frame method with two selection populations: mobile phone numbers and landline phone numbers; Kish Selection Grid to randomly select prospective respondents.

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
AT	11 446	74.5	0.42	73.7 - 75.3	1.19
BE	6 092	77.2	0.64	75.9 - 78.4	1.84
BG	4 587	69.9	0.70	68.6 - 71.4	1.75
CY	4 476	77.3	0.50	76.2 - 78.4	1.06
CZ	4 879	70.0	0.57	68.9 - 71.1	1.06
DE	16 862	70.7	0.47	69.7 - 71.6	2.48
DK	6 598 ⁽¹⁾	72.2	0.55	71.1 - 73.3	1.00
EE	2 723	59.6	0.70	58.2 - 61.1	:
EL	5 690	79.4	0.60	78.3 - 80.5	1.48
ES	15 587	76.0	0.69	74.2 - 76.9	5.64
FI	3 420	57.7	0.70	56.3 - 59.0	:
FR	10 065	71.2	0.30	70.6 - 71.9	:
HR	2 740	54.6	1.40	51.9 - 57.4	4.34
HU	3 185	61.5	0.54	60.5 - 62.6	0.70
IE	6 133	85.0	0.46	84.1 - 85.8	:
IT	31 266	71.0	0.29	70.4 - 71.6	1.85
LT	2 268	52.4	0.60	51.2 - 53.6	1.00
LU	3 266	74.2	0.65	72.9 - 75.5	0.99
LV	5 848 ⁽¹⁾	49.6	0.42	48.7 - 50.4	0.42
MT	3 502	82.5	0.60	81.2 - 83.8	:
NL	6 203	75.7	0.49	75.6 - 75.7	1.07
PL	16 850 ⁽¹⁾	61.9	0.52	60.9 - 62.9	1.93
PT	6 441	52.6	0.54	51.6 - 53.7	1.73
RO	10 456	70.6	0.66	69.3 - 71.9	:
SE	7 035	72.0	0.49	71.1 - 73.0	1.13
SI	6 531	67.5	0.50	66.0 - 68.0	1.08
SK	3 251	66.5	0.66	64.7 - 68.4	1.10
NO	6 249	79.5	0.50	78.5 - 80.4	1.20
RS	7 966	63.9	0.61	62.7 - 65.1	:

: Information not available.

(1) Total number of respondents of HS1 presented; Eurostat estimated number of respondents fulfilling the condition of HS1 would be: DK: 4 760, LV: 2 900, PL: 10 430.

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
AT	5 991	38.3	0.47	37.4 - 39.3	1.21
BE	2 376	29.2	0.69	27.8 - 30.6	1.82
BG	1 448	40.2	0.80	38.7 - 41.7	1.82
CY	3 395	47.7	0.70	46.3 - 49.0	1.18
CZ	4 161	44.3	0.63	43.0 - 45.5	1.05
DE	11 540	48.4	0.50	47.4 - 49.3	2.31
DK	6 572 ⁽¹⁾	37.3	0.60	36.2 - 38.5	1.00
EE	3 287	64.8	0.70	63.4 - 66.3	:
EL	4 040	41.7	0.70	40.3 - 43.1	1.64
ES	14 106	57.0	0.60	55.7 - 58.1	3.21
FI	3 277	48.3	0.70	46.9 - 49.6	:
FR	5 518	37.7	0.40	36.9 - 38.4	:
HR	2 795	50.2	1.33	47.6 - 52.8	4.02
HU	2 798	47.7	0.57	46.6 - 48.9	0.73
IE	2 322	25.8	:	24.0 - 27.5	:
IT	14 667	30.3	0.33	29.7 - 30.9	2.32
LT	2 512	45.9	0.63	44.7 - 47.2	1.01
LU	1 425	31.4	0.70	30.0 - 32.7	1.00
LV	6 025 ⁽¹⁾	73.2	0.40	72.5 - 74.0	0.48
MT	2 464	51.1	1.00	49.1 - 53.1	:
NL	2 892	35.0	0.54	34.9 - 35.0	1.07
PL	19 925 ⁽¹⁾	59.9	0.52	58.9 - 60.9	2.24
PT	8 318	48.2	0.69	46.9 - 49.6	2.82
RO	5 472	28.7	0.69	27.3 - 30.0	:
SE	6 883	71.4	0.48	70.4 - 72.3	1.11
SI	3 940	38.4	0.50	38.9 - 40.8	1.01
SK	3 410	53.7	0.75	52.4 - 55.1	1.30
NO	3 100	38.5	0.61	37.3 - 39.7	1.23
RS	6 050	46.0	0.66	44.7 - 47.3	:

: Information not available.

(1) Total number of respondents of HS2 presented; Eurostat estimated number of respondents fulfilling the condition of HS2 would be: DK: 2 450, LV: 4 410, PL: 11 940.

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
AT	1 420	8.9	0.28	8.4 - 9.5	1.21
BE	475	6.0	0.34	5.4 - 6.7	1.64
BG	527	5.8	0.30	5.2 - 6.5	1.43
CY	465	5.9	0.30	5.4 - 6.5	0.96
CZ	752	7.3	0.30	6.7 - 7.9	1.05
DE	1 596	8.3	0.30	7.7 - 8.9	2.54
DK	6 530 ⁽¹⁾	4.1	0.24	3.6 - 4.5	1.00
EE	605	11.1	0.50	10.2 - 12.0	1.01
EL	734	6.8	0.30	6.2 - 7.4	1.16
ES	1 271	5.0	0.18	4.4 - 5.1	1.59
FI	372	5.8	0.30	5.2 - 6.4	1.00
FR	1 279	9.0	0.20	8.6 - 9.4	:
HR	737	13.5	0.75	12.1 – 15.0	2.75
HU	411	6.4	0.29	5.8 - 7.0	0.80
IE	1 522	15.6	:	13.8 - 17.4	1.49
IT	3 559	7.0	0.14	6.8 – 7.3	1.41
LT	384	6.3	0.31	5.7 - 6.9	0.97
LU	169	3.8	0.29	3.2 - 4.3	0.99
LV	6 023 ⁽¹⁾	9.1	0.26	8.6 - 9.6	0.50
MT	264	5.3	1.40	2.6 - 8.0	:
NL	464	5.7	0.27	5.6 - 5.7	1.08
PL	19 864 ⁽¹⁾	7.5	0.25	7.0 - 8.0	1.80
PT	1 103	6.3	0.28	5.7 - 6.8	2.02
RO	872	4.6	0.22	4.2 - 5.1	:
SE	699	8.2	0.31	7.6 - 8.8	1.20
SI	786	8.0	0.30	7.4 - 8.5	1.02
SK	655	9.6	0.39	8.9 - 10.4	1.00
NO	500	6.2	0.30	5.6 - 6.8	1.24
RS	1 126	8.6	0.31	7.9 - 9.2	:

: Information not available.

(1) Total number of respondents of HS3 presented; Eurostat estimated number of respondents fulfilling the condition of HS3 would be: DK: 270, LV: 550, PL: 1 490.

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
AT	2 667	16.4	0.39	15.6 - 17.1	1.30
BE	1 100	11.2	0.43	10.4 - 12.1	1.82
BG	764	8.8	0.40	8.1 - 9.6	1.30
CY	601	8.9	0.40	8.2 - 9.7	:
CZ	1 085	11.7	0.39	10.9 - 12.4	1.02
DE	3 957	17.2	0.39	16.4 - 17.9	2.41
DK	:	:	:	:	1.00
EE	550	10.9	0.50	10.0 - 11.8	:
EL	791	8.4	0.30	7.7 - 9.1	1.26
ES	1 931	8.0	0.23	7.5 - 8.4	1.63
FI (2)	565	8.2	0.40	7.5 - 8.9	:
FR	1 492	10.4	0.30	9.9 - 11.0	:
HR	692	12.1	0.66	10.7 - 13.3	2.36
HU	700	11.6	0.39	10.8 - 12.3	0.85
IE	967	11.1	:	9.1 - 13.1	:
IT	3 761	8.0	0.16	7.7 - 8.3	1.53
LT	701	13.1	0.47	12.2 - 14.0	1.01
LU	502	10.9	0.46	10.0 - 11.8	0.98
LV	6 024(1)	11.5	0.30	10.9 - 12.1	0.56
MT	446	9.4	1.40	6.7 - 12.1	:
NL	579	6.9	0.29	6.8 - 6.9	1.08
PL	19 959(1)	16.4	0.34	15.7 - 17.0	1.69
PT	1 218	8.3	0.40	7.5 - 9.0	3.06
RO	853	4.6	0.27	4.0 - 5.1	:
SE (2)	681	6.5	0.67	5.1 - 7.8	1.14
SI	1 107	11.0	0.30	10.6 - 11.8	0.98
SK	737	11.8	0.45	10.9 - 12.6	1.10
NO	860	11.0	0.40	10.2 - 11.8	1.28
RS	1 041	7.9	0.27	7.4 - 8.5	:

: Information not available.

