EESTI
STATISTIKA

Description of the 2021 register-based census methodology

Introduction

The organisation of a register-based population census presents a considerable challenge for the country and the success or failure of it will have a major impact on the country's reputation, especially with regard to its IT capacity.

The possibility of conducting a register-based population and housing census was considered in Estonia already before the previous census (PHC 2011) but it was concluded that the registers were not yet ready for this, nor had a register-based census methodology been developed in Estonia.

The development of a register-based census methodology in Estonia started already in 2010 with an inter-agency methodology project that gave a relatively negative assessment of the Estonian register system and questioned the country's ability to organise a register-based census. Between 2013 and 2021, the methodology team for the register-based census in Statistics Estonia worked in the following main directions:

1. cooperation with state registers to verify the quality of data therein, identify shortcomings, and support efforts to improve the quality;
2. development and testing of algorithms for the calculation of census variables based on the information in registers;
3. development of the methodology (indices) for correcting inaccuracies in register data using models based on the information obtained from multiple registers and other sources of information.

This document describes the methodology of calculating each of the register-based census characteristics for the 2021 census. The document is divided into four chapters. The first chapter gives an overview of the census populations: how the populations of persons, households and dwellings are compiled. The second chapter introduces the compulsory census characteristics of persons, about which all EU countries have to collect information. The third chapter describes the census characteristics ordered by the Estonian state. The last chapter details the methodology for the census characteristics of dwellings.

All subchapters outlining census characteristics of persons and dwellings are divided into three sections. First, the definition with which the census characteristics must comply is given. The definitions of mandatory census characteristics are based on EU regulations. For the national level characteristics, the definitions used in the previous census have been applied. Second, registers that have been used to compile the census characteristics are listed. Third, a description of the algorithm with which the particular census variable has been compiled is given.

The document will be continually updated in 2022, in accordance with the publication calendar. The dates of the updates are included in the titles of subchapters.

Contents

Abbreviations

ADS	Address Data System of the Land Board
ADS_OID	Address object identifier in the Address Data System
ADR_ID	Address identifier in the Address Data System
ARIREG	Commercial register
EHAK	Estonian Administrative and Settlement Classification
EHIS	Estonian Education Information System
EHR	National Register of Buildings
EMPIS	Estonian Unemployment Information System
EMSR	Estonian Medical Birth Register
EMTAK	Estonian Classification of Economic Activities
ESD	Social tax declaration in special cases
ESU	Estonian Social Survey
e-File	e-File, online information system
ETK	Estonian Unemployment Insurance Fund
ETR	Register of Residence and Work Permits
ETU	Estonian Labour Force Survey
EVKONTO	Entrepreneur account data from the Estonian Tax and Customs Board
FIDEK form E	Business income of a resident natural person
FIDEK form A	Income tax return for a resident natural person
FIE	Self-employed person
HK	Estonian Health Insurance Fund
INF1	Disclosure of recipients of dividends, payments of equity
ISCED	International Standard Classification of Education
KIR	Prisoners' register
KIRST	Health Insurance Database
KMAIS	Identity Documents Database
KOPIS	Mandatory Funded Pension Register
KOV	Municipality
KR	Land register
KVKR	National Defence Obligation Register
LEKU	Comparative survey on household and place of residence data
LTR	Database of Registration of Short-term Employment of Aliens in Estonia
MKR	Register of taxable persons
NUTS	Geographical nomenclature subdividing the economic territory of the European Union into regions (*Nomenclature d'Unités Territoriales Statistiques*)
PÕMAK	Database of Agricultural Holdings
RAKS	State Register of Granting International Protection

REGREL	Register-based population and housing census
REL	Population and housing census
RETS	Estonian Medical Prescription Centre
RIHA	Administration system of the state information system
RK	Ethnic Nationality Classification
RR	Population register
SA	Statistics Estonia
SAP	State Personnel and Payroll Database
SKA	Estonian National Social Insurance Board
SKAIS	Social Security Information System
SPI	Business register for statistical purposes
SPR	Causes of Death Register
STAR	Social Services and Benefits Registry
TETRIS	Database of Work Ability Assessment and Work Ability Allowance
TÖR	Employment register
TSD	Declaration of income and social tax, unemployment insurance premiums and contributions to mandatory funded pension
TSD Annex 1A	Payments made to resident natural persons
TSD Annex 2A	Payments made to non-resident natural persons

1. Populations

In the case of a register-based census, the most important issue is related to the quality of the registers due to inaccurate data provided by the population. Estonia's greatest problem in this respect is the inaccuracy of residence data in the population register (RR).

With this in mind, Statistics Estonia has developed an 'index methodology' (the residency and location index) to verify and specify the register data, using a wide range of other registers and data sources.

Both indices use Estonia's system of administrative registers, which uses common identifiers and allows linking and combining the data of different registers. Assuming that, nowadays, people living and working in Estonia inevitably leave traces of activity in the form of records in various databases, it is possible to verify the person's residence in the country as well as connections between persons and their locations on an annual basis. Such verification is based on signs of life, signs of partnership, and signs of location recorded in registers every year. The annual indices, established as combinations of these signs, enable to track changes in a person's status over the years.

The indices are calculated for all persons who have ever received an Estonian personal identification code or who have appeared in the underlying registers. This makes it possible to monitor transnational persons who have left Estonia, including to detect whether they have returned, or how trans-boundary commuters move between their homeland and other countries (Tiit, Vähi, Kool, 2018).

Even though the general indexing principles have been established and model parameters have undergone empirical assessment, the methodology is still evolving, and new signs can be added each year, depending on new information (including big data) becoming available. The accuracy of index-based estimates is assessed through the use of additional surveys and estimation errors are presented along with the results. Adding new information (further signs) will result in the consistent improvement of the accuracy of index-based estimates.

1.1. Population of persons

To form a population of individuals, Ene-Margit Tiit and Ethel Maasing have developed a residency index (Tiit, Maasing, 2016) that uses information from a wide range of databases to assess the likelihood of a person being in Estonia.

In accordance with international rules, included in the census are persons who, at the time of the census, are permanent residents, i.e. persons who have lived in the country for at least one year, or who have lived in the country for a shorter period but intend to stay for at least one year. Those who left the country less than a year ago but do not intend to stay abroad for more than a year are also enumerated. People who left the country more than a year ago are excluded from the census.

Determining all these conditions is difficult in a register-based census, as it is not possible to ask people about their intentions. However, a general assumption was made: if a person has registered his or her arrival when entering the country, he or she intends to stay for at least one year, and if the person has registered his or her departure, he or she intends to stay in another country for at least one year.

Long-term stay or non-stay in Estonia can be established with a fairly high degree of probability using the so-called signs of life, i.e. person's activity in various state registers. To this end, a residency index was developed, which is calculated annually for each person who is either a resident or could become a resident. The value of an index varies between 0 and 1 and every year it indicates the probability of a person being a resident of Estonia. The formula for calculating the index uses the person's residency status in the previous year and the signs of life collected in the previous year:

$$R(k) = 0{,}8 * R(k-1) + 0{,}2 * \sum_{i=1}^{n} a_i * E_i$$

In the formula, each state register corresponds to a sign of life E_i, with a value of 0 if the person was not active in that register during the previous year, and with a value of 1 if the person was active (at least once) in that register. If the value of the index is above the threshold of 0.7, the person is considered to be resident.

The coefficients a_i, the threshold 0.7, and the parameter values 0.2 and 0.8 are statistically defined in such a way that the indexed residents are as close as possible to the definition of residents formulated in the census condition. The statistical estimation error for the presented procedure is of the order of 0.05%, i.e. about 700 persons in case of Estonia.

The value of the index is calculated for all persons in the extended population. That includes persons who were in the population of the census in 2011 or in the Estonian population register (in 2012–2017). Each year, the extended population is updated on the basis of information gathered from the population register. Persons included in the extended population may have a registered residence in Estonia or abroad, or it may not be registered at all. These people may also be placed in the 'passive' part of the population register. In 2017, the index was calculated for more than 1.6 million people. This will also allow the designation of returnees as residents if they have an Estonian personal identification code.

The index is calculated annually for persons alive at the beginning of the year, using all known administrative registers (and their independent sub-registers), and finding for each person all the signs of life acquired in the previous year. This is how Statistics Estonia calculates Estonia's population as of 2016. The size of population defined in this manner is 2–3% smaller than the size of population in the population register, since in the index-based population census, unregistered migration is taken into account as well. As the annual size of population is calculated on the basis of index, the population of residents is also the population of persons in the register-based population and housing census.

Table 1. Registers and explanations of signs of life

No of register	No of sign of life	Register	Name of sign of life	Explanation
1	1	ETR	ETR	Person was in the ETR as at 31 December (has a valid residence or work permit)
2	2	EHIS	EHIS	Person was a pupil (primary, general, vocational, higher education) as at 10 November or 31 December
	3		EHIS_PEDA	Data on teachers are received from the registry holder once a year as at 10 November and 31 December of the previous year
	4		HUVIHARIDUS	Data are received from the registry holder once a year as at 10 November and 31 December of the previous year. This sign of life is ascribed to a person who has participated in at least one activity related to hobby education during the year (children and pensioners, who might otherwise get few signs of life, will thus be included)
3	5	TÖR	TOR	Person was in TÖR for at least one day
4	6	STAR	STAR	Person is in STAR, i.e. has received or applied for some form of social allowance, income-related support (e.g. subsistence benefit), etc. from the municipality
5	7	KVKR	KVKR	Person was in mandatory service in the defence forces or in alternative service
6	8	Traffic Register	LR_JL	Person made or exchanged a driving licence
	9		LR_OM	Person has bought or sold a vehicle, has been the user of a leased vehicle, or has been the user of a vehicle bought from or sold to a legal person
7	10	e-File	ET	Person has attended a hearing or interrogation; person has committed a criminal offence or misdemeanour and is associated with the event; person has personally received a document for which information on receipt is required (excl. notifications sent by electronic means)

No of register	No of sign of life	Register	Name of sign of life	Explanation
8	11	EMPIS	TK	Person has been unemployed or a jobseeker (in EMPIS of the Estonian Unemployment Insurance Fund)
9	12	PKR/SKAIS	SKA_INST	Person is in 24-hour special care by the state
	13		SOTS_TOET	Person or his or her ward has received social allowance from the state
	14		SKA_PENS	Person is paid a state pension into an Estonian bank account (excl. those whose pension is paid into a foreign account or who live abroad)
	15		PERE_TOET	Person receives family allowance or has a child for whom it is paid
	16		VANEMAH	Person receives parental benefit or has a child for whom it is paid
	17		SKA_P_TV	Person has a valid disability and/or incapacity for work certificate (incl. those who have not been awarded pension for incapacity for work) for at least one day
10	18	KIRST	HAMBARAVI	Person has been reimbursed for dental care or dentures
	19		RAVIARVE	Person has a medical bill
	20		LAPSVABASTUS	Person has been absent from work due to childbirth or adoption (has a certificate for maternity or adoption leave) for at least one day
	21		TOOVOIMETUS	A certificate of incapacity for work (sickness benefit, care allowance) has been issued to person for at least one day
	22		KINDLUSTUS	Person has had state health insurance from the Health Insurance Fund at least once in the year preceding the data extraction from the population register (excl. those who had only the following insurances: person up to the age of 19, foreign student, Estonian pensioner in another EU Member State, and family member living in an EU Member State)
11	23	RETS	DIGIRETSEPT	Person has purchased electronically prescribed medication (the person who bought the medication, not the person for whom it was prescribed) during the year
12	24	KMAIS	KMAIS	Person has replaced an identity document in 2016. Person has applied for the document in Estonia, and it has been issued in Estonia, not in a foreign mission
13	25	KIR	VANGIS	Person has been detained or under probation supervision for at least one day
	26		VANGI_KUL	Person has visited someone jailed in Estonia
14	27	RR	ABIELU	Person has entered into contract of marriage in Estonia
	28	RR	LAHUTUS	Person has registered for divorce in Estonia
15	29	SAP	SAP	Person has worked in a state agency for at least one day a year
16	30	TETRIS	TOOVOIM	Person has a valid certificate of reduced capacity for work and/or has applied for an assessment of capacity for work
	31	RR	EL_MUUTUS	During the year, person has registered a new residence in Estonia down to the level of dwelling (the previous registered dwelling-level residence was also located in Estonia)
17	32	Euroopa Sotsiaalfondi andmekorje	ESF	Person has participated in ESF activities for at least one day a year. This is not a register but a large survey data set (data collection of participants in the activities of the European Social Fund in Statistics Estonia in 2014–2025)

No of register	No of sign of life	Register	Name of sign of life	Explanation
18	33	MKR	TSD	TSD Annex 1A has been submitted for person: payments made to resident natural persons, withheld income tax, contributions to mandatory funded pension and unemployment insurance premiums, and calculated social tax and unemployment insurance premiums paid by employer

1.2. Population of households

Definition of a household

Household and family statistics are an important part of a population census. Traditionally, a household is defined as a housekeeping unit: a household is made up of people who share a place of residence and housekeeping expenses. A household can also consist of one person.

