

*RITA Mobiilne elu – mobiilne eluviis, avalike teenuste tarbimine ja
elukohaandmed riiklikes registrites*

Administratiivse elukoha täpsus ja selle jälgimine Euroopa riikides:
Belgia, Taani, Soome, Norra, Rootsi ja Holland
Rahvusvahelise kogemuse õppetunnid Eestile süsteemi täiustamiseks

Aruanne

Accuracy of administrative place of residence and its monitoring
in European countries: Belgium, Denmark, Finland, Norway,
Sweden and The Netherland
Lessons from international experience to improve the system in Estonia

Report

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EXECUTIVE SUMMARY and RECOMMENDATIONS

Aim of the report

This report presents an overview on the assessment of the accuracy of the registered place of residence in selected countries with a continuous population registration system. Considering the need for improved accuracy in the data registered in the Estonian Population Register, the report presents the experience of countries where the accuracy is proved to be high. Based on these investigations, recommendations are proposed for improving the registration of inhabitants of Estonia at their usual place of residence.

The identification of the usual place of residence

The usual place of residence is the place where the person spends most of his/her daily period of rest (article 2 of the EU Regulation N°862/2007). On a qualitative viewpoint, this is the dwelling where he/she feels being 'at home' and where he/she keeps most personal belongings, a place that might be considered as a *de facto* place of residence.

The importance of an accurate registration of the place of residence

In reality, the place of a person's administrative place of residence is not always identical with the place of usual residence. The administrative place of residence is a broader concept in which a person is linked to a given local administrative unit for all duties and rights managed at the local level. Therefore, for an optimal management of the multiple relationships between an individual and local administrative authorities, the registered place of residence should be identical to the usual place of residence as defined above.

The accuracy of the registration of the place of residence in Estonia

Several analyses demonstrate that the accuracy of the registration of the administrative place of residence relative to the usual place of residence is largely unsatisfactory in Estonia. Within the preparation of the forthcoming register-based census, it was found that the administrative place of residence (address) differed from the *de facto* place of usual residence in more than 20 % of the cases. According to our knowledge, in Estonia, the sole responsible for the accuracy of the registered place of residence is the person him/herself whereas registration authorities execute only minimum control during the procedure.

The situation observed in other countries with similar population registration system

A careful assessment of the situation in six European countries is presented in this report on the base of interviews and examination of their administrative reports. All countries involved considered the accuracy of the address of residence and the reliability of information recorded in the population registration system as priorities to ensure an optimal management of matters related to the population. In all countries

under investigation, the registration of the administrative address is considered satisfactory. This is the main reason why no specific investigation about the accuracy of residence registration is at overall level was carried out in two countries. In these countries, individual controls are performed in problematic cases only. In the four other countries, the accuracy of the registered address is assessed either through sample surveys or by confrontation with other administrative registers. Despite the fact that the methodologies used were different, the results publicly disseminated by these countries show a similar level of inaccuracy of about 5%.

The reasons invoked to declare an administrative place of residence that is not the usual place of residence

The main reasons for inaccuracy are often linked to the existence of various advantages or disadvantages associated with registration in a given municipality for both the individual or the municipality concerned.

For an individual the choice of the administrative place of residence may be conditioned by multiple reasons, most of them having a financial dimension. A large part of the inaccuracy arises from the non-declaration of a change of residence in absence of strict rules and systematic control. Persons occupying a new dwelling but keeping the possibility to reoccupy the previous one (e.g. because it is still their property) often do not report their change of residence. Less frequently, it happens that for personal reasons, individuals may report a change of residence that does occur in reality.

For a municipality, there can be an interest, also often for financial reasons, to attract people to be registered in their territory. Also, they may not always be willing to deregister persons who have left for abroad. There is a saying that a municipality with growing number of population is a flourishing one. Therefore most local stakeholders are proud to announce that the population of their municipality became larger. However, the paradox is that while municipalities want to see their population growing the total population of the country does not increase, except by immigration of foreigners who are not always welcome in these municipalities.

Recommendations for policy development in Estonia

For an optimal use of the population registration system, the administrative place of registration should coincide with the **usual place of residence**. As such, the person may be easily contacted and the services provided by the municipality may be planned according to the actual size of the resident population. The following recommendations are derived from the existing management practices and conditions created to ensure the accuracy of the registration of the administrative residence in the six investigated countries.