(1) Total number of respondents of HO1 presented; Eurostat estimated number of respondents fulfilling the condition of HO1 would be: LV: 690, PL: 3 270.

(2) Having been hospitalized calculated as HO12 >0.

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 \geq 30).

Table 19. Sampling errors — Respondents aged 18 years or over who are obese (BMI \geq 30)

	Number of respondents — n	Estimated proportion — p	Standard error — SE	95 % confidence interval	Design effect — deff
AT	2 514	17.1	0.38	16.0 - 18.0	1.24
BE	1 494	15.1	0.49	14.2 - 16.1	1.83
BG	1 004	13.2	0.50	12.3 - 14.2	1.51
CY	955	14.9	0.50	13.9 - 15.9	:
CZ	1 654	19.3	0.52	18.3 - 20.4	1.07
DE	3 881	18.5	0.40	17.8 - 19.3	2.44
DK	6 416 ⁽¹⁾	15.6	0.46	14.7 - 16.5	1.00
EE ⁽²⁾	1 095	21.0	0.60	19.8 - 22.2	:
EL	1 345	16.3	0.50	15.2 - 17.3	1.58
ES	3 365	15.0	0.33	14.7 - 16.0	1.89
FI	1 210	19.2	0.50	18.2 - 20.3	:
FR	2 049	14.4	0.30	13.8 - 15.0	:
HR	1 241	23.1	0.91	21.4 - 24.9	2.48
HU	1 379	24.5	0.53	23.4 - 25.5	0.85
IE	1 800	24.7	:	22.7 - 26.6	:
IT	5 036	11.4	0.20	11.4 - 11.8	1.80
LT	957	18.9	0.55	17.9 - 20.1	0.99
LU	724	16.1	0.56	15.0 - 17.2	0.99
LV	5 528 ⁽¹⁾	23.0	0.40	22.2 - 23.8	0.52
MT	1 164	26.1	1.30	23.6 - 28.6	:
NL	1 144	14.7	0.42	14.6 - 14.7	1.08
PL	16 494 ⁽¹⁾	19.0	0.41	18.2 - 19.8	1.80
PT	2 660	16.9	0.52	15.9 - 18.0	2.76
RO	1 833	11.5	0.45	10.7 - 12.4	:
SE	1 326	14.7	0.39	14.0 - 15.5	1.14
SI	1 799	19.9	0.40	19.7 - 20.1	1.00
SK	1 202	19.1	0.55	18.0 - 20.2	1.10
NO	1 088	14.1	0.45	13.2 - 15.0	1.24
RS	2 010	17.3	0.45	16.4 - 18.2	:

: Information not available.

(1) Total number of respondents of BMI presented; Eurostat estimated number of respondents fulfilling the condition of BMI $>$ 30 would be: DK: 1 000, LV: 1 270, PL: 3 130.

(2) Respondents aged 15 years and older.

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.

Table 20. Under-coverage, over-coverage of the sampling frame in EHIS wave 3

	Under-coverage	Over-coverage
AT	0 %	0 %
BE	:	Unknown but very close to 0%
BG	0.8 %	0 %
CY	1.4 %	16.3 %
CZ	1.7 %	10.0 %
DE	≈0 %	0 %
DK	<1.0 %	0 %
EE	<1.0 %	3.0-4.0 %
EL	2.4 %	0 %
ES	0 %	0 %
FI	≈0 %	0 %
FR	5.0 %	6.8 %
HR	:	4.6 %
HU	<0.5 %	~6.6 %
IE	0.1 %	0 %
IT	0 %	8.8 %
LT	0 %	0 %
LU	0 %	0 %
LV	0 %	3.1 %
MT	:	12.1 %
NL	0.3 %	0.3 %
PL	≈0 %	11.0 %
PT	1.0 %	16.5 %
RO	0 %	8.1 %
SE	0 %	0 %
SI	0 %	0 %
SK	:	:
NO	0 %	1.3 %
RS	:	:

: Information not available.

In some countries, certain population groups were excluded even though they would have belonged to the sampling frame. In detail, persons with a protected address (Denmark), homeless people and persons with no permanent address (Estonia, Greece, referring to foreigners in diplomatic missions, the Netherlands, Finland) were not covered. Particularly in Germany, Cyprus, Czechia, Luxembourg and the Netherlands, persons for whom language was a barrier were excluded, even though they would have belonged to the target population. Persons with hearing problems (Germany and Norway) could not be captured due to the mode of data collection used.

MEASUREMENT ERRORS

Measurement errors occur during the data collection and imply that the recorded values of variables are 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. So, health questions are self-assessed and often sensitive to be answered by another person. But if the respondent is not able to answer for health reasons, a significant amount of essential respondents' health status data could be lost.

According to the methodological guidelines, proxy answers in EHIS could be allowed for some questions only and for cases where the respondents were unable to answer because of one or more of the following reasons:

1. Suffering from long term cognitive impairment;
2. Suffering from long term 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 Germany, Denmark, Hungary, Ireland, Luxembourg, the Netherlands, Portugal, Sweden and Slovakia (see Table 21 and Figure 6).

Table 21. Proxy interviews and reasons for proxy usage in EHIS wave 3

	Proxy interviews allowed	Part of the questionnaire for which proxy usage was allowed	Reasons ⁽¹⁾ for proxy usage
AT	Yes	Limited to questions specified in guidelines	1, 2, 3
BE ⁽²⁾	Yes	Other questions	1, 2, 3, 4, 5
BG	Yes	Limited to questions specified in guidelines	1, 2, 3, 4
CY	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
DE	No	-	-
DK	No	-	-
EE	Yes	Whole questionnaire	1, 2, 3
EL	Yes	Whole questionnaire	1, 2, 3, 4
ES	Yes	Whole questionnaire	1, 2, 3, 4
FI	Yes	Whole questionnaire	6
FR	Yes	Whole questionnaire	1, 2, 3
HR	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
HU	No	-	-
IE	No	-	-
IT	Yes	Whole questionnaire	1, 2, 3, 4, 5, 6
LT	Yes	Limited to questions specified in guidelines	1, 2, 3, 4
LU	No	-	-
LV	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5, 6
MT	Yes	Limited to questions specified in guidelines	1, 2, 3, 4
NL	No	-	-
PL	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
PT	No	-	-
RO	Yes	Whole questionnaire	1, 2, 3, 4, 5, 6
SE	No	-	-
SI	Yes	Limited to questions specified in guidelines	1, 2, 3, 4, 5
SK	No	-	-
NO	Yes	Whole questionnaire	1, 2
RS	Yes	Other questions	1, 2, 3, 4, 5, 6