In a register-based census, it is impossible to determine the housekeeping arrangements of people sharing a dwelling and therefore the 'household-dwelling' concept is applied to identify private households. According to this concept, a household is made up of persons living in the same housing unit. As sometimes more than one household live at one address, there are slightly fewer household-dwellings than traditional households. Analysis of the 2011 census revealed that the number of household-dwellings was 7% smaller than that of traditional households (Kütt, 2015).

Family is defined in a narrow sense: it only comprises family nuclei. A family nucleus is one of the following: a married or consensual union couple without children, a married or consensual union couple with one or more resident children, or a lone parent with one or more resident children. If a child living with his or her parent(s) has a partner or own children, the child is not counted as part of his or her parents' family (European Commission, 2017). A household may contain one, several or no family nuclei. During the first pilot census in 2016, it became clear that the statistics on households and families based on the residence data in the population register (RR) were very different from those of the census. For example, in the 2011 census, 24% of family nuclei were lone parent families and 76% were married or consensual union couple families. In the pilot census conducted four years later, the share of lone parent families was 41% and 59% were families of couples (Statistics Estonia, 2017).

The reason for the discrepancy lies in the quality of dwellings data in the population register. It has been established that roughly 80% of people have registered the correct place of residence in the population register (Äär, 2017). According to population register data, members of the same family often live in different dwellings. If, for example, in a two-child, two-parent family, the mother is registered at the same address as one of the children and the father with the other child is registered at a different address, there appear to be two lone parent families in the register. To ensure that the statistics are not biased, it is important to identify families even if they do not share a dwelling according to the population register.

In family nuclei, there are two types of relationships between individuals: relationships between children and parents, and those between partners. Marriages and children's relationships with parents are very well covered in the population register. Identifying partners in a consensual union is much more complex, but it can usually be done with the help of registers.

Partnership index

In 2017–2018, Statistics Estonia developed a partnership index methodology with the aim of finding partners who live in separate dwellings according to the population register, using various administrative sources. The partnership index is analogous to the residency index that allows to identify quite precisely who lives permanently in Estonia and who does not, using the so-called signs of life found in various registers (e.g. going to work, seeing a doctor, buying a car). Instead of signs of life, the search is on for so-called signs of partnership that connect two potential partners (i.e. two opposite-sex adults who are not related). Partnership signs include, for instance, marriage, having children together, a shared home loan, registration at the same

address, and using the same car. Signs that indicate that cohabitation is unlikely, such as divorce or a maintenance dispute, are also informative.

The partnership index is a score that describes the likelihood of two people being partners. The index is essentially a weighted sum of the partnership signs (a sign is usually an attribute with a value of 0 or 1, depending on whether the sign is present or not), which also takes into account the time when the signs were created and the age differences of the individuals. Weighing is important as signs are not equal: for example, married people are usually partners but users of the same car can simply be colleagues. The weight of signs is estimated on the basis of two major annual household surveys: the Estonian Social Survey and Estonian Labour Force Survey. Once the weight is known, the partnership index can be calculated for any couple in the population. As in the residency index, the presence or absence of any particular partnership sign is not decisive; it is the total weight of all the signs that counts (Tiit, Visk, Levenko, 2018; Visk, 2019).

In the Comparative Survey of Household and Place of Residence conducted in 2018, the partnership index was able to correctly identify 84% of the actual couples and the accuracy of family statistics improved significantly. According to the survey, 22% of families were lone parent families. A similar result – 24% – was achieved using registers and the partnership index. Based on only the place of residence registered in the population register, lone parent families would have accounted for 40% (Visk, Lehto, 2019).

Placing partners who are separated according to population register data in the same household leaves open the question of the household's place of residence. Do they live in the registered dwelling of the man or woman? Or in the apartment with an electricity contract in the man's name? Or in the house owned by the woman?

Location index

The location index is designed to answer two questions: where and with whom does a person live. In other words, the distribution of people into households and their places of residence are determined simultaneously. Compared with the partnership index, this is a more general approach. The workings of the location index are explained in Subchapter 2.1. Place of usual residence, and in a separate methodology document[1].

1.3. Population of dwellings

The total population of dwellings consists of occupied collective living quarters, occupied other housing units and all conventional dwellings (both occupied and vacant).

Sources

ADS – address objects of dwellings, their codes;
EHR – information on the intended use of a building;
Kloostrid – information on the locations of monasteries;
STAR – information on the locations of substitute homes;
SKA – information on the locations of social welfare institutions;
KIR – information on the locations of prisons and prison cells.

Short description of compiling the population of dwellings

The main source of data for the population of dwellings is ADS. Buildings and parts of buildings valid at the time of census, i.e. a broad population of dwellings, are selected from the ADS address objects. The definitions section below clarifies which buildings and parts of buildings are classified into the population of dwellings and which are not.

To check the basis for classification, the broad population of dwellings is linked to the EHR and the population of persons in the census. ADS and EHR are linked by EHR_KOOD and OSA_KOOD, which are the codes of the building and part of building, respectively (in the EHR, all buildings and parts of buildings have a code, EHR_KOOD and OSA_KOOD, respectively. In the ADS, only those objects that are linked to the EHR in address objects have this code). ADS and census persons' places of residence are linked by ADS_OID.

[1] Households and residences in registers; available at https://www.stat.ee/sites/default/files/2022-05/Households%20and%20residences%20in%20registers.pdf

The first two characters of the address object identifier ADS_OID indicate whether the object is a building or a part of building: EE or ME indicates that the object is a building; ER or MR indicates that it is a part of building.

Definitions of types of buildings and parts of building:

- EE – residential building; in the EHR it corresponds to a building with the designation of a dwelling or in some cases non-residential building;
- ME – non-residential building; in the EHR it corresponds to a building with the designation of a non-residential building or in some cases residential building;
- ER – dwelling; in the EHR it corresponds to the part of building called flat;
- MR – non-dwelling; in the EHR it corresponds to the part of building called non-dwelling.

In the case of a register-based census, the type of building (residential or non-residential building) is first established on the basis of the EHR data and, if there is no link to the EHR, the first two letters of the ADS_OI are used.

Address objects that meet the following conditions form the population of dwellings.

First, **collective living quarters** can be identified. These are premises which are designed for habitation by large groups of individuals or several households and which are used as the place of usual residence of at least one person at the moment of census. In the case of a register-based census, this group can be compiled from the population of dwellings, using the following conditions:

- occupied parts of a building, the intended use of which according to the EHR is 'Buildings of social welfare institutions and dormitories';
- occupied parts of building in monastery buildings;
- substitute buildings (STAR);
- special care homes (SKA);
- addresses of custodial institutions (KIR);
- dwelling that served as the place of usual residence for at least 16 persons at the moment of census.

Other housing units, i.e. huts, cabins, shacks, shanties, caravans, houseboats, barns, mills, caves, or any other shelter used for human habitation at the time of the census, are then identified. In a register-based census, dwellings are designated as other housing units if the address object type of the part of building is 'non-dwelling' and a person who does not live in a collective living quarter is registered there.

The last to be identified are **conventional dwellings**, which are a flat, a one-family dwelling, an isolated part of a private house, a housing unit of row house or semi-detached house; at the moment of census it may be occupied or vacant. A dwelling is considered as a conventional dwelling if it is not a collective living quarter or other housing unit but is a one-family dwelling (excl. vacant summer house) or a part of building with the address object type of 'flat', i.e. the first two letters of the ADS_OID are ER.

A dwelling in the population of dwellings is the place of residence for one household, with the address object of either 'one-family dwelling', 'flat in a building', or 'occupied non-dwelling' (see Table 2).

Table 2. Breakdown and explanation of the population of dwellings

Dwellings	**Building**	One-family dwelling, i.e. building with one or no flats, the intended use of which according to EHR is 'residential building with one flat', excl. vacant summer houses.
	Flat	Part of building with the address object type ER
	Non-dwelling	Occupied part of building with the address object type MR

2. Information about persons (mandatory in the EU)

2.1. Place of usual residence

Definition

A place of residence is considered permanent if, at the time of the census, the person has lived or intends to live there for at least 12 months. In cases where it is not possible to measure the intention to reside in a particular location, the place of residence where the person is registered shall be accepted as the place of usual residence.

Exceptions

(a) Where a person regularly lives in more than one residence during the year, the residence where he or she spends the majority of the year shall be taken as his or her place of usual residence regardless of whether this is located elsewhere within the country or abroad. However, a person who works away from home during the week and who returns to the family home at weekends shall consider the family home to be his or her place of usual residence, regardless of whether his or her place of work is elsewhere in the country or abroad.

(b) Primary and secondary school pupils and students who are away from home during the school term and regardless of how often they return to their family home, shall consider their family home to be their place of usual residence (regardless of whether they are pursuing their education elsewhere in the country or abroad).

(c) Tertiary students who are away from home while at college or university shall consider their term-time address to be their place of usual residence regardless of whether this is an institution (such as a boarding school) or a private residence and regardless of whether they are pursuing their education elsewhere in the country or abroad. Exceptionally, where the place of education is within the country, the family home can be considered as the place of usual residence.

(d) An institution shall be taken as the place of usual residence of all its residents who at the time of the census have spent, or are likely to spend, 12 months or more living there.

e) The general rule in relation to where most of the daily period of rest is spent applies to persons doing compulsory military service and to members of the armed forces who live in military barracks or camps.

(f) The place of enumeration shall be taken as the place of usual residence of homeless or roofless persons, nomads, vagrants, and persons with no concept of usual residence.

(g) A child who alternates between two places of residence (for instance if his or her parents are divorced) shall consider the one where he or she spends the majority of the time as his or her place of usual residence. Where an equal amount of time is spent with both parents, the place of usual residence shall be the one where the child is found at the time on census night or, alternatively, the household where the child has his or her legal or registered residence.

(h) Merchant seamen and fishermen usually resident in the country but at sea at the time of the census (including those who have no place of residence other than their quarters aboard ship) shall be included.

(i) Persons who may be irregularly staying or undocumented, as well as asylum seekers and persons who have applied for, or been granted, refugee status or similar types of international protections, provided that they meet the criteria for the usual residence in the country, shall be included. The intention is not to distinguish these persons separately, but rather to ensure that they are not missed from the enumeration.

(j) Children born in the 12 months before the census reference time and whose families are usually resident in the country at the census reference time shall be included.

(k) Persons whose stay in the country (actual and/or intended) is exactly one year shall be included. Military, naval, and diplomatic personnel and their families.

(l) Foreign military, naval and diplomatic personnel, and their families, located in the country, regardless of their duration of stay shall be excluded from the usually resident population of a country.

(m) Where the duration of residence outside of the country can be established for national military, naval and diplomatic service personnel and their families located outside the country, the following shall be applied:

- If they are residing abroad for less than 12 months and they are intending to return to the place of departure, they shall be allocated within the country in accordance with the rules for usual residence. They could be allocated to (by decreasing order of priority):
  (i) the family home address within the country, if any, or
  (ii) the duty station within the country to which they were attached before leaving.
- If they are residing abroad for at least 12 months or if they are not intending to return to the place of departure (even if returning in the country within a 12-month period), they shall be attributed to a 'virtual place' (extra-region) of the country of departure.

On the basis of the definition of the place of usual residence, persons usually resident in the place of enumeration but absent, or expected to be absent, at the time of the census for less than one year shall be considered as temporarily absent persons and thus included in the total population. In contrast, persons living or expected to live outside the place of enumeration for one year or more shall not be considered temporarily absent and shall therefore be excluded from the total population. This is regardless of the length of visits that they may pay to their families from time to time.

Persons who are enumerated but do not meet the criteria for usual residence in the place of enumeration, i.e. do not live or do not expect to live in the place of enumeration for a continuous period of at least 12 months, are considered temporarily present and are therefore not counted in the total usual resident population.

Geographical area			**GEO.N.**	**GEO.M.**	**GEO.H.**
0.	Total		0.	0.	0.
x.	All NUTS 3 regions			x.	x.
	x.x.	All LAU 2 regions			x.x.

In Estonia, LAU 2 regions are municipalities.

On NUTS 3 level, the counties are grouped as follows:

- Northern Estonia: Harju county
- Western Estonia: Hiiu, Lääne, Pärnu, and Saare county
- Central Estonia: Järva, Lääne-Viru, and Rapla county
- North-Eastern Estonia: Ida-Viru county
- Southern Estonia: Jõgeva, Põlva, Tartu, Valga, Viljandi, and Võru county

- **Sources**
- The following registers are used to establish the place of usual residence: e-File, KIRST, Traffic Register, MKR, RETS, population register, STAR, Elering, TETRIS, VANGIS, KR, PHC 2011, EHIS, KMAIS, KOPIS, and TÖR.
- **Algorithm**
- In the register-based census, the place of usual residence is determined using the location index methodology developed from the residency index, and the partnership index methodology used in the second pilot census. The location index is designed to answer two questions: where and with whom does a person live. In other words, the distribution of people into households and their places of residence are determined simultaneously.
- The workflow of the location index is as follows. Various datasets are used to collect signs that could indicate whether two people live in the same household (Table 3). Such signs include signs of partnership but, unlike in the partnership index, there are no restrictions on gender, age, or blood

relationship of the persons. Therefore, parenthood or the payment of child allowance to an adult caring for a child are also suitable linking signs.