Strong recommendations

1. The basic element needed to ensure the accuracy of the registered address, is the existence of a **precise address** of each dwelling. Such **cadaster** should include all flats in large apartment-buildings and each house or farmhouse in the countryside. Each dwelling should have a unique **postal address**. Fictitious postal addresses or postboxes not linked to dwellings should be avoided. Using **postal address** as administrative address for communication

with local and governmental authorities is a strong incentive for a person to inform authorities about his/her actual place of residence.

2. In countries where the population registration system is implemented, a **precise definition of the (usual) place of residence** is provided by Law, with the obligation to register this place as the administrative place of residence. We recommend to review the current legislation for population register and consider the need to introduce therein a precise definition of the place of residence for the purpose of the population registration as well as the rules for the reporting changes of residence. Such rules normally include the number of days as maximum delay for the declaration and the duration of temporary stay or absence that does not oblige declaration. Concrete rules should apply in case of multi-residences and provide the conditions used to determine which place of residence that should be regarded as the principal and registered as administrative place of residence. The legislation should also foresee sanctions (fines) for non-declaration or divergence of the administrative place of residence relative to the usual one.
3. Accuracy of residence registration should be a shared responsibility of the person concerned and the authority in charge of the population registration.

Medium recommendations

4. The concept of the place of residence in the registration system should be associated with **the concept of household** defined as the group of family-related or not family-related persons living together in the same dwelling. Determining the person of reference in the household may be useful as it helps authorities to better communicate information on urgent matters. It also strengthens the sense of responsibility to accurately register household members.
5. The change of residence may concern some members of a given household but not all of them or, alternatively, all members of the household. Accordingly, any investigation would distinguish individual mobility and household mobility with different consequences in term of availability of the dwelling. Two situations should be avoided: (i) two or more households occupying a given dwelling with the same postal address or (ii) some members of a given household being registered in a different postal address compared to the address of the person of reference of the household.
6. A **report from the local police** is a key element that confirms the change of residence in some countries with population registration system. The change of administrative place of residence is considered completed after this confirmation. However, it is not a standard procedure used in all countries with population registration system.
7. The registration authority **checks** if the person is de facto living at the declared place of residence; it also identifies the relationship between occupants of the same dwelling. When a person declares a change of administrative place of residence to live in a dwelling already occupied by other persons, the authorization of the latter should be needed except if the family link is not evident as for children, spouse or parents. Errors of registration can be identified when a new household wants to register in a dwelling wherefrom the previous one has not de-registered.

8. As in some other countries, we recommend that the updating of the population register should be managed at municipality level and the change of administrative place of residence between two different municipalities should be agreed by both as a real change in a manner defined by the rules.
9. Large media campaigns should be organized to encourage people to register their changes of residence and explain the advantages of being officially registered relative to living de facto without registration.
10. We recommend to investigate carefully all advantages or disadvantages that a person may have by (i) not being registered administratively where he/she lives usually (ii) not declaring a de facto change of usual residence (iii) declaring in the register a de facto change of usual residence.
11. On the basis of our observation and the interviews conducted in the context of this project, we suggest a list of situations to be associated with advantages or disadvantages with administrative place of residence in a given municipality.
 - There are some restrictions of services linked to where a person living – it may be that he/she cannot receive new documents (ID card, driving licenses etc.) from any other place except your municipality of residence.
 - Additional local tax on income, goods or companies may vary between municipalities, an aspect associated with the wish of a given municipality to be more attractive to people and businesses.
 - Person might pay less tax if registered in a property corresponding to his/her usual place of residence compared to what should be paid for any secondary place of residence.
 - At least somebody from the household must have registered in a dwelling to profit from the service of trash collection.
 - Some taxes/advantages might be linked to the type of household, more specifically differences might exist depending on whether a person is living alone or with others.
 - Public transportation may be free of charge for residents of the concerned municipality and not for others.
 - Students are registered with family. University students might not be allowed to register out of their household until they do not prove that has independent income.
 - Some funds for students provide stipend based on registration in a particular municipality whereas some municipalities may propose several specific advantages to attract students and register them as usual residents.
 - Some support to people in need might be provided by some municipalities and not others (e.g. minimal income, occasional lump sum, support for electricity and water consumption, food supply, unemployment allowance, education costs, health costs)...
 - Having the right to vote, having free access to municipal services (e.g. kindergarten, health services, libraries, sport facilities, cultural centres, access to school/preschool) all these services provided by the municipality might be accessible only to those registered in the municipality.