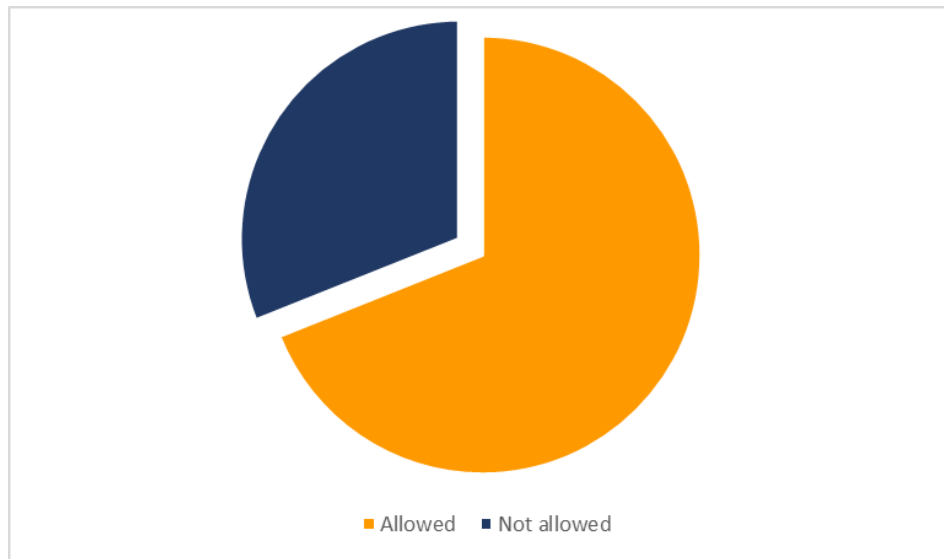
(1) The possible reasons for proxy interviews are: 1 = Respondent suffering from long-term cognitive impairment; 2 = Respondent suffering from long-term debilitation; 3 = Respondent suffering from long-term sensory impairment that prevents interaction between interviewer and interviewee; 4 = Respondent in hospital, in health or social care facility for entire period of fieldwork; 5 = Respondent away from own household for educational or work purposes for entire period of fieldwork in the area of residence; 6 = Other reason.

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

- Proxy usage not allowed.

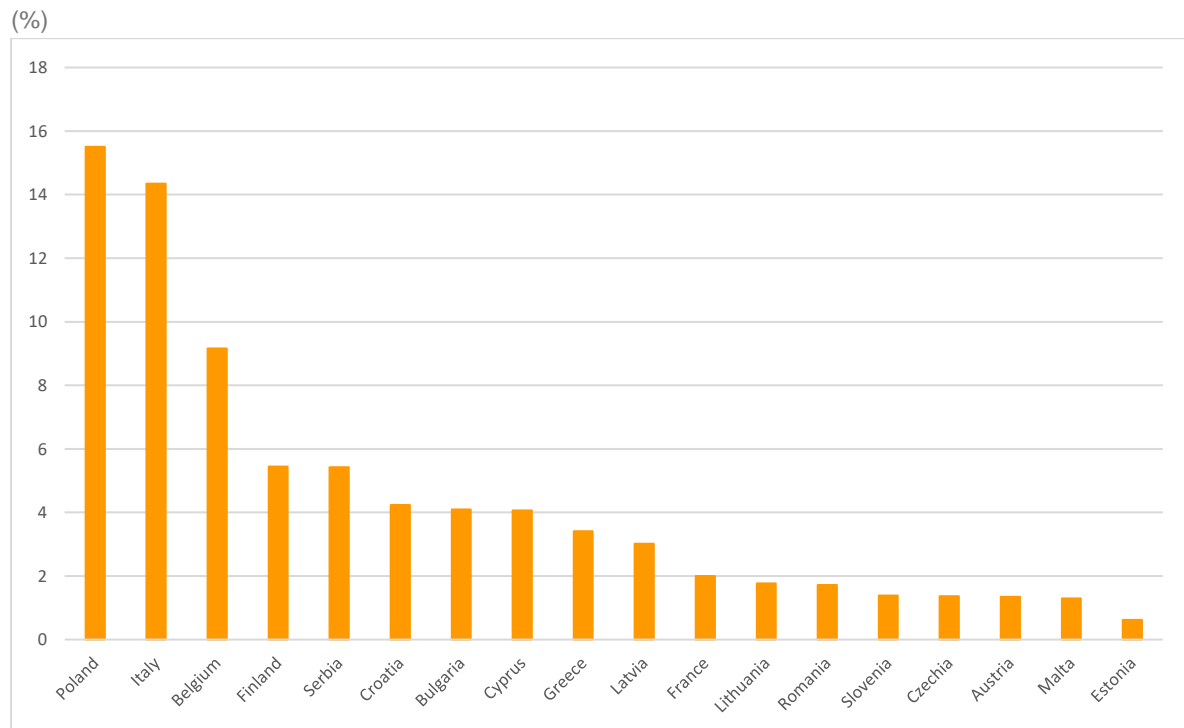
Regarding reasons for using proxy, five countries (Czechia, Italy, Latvia, Romania and Serbia) declared that proxy interviews were used for all six reasons mentioned above. Similarly, in the five countries Belgium, Cyprus, Croatia, Poland and Slovenia for all five reasons (without 'Other reason') were allowed. In Austria, Bulgaria, Estonia, Greece, Spain, France, Lithuania, Malta and Norway, where proxy was allowed only in situations in which the respondent was not able to reply, i.e. reasons 1, 2, 3 or 4. For some more details, in Czechia and Italy, proxy interviews were also allowed for cases where the selected person refused to reply personally. In Serbia instead, proxy interviews were used for cases where the selected person did not speak Serbian. In Italy and in Serbia, proxies were used when persons were too old and needed help, had language difficulties or were not willing to reply; in Serbia proxies were also used in case if the respondent was on a long stay visit to relatives elsewhere, or he or she was abroad. Moreover, in Belgium, proxy use was only allowed for (some) questions of the face to face questionnaire. Finally, proxies were used in Finland when the selected persons or their caregivers considered it as necessary.

Figure 6. Countries in which proxy interviews were allowed in EHIS wave 3



As Figure 7 shows, the percentage of proxy interviews varied significantly across countries, from 15.5% in Poland to 0.6% in Estonia.

Figure 7. Percentage of proxy interviews in EHIS wave 3



Note: Proxy interviews were not allowed in Germany, Denmark, Hungary, Ireland, Luxembourg, the Netherlands, Portugal, Sweden and Slovakia. Norway only conducted two interviews of this type in 2019, and only due to severe illness or medical problems.

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.

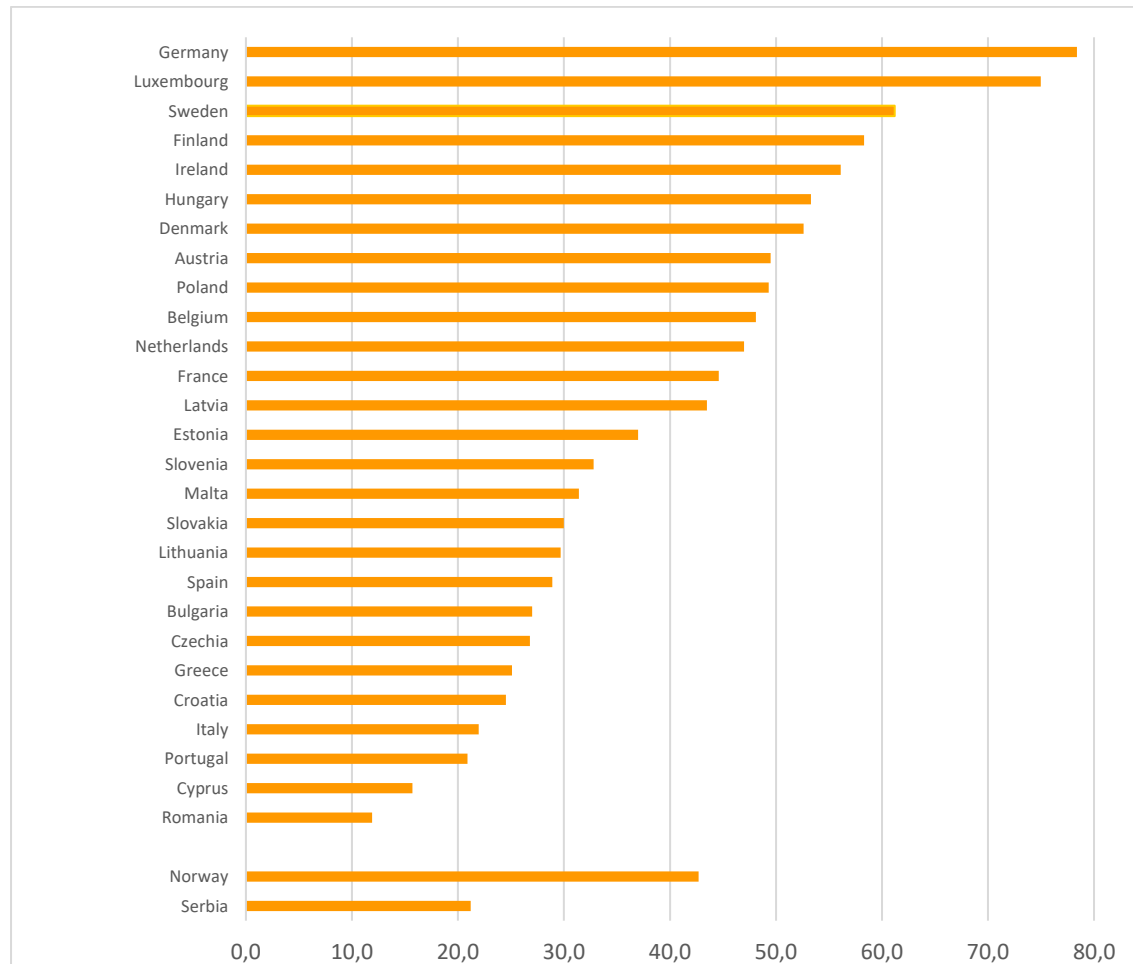
There are two types of non-response:

- 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 compared 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 3 (in %)



(¹) The non-response rate was derived based on figures referring to households.

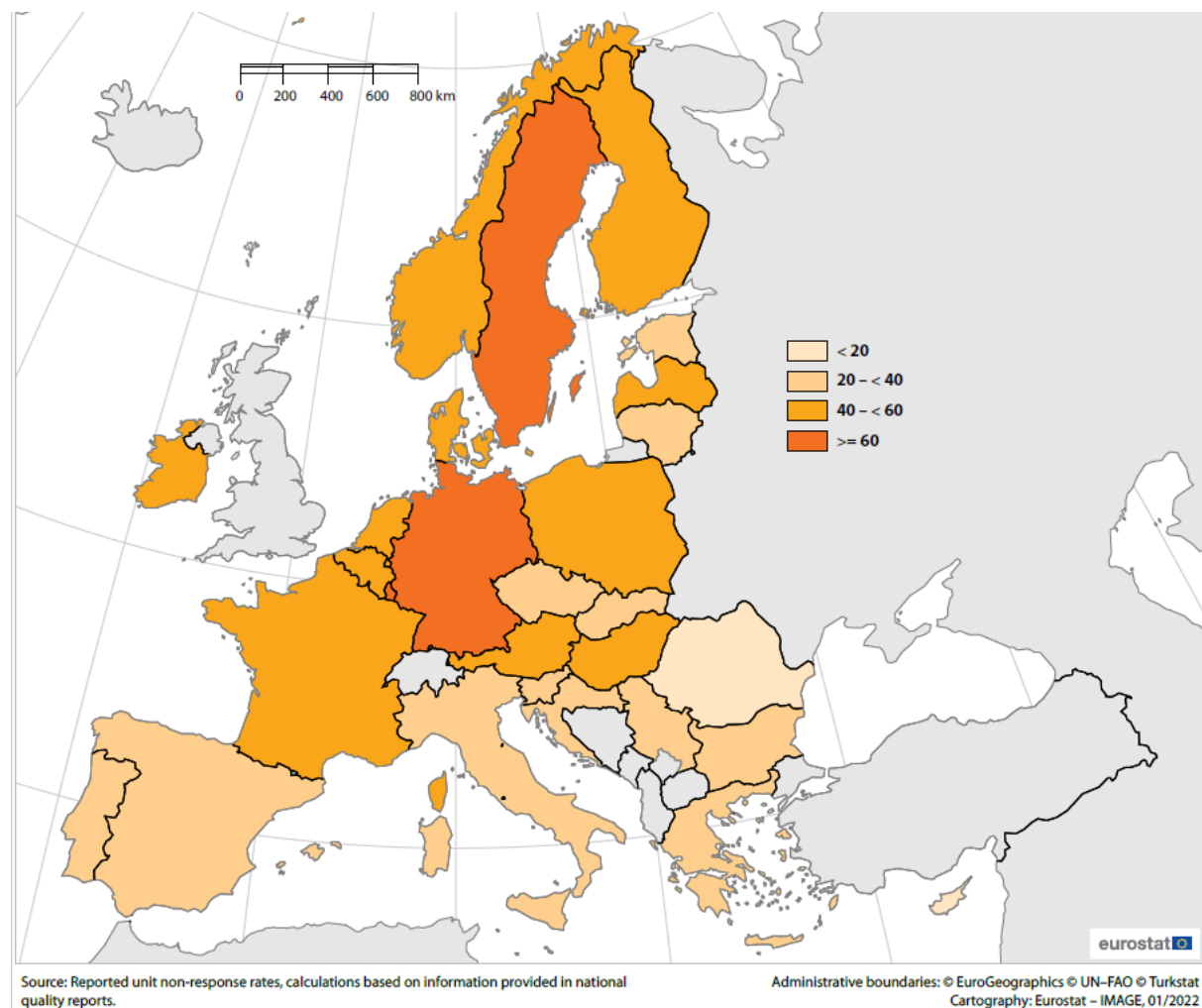
Source: Reported unit non-response rates, calculations based on information provided in national quality reports.

The reported unit non-response exceeded 50% in seven countries (Denmark, Finland, Germany, Hungary, Ireland, Luxembourg, Sweden), while in Cyprus and Romania the respective rate was less than 20%. It should be mentioned that it recorded its highest values in four countries that solely used a self-administered mode of data collection (Denmark, Finland, Luxembourg and Sweden). While the high non-response rates in Germany resulted in combination with a 100% CATI mode and in Ireland in combination with a 100% CAPI mode, a mix of CAWI and CAPI was applied in Hungary.

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

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 3 (in %)



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 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 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, two reminders were sent;

non-respondents were then approached for a face-to-face and telephone interview, respectively. In Sweden, the first contact invitation letter with log-in to web questionnaire was followed by a log-in to web questionnaire and a paper questionnaire (second contact), a letter with reminder (third contact) and finally a log-in to web questionnaire and paper questionnaire again (fourth contact). In Slovakia, survey promotion has been conducted, whereas incentive strategies were applied (Austria, Estonia, Finland, Hungary, the Netherlands, Slovenia, Norway) and promotional presents were given (Czechia, Slovakia) to motivate respondents.

Additionally, in two countries (Belgium and Serbia), substitutions were made in case of unit non-response. In Belgium, all non-respondents have been substituted (48.1%), in Serbia substitutions were used in the cases of refusal, if household members were not at home at time of visit after few visits and for cases when household or dwelling could not be found because of address system.

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 variables with the highest reported item non-response rate among those variables with an item non-response rate greater than 10 %.

Bulgaria, and Finland reported an item non-response rate greater than 10 % for more than ten EHIS variables. The variable "Net monthly equivalised income of the household" (HHINCOME) recorded high non-response rates in many countries. Estonia, Spain, Croatia, Lithuania, Malta, Finland and Slovenia reported an item response rate that was below 90 % for HHINCOME, while Austria, Germany, Greece, Italy, Cyprus, Luxembourg, Hungary, Portugal, Romania, Slovakia, Belgium, Norway and Serbia stated that no difficulties were met in the recording of this variable.

Most countries did not apply item imputation, with the exception (at least for HHINCOME, and for more variables in other countries) of Belgium, Germany, Estonia, Ireland, Italy, Latvia, Hungary, Austria, Romania, Slovenia and Serbia.