- Signs that connect a person with various locations (Table 4) are also important, whether they are possible places of residence (e.g. address in the population register, property, dwelling connected into the electricity grid) or simply indications to the area in which the person lives (e.g. GP, workplace, school, pharmacy where electronically prescribed medication was purchased).

Table 3. Signs linking individuals

Database	Link between persons
E-File, information system for the expedited payment order procedure	Persons are on the same side in a maintenance dispute (e.g. the recipient and the child for whom maintenance is paid)
	Persons are opposing parties in a maintenance dispute (e.g. the recipient and the payer)
Health Insurance Information System	One person has cared for another person in the year preceding the census
Traffic register	Persons are linked to the same vehicle (e.g. owner and user of the car)
Register of taxable persons	Persons have jointly taken out a housing loan (information provided by the bank for the interest refund)
	Person has declared the training expenses of another person on his or her income tax return
	Person received income tax exemption for two or more children. The link is between the child and the declarant
	One spouse has transferred tax-free income to the other spouse
Estonian Medical Prescription Centre	Person has purchased electronically prescribed medication on behalf of another person
Population register	Persons are married
	Persons are divorced
	Person is the mother of the other
	Person is the father of the other
	An adult serves as the guardian of another adult
	Child is separated from parent
	Person has partial or limited right of custody over child’s property and/or child
	Person has full right of custody over child's property and child
	Person receives family allowance for a child
	Person receives parental benefit for a child
	An adult receives extra leave to care for a disabled adult
Social Services and Benefits Registry	Persons in the same household have received subsistence benefit
Social Security Information System	Person receives family allowance for a child
	Person receives parental benefit for a child
	An adult receives extra leave to care for a disabled adult

Table 4. Signs linking persons and locations

Database	Link between person and location	Location accuracy
Elering	Person has an electricity contract at a particular address	Possible place of residence

Database	Link between person and location	Location accuracy
Register of persons registered as unemployed or jobseekers, and of provision of labour market services	Person's place of residence	Possible place of residence
	Person’s postal address	Possible place of residence
Prisoners’ register	Place of residence of prisoners, detained persons, persons in custody, and probationers	Possible place of residence
Land register	Real estate belonging to person	Possible place of residence
Population register	Person's registered place of residence	Possible place of residence
	Person’s additional address	Possible place of residence
	Person’s previous places of residence	Possible place of residence
	Person’s place of stay (e.g. dormitory)	Possible place of residence
Population and housing census of 2011	Addresses of the person and his or her mother	Possible place of residence
Social Services and Benefits Registry	Person's place of residence	Possible place of residence
Register of taxable persons	Real estate purchased with a person’s housing loan	Possible place of residence
Estonian Education Information System	Kindergarten of child	Municipality
	School of vocational or higher education student	Municipality
	School of pupil in general education	Municipality
	Teacher’s place of work	Municipality
Health Insurance Information System	Dental care institution visited by the person	Municipality
	Medical institution visited by the person	Municipality
	Person’s GP	Municipality
Identity Documents Database	Place of receipt of an identity document	Municipality
Mandatory Funded Pension Register	Address of person who has joined the second pension pillar	Municipality
Estonian Medical Prescription Centre	Pharmacy in which the person has purchased electronically described medication	Municipality
Employment register	Person’s place of work	Municipality

Next, the likelihood that the persons linked by a sign actually do live together is assessed. Similar to the partnership index, information on actual cohabitation is available from large household surveys: the Estonian Social Survey and the Estonian Labour Force Survey. Based on survey data, the model parameters are estimated and then the probabilities are calculated for all pairs of individuals found in the registers.

The probability of a person living at a particular location is calculated in a similar manner. The various links with a specific address and municipality as well as the person’s distance from his or her workplace, school or kindergarten are taken into account.

Persons, places, and the links between them can be described mathematically as a *graph*. Graphs consist of vertices and edges connecting them. For example, social networks can be viewed as a graph: vertices are people, and edges are friendships. Sometimes weights are assigned to the edges. For instance, in transportation, the weight of a road (edge) connecting two geographical points (vertices) may be the length of the road. In this case, vertices are people and places, and edges are the links between them. Weights are the statistically estimated probabilities of two persons living together or of a person dwelling in the particular place (Figure **1**).

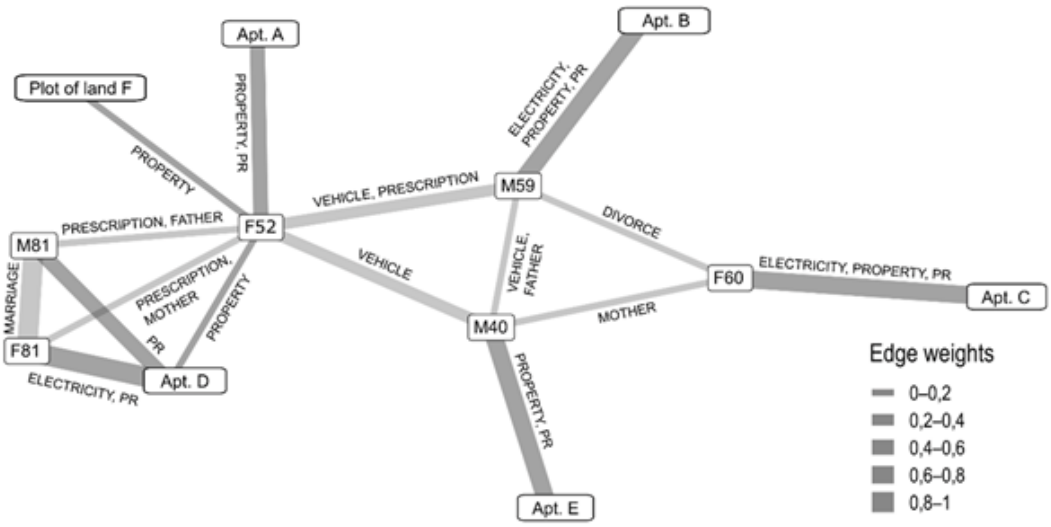

Figure 1. Fragment of a graph of persons and locations. The vertices indicating persons show the person's sex and age. The width of lines indicates the likelihood of persons living together (light lines) or of a person dwelling in the particular place (dark lines). The labels on the edges indicate the nature of the link: PRESCRIPTION – one person has bought electronically prescribed medication on behalf of another person, RR – place of residence according to the population register, VEHICLE – persons are linked to the same vehicle, e.g. users of the same car. The figure has been previously published in the journal Akadeemia (Tiit, Visk, Maasing, Levenko, Lehto, 2021).

In the analysis of social networks, *community detection* plays an important role. In mathematical terms, the search is for a set of vertices that are closely related to each other and weakly related to other vertices. The household with its place of residence can also be seen as such a sub-graph. The core of the location index is the subdivision of the graph of people and places into sub-graphs that contain one or more persons and at least one possible place of residence, using a community detection algorithm. Persons in the same sub-graph form a household and their place of residence is also in this sub-graph.

If more than one residence is associated with a household, the most likely of these is selected. This is done by taking into account the household's weights for each place, electricity consumption, size of dwelling, and amenities (central heating, bathroom, toilet, water). Electricity consumption data are obtained from Elering, and size and amenity data from the Building Register. Although the location index includes a wide range of registers in the sample, in most cases individuals have the strongest association with the place of residence in the population register. For instance, in 2022, the location index left 74% of the individuals in their place of residence in the population register.

The algorithm described above is applied to people belonging to private households. Persons known to be homeless or living in an institution, i.e. belonging to an institutional household, are identified separately. Data on the homeless population are obtained from municipalities, data on nursing homes and special care homes from the Social Protection Information System, data on substitute homes from the Social Services and Benefits Data Register, and data on prisoners from the prisoners' register. Monastery residents are identified by their residential address in the population register. In addition, information on places of stay found in the population register is used – under the new Population Register Act, which entered into force in 2019, a number of institutions, including social welfare institutions, are obliged to register their inhabitants in the population register.

2.2. Sex and age

Definition

The characteristics sex and age are designed to break down any total or subtotal referring to persons. Age is the person's age in completed years at the moment of census (early morning of 31.12.2021).

Sources

Sex and date of birth are determined from the person's Estonian personal identification code retrieved from the population register.

Algorithm

Sex and date of birth (year, month, date) are determined from the first seven digits of the personal identification code.

Meaning of the first digit of the personal identification code: 1 – a man born in 1800–1899, 2 – a woman born in 1800–1899, 3 – a man born in 1900–1999, 4 – a woman born in 1900–1999, 5 – a man born in 2000–2099, 6 – a woman born in 2000–2099. The second and third digit mark the last two digits of the year of birth; the fourth and fifth digit denote the month of birth (January – 01, February – 02, etc.), and the sixth and seventh digit mark the date of birth.

2.3. Legal marital status

Definition

Marital status is the (legal) conjugal status of an individual (i.e. *de jure* status).

The person is classified according to the most recently acquired legal marital status at the moment of census.

Legal marital status		LMS.L.	LMS.H.
0.	Total	0.	0.
1.	Never married and never in registered partnership	1.	1.
2.	Married or in registered partnership	2.	2.
3.	Widowed or registered partnership ended with the death of partner (and not remarried or in a registered partnership)	3.	3.
4.	Divorced or registered partnership legally dissolved (and not remarried or in a registered partnership)	4.	4.
5.	Not stated	5.	5.

As of the register-based population and housing census of 2021, it is not possible to form the subdivisions of same-sex and opposite-sex registered partnerships. Registered Partnership Act is in force since 01.01.2016, but there are no implementing provisions and therefore no data have been collected in the registers.

Sources

Legal marital status is allocated based on population register data and PHC 2011.

Algorithm

The marital status in the population register is considered a priority because it is based on records; PHC 2011 data are only added if the person is not in the population register. 15- to 17-year-olds are considered unmarried if no other marital status can be allocated to them on the basis of the above; persons under 15 years of age are considered unmarried regardless of their marital status in the population register or PHC 2011.

2.4. Country of birth

Definition

Information on the place of birth is collected according to the place of usual residence of the mother at the time of the birth, or, if not available, the place in which the birth took place. Information on the country of birth is collected on the basis of international boundaries existing at the moment of census.

Sources

Data sources are population register (country of birth and mother's usual place of residence at the time of the birth), Statistics Estonia's data of births (RAAB), and PHC 2011. In case of population register, data extracted as at 31 December 2005 are used.

Algorithm

Country of birth algorithm differs by year of birth.

- For persons born before 1970, the country of birth is imputed based on PHC 2011 data and, if missing, from country of birth data in the population register.
- For persons born between 1971 and 2011, country of birth characteristics in the population register and PHC 2011 data are used. First, information retrieved from the PHC 2011 data is used, then the information on the country of birth taken from the population register, and lastly, the information on the mother's place of residence in the population register at the time of person's birth.
- For persons born after 2011, Estonia is assigned as the country of birth for those who have been registered as born in Estonia in Statistics Estonia's database of births. For foreign-born, first the population register 's country of birth data is used. If this data is insufficient, the mother's place of residence at the time of person's birth is used.

2.5. Country of citizenship

Definition

Citizenship is defined as the particular legal bond between an individual and the State, acquired by birth or naturalisation, whether by declaration, choice, marriage, or other means according to national legislation.

A person of two or more citizenships is allocated to only one country, to be determined in the following order of precedence:

1. reporting country; or
2. if the person does not have the citizenship of the reporting country: other EU Member State; or
3. if the person does not have the citizenship of another EU Member State: other country outside the European Union.

Where there are cases of dual citizenship where both countries are within the European Union but neither is the reporting country, Member States shall determine which country of citizenship is to be allocated.

Sources

Country of citizenship is noted on the basis of population register, PHC 2011, and LTR data.

Algorithm

Country of citizenship in the population register is considered a priority, as it is based on records; PHC 2011 data is only added if the person belonging in the population is not in the population register. In addition, as of 01.01.2021, data is complemented with information retrieved from the Short-Term Employment Register (LTR).

2.6. Place of usual residence one year prior to the census

Definition

The characteristic 'Place of usual residence one year prior to the census' indicates whether or not a person has changed his/her place of residence during the year. For the purpose of comparison, the place of usual residence one year before the census is taken into account within the administrative divisions in force at the time of the census.

Place of usual residence one year prior to the census				ROY
0.	Total			0.
1.	Usual residence unchanged			1.
2.	Usual residence changed			2.1.
	2.1.	Usual residence changed within the country		2.1.
		2.1.1.	Usual residence one year prior to the census within the same NUTS 3 area as the current usual residence	2.1.1.
		2.1.2.	Usual residence one year prior to the census outside the NUTS 3 area of the current usual residence	2.1.2.
	2.2	Immigrated from outside Estonia		2.2.
3.	Not stated			3.
4.	Not applicable			4.

Sources

The source data for the compilation of the characteristic are the residents and their usual places of residence in the census year and the year prior to the census.

Algorithm

First, the anonymised personal identification codes of individuals in the data from the previous year are updated to link the information from the previous year to that of the current year. Then, the addresses of the usual place of residence of the persons in the data from the previous year are updated.

Children under 1 year of age are classified under 'Not applicable'.

Persons who were not residents a year ago are assigned the value 'Immigrated from outside Estonia'.

If a person was a resident a year ago, the existence of a place of residence is checked. If a person's place of residence at the census moment or a year ago was unknown, the value 'Not stated' is assigned.

If a person's place of residence in both years is known, the places of residence are compared. If the place of residence is the same in both years, the value 'Usual residence unchanged' is assigned. If the places of residence in these years do not match, it is checked whether the previous year's place of residence is in the same NUTS 3 area as the current one. If not, the value of the characteristic is set to 'Usual residence one year prior to the census outside the NUTS 3 area of the current usual residence'. If yes, the value 'Usual residence one year prior to the census within the same NUTS 3 area as the current usual residence' is assigned.

2.7. Location of place of work

Definition

The location of place of work is the actual location in which an employed person performs his/her main job. The main place of work is where, during the last full working week of 2021 (13–19 December 2021), a person worked according to the employment register, had a heavier workload, or received higher pay, and that has been established when determining the person's current activity status. If a person works in a subunit located

at a place different from the employer's main place of business, the location of the subunit is reported. Within the country, the address of a person's place of work is determined.

Location of place of work		LPW.N.	LPW.L.
0.	Total	0.	0.
1.	In the territory of Estonia	1.	1.
2.	Not in the territory of Estonia	2.	2.
3.	Unknown place of work (unknown if inside or outside Estonia)	3.	3.
4.	Not applicable (not working)	4.	4.

Sources

Location of place of work is established on the basis of data from the following databases: TÖR, SPI, FIDEK form E, FIDEK form A, EVKONTO, ARIREG, and population of persons. In addition, the processing file generated when determining the current activity status is used.

Algorithm

For the majority of the employed, the main job is determined on the basis of employment register (TÖR) data. In most cases, the address of the place of work is found in the employment register. If the location of the place of work is not available at ADS_OID or ADR_ID level in the employment register, the person is linked to the legal address of the employer from the business register for statistical purposes (SPI).

If wage data for an employee are available in the state personnel and payroll database (SAP) and a more accurate location of place of work than the one in the employment register is found using the name of the structural unit of the place of work, then this location is assigned to the person.

If an employed person's main place of work is taken from the FIDEK form E (self-employed persons), the legal address of the enterprise obtained from SPI is linked to the person.

If an employed person's main place of work is taken from the FIDEK form A, the country of payment determines whether the place of work is in Estonia or not. If the place of employment is in Estonia, the place of employment is linked to the legal address of the payer from the SPI. If an employed person's main place of work is taken from the FIDEK form A, the country of payment determines whether the place of work is in the territory of Estonia or not. If the location of employment is in Estonia, the location of place of work is linked to the legal address of the payer taken from the SPI.

For persons designated as employed as the spouse of a self-employed person, the place of work of the self-employed spouse is assigned as the location of place of work.

For employed persons whose main place of work has been determined on the basis of entrepreneur account (EVKONTO) data, the location of place of work is the address of their place of residence.

2.8. Current activity status

Definition

Current activity status describes the economic activity of a person in the last full working week (13–19 December 2021) preceding the census moment, i.e. in the reference week. Persons are divided into the economically active population, i.e. the labour force, and the economically inactive population.

Economically active population (labour force) comprises all persons aged 15 and over who during the reference week were employed, temporarily absent from a job, or unemployed but (actively) seeking work.

The *employed* comprise all persons aged 15 years or over who during the reference week

- performed at least one hour of work for pay or profit, in cash or in kind, or
- were self-employed, or

- were temporarily absent from a job in which they had already worked and to which they maintained a formal attachment.

The *unemployed* comprise all persons aged 15 years or over who during the reference week were not in employment, prison, or conscription service and were:

- 'seeking work', i.e. had taken specific steps to seek wage employment or self-employment within four weeks ending with the reference week; and
- 'currently available for work', that is, were available for wage employment or self-employment during the reference week and for two weeks after that.

Economically inactive population comprises all persons who were not economically active (employed or seeking work) during the reference week, i.e. all children under the age of 15, pension or capital income recipients, students, and other persons not belonging to any other group.

Current activity status			CAS.L.	CAS.H.
0.	Total		0.	0.
1.	Economically active (labour force)		1.	1.
	1.1.	Employed	1.1.	1.1.
	1.2.	Unemployed	1.2.	1.2.
2.	Economically inactive (outside of the labour force)		2.	2.
	2.1.	Persons under 15 years of age		2.1.
	2.2.	Pension or capital income recipients		2.2.
	2.3.	Students		2.3.
	2.4.	Others		2.4.
3.	Not stated		3.	3.

Sources

Current activity status is established on the basis of data from the following databases: ARIREG, EHIS, EMPIS, EVKONTO, KIR, KIRST, KOPIS, KVKR, MKR (TSD Annexes 1A and 2A, INF1, FIDEK form E, points 8.1 and 8.2 of FIDEK form A), SAP, SPI, SKAIS, STAR, and TÖR.

Algorithm

In the current activity status algorithm, separate subpopulations of the employed, unemployed, pensioners, capital income recipients, and students are created. Persons in these subpopulations overlap to some extent, as a person can belong under more than one current activity status. The subpopulations are linked by pseudonymised personal identification code and then each person is assigned one current activity status. When establishing the initial activity status, the order of preference of the activity statuses given in the census regulation is followed (employed or unemployed > pension or capital income recipient > student > other inactive). Subsequently, the current activity status of persons with more than one status is adjusted.

First, persons under the age of 15 are assigned an age-appropriate status based on the total population of permanent residents. A subpopulation of the employed is then constructed from the databases TÖR, FIDEK form E, FIDEK form A, TSD Annex 1A, TSD Annex 2A, INF1, EVKONTO, ARIREG, SAP, and SPI.

Steps in the calculation of the subpopulation of employed persons:

1. The employment register (TÖR) is the main source of data for the identification of the employed. First, all employment relationships that were in force between 01.11.2021 and 31.01.2022 are retrieved from the employment register. The longer period is needed after linking to TÖR to eliminate the employment relationships that ended before the start of the reference week or started after the reference week after linking to the TSD.
2. The data on suspensions of employment as of 31.05.2022 are retrieved from the employment register. Successive suspensions are summed up, i.e. the first start and last end of the suspension are found.

3. The employment register entries and the suspension entries are linked by work ID (TOOT_ID) and indicators are calculated to show whether work was suspended during the reference week and whether the suspension lasted more than 3 months. Long-term suspensions are counted as non-working time.
4. Earned income payment records for December 2021 and January 2022 are extracted from the form TSD. Payments are totalled by the payer's commercial registry code and ID code. The TSD data are linked to employment register data.
5. The linked records of employment register and the TSD where the period of employment does not fall within the reference week are removed. If no link to the TSD is found in the employment register, the corresponding record remains in the dataset.
6. The linked data of the employment register and the TSD are sorted in this order: existence of employment register entry, workload (decreasing), earned income (decreasing). Unique records by persons are identified. If there are multiple records, the first sorted record is retained for the person.

Adding entrepreneurs to the list of the employed:

1. A holder of an entrepreneur account is considered to be employed if the account has received payments in the 4th quarter of the census year and the amount of payments per month is at least equal to the subsistence minimum.
2. A person submitting the income tax return of business income (Form E) is considered to be employed if he/she has non-zero income in at least one of the following income categories: business income, income from agriculture or income from the sale of timber.
3. A person involved in a company is considered to be employed if:
    1. his/her role in the company is at least one of the following: founder, founder (non-contributing), partner, shareholder, entrepreneur, limited partner authorised to represent the company, sole member of the management board, chairman of the management board, member of the management board (director), member of the management board, general partner, limited partner, branch manager;
    2. he/she has at least a 50 percent holding in the company (shares or units);
    3. he/she has received dividends during the census year amounting to at least 12 times the minimum wage for that year.

Steps for calculating the unemployed subpopulation:

1. EMPIS and STAR are the main data sources for the determination of unemployment status. TSD and TÖR data are used as additional data sources. EMPIS data for the census year and the year before is used, and data from STAR are only taken for the second half of the census year.
2. Unemployed status is assigned to persons who were registered as unemployed or jobseekers in EMPIS during the reference week, and to persons whose social status in STAR in the second half of the year was either registered or unregistered unemployed person. STAR also provides data on the unemployed persons who are not registered with the unemployment fund.

Steps for calculating the subpopulations of pension and capital income recipients**:**

1. SKAIS, KIRST, and KOPIS are the data sources used to determine pensioner status. SKAIS is used to check whether a person received a pension during the reference week, according to the start and end dates of pension payment. It is also checked whether pension payments were suspended during the reference week. In case of suspension, pensioner status is not assigned.
2. Health insurance categories 13 (Estonian pensioner with permanent residence in another EU Member State), 33 (person receiving a military pension from the Russian Federation), 35 (person residing in

Estonia and receiving a pension from an EU Member State), and 41 (person receiving a parliament pension) are added from the Health Insurance Information System (KIRST).

3. Information on the beneficiaries of payments from the 3rd pillar of the pension scheme is taken from the Estonian Funded Pension Registry. As it is possible to receive 3rd pillar payments well before the official retirement age, only those recipients who are at least 60 years of age in the reference week and whose average monthly payment is at least equal to the minimum subsistence income in the reference year are considered as pensioners.
4. If a person has received dividends during the census year amounting to at least 12 times the minimum wage for that year and he/she is not employed or unemployed, he/she is considered to be a recipient of capital income.

Steps for calculating the subpopulation of students:

1. The end-of-year extract from the EHIS database is used to determine student status. A student is defined as any person who is studying at primary, general, vocational, or higher education level and is not on academic leave.
2. For persons studying at several levels, the highest level is considered to be the level of study.

Finally, for people who do not yet have a current activity status, the status is set to 'other' and the following cases are adjusted:

	Requirement	**Final activity status**
1	Person is employed according to INF1 and his/her holding in enterprises is less than 50%	capital income recipient (pensioner)
2	Person is the spouse of a self-employed person under the age of 65 who is not in prison or conscription service, and the self-employed person's highest earned income comes from business according to FIDEK form E	employed
3	Person is both a student and a pension recipient, but pension has been suspended	student
4	According to STAR, person is both a student and unemployed but not a pension recipient	student
5	Person is a pension recipient only, but pension has been suspended	other
6	Person is a pension recipient only, but type of pension is survivor's pension	other
7	Person is unemployed and in prison or conscription service	other
8	Person is both unemployed and a pension recipient but is in prison or conscription service	pensioner
9	Person is both unemployed and a student, in prison or conscription service, but not a pension recipient	student
10	Person is employed but on parental leave or employment is suspended for more than 90 days and person does not receive parental benefit at that time	other
11	Person is at least 65 years of age, unemployed, and a pension recipient not in employment	pensioner
12	Person is at least 65 years of age and unemployed	other

13	Person is under 25 years of age, a student, and a pension recipient, but type of pension is survivor's pension	student
14	Person is under 25 years of age and a pension recipient, but type of pension is survivor's pension	other
15	Person is under 60 years of age, a student, and a pension recipient	student

2.9. Occupation

Definition

'Occupation' refers to the type of work done in the main job. 'Type of work' is described by the main tasks and duties of the work according to the International Standard Classification of Occupations (ISCO-08). The main place of work is the place where, during the last full working week of 2021 (13–19 December 2021), a person worked according to the employment register, had a heavier workload, or received higher pay, and that has been established when determining the person's current activity status.

Occupation		OCC.
0.	Total	0.
1.	Managers	1.
2.	Professionals	2.
3.	Technicians and associate professionals	3.
4.	Clerical support workers	4.
5.	Service and sales workers	5.
6.	Skilled agricultural, forestry, and fishery workers	6.
7.	Craft and related trades workers	7.
8.	Plant and machine operators, and assemblers	8.
9.	Elementary occupations	9.
10.	Armed forces occupations	10.
11.	Not stated	11.
12.	Not applicable	12.

Sources

Occupation is established on the basis of data from the following databases: TÖR, SAP, population of persons. In addition, the processing file generated when determining the current activity status is used.

Algorithm

Most of the employed are assigned the occupation in the employment register.

If no occupation is available in the employment register, it is searched for in SAP (for public sector).