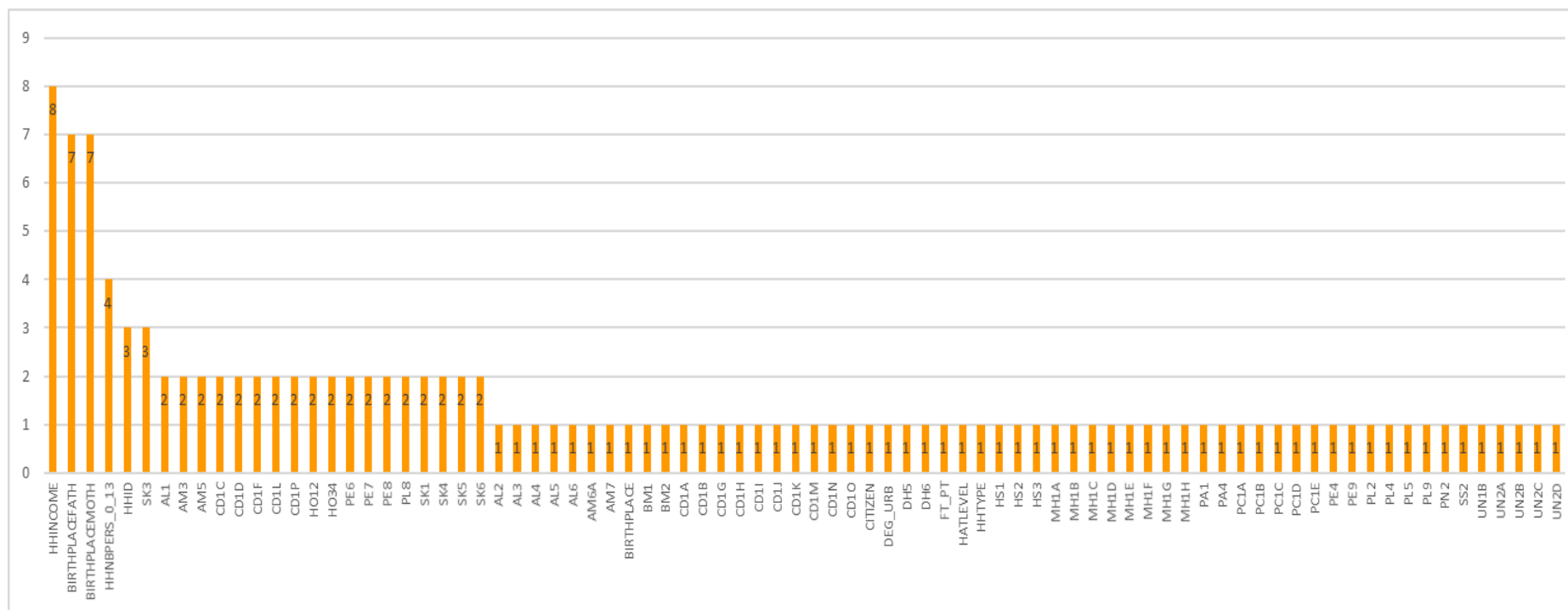
Table 22. Summary information on item non-response rates (unweighted/before imputation) in EHIS wave 3

	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			
AT	0	0.2	8.6	:	0	-
BE	0	:	100.0	:	:	:
BG	0	3.9	36.7	3.1	11	AW2 (36.7%), PE7 (30.5%)
CY	0	0	0	:	0	-
CZ	0	0.1	4.0	1.5	2	BIRTHPLACEFATH, BIRTHPLACEMOTH
DE	<1	<1	<1	<1	0	-
DK	0.5	3.8	14.0	4.6	2	HA3, SK4
EE	0	0.1	1.5	0.5	1	HHINCOME
EL	0	0	0	0	0	-
ES	0	0.3	3.2	0.3	1	HHINCOME (37.2%)
FI	0.9	6.0	26,1	6.0	24	HHINCOME, BIRTHPLACE-FATH, BIRTHPLACEMOTH, HATLEVEL, HHNB-PERS_0_13, PE4, PE8, PN2, SK4, CD1A-D, CD1F-P
FR	2.0	4.1	32.9	3.6	0	-
HR	0	0.7	6.4	1.0	1	HHINCOME
HU	0	1.3	9.8	:	0	-
IE	0	2.6	51.1	4.2	2	BM1, BM2
IT	0	1.4	7.8	1.2	0	-
LT	0.1	1.2	4.3	2.1	1	HHINCOME (12.9%)
LU	0.3	2.1	9.4	3.3	2	HHINCOME (24.4%), UN1B (10.5%)
LV	0.1	0.3	3.5	0.7	2	IN1, IN2
MT	0	0.4	6.3	0.4	1	HHINCOME
NL	0	0.1	6.9	0.7	1	PA4
PL	0	1.4	47.0	1.2	5	AM5 (47,0%), AM3 (52,6%), SK4 (61,7%), AL6 (84,6%), IC3 (87,2%)
PT	0	0.7	6.9	0.7	0	-
RO	0	0.4	3.7	0.4	0	-
SE	:	:	:	:	2	PL4, PL5
SI	0	:	13.0	:	1	HHINCOME
SK	0	0.1	1.6	0.1	0	-
NO	0	0	0.2	:	0	-
RS	-	-	-	-	0	-

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

Figure 9 shows the number of countries per EHS variable for which the item non-response rate was higher than 10%; so, this figure is based on Eurostat’s calculation of item non-response rare based on the EHS microdata files. The variables that recorded at least seven countries an item non-response rate greater than 10% were “Net monthly equivalised income of the household” (HHINCOME), “Country of birth of father” (BIRTHPLACEFATH), and “Country of birth of mother” BIRTHPLACEMOT).

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



Source: Calculations based on national EHS 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 the methods used for data cleaning and the methods used for post-codification of open questions are, in summary, described below.

Data entry and coding control process: data entry has been applied either by interviewers or by the staff of the regional statistical offices in case of non-electronic data collections. And in most of these cases, data coding was either done manually or by using scanning technology.

Main errors detected: codification errors concerning questions on occupational (JOBISCO) and economic activities (LOCNACE) as well as of open questions applied, for example, to record status in employment (JOBSTAT), and the economic sector of employment (LOCNACE). 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.

In Czechia, imputation of selected variables (household income, chronic conditions, physical activity) were identified as possible sources of errors. Belgium stated that some difficulties were encountered when reading responses to open-ended questions and for post coding due to a lack of specificity of the responses. On the other hand, in Cyprus processing errors were reduced compared to previous waves because data was entered directly in interviewers' notebooks and several checks were performed afterwards.

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.

5.3. Timeliness and punctuality

Timeliness of statistical data means the length of the time between availability of data and the point in time at which the phenomena they describe occurred. Punctuality refers to any time lag between the release and the target date for delivery of the data.

The duration of the preparation, data collection and data process phases varied among countries, the majority of them provided their data to Eurostat on time while few countries, such as Belgium, France, Ireland and Malta, did not succeed in meeting their target delivery date due to the disruption resulting from the Covid-19 pandemic.