If the occupation of an employed person remains unknown after these steps, it is assigned on the basis of persons with known occupations (excluding armed forces occupations), using the following background variables:

1. sex,
2. age,
3. highest level of education attained,
4. amount of earned income,
5. branch of economic activity of person.

Unemployed persons are classified under 'Not applicable'.

2.10. Industry (branch of economic activity)

Definition

Industry (branch of economic activity) refers to the kind of production or activity of the establishment or similar unit in which the job of an employed person is located. If a person worked in a subunit with an activity different from the employer's main branch of activity, the subunit's branch of activity is reported. A subunit is an enterprise's or organisation's subdivision with a branch of economic activity or address different from that of the head office.

The allocation of a person within the breakdowns of the topic 'Industry' is based on the person's main place of work. The main place of work is the place where, during the last full working week of 2021 (13–19 December 2021), a person worked according to the employment register, had a heavier workload, or received higher pay, and that has been established when determining the person's current activity status.

Persons who were unemployed or economically inactive are classified under 'Not applicable'.

Industry (branch of economic activity)			IND.L.	IND.H.
0.	Total		0.	0.
1.	Agriculture, forestry, and fishing		1.	1.
2.	Manufacturing, mining and quarrying, and other industry		2.	2.
	2.1.	Mining and quarrying		2.1.
	2.2.	Manufacturing		2.2.
	2.3.	Electricity, gas, steam and air conditioning supply		2.3.
	2.4.	Water supply; sewerage, waste management and remediation activities		2.4.
3.	Construction		3.	3.
4.	Wholesale and retail trade, transportation and storage, accommodation and food service activities		4.	4.
	4.1.	Wholesale and retail trade; repair of motor vehicles and motorcycles		4.1.
	4.2.	Transportation and storage		4.2.
	4.3.	Accommodation and food service activities		4.3.
5.	Information and communication		5.	5.
6.	Financial and insurance activities		6.	6.
7.	Real estate activities		7.	7.
8.	Professional, scientific, technical, administrative and support service activities		8.	8.
	8.1.	Professional, scientific and technical activities		8.1.
	8.2.	Administrative and support service activities		8.2.
9.	Public administration, defence, education, human health and social work activities		9.	9.
	9.1.	Public administration and defence; compulsory social security		9.1
	9.2.	Education		9.2.
	9.3.	Human health and social work activities		9.3.
10.	Other services		10.	10.
	10.1	Arts, entertainment and recreation		10.1
	10.2	Other service activities		10.2
	10.3	Activities of households as employers; undifferentiated goods- and services producing activities of households for own use		10.3
	10.4	Activities of extraterritorial organisations and bodies		10.4
11.	Not stated		11.	11.
12.	Not applicable		12.	12.

Sources

Branch of economic activity is established on the basis of data from the following databases: TÖR, FIDEK form E, SPI, population of persons. In addition, the processing file generated when determining the current activity status is used.

Algorithm

Branch of economic activity is to be assigned to all employed persons, therefore the processing file created during the compilation of the current activity status is used as a source dataset. From this dataset, the employed are extracted, the remaining persons are automatically assigned the value 'Not applicable'.

The first step is to find the main employer's business code for all employed persons, and later to use this code to find the branch of economic activity of the main place of work from SPI.

1. If an employed person’s main place of work is taken from the FIDEK form E or from the entrepreneur account data, the business code from SPI or form E must be linked to the person's personal identification code to determine the branch of economic activity.
2. If an employed person is the spouse of a self-employed person, his/her employer's business code is the self-employed person's business code.
3. If an employed person’s main place of work is taken from the FIDEK form A, the business code of the payer (natural or legal person) is assigned as the employer's business code (by linking the business code from SPI to the personal identification code in the case of a natural person).
4. If an employed person’s main place of work is taken from the employment register (TÖR) or TSD tables, the business code is available for legal person employers, but for self-employed employers the business code is linked via the personal identification code from SPI.

The employer’s branch of activity is then identified from SPI for all employed persons using the employer’s business code.

An employed person may also work in a subunit of the employer, which is identifiable by the address of the place of work (updated and adjusted to the accuracy of the cadastral unit).

If SPI contains information on the subunit along with its branch of activity, the activity of the subunit is linked to employed persons using the business code and workplace address.

If, according to the employment register, a person is employed in a subunit for which no information is available in SPI, the XGBoost model calculates the subunit’s possible branch of economic activity as a 2-digit EMTAK code, using the person’s occupation, main branch of economic activity of the place of work, and location of place of work. The model-calculated branch of activity is taken into account if all the following conditions are met:

1. No accurate branch of activity has been obtained from SPI.
2. The branch of activity predicted by the model is not the same as the main branch of economic activity.
3. The branch of activity predicted by the model is not accommodation or education (because these are explicitly identified in SPI).

The XGBoost model is trained on the 2020 subunits with known branch of economic activity.

2.11. Status in employment

Definition

An employed person's status in the main place of work. The main place of work is the place where, during the last full working week of 2021 (13–19 December 2021), a person worked according to the employment register, had a heavier workload, or received higher pay and that has been established when determining the person’s current activity status. If a person had more than one status in the main job, the one with the higher income was used.

Employed persons are broken down by status in employment as follows:

- Employee – a person who was employed full-time or part-time by an institution, enterprise, or other employer and who was remunerated for their work;
- Employer – a person who owned a share in an enterprise and the enterprise had at least 2 employees in December 2021, or a self-employed person with salaried employees in December;
- Own-account worker – a person who owned a share in an enterprise and the enterprise had no employees in December, or a self-employed person without employees, or a person's business activity was indicated by entrepreneur account data;
- Other employed person – a person not belonging to any of the above groups (includes unpaid workers in a family enterprise or farm).

Status in employment		SIE.
0.	Total	0.
1.	Employees	1.
2.	Employers	2.
3.	Own-account workers	3.
4.	Other employed persons	4.
5.	Not stated	5.
6.	Not applicable	6.

Sources

Person's status in employment is established on the basis of data from the following databases: TÖR, SPI, MKR (TSD Annexes 1 and 2A). In addition, the processing file generated when determining the current activity status is used.

Algorithm

The algorithm uses as input the result of the current activity status and the additional characteristics calculated during the determination of the current activity status.

Persons whose current activity status is 'employed' are classified under the following categories according to their status in employment:

1. Employee – if the person's current activity status was determined using the employment register or earnings from abroad on FIDEK form A, the person has no holding in an enterprise and is not the employer of another person;
2. Employer – if the person had a holding in an enterprise and the enterprise had at least 2 employees in December, or the person was self-employed with salaried employees in December;
3. Own-account worker – if a person had a holding in an enterprise and the enterprise had no employees in December or had one employee; person was self-employed (without employees) or conducted business through an entrepreneur account;
4. Other employed person – if the person's employment type in the employment register was 6 (allowance for a spouse) or 15 (sole proprietor's spouse).

Persons whose current activity status is not 'employed' are classified under 'Not applicable'.

2.12. Educational attainment

Definition

Educational attainment is determined for persons aged 15 or over, taking into account the highest level of education obtained.

In the census, the highest educational attainment is presented according to the International Standard Classification of Education (ISCED 2011).

Educational attainment (highest level obtained)		EDU.
ISCED level 0:	Pre-primary (preschool) education or no primary education	0.
ISCED level 1:	Basic education (grades 1–6 of basic school)	1.
ISCED level 2:	Basic education (grades 7–9 of basic school)	2.
ISCED level 3:	Secondary education	3.
ISCED level 4:	Vocational secondary education or vocational education after secondary education	4.
ISCED level 5:	Secondary specialised education and technical education after secondary education	5.
ISCED level 6:	Bachelor's or equivalent level	6.
ISCED level 7:	Master's or equivalent level	7.
ISCED level 8:	Doctoral or equivalent level	8.
Educational attainment unknown (persons aged 15 or over)		9.
Not applicable (persons under 15 years of age)		10

Sources

Educational attainment is noted on the basis of data found in EHIS, ETR, RAKS, SAP, population register, and PHC 2011.

Algorithm

The level of education in EHIS is considered the highest priority, as it is a records-based source. No age checks are carried out on EHIS data. The next in priority are the statement-based ETR, RAKS, and SAP. Data contained in these are age checked, which means that if the level of education indicated in the source is too high considering the person's age, this information is disregarded. The education in the population register is only taken into account if the person's educational attainment is not indicated in any of the other sources mentioned above and it has not been recorded in any of the previous years. Population register data are also subject to age checks.

2.13. People who have ever resided abroad and the year of their arrival in the country (from 1980)

Definition

The characteristic 'People who have ever resided abroad and the year of their arrival in the country' shows whether current residents of Estonia have lived abroad at any time since 1980 and, if so, in which year they last migrated to Estonia or back abroad.

People who have ever resided abroad and year of their arrival in the country (from 1980)				YAE.L.	YAE.H.
0.	Total			0.	0.
1.	Ever resided abroad and arrived in 1980 or after			1.	1.
	1.1.	2020 to 2021		1.1.	1.1.
		1.1.1.	2020		1.1.1.
		1.1.1.	2021		1.1.1.

	1.2.	2015 to 2019		1.2.	1.2.
		1.2.1.	2019		1.2.1.
		1.2.2.	2018		1.2.2.
		1.2.3.	2017		1.2.3.
		1.2.4.	2016		1.2.4.
		1.2.5.	2015		1.2.5.
	1.3.	2010 to 2014		1.3.	1.3.
		1.3.1.	2014		1.3.1.
		1.3.2.	2013		1.3.2.
		1.3.3.	2012		1.3.3.
		1.3.4.	2011		1.3.4.
		1.3.5.	2010		1.3.5.
	1.4.			1.4.	1.4.
		1.4.1.	2009		1.4.1.
		1.4.2.	2008		1.4.2.
		1.4.3.	2007		1.4.3.
		1.4.4.	2006		1.4.4.
		1.4.5.	2005		1.4.5.
	1.5.	2000 to 2004		1.5.	1.5.
	1.6.	1995 to 1999		1.6.	1.6.
	1.7.	1990 to 1994		1.7.	1.7.
	1.8.	1985 to 1989		1.8.	1.8.
	1.9.	1980 to 1984		1.9.	1.9.
2.	Resided abroad and arrived in 1979 or before, or never resided abroad			2.	2.
3.	Not applicable			3.	3.

Sources

The year of arrival in the country is constructed using the immigration statistics published by Statistics Estonia, extracts from the population register, and PHC 2000 and 2011 data.

Algorithm

For residents for whom immigration information is available in the migration files for the years 2012–2021, the later year of arrival is indicated.

If immigration information is not available, but there is an address reported in the population register at the time of arrival from abroad and the date of the procedure, the year of arrival in the country is indicated using the time of the procedure.

For the rest, the year of arrival in the country is determined on the basis of the population register extracts and PHC 2000 and 2011 according to the person's age and the year since which the person has been a resident of Estonia as per the population register or the year of arrival according to previous censuses.

2.14. Locality

Definition

A locality is defined as a built-up area where none of the buildings are separated from its nearest neighbour by more than 200 meters and where there are at least 200 inhabitants. See also Levels of administrative units and spatial data.

Sources

Data source is census characteristic 'place of usual residence'.

Algorithm

A locality is established on the basis of the place of usual residence. With the help of GIS tools and using the spatial coordinates of the usual place of residence, localities are formed in more or less the same way as during PHC 2011.

2.15. Household status

Definition

Household status indicates whether a person belongs to a private household, whether he or she lives with someone, and whether he or she is part of a family nucleus. Among those not in a private household, a distinction is made between persons living in institutional households and the homeless.

	Household status			HST.L.	HST.M.	HST.H.
0.	Total			0.	0.	0.
1.	Persons living in a private household			1.	1.	1.
1.1.		Persons in a family nucleus			1.1.	1.1.
1.2.		Persons not in a family nucleus			1.2.	1.2.
1.2.1.			Living alone			1.2.1.
1.2.2.			Not living alone			1.2.2.
1.3.		Persons living in a private household, but category not stated			1.3.	1.3.
2.	Persons not living in a private household			2.	2.	2.
2.1.		Persons in an institutional household			2.1.	2.1.
2.2.		Persons not living in a private household (incl. homeless persons), but category not stated			2.2.	2.2.

The number of household status breakdowns has been reduced in the 2021 census. The subdivisions of persons in a family nucleus that overlapped with the family status breakdowns have been omitted.

Sources

Data sources for institutional households:

- SKAIS, RR – inhabitants of care homes
- KIR – prisoners
- STAR – inhabitants of substitute homes.

Persons whose place of residence in the population register is a monastery (list from the Ministry of the Interior) were also counted as belonging to an institutional household. In addition to SKAIS data, residential addresses in the population register were used to identify inhabitants of care homes. (Under the new Population Register Act, which entered into force in 2019, social welfare institutions are obliged to register their inhabitants in the population register).

Data on the homeless population were obtained from municipalities.

Algorithm

For the breakdown of private households into family nuclei, see Subchapter 2.16.

2.16. Family status

Definition

Family status indicates a person's role in the family nucleus, and it can be one of the following: partner, parent, or child.

Partners include married couples and couples who live in a consensual union.

Two persons are considered to be partners in a consensual union when they

- belong to the same household,
- have a marriage-like relationship with each other, and
- are not married to each other.

Family status			FST.L.	FST.M.	FST.H.
0.	Total		0.	0.	0.
1.	Partners		1.	1.	1.
	1.1.	Persons in a married couple		1.1.	1.1.
	1.2.	Partners in a consensual union		1.2.	1.2.
2.	Lone parents		2.	2.	2.
3.	Sons/daughters		3.	3.	3.
	3.1.	Not of lone parent		3.1	3.1
	3.2.	Of lone parent		3.2.	3.2.
4.	Not stated		4.	4.	4.
5.	Not applicable – not in a family nucleus		5.	5.	5.

Marriages include those of opposite- and same-sex partners. Estonia does not allow same-sex marriages, but same-sex marriages contracted abroad are recorded in the population register. However, because of the small number of such marriages, spouses of same-sex couples are not listed as a separate category. Consensual union couples include same-sex couples with children where both partners have custody of child(ren).

Registered partnerships are excluded, as partnerships registered in Estonia or abroad are not entered in the population register.

Sources

When subdividing households – identified with the location index – into families, the sex and date of birth of persons, as well as the relationship between individuals (marriage, divorce, child's relationship to the parent) are used. The same set of characteristics is also applied when calculating the census characteristics 'type of family nucleus' and 'type of private household'.

Algorithm

Persons living in the same household are considered to be partners when they

1) are married,
2) have a child together, and
3) are an adult man and woman who are not close relatives and whose age difference is less than 16 years (provided that such a couple is unambiguously established) (Kütt, 2014, 2015).

If the person in the role of child has a partner or own child in the same household, this person is not included in the family nucleus of his or her parent(s).

2.17. Type of family nucleus

Definition

Type of family nucleus describes the structure of a family and the age of children. A distinction is made between families of couples and of lone parents. Family nuclei with children are divided into two types according to whether there are children under 25 in the family.

	Type of family nucleus		TFN.L.	TFN.H.
0.	Total		0.	0.
1.	Married couple families		1.	1.
	1.1.	Without resident children		1.1.
	1.2.	With at least one resident child under 25		1.2.
	1.3.	Youngest resident son/daughter 25 or older		1.3.
2.	Consensual union couple families		2.	2.
	2.1.	Consensual union couples without resident children		2.1.
	2.2.	Consensual union couples with at least one resident child under 25		2.2.
	2.3.	Consensual union couples, youngest resident son/daughter 25 or older		2.3.
3.	Lone father families		3.	3.
	3.1.	Lone father families with at least one resident child under 25		3.1.
	3.2.	Lone father families, youngest resident son/daughter 25 or older		3.2.
4.	Lone mother families		4.	4.
	4.1.	Lone mother families with at least one resident child under 25		4.1.
	4.2.	Lone mother families, youngest resident son/daughter 25 or older		4.2.

Sources

See Subchapter 2.16 Family status.

Algorithm

In order to identify the type of family nucleus, presence of children in the family, age of the youngest child, presence of partners in the family nucleus, marital status, and sex of the lone parent are determined.

2.18. Size of family nucleus

Definition

Size of family nucleus is the number of persons in a family nucleus. A single person does not form a family nucleus, so a family nucleus always consists of at least two people.

	Size of family nucleus		SFN.
0.	Total		0.
1.	2 persons		1.
2.	3 to 5 persons		2.
	2.1.	3 persons	2.1.
	2.2.	4 persons	2.2.
	2.3.	5 persons	2.3.
3.	6 and more persons		3.

	3.1.	6 to 10 persons	3.1.
	3.2.	11 and more persons	3.2.

Sources

Division of persons into family nuclei described in Subchapter 2.16 'Family status'.

Algorithm

The size of family nucleus is directly derived from the breakdown of persons into family nuclei.

2.19. Type of private household

Definition

Type of private household describes the structure of a private household on the basis of families present. Non-family households are divided into one- and multiperson households, and types of family nuclei are distinguished in one-family households.

	Type of private household			TPH.L.	TPH.H.
0.	**Total**			0.	0.
1.	**Non-family households**			1.	1.
	1.1	One-person households		1.1.	1.1.
	1.2	Multiperson households		1.2.	1.2.
2.	**One-family households**			2.	2.
	2.1.	**Couple households**			2.1.
		2.1.1	Couples without resident children		2.1.1.
		2.1.2	Couples with at least one resident child under 25		2.1.2.
		2.1.3	Couples, youngest resident son/daughter 25 or older		2.1.3.
	2.2.	**Lone father households**			2.2.
		2.2.1	Lone father households with at least one resident child under 25		2.2.1.
		2.2.2	Lone father households, youngest resident son/daughter 25 or older		2.2.2.
	2.3.	**Lone mother households**			2.3.
		2.3.1.	Lone mother households with at least one resident child under 25		2.3.1.
		2.3.2.	Lone mother households, youngest resident son/daughter 25 or older		2.3.2.
3.	**Two-or-more-family households**			3.	3.

Sources

See Subchapter 2.16 Family status**.**

Algorithm

The number of family nuclei in a household is determined (see Subchapter 2.16). If there is only one family nucleus, its type is identified (analogous to Subchapter 2.17); in case of a non-family household, the size of household is determined.

2.20. Size of private household

Definition

Size of private household is the number of persons in a private household. A private household may consist of one person.

	Size of private household		SPH.
0.	Total		0.
1.	1 person		1.
2.	2 persons		2.
3.	3 to 5 persons		3.
	3.1.	3 persons	3.1.
	3.2.	4 persons	3.2.
	3.3.	5 persons	3.3.
4.	6 to 10 persons		4.
5.	11 or more persons		5.

Sources

Distribution of persons into private households, calculated with the location index.

Algorithm

The size of a private household is directly derived from the distribution of persons into households.

3. Information about persons (national)

Below is the information on such census characteristics that are compiled at the request of national consumers. Other EU countries are not required to collect these data.

3.1. Ethnic nationality

Definition

Persons had the right to declare themselves as members of the nationality group to which they felt the strongest ethnic and cultural connection. Persons who felt belonging to more than one ethnic nationality chose the one that was most important to them.

Sources

Ethnic nationality is recorded based on data in the population register, PHC 2011, EMSR, and KMAIS.

Algorithm

If a person's ethnic nationality is the same in all three sources (RR, PHC 2011, EMSR), the same in two of them, or recorded in only one of the sources, that ethnic nationality is assigned for the person.

If a different ethnic nationality is recorded for a person is various sources, the person will be assigned the ethnic nationality with the most recent amendment date.

Children (under 18 years of age) – if the ethnic nationality of the child is not indicated in any of the registers, the ethnic nationality of the mother will be assigned to the child.

If ethnic nationality has been entered in KMAIS later than in the last source, or was missing from an earlier source, the ethnic nationality entered in KMAIS will be recorded as the person's ethnic nationality.

3.2. Mother tongue

Definition

Mother tongue is the language acquired in early childhood as the first language; usually the language in which the person is most proficient. If the person's mother tongue was missing, the mother tongue of his or her mother (provided that the father's mother tongue is the same or unknown) will be noted as that person's mother tongue.

Sources

Annual data extractions from the population register since 2005, PHC 2011, EHIS, and KMAIS.

Algorithm

From the data in three sources (RR, PHC 2011, and KMAIS), the language most recently entered in the databases is selected as the person's mother tongue. If data are still missing after that, the mother tongue reported in EHIS are added. And if the mother tongue is not indicated in that register either, the mother tongue of the mother will be recorded as the person's mother tongue (provided that the father's mother tongue is the same or the father has no mother tongue recorded).

3.3. Number of children given birth to

Definition

The number of live births in a woman's lifetime. Adopted children are not taken into account here. This characteristic is noted for women of at least 15 years of age.

Sources

Sources are PHC 2011, PHC 2000, EMSR, population register.

Algorithm

When determining the number of children, three sources are compared, and the highest result is selected:

1. PHC 2011 data showing the woman's number of children as at 31.12.2011, plus the number of children born in the period of 01.01.2012 – 30.12.21 based on the EMSR.
2. To get the total number of children in the EMSR data set, the number of children born most recently is added to the number of children born earlier.
3. Number of children obtained from the child-mother relationship file compiled based on EMSR, PHC 2011, PHC 2000, and population register.

In addition to the number of children given birth to, it must be decided for whom the lack of information on children indicates that there are no children and for whom the number of children is simply unknown. Persons who meet the following conditions are considered as childless.

- Women who declared in the PHC 2011 that they have no children, who have lived continuously in Estonia since the census, and who have no children according to other sources. Permanent residence in Estonia is determined on the basis of the latest extract from the population register.
- Women who have permanently resided in Estonia since the age of 15 and who have no children according to other sources. Permanent residence in Estonia is determined on the basis of the latest extract from the population register, using the same characteristics as in the previous point – the latest age at which the person moved to Estonia must be < 15.
- Women who declared in the PHC 2011 not to have given birth and who were over the childbearing age (women aged 50 and older) at the time of the PHC.
- Women whose childbearing age (15) begins in the year 1990 and who have no children according to various data sets.
- Estonian citizens who have no children according to other sources.

3.4. Age at birth of first child

Definition

Age at birth of first child is calculated for all women aged 15 and over with at least one child.

Sources

Sources are PHC 2011, PHC 2000, EMSR, population register.

Algorithm

A woman's age at the birth of her first child is obtained by subtracting the date of birth of the first child from the date of birth of the mother. Age at birth of first child is calculated for all women aged 15 and over living in Estonia who have given birth and whose number of children is known.

3.5. Secondary place of residence

Definition

Only the secondary place of residence outside the city or rural municipality of a person's usual place of residence was taken into account. The secondary residence may also have been a place not suitable for year-round living (e.g. a summer house). Secondary place of residence was only calculated for persons in a private household. Therefore, inhabitants of care homes and prisoners do not have a secondary residence.

Sources

Secondary residence in a foreign country: TÖR, RR, LTR, TSD.

Secondary residence in Estonia: Elering, ADS, EHIS, usual residences of persons, population of dwellings, links between persons, links between persons and locations, the graph of persons and locations and its breakdown into subgraphs.

Algorithm

The secondary place of residence was one of the following:

Priority of source	Secondary place of residence	Restriction	Location of secondary place of residence
1	Place of stay (RR)	Excl. the Defence Forces	Foreign country and Estonia
2	Place of work (TÖR)		Foreign country
3	School of vocational or higher education student (EHIS)	Full-time student whose usual place of residence is outside the county of study	Estonia
4	Registered place of residence (RR)		Foreign country
5	Additional address (RR)		Foreign country
6	Separated spouse's usual place of residence	Person who has a strong link with spouse's, municipality*, neither spouse has a partner in their household, both spouses belong to a private household, and there is no maintenance dispute between the spouses	Estonia
7	Separated parent's usual place of residence	Child up to 18 years of age living with one parent and the other parent living in a private household, child has a strong link with the separated parent**, and child (a) attends school in the municipality of the separated parent or (b) has a strong link with that municipality*	Estonia
8	Country of nationality of person working in Estonia for short periods of time (LTR)		Foreign country
9	Country from which remuneration was received (TSD)		Foreign country
10	Dwelling to which person or several members of his/her household are attached	Dwelling is in the same subgraph as the household (see Subchapter 2.1 **Error! R eference source not found.**), is part of the population of dwellings, and is not someone's usual place of residence	Foreign country

* The estimated probability that the person resides in this municipality is greater than 0.1.
** The estimated probability that the persons live in the same household is greater than 0.1.

If a person had more than one possible secondary places of residence based on these sources, one of those was selected and the sources higher up in the table were preferred. If there were several possible secondary places of residence linked to the same source (e.g. a person worked in several countries), preference was given to the most recent ones and those for which there was evidence of the longest temporal link.

Where it was not possible to unambiguously associate households and dwellings suitable as a secondary place of residence in the subgraph, preference was given to combinations where the link between persons and dwelling was stronger, and to dwellings with higher electricity consumption and larger floor areas.

3.6. Origin

Definition

Origin refers to the division of Estonia's populace into native and foreign-origin population.

Origin			Explanation
1.	Native population		Permanent residents of Estonia with at least one parent and at least one grandparent born in Estonia
2.	Foreign-origin population		Permanent residents of Estonia who do not belong to the native population. Foreign-origin population has been divided into the first, second and third generation as follows:
	2.1.	first generation of foreign-origin population	Permanent residents of Estonia who and whose parents were born abroad
	2.2.	second generation of foreign-origin population	Permanent residents of Estonia who were born in Estonia but whose parents were born abroad
	2.3.	third generation of foreign-origin population	Permanent residents of Estonia with at least one parent born in Estonia but all grandparents born abroad
3.	Origin unknown		

Sources

The census characteristic 'origin' is constructed by looking at the countries of birth of three generations (the person permanently living in Estonia, his/her parents, and grandparents). The main data source for determining origin is the census characteristic 'country of birth' (see Subchapter 2.4 Country of birth), supplemented, if necessary, with PHC 2011 and PHC 2000 data on the country of birth of the person or that of his/her parents.