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 3

Modifications in the questions for EHIS variables in wave 3	
BG	HS3 - single question; AC2 - first two answers' categories are merged; PL6 – 500 m instead of half a km is used; HO1 – additional question is included in order to exclude the respondents that are currently hospitalised.
CY	CD1: 4 diseases were added; PL2 was split into 2 questions depending on whether the respondent wears glasses or not; PL4 was split into 2 questions depending on whether the respondent uses hearing aids or not; PL5 was split into 2 questions depending on whether the respondent uses hearing aids or not; after PC2 a question asking who provides help was added; after HA2 a question asking who provides help was added; in question AM6, a chiropractor was added after the physiotherapist and a psychiatrist was placed as a separate category; After AM7 a question asking whether the help was provided by the public or private sector; Before PA1 a question asking if the respondent has ever been vaccinated against hepatitis; Question PA.1 was split into 3 questions (ever vaccinated against flu, if yes which year, if in 2019 or 2018 which month); Questions PA5, PA6, PA7, PA8 were split into 2 questions asking at first if the respondent has ever had the exam and if yes when; Question SK4 was split into 2 questions the first applying to smokers and the second applying to ex-smokers.
CZ	CD1, AC2, PL5, PL6, PL7, PN2, AM6A, AM6B, AM7, PA1, PA5, PA6, UN2, PE1, DH6, AL1, SS2: Adaptations included use of routed questions, different use of filters, reversed order of the questions, small modifications in wording. Some additional questions added, some short explanations were added or extra instructions for interviewers were added.
EE	PARTNERS, PC2, HA2, PA1, AM3, AM5, MD1, MD2, SK1, AL3, AL5, PE3, PE5: Several questions were used to obtain the required variable, or there were more answer options used to obtain more detailed information. For SK3 2018 manual version was used without heated tobacco products mentioning. Alcohol consumption: questions were asked separately about light alcohol (with an alcohol content of up to 6%); strong beer (with more than 6% alcohol content), wine and sparkling wine (with up to 12% alcohol content), alcoholic cocktails or dilute liqueurs (with about 20% alcohol content) and spirits (40% vol.). In addition, separate glass and bottle sizes with the number of consumed units were asked.
EL	PL1, PL1A, PL8_1 /PL8_2, DH3 (DH3_1/DH3_2), DH4 (DH4_1/DH4_2), SK1, SK3, SK5 (SK5_1/SK5_2/SK5_3), IC1: different wording used; AC2, PC2, HA2, MD1, MD2, UN1_4, UN2_5: added new categories. No impact on the derived variables. Questions CD2A, CD1_11a/CD1_11b, CD1_17, CD1_18, CD1_19, CD1_20, CD1_21, CD1_22, CD1_24, AC3, AW3, PL7A, MH1_9, PA9, DH7, DH8, DH9, SK4, SK4A, SK4B, SK5A, SK5B, SK5C, AL7, IC4, IC5 were included to cover national needs.
ES	AM1, AM2, AM4, AM7, PA1-PA8, PE1, FV1-FV4, SK1, SK4, AL2-AL5: Split of answer categories.
FI	AW1 and AW2, HO1A and HO1B, MD1 and MD2, PA7 and PA8, SK3 and SK4: merged into one question; AM2: adapted to the national health care system; PA1: question modified; PA2, PA3 and PA4: merged into one matrix survey question; SK1: modified due to lingual differences.
FR	Minor changes for: HS3, MH1, PA1, PA5, PA6, PA7, PA8, UN1A, UN1B, UN2A, UN2B, UN2C, UN2D, PE9, SK1, SK2A, AL1, AL6.
IT	AC2: Split into two questions to make clear the need of medical care; HA1D, HA1E, HA1F, HA1G, AM4: Examples were added; HO12, HO34: Split into two questions; AM6B: Split into two type of professions to distinguish: Psychologist, psychotherapist (AM6b) and Psychiatrist (AM6c); AM7: the answer "Yes" was split into three categories to distinguish the type of assistance received; PA1: Added an answer category to "yes" to know if people have never had a vaccination against flu. A filter was used to have a specific question concerning the month and year when respondent have been vaccinated less than two years before; PA8: an additional question (PA9) was added for HPV test; UN1A, UN1B: answer "No" was modified to "No, I have got them without delay"; SK1: answer category "not at all" was modified in two answer categories to distinguish between persons who have never smoked and persons who smoked in the past; AL3, AL5: the questions were changed to ask the daily average number of glasses drunk by type of drink; AL6: the question was split into two questions asking first if in the past 12 months he/she had 6 or more drinks containing alcohol on one occasion and, if YES, how often.
LT	HO1B: In order to unify questions HO1B and HO2B, question HO1B has been modified and the wording "In the last 12 months ..." has been added; UN2A: To avoid duplication with UN2B, words "excluding dental care" were added; AL6: The question was supplemented by the words "...1.5 litres or more of beer, 6 glasses (600 ml) or more of wine or 5 shots (200 ml) or more of vodka or other strong spirits ...".
LV	CD1: Before this question two national questions were added. Other chronic diseases or conditions in

Modifications in the questions for EHIS variables in wave 3	
	the proposed list for national purposes were also added; AC2: For answer category “Yes, from a doctor or nurse” additional medical personal category “physician assistant / fleshier” was added; AM1: question was modified.
HU	CD1: additional diseases/conditions were added to the diseases list and additional questions were also asked to all diseases; PN2: PN1 was used as a filter question to PN2.; AM7: split into 2 questions; PA1: filter question was added, PA1 was split into 2 questions; PA5, PA6: filter question was added; BM1, BM2: additional question inserted; PE1: first answer category was split into 2 categories (mostly sitting, mostly standing); DH1, DH3: first answer category was split into 2 categories (more times a day, once a day); SK1 was split into 2 questions; SK2: SK2A was asked in a different form, SK2B was split into 2 questions; SK5 was split into 2 questions; AL2-5 were asked together in a detailed table for the weekly alcohol consumption.
MT	AM1-AM5: split into questions related to private and public service provision; PE6-PE7: split by intensity of fitness/sport/recreational activity; SK5: split by type of indoor places.
NL	HS3, CD1c,d,f,h-o, CD2, AC1a-c, AC2, AW1, AW2, PL1-4, PL6, PL7, PC1a-e, PC2, PC3, HA1f, HA2, HA3, HO123, HO344, AM1, AM4, AM6a, PA1-PA8, UN2a-d, PE2-PE8, DH1-4, FV1-FV4, SK1, SK2, SK5, AL1-AL6, IC1-IC3.
PL	PA1: major changes; PL7, AM2, AM4, AL3, AL5, MD2: minor changes.
PT	AC1a-c, AC2, AW1, PL2-PL7, PC1a-e, HA1a-g, AM7, PA1-PA8: questions were split in two; the first question about the existence of accident, difficulty, or the occurrence of the preventive services measurements.
RO	AM1, AM2, AM4: answer categories were added; AM6b: the category “Psychologist, psychotherapist or psychiatrist” was more elaborated; PA5, PA6, PA7, PA8: adaptations of the question on the last time of different tests; PE9: Time spent sitting on a typical day was included as hh:mm.
SE	The question on e-cigarette was changed and excluded the word “vaping”.
SI	AM6: Splitting (1) Psychologist, psychotherapist (2) Psychiatrist, PA1 was split into two questions because of a better/easier answering process/administration, SK4: The question was separately asked for current smoker and past smokers, because of the translation into Slovene. This way it was easier to understand for the respondents.
SK	MAINSTAT: Referred to ‘Self-declared labour status’, wider scale of answer categories were used.; HATLEVEL: Answer categories based on the national educational system; JOBSTAT: Compiled from 2 questions; HHINCOME: not the total net income of the household was asked for but a question with broader categories of the total net income of the household was used; HHTYPE: GRID table was used.
NO	HS3: 3 questions instead of 2. AL6: 6 units or more on one occasion. Slightly fewer categories than proposed; PA1: Instead of month and year the following categories were asked for: Less than 12 months ago, 12 months ago or longer, or never.; PA2, PA3, PA4 and PA6: Simplified categories, they all have the same five categories: Less than 12 months ago, 1-2 years ago, 2-3 years ago, more than 3 years ago and never.

Note: Belgium, Denmark, Germany, Ireland, Croatia, Luxembourg, Austria and Serbia did not raise any issues.

5.4.2. Problematic modules or questions

In general, some countries stated that respondents experienced difficulties with questions that require remembering past experiences or events and different time intervals. The most common questions or modules being reported as problematic are the following:

- Physical activity/exercise (PE): In Czechia and Romania, respondents had difficulties in specifying the exact time spent in physical activity mainly due to the difficult concept of “typical week” and “typical day” In addition, Czech respondents faced also difficulties to estimate the “total time sitting” for PE9 (Time spent sitting on a typical day). Difficulties to answer questions on physical activity were also found by respondents in Bulgaria and in Estonia (i.e. implausible values for some hours and minutes physical activities).
- Alcohol consumption (AL): Czechia, Estonia, Italy and Serbia reported that respondents confronted difficulties in quantifying the exact number of drinks consumed. Italy reports on their improvement of the results on alcohol consumption and the according change of questions from EHIS wave 2 to EHIS wave 3. In wave 2, respondents had difficulties in quantifying exactly the number of drinks if this is not distinguished by type of drink. Therefore in wave 3, different kinds of drinks have been specified, in order to adapt them to Italian habits in alcohol consumption. Nevertheless, the main indicators received are still different from those calculated with the Italian social survey used at national and international level (aspects of daily life).

- Mental health (MH): Czechia stated that questions about mental health and weight were considered too sensitive for many respondents.
- Use of inpatient and day care (HO): In EHIS wave 3, the same as in EHIS wave 2, the use according to collected data was much higher than the one measured by administrative data on hospital discharges. In Italy, this problem is well known, because respondents seem to have difficulties in distinguishing between day-care (with a formal admission in hospital) and outpatient care (provided by ambulatories inside the hospitals).
- Income (HHINCOME): Respondents were reluctant to provide information for their income in Czechia and Estonia. Additionally, in Czechia it was also difficult to know the income for the whole household.