Algorithm

As the first step in the compilation of the characteristic of origin, parents and grandparents of the persons in the population are identified, relying on the population register, EMSR, and data from prior censuses. Then, the pre-established census characteristic 'country of birth' is added for the person, his/her parents, and grandparents. If the country of birth remains undetermined, information on the person's own country of birth or that of his/her parents is sought from data collected during the two previous censuses. A person's origin is determined using a combination of the country of birth of the person and that of his/her parents and grandparents as follows:

No	Person's country of birth	Parents' country of birth	Grandparents' country of birth	Origin
1	Estonia	Estonia for at least one parent	Estonia for at least one grandparent	Native population
2	Estonia	Estonia for at least one parent	Foreign country for all grandparents	Third generation
3	Estonia	Estonia for at least one parent	Unknown for all grandparents	Native population
4	Estonia	Foreign country for both parents*	Estonia for at least one grandparent	Second generation

5	Estonia	Foreign country for both parents*	Foreign country for all grandparents	Second generation
6	Estonia	Foreign country for both parents*	Unknown for all grandparents	Second generation
7	Estonia	Unknown for both parents	Estonia for at least one grandparent	Native population
8	Estonia	Unknown for both parents	Foreign country for all grandparents	Third generation
9	Estonia	Unknown for both parents	Unknown for all grandparents	Origin unknown
10	Foreign country	Estonia for at least one parent	Estonia for at least one grandparent	Native population
11	Foreign country	Estonia for at least one parent	Foreign country for all grandparents	Third generation
12	Foreign country	Estonia for at least one parent	Unknown for all grandparents	Native population
13	Foreign country	Foreign country for both parents*	Estonia for at least one grandparent	First generation
14	Foreign country	Foreign country for both parents*	Foreign country for all grandparents	First generation
15	Foreign country	Foreign country for both parents*	Unknown for all grandparents	First generation
16	Foreign country	Unknown for both parents	Estonia for at least one grandparent	Native population
17	Foreign country	Unknown for both parents	Foreign country for all grandparents	Third generation
18	Foreign country	Unknown for both parents	Unknown for all grandparents	Origin unknown
19	Unknown	Estonia for at least one parent	Estonia for at least one grandparent	Native population
20	Unknown	Estonia for at least one parent	Foreign country for all grandparents	Third generation
21	Unknown	Estonia for at least one parent Eesti	Unknown for all grandparents	Native population
22	Unknown	Foreign country for both parents*	Estonia for at least one grandparent	Second generation
23	Unknown	Foreign country for both parents*	Foreign country for all grandparents	Second generation

24	Unknown	Foreign country for both parents*	Unknown for all grandparents	Second generation
25	Unknown	Unknown for both parents	Estonia for at least one grandparent	Origin unknown
26	Unknown	Unknown for both parents	Foreign country for all grandparents	Third generation
27	Unknown	Unknown for both parents	Unknown for all grandparents	Origin unknown

*This includes cases where one parent is foreign-born and the country of birth of the other is unknown.

3.7. Main source of subsistence

Definition

A person's main source of subsistence is the main source of income, monetary or otherwise, of which he/she was dependent in 2021. The main source of subsistence may be:

- wage, salary;
- entrepreneurial income or income from farming;
- pension;
- support, scholarship, benefit;
- other source of subsistence.

For these five sources of subsistence, a person's monetary income is considered. If a person has several sources of subsistence, the one with the higher income is taken into account. A person may also be maintained by other persons or institutions.

Sources

To determine the main source of subsistence, the output of the current activity status processing file, SKA, ETK, HK, TÖR, MKR, KOPIS, SPI, and population register extract of 01.01.2022 are used.

Algorithm

First, based on the information in the various registers, the income received in 2021 is determined for all persons for the following categories: wage, salary; entrepreneurial income or income from farming; pension; support, scholarship, benefit; other source of subsistence. For these five sources of subsistence, a person's monetary income is considered. If a person has several sources of subsistence, the one with the higher income is taken into account.

Second, persons are classified under ’maintained by other persons’ and ‘maintained by an institution’. Anyone under the age of 15 is classified as ‘maintained by other persons’. Persons maintained by the state in substitute homes and care homes are maintained by an institution. Prisoners and conscripts are also designated as ‘maintained by an institution’.

Lastly, persons are assigned a source of subsistence with additional conditions using information on the amount of monetary income, children, spouse, and current activity status as follows:

- For the elderly staying in general care homes, the existence of children and spouses is checked. If one of these family members exists, the elderly person is classified under ’maintained by other persons’.
- For the elderly in general care homes without children or a spouse, the size of a pension is checked. If a pensioner’s annual income exceeds six times the minimum means of subsistence, the elderly

person’s source of subsistence is ‘pension’. However, if the income is below six times the minimum means of subsistence, the person is classified under 'maintained by an institution'.

- In the case of students whose main source of subsistence was initially identified as ’wage, salary’, the amount of income is also considered. If a student's earned income is less than six times the minimum means of subsistence, the student is classified as ’maintained by other persons’.
- The same approach is used for the unemployed. If an unemployed person's income (benefits) is below six times the minimum means of subsistence, the person is classified as ’maintained by other persons’.
- If, as a result of the above processing, there are students whose source of subsistence is not yet known, they are classified under ’maintained by other persons’.
- If there are persons with the current activity status of 'other' whose source of subsistence is unknown, but they have a spouse, they are classified as ’maintained by other persons’.

4. Housing-related characteristics

An overview of the methodologies for calculating census characteristics related to dwellings is given below. First, a summary table shows which sets are included when forming various census characteristics.

Table 5. Subsets of the population of dwellings used in the formation of housing-related characteristics (x indicates that the subset is involved in the formation of the characteristic)

Dwelling characteristic		Collective living quarters	Other housing units	Occupied conventional dwellings	Vacant conventional dwellings
1.3.	Population of dwellings	x	x	x	x
4.1.	Housing arrangements	x	x	x	
4.2.	Tenure status of households		x	x	
4.3.	Type of dwelling	x	x	x	
4.4.	Occupancy status of conventional dwelling			x	x
4.5.	Type of ownership			x	x
4.6.	Number of occupants in dwelling			x	
4.7.	Useful floor space and/or number of rooms of housing unit			x	x
4.8.	Density standard			x	
4.9.	Water supply system			x	x
4.10.	Toilet facilities			x	x
4.11.	Bathing facilities			x	x
4.12.	Type of heating			x	x
4.13.	Dwellings by type of building			x	x
4.14.	Dwellings by period of construction			x	x

4.1. Housing arrangements

Definition

The topic 'Housing arrangements' covers the whole population and refers to the type of housing in which a person usually resides at the moment of census. This covers all persons who are usual residents in different types of living quarters, or who do not have a place of usual residence and stay temporarily in some type of living quarters, or who are roofless, sleeping rough or in emergency shelters, when the census is taken.

Occupants are persons with their usual residence in the places listed in the respective category.

Conventional dwellings are structurally separate and independent premises at fixed locations which are designed for permanent human habitation and are, at the reference date,

(a) used as the usual residence, or

(b) vacant, or

(c) reserved for seasonal or secondary use.

Separate means surrounded by walls and covered by a roof or ceiling so that one or more persons can isolate themselves. 'Independent' means having direct access from a street or a staircase, passage, gallery or grounds.

Other housing units are huts, cabins, shacks, shanties, caravans, houseboats, barns, mills, caves, or any other shelter used for human habitation at the time of the census, irrespective if it was designed for human habitation.

Collective living quarters are premises which are designed for habitation by large groups of individuals or several households and which are used as the usual residence of at least one person at the time of the census.

Occupied conventional dwellings, other housing units and collective living quarters together represent *living quarters*. Any living quarter must be the usual residence of at least one person.

The sum of occupied conventional dwellings and other housing units represents *housing units*.

The *homeless* (persons who are not usual residents in any living quarter category) are persons living in the streets without a shelter that would fall within the scope of living quarters (primary homelessness) or persons moving frequently between temporary accommodation (secondary homelessness).

Housing arrangements			HAR.
0.	Total		0.
1.	Occupants living in a conventional dwelling or in a collective living quarter		1.
	1.1.	Occupants living in a conventional dwelling	1.1.
	1.2.	Occupants living in a collective living quarter	1.2.
2.	Occupants living in an other housing unit and the homeless		2.
3.	Not stated		3.

Sources

Sources are ADS, EHR, census characteristic 'place of usual residence', KIR, SKA, STAR, monasteries, the homeless.

Algorithm

The breakdown of occupied dwellings by housing arrangements is given in the description of the population of dwellings in Subchapter 1.3. The difference is that only occupied dwellings are included here.

4.2. Tenure status of households

Definition

The topic 'Tenure status of households' refers to the arrangements under which a private household occupies all or part of a housing unit.

Households that are in the process of paying off a mortgage on the housing unit in which they live or purchasing their housing unit over time under other financial arrangements are classified under category 'Households of which at least one member is the owner of all or part of the housing unit'.

Households of which at least one member is the owner of the housing unit and at least one member tenant of all or part of the housing unit are also classified under category 'Households of which at least one member is the owner of all or part of the housing unit'.

Tenure status of households		TSH.
0.	Total	0.
1.	Households of which at least one member is the owner of all or part of the housing unit	1.
2.	Households of which at least one member is a tenant of all or part of the housing unit	2.
3.	Households occupying all or part of a housing unit under some other form of tenure	3.
4.	Not stated	4.

Sources

Sources are KR, EHR, census characteristics 'place of usual residence' and 'relations between household members'.

Algorithm

In order to determine the tenure status of households, the KR, EHR, the total census population (place of residence of Estonia's permanent residents, their marital status, and relations between household members) as well as the population of dwellings have been considered.

If the owner of the housing unit resides in the dwelling according to the KR and EHR, the tenure status of household is 'at least one member of the household is the owner of all or part of the housing unit (dwelling)'.

If a close relative or spouse of the owner resides in the dwelling according to the KR, EHR, place of usual residence and the relations between household members, the tenure status of household is 'household occupies all or part of a housing unit under some other form of tenure'.

If the ownership status of the dwelling is unknown, the tenure status of household is 'household occupies all or part of a housing unit under an unspecified form of tenure.

4.3. Type of living quarters

Definition

A living quarter is housing which is the place of usual residence of one or more persons. The terms *conventional dwellings*, *other housing units* and *collective living quarters* are defined as under the topic 'Housing arrangements'.

Type of living quarter		TLQ.
0.	Total	0.
1.	Occupied conventional dwellings	1.
2.	Other housing units	2.
3.	Collective living quarters	3.
4.	Not stated	4.

Sources

Sources are ADS, EHR, census characteristic 'place of usual residence', KIR, SKA, monasteries, the homeless.

Algorithm

The breakdown of occupied dwellings by housing arrangements is given in the description of the population of dwellings in Subchapter 1.3. The difference is that only the occupied dwellings are included here. In section 4.1, persons were counted and here dwellings were enumerated.

4.4. Occupancy status of conventional dwellings

Definition

Occupied conventional dwellings are conventional dwellings which are the usual residence of one or more persons at the time of the census.

Vacant conventional dwellings are conventional dwellings which are not the usual residence of any person at the time of the census.

Dwellings reserved for seasonal or secondary use, vacant dwellings, as well as conventional dwellings with persons present but not included in the census are classified under the category 'Vacant conventional dwellings'.

Occupancy status of conventional dwellings		OCS.
0.	Total	0.
1.	Occupied conventional dwellings	1.

2.	Vacant conventional dwellings	2.
3.	Not stated	3.

Sources

Sources are census characteristic 'place of usual residence' and ADS.

Algorithm

Conventional dwellings are formed on the basis of ADS, see Subchapter 1.3. A dwelling in which at least one person lives according to the characteristic 'place of usual residence' is considered to be occupied. If nobody lives in a dwelling, it is considered to be vacant. 'Not stated' is not used.

4.5. Type of ownership

Definition

The topic 'Type of ownership' refers to the ownership of the dwelling and not to that of the land on which the dwelling stands. It is intended to show the tenure arrangements under which the dwelling is occupied.

Owner-occupied dwellings are those where at least one occupant of the dwelling owns parts or the whole of the dwelling.

Rented dwellings are those where at least one occupant pays a rent for the occupation of the dwelling, and where no occupant owns parts or the whole of the dwelling.

Vacant conventional dwellings are classified under 'Not applicable'.

Type of ownership		OWS.
0.	Total	0.
1.	Owner-occupied dwellings	1.
2.	Rented dwellings	2.
3.	Dwellings in other types of ownership	3.
4.	Not stated	4.
5.	Not applicable	5.

Sources

Sources are KR, EHR, census characteristics 'place of usual residence' and 'relations between household members'.