5.4.3. Cross-country comparability

The common regulatory framework, variable definitions, conceptual guidelines and the proposed protocol for translation serve as 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.

From the point of view of national comparability of the results, the majority of countries mentioned that it is assured at NUTS 2 level. In Slovakia, results were comparable also at NUTS 3 level. Italy provided the following additional remark “Geographical comparability ensured by sampling with the representativeness of data at the regional level; household concept for Italy slightly differs from EU Regulation definition; presence of other persons not belonging to the family but cohabiting were added at end of questionnaire (percentage very low); some differences could be linked to the Italian organization of the health care services”.

Comparability over time: An assessment of the comparability of the variables between the three EHIS waves is undertaken in a separate Eurostat study. In most countries, results from the second wave (2014) and the third wave (2019) of EHIS are quite comparable over time. However, in some cases, less comparability exists between these two waves and the first wave of EHIS in 2009. This might be explained by different sampling procedures and/or different modes used to collect information, such as in Ireland, that may have impacted the comparability of the results.

5.5. Coherence

Cross-domain coherence: Statistical outputs have the potential to be validly combined and used jointly. Statistics produced from EHIS should be comparable with those from EU-SILC for the three questions of the Minimum European Health Module (MEHM). An assessment of the coherence of the MEHM variables between EHIS wave 3 and EU-SILC will be undertaken in a separate Eurostat study. Despite that, some countries specifically referred to this issue in their national quality reports.

Coherence with EU-LFS: Norway

Coherence with EU-SILC (MEHM questions, i.e. variables on “Self-perceived health” (HS1), long standing health problems” (HS2) and “General activity limitation” (HS3): Bulgaria, Czechia, Cyprus, Ireland, Greece, France, Italy, Hungary, Malta, Austria, Romania, Slovakia and Norway

Coherence with other national surveys: Bulgaria, Denmark (NHS), Spain (EESE), Croatia, Italy (AVQ), Poland, Finland (FinSote).

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 third wave of the EHIS. Underlying issues in the following three aspects provide important information for an accurate interpretation of the EHIS statistics. Moreover, the three aspects assist users of those statistics to evaluate the degree of comparability achieved.

- a) Methodology for the implementation of the survey at national level
- b) National adaptations of the EHIS model questionnaire by participating countries
- c) Main characteristics and technical features of the surveys in the 27 EU member states (MSs) complemented by Norway and Serbia,

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 third 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 the expectations with regard to the quality of the survey implementation and to its performance. The countries followed Eurostat's guidelines and the Commission Regulation implementing EHIS wave 3 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) and culture.

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 size to be achieved in every participating country, 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” (HS3) – 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 one country implemented the survey as a follow-up of the LFS, which might have influenced the accuracy of the results due to potential introduction of a selection bias.

Survey implementation

All countries made great efforts to ensure that the questionnaires meet their purposes 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 to participation. Moreover, they received feedback on the quality of the interview, like interviewer's behaviour 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, four countries used solely a self-administered mode. It should be noted here that a self-administered mode may offer many advantages but introduces a risk of measurement errors or selective bias. As a matter of fact, all four countries that had used a self-administered mode, recorded relatively high unit non-response rates. The self-administered mode also introduces in particular the issue of an obligation to modify the model questionnaire as well as to adapt the instructions, examples and explanations of concepts for the different modes of data collection. So, a couple of countries that had used solely a self-administered mode mentioned for example, 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 the 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. A solution that reduces the size of the questionnaires could be a broader use of register data, if the latter meet the desired characteristics and quality. 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 method/ mode of data collection and administration used per country and
- b) the use of administrative data for the derivation of 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 to the HIS questions only or to the whole national questionnaire.

Moreover, nine countries offered incentives to the respondents, either to encourage them to participate in the survey or to thank for their participation. The use of important incentives may be considered as another factor that could potentially have introduced selection bias, and thus influencing the accuracy of the results. On the other hand and as mentioned by one NSI expert, it is difficult to imagine that incentives in the form of health related pamphlets, pens, stress balls, key holders and mint pastilles (i.e. "souvenirs") have caused "selection bias".

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 narrow and the coverage was high in most cases.

The standard errors for three key indicators were 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 \geq 30),

The standard errors for these key indicators did, on average, not exceed the value of 0.70. Thus, standard errors did not reveal any issues of low reliability.

Proxy use in EHIS wave 3, i.e. the participation in the survey via another person in the household, was allowed in 20 of the 29 countries that participated in the survey. Eight of those countries allowed the use of proxy interviews for the whole set of questions. Evidently, the usage of proxy interviews may have an 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 themselves. 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 eleven countries, while in seven countries, the respective rate exceeded 50 %. As already mentioned, countries that used solely a self-administered mode of data collection recorded higher 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 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, smoking 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 3 was achieved.

7

Annexes

Annex 1: Sampling design

Table 24. Sampling design, sampling unit and probability to draw the sample in EHIS wave 3

	Sampling design	Ultimate sampling unit	Probability used to draw the sample	Number of selected individuals	Stratification variable
AT	Stratified sampling	Individuals	-	-	Stratified Sampling by geographical area
BE	Stratified Multi-stage Cluster sampling	Households	Number of interviews according to the population size in every province. Selection of municipalities (stepwise). Selection of households within selected municipalities. Selection of HH members	Maximum 4 members per household	Fixed number per region.
BG	Multi-stage sampling	Households (all individuals)	First stage: census enumeration units (SU) with probabilities proportional to size Second stage: private households with population 15+ with unequal probabilities	All household members aged 15 and over	Sample stratified by administrative-territorial districts (NUTS3)
CY	Stratified sampling	Households (all individuals)	-	All members of the household aged 15 and over	Strata defined according to geographical criteria
CZ (1)	Multi-stage sampling with stratification	Dwellings	First stage (census districts): probabilities proportional to size Second stage (dwellings): equal probability; Third stage (individuals): equal probability	2 individuals per household	Sample stratified by NUTS4 and municipality size. Census districts drawn at first stage, dwellings at second stage and individuals at third stage
DE	Telephone sample based on dual-frame method with two selection populations	Individuals	Random Digit Dialing (RDD) - Dual Frame	-	
DK	Simple	Individuals	Equal probability	-	

	Sampling design	Ultimate sampling unit	Probability used to draw the sample	Number selected individuals	of	Stratification variable
	random sampling					
EE	Systematic Stratified sampling	Individuals	Sample stratified by county; un-proportional stratification applied (population size varying by county); address persons selected from strata into sample by systematic selection	-		4 groups based on counties
EL	Stratified Multi-stage sampling	Individuals	Stage 1: probabilities proportional to size Stage 2: equal probabilities Stage 3: equal probabilities	One household member		stratification criteria region (NUTS 2)
ES	Stratified Multi-stage sampling	Individuals	Three stage sampling with stratification of census sections (1st); dwellings (2nd); 1 person 15 + selected from each household	One household member		-
FI	Simple random sampling	Individuals	Equal probabilities	-		-
FR	Multi-stage sampling	Individuals	Self-weighted stage of individual selection	Population of 15 years old or more residing in an ordinary households as principal residence in mainland France		-
HR	Multi-stage sampling	Dwellings	SSUs selected from each PSU with equal probability	All individuals in all households in the selected dwelling		Two-stage stratified design; PSUs = territorial units; SSUs selected from each PSU with equal probability
HU	Stratified sampling	Individuals	Individuals selected with equal probability systematic random selection method	-		Stratified one-stage sampling in larger towns; stratified two-stage sampling in smaller localities
IE	Two-stage sample design	Individuals	Stage 1: Probabilities proportional to size; Stage 2: Equal probability	One household member aged 15 and over		-
IT	Multi-stage sampling	Households (all individuals)	PSUs selected proportional to size; SSUs selected with equal probability	All members of the household aged 15 and over		-
LT	Stratified sampling	Individuals	-	-		Strata: 5 largest cities, other towns and rural area by county
LU	Stratified sampling	Individuals	Equal probabilities	-		Sex, Age group, District
LV	Stratified sampling with five strata and two-stage sampling for first four strata &	Individuals	Systematic sampling method (unequal probabilities, without replacement, fixed sample size) used in all sampling stages	-		Sex and age, economic activity status, household income, NUTS-3 regions, highest achieved education level.

	Sampling design	Ultimate sampling unit	Probability used to draw the sample	Number selected individuals	of Stratification variable
	single stage sampling for 5th stratum				
MT	Stratified sampling	Individuals	-	One individual	District of residence, gender and age group
NL	Multi-stage sampling	Individuals	First stage municipalities selected proportional to number of inhabitants. Second stage simple random sample of people in the selected municipalities	-	Municipalities
PL	Multi-stage sampling	Dwellings	PSUs sampled within strata with sampling probability proportional to number of dwellings in PSU; SSU sampled independently in strata by simple random sampling without replacement	All household members	Size of the municipality, urban/rural division of regions (NUTS 2) & division within regions depending on size
PT	Multi-stage sampling design	Dwellings	1st stage: cluster sampling of geographical areas, probabilities proportional to size; 2nd stage: systematic sampling of dwellings, equal probability; 3rd stage: random sampling of individuals, equal probability	One person per household	Region
RO	Multi-stage sampling	Dwellings	First stage: proportionally to size; second stage: selection of survey sample (dwellings) with equal probability	All households in the dwelling and all members of the household	Residence area (urban /rural) and county (NUTS3 level)
SE	Stratified sampling	Individuals	-	-	Age group, sex, country of birth
SI	Stratified Multi-stage sampling	Individuals	First stage primary sampling units selected with probability proportional to size; second stage persons selected in each sampling unit	-	Statistical region and type of settlement
SK	Stratified Multi-stage sampling	Individuals	-	One member per household	NUTS3 by size of municipality
NO	Stratified sampling	Individuals	Equal probabilities	-	Counties
RS	Multi-stage sampling	Households (all individuals)	Random sample of enumeration areas selected with probabilities proportional to size within each stratum at first stage; sample of households selected with equal probabilities in each enumeration area at second stage	All household members	Stratification according to type of settlement 4 regions (8 strata)

(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).

: 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 3

	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
AT	Mixed mode	Face-to-face, electronic version; Use of internet	Yes		Physical activity		No
BE	Mixed mode	Face-to-face electronic version (all respondents); paper auto-questionnaire (respondents 15+)	Yes	Paper	HS, AL, MH, PE, SK, SS	ADMIN (National Register)	Date of birth and sex
BG	Mixed mode	Face-to-face, non-electronic version	Yes	Paper	SK, AL	-	No
CY	Unimode	Face-to-face, electronic version	No	-	-	-	No
CZ	Mixed mode	Face-to-face, non-electronic version; face-to-face, electronic version; telephone, non-electronic version; telephone, electronic version			-	LFS	No variables from external sources; most socio-demographic variables from LFSS: BIRTHPLACE, CITIZEN, COUNTRY, DEG_URB, FT_PT, HHNBERS, HHNBERS_0_13, HHTYPE, JOBISCO, LOCNACE, HATLEVEL, REGION, MAINSTAT, JOBSTAT, PARTNERS, PASSBIRTH, MARSTALEGAL, SEX, YEARBIRTH, BIRTHPLACEFATH, BIRTHPLACEMOTH
DE	Unimode	Telephone, electronic version	No	-	-	-	No
DK	Mixed mode	Postal, non-electronic version, use of internet	Yes	Paper, Web questionnaire	All	-	Country of birth, Country of main citizenship, Country of residence, Region of residence, Degree of urbanisation, Sex, Year of birth, Country of birth of mother, Country of birth of father, Legal marital status
EE	Mixed mode	Face-to-face, electronic version; use of internet	Yes		SK, AL	ADMIN (National Register)	HATLEVEL, BIRTHPLACE, CITIZEN
EL	Unimode	Face-to-face, non-electronic	No	-	-		No

	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
		version					
ES	Mixed mode	Face-to-face, electronic version; telephone, electronic version	No	-	-	Tax agency	HHINCOM
FI	Mixed mode	Self-administered, postal non-electronic version; Self-administered, web questionnaire	Yes		All	ADMIN (DPDSA)	Age, gender, living area, marital status, birthday, country of birth, household size
FR	Mixed mode	Face-to-face, electronic version; telephone, electronic version	Yes	CAPI	MH, SK, AL	National tax files	HHINCOME
HR	Mixed mode	Face-to-face non-electronic, face-to-face electronic, telephone non-electronic, telephone electronic	No	-	-	-	No
HU (1)	Mixed mode	Face-to-face, electronic version; use of internet	Yes, but only for CAWI	CAPI & CAWI	All variables self-completed in CAWI; respondents 18+ could choose between CAPI & CAWI; respondents aged 15-17 no internet questionnaire because of legal reasons	-	No
IE	Mixed mode	Face-to-face, electronic version	Yes		HS, AC, CD, AW, PL, PC, HA, PN, MH, HO, AM, MD, PA, UN, BM, PE, DH, SK, AL, SS, IC		No
IT	Mixed mode	Paper auto-questionnaire; face-to-face, non-electronic version	Yes		SK, AL	-	SEX & YEARBIRTH when missing / incoherent with information available in sample frame
LT	Mixed mode	Face-to-face, non-electronic / Face-to-face, electronic / Telephone, electronic / Other	Yes		All	-	SEX, YEARBIRTH, PASSBIRTH, COUNTRY, REGION, BIRTHPLACE, CITIZEN, MAINSTAT, JOBSTAT, JOBISCO, LOCNACE, MARSTALEGAL
LU	Mixed mode	Paper auto-questionnaire / Postal, electronic version	Yes	Paper, Web	All		No

	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
		(email)		questionnaire			
LV	Mixed mode	Face-to-face, electronic version / Telephone, electronic version / Use of internet	Yes		n.a.	ADMIN (Population Register, State Revenue Service, Population Census Education database)	SEX, AGE, MARSTALEGAL, COUNTRY, REGION, GEG_URB, BIRTHPLACE, CITIZEN, BIRTHPLACEFATH, BIRTHPLACEMOTH; JOBISCO, LOCNACE; HATLEVEL
MT	Mixed mode	Postal, non-electronic version; face-to-face, non-electronic version; telephone, non-electronic version; telephone, electronic version	Yes		Smoking, alcohol consumption, income	-	No
NL (2)	Mixed mode	Face-to-face, electronic version / Use of internet	Yes		All questions which were not originated from registers	ADMIN (Basis Registratie Personen)	COUNTRY, BIRTHPLACE, FATHBIRTHPLACE, BIRTHPLACEMOTH, CITIZEN, REGION, DEG_URB, HHINCOME; for SEX, YEARBIRTH and MARSTALEGAL from BRP respondent is asked if information is correct / could be adapted
PL	Unimode	Face-to-face, electronic version	No	-	-		No
PT	Mixed mode	Face-to-face, electronic version; Use of internet	Yes	CAWI	All	-	No
RO	Mixed mode	Paper auto-questionnaire; Face-to-face, non-electronic version; Face-to-face, electronic version	Yes	Paper	SK, AL	-	No
SE (3)	Mixed mode	Postal invitation letter with log-in to web-based questionnaire and paper questionnaire (mixed internet-paper mode)	Yes	Web questionnaire, paper	All	-	No

	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
SI	Mixed mode	Face-to-face, electronic version; use of internet	Yes	CAWI	All	-	No
SK	Mixed mode	Face-to-face, non-electronic version; face-to-face, electronic version	-			-	No
NO	Unimode	Telephone, electronic version	No	-	-	ADMIN (Administrative registers)	Region, country of birth, mother's country of birth, fathers country of birth, citizenship, income and education
RS	Mixed mode	Paper auto-questionnaire / face-to-face, non-electronic version	Yes		SK, AL	-	No

(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. All those who did not respond to the self-administered survey were further approached by up to three reminders.

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

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

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 third 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 third wave of EHIS and an overview of the survey implementation by ESS countries between 2018 and 2020. This is followed by a presentation and discussion of the main quality indicators for EHIS wave 3 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 4 that will take place in ESS countries in 2025.

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