Algorithm

The same algorithm as in Subchapter 4.2. 'Tenure status of households', but all conventional dwellings are counted here.

4.6. Number of occupants

Definition

Number of occupants of a housing unit is the number of people for whom the housing unit is the place of usual residence.

Number of occupants			NOC.
0.	Total		0.
1.	1 person		1.
2.	2 persons		2.
3.	3 to 5 persons		3.
	3.1.	3 persons	3.1.

	3.2.	4 persons		3.2.
	3.3.	5 persons		3.3.
4.		6 and more persons		4.
	4.1.		6 to 10 persons	4.1.
		4.1.1.	6 persons	4.1.1.
		4.1.2.	7 persons	4.1.2.
		4.1.3.	8 persons	4.1.3.
		4.1.4.	9 persons	4.1.4.
		4.1.5.	10 persons	4.1.5.
	4.2.	11 or more persons		4.2.

Sources

Census characteristics 'usual place of residence' and 'type of dwelling'.

Algorithm

Calculated for all occupied dwellings to find out how many people live there permanently.

4.7. Useful floor space and/or number of rooms of housing units

Definition

Useful floor space is defined as:

— the floor space measured inside the outer walls excluding non-habitable cellars and attics and, in multi-dwelling buildings, all common spaces; or

— the total floor space of rooms falling under the concept of *room*.

Room is a space in a housing unit enclosed by walls reaching from the floor to the ceiling or roof, of a size large enough to hold a bed for an adult (at least 4 m^2) and at least 2 metres high over the major area of the ceiling.

The characteristic has two components: *useful* floor space and *number of rooms.*

Useful floor space		UFS.
0.	Total	0.
1.	Less than 30 m^2	1.
2.	30 to less than 40 m^2	2.
3.	40 to less than 50 m^2	3.
4.	50 to less than 60 m^2	4.
5.	60 to less than 80 m^2	5.
6.	80 to less than 100 m^2	6.
7.	100 to less than 120 m^2	7.
8.	120 to less than 150 m^2	8.
9.	150 m^2 and over	9.
10.	Not stated	10.

Number of rooms		NOR.
0.	Total	0.
1.	1 room	1.
2.	2 rooms	2.
3.	3 rooms	3.
4.	4 rooms	4.
5.	5 rooms	5.
6.	6 rooms	6.
7.	7 rooms	7.
8.	8 rooms	8.
9.	9 or more rooms	9.
10.	Not stated	10.

Sources

Sources are EHR and PHC 2011.

Algorithm

The useful floor space and number of rooms of housing unit are based on EHR data. Where EHR data is missing, PHC 2011 data have been added. If no data were available in these two sources, the number of rooms is indicated as 'Not stated'.

4.8. Density standard

Definition

The topic 'Density standard' relates the useful floor space in square meters or the number of rooms to the number of occupants, as specified under the topic 'Number of occupants'. Member States report on the density standard measured by the 'useful floor space', or, if not possible, by the 'number of rooms'.

This characteristic has two components: *useful floor space* and *number of rooms*.

Density standard (useful floor space)		DFS.
0.	Total	0.
1.	Less than 10 m^2 per occupant	1.
2.	10 to less than 15 m^2 per occupant	2.
3.	15 to less than 20 m^2 per occupant	3.
4.	20 to less than 30 m^2 per occupant	4.
5.	30 to less than 40 m^2 per occupant	5.
6.	40 to less than 60 m^2 per occupant	6.
7.	60 to less than 80 m^2 per occupant	7.
8.	80 m^2 and over per occupant	8.
9.	Not stated	9.

Density standard (number of rooms)		DRM.
0.	Total	0.
1.	Less than 0.5 rooms per occupant	1.

2.	0.5 to less than 1 room per occupant	2.
3.	1 to less than 1.25 rooms per occupant	3.
4.	1.25 to less than 1.5 rooms per occupant	4.
5.	1.5 to less than 2 rooms per occupant	5.
6.	2 to less than 2.5 rooms per occupant	6.
7.	2.5 to less than 3 rooms per occupant	7.
8.	3 and more rooms per occupant	8.
9.	Not stated	9.

Sources

Census characteristics 'usual place of residence' and 'useful floor space' or 'number of rooms'.

Algorithm

Density standard is obtained by dividing the useful floor space of the dwelling by the number of people living in the dwelling. In the latter case, the number of rooms is divided by the number of occupants.

4.9. Water supply system

Definition

The topic 'Water supply system' breaks down dwellings according to whether or not the dwelling has piped water.

Water supply system		WSS.
0.	Total	0.
1.	Piped water in conventional dwelling	1.
2.	No piped water in conventional dwelling	2.
3.	Not stated	3.

Sources

Sources are EHR and PHC 2011.

Algorithm

First, information from the EHR is added and if the data there were insufficient, PHC 2011 data are used. The next step is to check the availability of piped water in blocks of flats.

- If the availability of piped water is unknown for some of the flats in a building, and piped water is known to be either available or unavailable in all the other flats, the value 'unknown' is replaced with the value of other flats. It is assumed that all the flats in the building either have or don't have piped water.
- If the availability of piped water is unknown for some of the flats in a building, and piped water is known to be either available or unavailable in the other flats, the share of flats with available piped water among the flats for which information on piped water is available is calculated. If piped water is available in more than 70% of the flats, piped water is recorded as available also for the flats with the missing value. If piped water is not available in more than 70% of the flats, piped water is recorded as unavailable also for the flats with the missing value.

4.10. Toilet facilities

Definition

The topic 'Toilet facilities' breaks down dwellings by the availability of a flush toilet.

Toilet facilities		TOI.
0.	Total	0.
1.	Flush toilet in conventional dwelling	1.
2.	No flush toilet in conventional dwelling	2.
3.	Not stated	3.

Sources

Sources are EHR and PHC 2011.

Algorithm

First, information from the EHR is added and if the data there were insufficient, PHC 2011 data is used. The next step is to check the availability of a flush toilet in blocks of flats.

- If the availability of a flush toilet is unknown for some of the flats in a building, and a flush toilet is known to be either available or unavailable in the other flats, the value 'unknown' is replaced with the value of other flats. It is assumed that all the flats in the building either have or don't have a flush toilet.
- If the availability of a flush toilet is unknown for some of the flats in a building, and a flush toilet is known to be either available or unavailable in the other flats, the share of flats with an available flush toilet among the flats for which information on flush toilet is available is calculated. If a flush toilet is available in more than 70% of the flats, flush toilet is recorded as available also for the flats with the missing value. If a flush toilet is not available in more than 70% of the flats, flush toilet is recorded as unavailable also for the flats with the missing value.

4.11. Bathing facilities

Definition

A bathing facility is any facility designed to wash the whole body and includes shower facilities. The key question is whether or not the conventional dwelling has a has a fixed bath or shower.

Bathing facilities		BAT.
0.	Total	0.
1.	Fixed bath or shower in conventional dwelling	1.
2.	No fixed bath or shower in conventional dwelling	2.
3.	Not stated	3.

Sources

Sources are EHR and PHC 2011.

Algorithm

First, information from the EHR is added and if the data there were insufficient, PHC 2011 data are used. The next step is to check the availability of bathing facilities in blocks of flats.

- If the availability of bathing facilities is unknown for some of the flats in a building, and bathing facilities are known to be either available or unavailable in the other flats, the value 'unknown' is replaced with the value of other flats. It is assumed that all the flats in the building either have or don't have bathing facilities.
- If the availability of bathing facilities is unknown for some of the flats in a building, and bathing facilities are known to be either available or unavailable in the other flats, the share of flats with available bathing facilities among the flats for which information on bathing facilities is available is calculated. If bathing facilities are available in more than 70% of the flats, bathing facilities are recorded as available also for the flats with the missing value. If bathing facilities are not available in more than 70% of the flats, bathing facilities are recorded as unavailable also for the flats with the missing value.

In Estonia, bathing facilities are recorded as available if there is a sauna in the dwelling, in the building, or on the property.

4.12. Type of heating

Definition

Conventional dwelling is considered as centrally heated if heating is provided either from a community heating centre or from an installation built in the building or in the conventional dwelling, established for heating purposes, without regard to the source of energy.

	Type of heating	TOH.
0.	Total	0.
1.	Central heating in conventional dwelling	1.
2.	No central heating in conventional dwelling	2.
3.	Not stated	3.

Sources

Data sources are EHR and PHC 2011.

Algorithm

First, information from the EHR is added and if the data there were insufficient, PHC 2011 data are used. The next step is to check the availability of central heating in blocks of flats.

- If the availability of central heating is unknown for some of the flats in a building, and central heating is known to be either available or unavailable in the other flats, the value 'unknown' is replaced according to whether or not central heating is available. It is assumed that all the flats in the building either have or don't have central heating.
- If the availability of central heating is unknown for some of the flats in the building, and central heating is known to be either available or unavailable in the other flats, the share of flats with available central heating among the flats for which information on central heating is available is calculated. If central heating is available in more than 70% of the flats, central heating is recorded as available also for the flats with the missing value. If central heating is not available in more than 70% of the flats, central heating is recorded as unavailable also for the flats with the missing value.

4.13. Dwellings by type of building

Definition

The topic 'Dwellings by type of building' refers to the number of dwellings in the building in which the dwelling is placed.

	Dwellings by type of building		TOB.
0.	Total		0.
1.	Conventional dwellings in residential buildings		1.
	1.1.	Conventional dwellings in 1-flat residential buildings	1.1.
	1.2.	Conventional dwellings in 2-flat residential buildings	1.2.
	1.3.	Conventional dwellings in residential buildings with 3 or more flats	1.3.
2.	Conventional dwellings in non-residential buildings		2.
3.	Not stated		3.

Sources

Census characteristic 'type of dwelling' and ADS.

Algorithm

Conventional dwellings are broken down by the number of flats and the type of address object identifier.

4.14. Dwellings by period of construction

Definition

The topic ‘Dwellings by period of construction’ refers to the year when the building in which the dwelling is placed was completed.

When forming this characteristic, it is necessary to identify the period in which the building was constructed. Date ranges have been given.

Dwellings by period of construction		POC.
0.	Total	0.
1.	Before 1919	1.
2.	1919–1945	2.
3.	1946–1960	3.
4.	1961–1980	4.
5.	1981–2000	5.
6.	2001–2010	6.
7.	2011–2015	7.
8.	2016 and later	8.
9.	Not stated	9.

Sources

Sources are EHR and PHC 2011.

Algorithm

First, information from the EHR is added and if the data there were insufficient, PHC 2011 data are used. In the PHC 2011 data, the year of construction is given as a period and therefore a period average is used.

References

Kütt, K. (2014). Households and families in the register-based census. University of Tartu. Available in Estonian at http://dspace.ut.ee/bitstream/handle/10062/42537/kutt_kairiin_msc_2014.pdf.

Kütt, K (2015). Households and families in the register-based census. *Quarterly Bulletin of Statistics Estonia, 1*, pp. 148–155. Available at https://www.stat.ee/sites/default/files/2020-07/Kvartalikiri_1-15.pdf

European Commission. Commission Implementing Regulation (EU) 2017/543. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32017R0543&from=EN

Statistics Estonia (2017). Report on the first trial census of the register-based population and housing census (REGREL). Available in Estonian at https://www.stat.ee/sites/default/files/2021-10/REGREL%20esimese%20prooviloenduse%20raport.pdf

Tiit, E.-M., Maasing, E. (2016). Residency index and its applications in censuses and population statistics. *Quarterly Bulletin of Statistics Estonia, 3*, pp. 53–60. Available at https://www.stat.ee/sites/default/files/2020-07/kvartalikiri_3-2016.pdf

Tiit, E.-M., Visk, H., Levenko, V. (2018). Partnership index. *Quarterly Bulletin of Statistics Estonia*, *1*, pp. 29–41. Available in Estonian at https://www.stat.ee/sites/default/files/2020-07/Kvartalikiri_1_18_EST.pdf

Tiit, E.-M., Vähi, M., Kool, P. (2018). Estimating the number of stationary and transnational Estonians. In Estonian. *Akadeemia*, *2*, pp. 231–253.

Tiit, E.-M., Visk, H., Maasing, E., Levenko, V. & Lehto, K. (2021). Another population and housing census: why and how? In Estonian. *Akadeemia*, 33(11), pp. 2009–2064.

Visk, H. (2019). An index-based approach to determine partnership in a register-based census. Statistical Journal of the IAOS, 35(2), pp. 245–251. Available at https://doi.org/10.3233/SJI-180484.

Visk, H., Lehto, K. (2019). Constructing families using administrative registers. Available at https://www.tilastokeskus.fi/static/media/uploads/ajk_en/Events/nsm2019/visk_-_constructing_families_using_administrative_registers.pdf

Äär, H. (2017). Coincidence of actual place of residence with population register records. *Quarterly Bulletin of Statistics Estonia, 1*, pp. 80–83. Available at https://www.stat.ee/sites/default/files/2020-07/Kvartalikiri_1_17.pdf