Additional recommendations for systematic checking of the accuracy of the residence registration

12. There are different situations in which the accuracy of the population registration system may be addressed:

- at the time of the declaration of a change of usual place of residence, by checking the address and the composition of the household involved;
- in the case of problems associated with a given person or dwelling occupied;
- in case of undelivered/returned mail originated from the administration, with the indication that the person concerned do not live anymore at that specific address;
- in case of a person selected for a statistical survey is not found on the field by the interviewer.

Report

1. Introduction

The aim of this report is to present the experience of countries with advanced population registration systems used to monitor the accuracy of administrative data on the place of residence. To achieve this aim we selected six countries with long history in administrative population registration. These are, by alphabetic order, Belgium, Denmark, Finland, Norway, Sweden and The Netherlands.

In these six countries surveyed, the reliability of information recorded in the population registration system is a priority. Compared to the registration of births, marriages, divorces and deaths, registration of migrations or changes of residence presents the lowest level of accuracy. As a change of residence is usually self-reported, the risk of error is larger compared to the registration of vital events that are recorded by civil registrars.

There are three main sources of errors:

- (i) non-declaration of change of residence;
- (ii) declaration of false (fictitious) change of residence;
- (iii) other errors in the registration of the change of residence.

All countries involved in the investigation considered the accuracy of the address of residence as crucial to ensure an optimal management of matters related to the population. Large number of accesses to individual-level register data occurring on a regular basis give ample possibilities to check the accuracy of the data. As an example, there are more than 100 million inquiries on a yearly basis in Belgium. This is the main reason why no specific investigation at overall level was carried out in Belgium but also in Denmark where individual controls are performed in problematic cases only. In both countries the accuracy of administrative place of residence is considered satisfactory.

In the four other countries, the accuracy of the registered address has been assessed, either through a special sample surveys or by confrontation with other administrative registers. Over time, the task of assessing the accuracy of the population register has been transferred from authorities running the population register to national statistical offices. Despite the fact that the methodology used is different, the results of assessments publicly disseminated show a fairly similar level of inaccuracy of about 5%. This means that in each of these countries, several hundred thousand of people have a registered place of residence that is different from their de facto place of residence where they actually live and spend most of their daily periods of rest. However, through personal communication with our contact persons, the number of mails addressed to sampled households in statistical surveys, returned with indication 'unknown' or 'living no longer in this address', is large enough to consider that the problem of incomplete registration has not disappeared.

2. Population registration system and place of usual residence

The population registration system is based on two important concepts: the **household** and **place of residence**. In most European countries where such system exists, it is computerized and continuously updated by changes in household composition and place of residence. These changes are generally self-reported by individuals who follow certain regulations. The place of residence is usually identified by a postal address or a cadaster reference number.

Because of non-reporting a change of residence or declaring a fictitious change of residence and the weakness of administrative control procedures, the registered administrative place of residence might be different from the usual place of residence. Such situations are problematic in modern societies as various rights and obligations of individuals are linked to their place of administrative residence. Moreover, local administrations are connected to their population through a wide panel of services, allowances, taxes, various other obligations and benefits. Last but not least, statistical population estimates at local level should present an accurate portrait of the resident population to provide a reliable information support for policy development at local level.

Considering the need for more accuracy in the data registered in the Population Register of Estonia, this report presents and analyses the experience of countries with developed administrative population register systems. Based on these investigations, recommendations will be proposed in the report for improving the population registration in Estonia regarding the place of usual residence. Six countries with long tradition in population registration system were selected and contacts were established with national statistical institutions: Finland, Sweden, Norway, Denmark, The Netherlands and Belgium. In four of them, statistical approaches were developed to assess the accuracy of the data registered in the population registration system and more specifically on the accuracy of the address of the place of residence and the composition of households. This report discusses their results and compares the level of accuracy across countries. Among the six countries, Belgium and Denmark did not carry out any kind of special investigation to assess the accuracy of their population register but fortunately a special study (Master thesis) was devoted to the topic in Belgium.

Increasing number of countries, mostly in Europe, run continuous population registration systems for administrative purposes. Originally kept on paper in numerous registers renewed at every census by local authorities, the systems have been digitalized and centralised at national level even if continuous updating of the registers remains in most countries under the responsibility of local municipalities. For historical reasons, some countries like France, Ireland and the United Kingdom have decided not to introduce a population registration system even if supportive arguments have been voiced from time to time in these countries.

The civil registration system records births, deaths, marriages, divorces i.e demographic events that determine the civil or marital status of individuals. This system is operational worldwide and is nowadays digitalized and centralized at national level in most of countries of Europe.

The population registration system also records the events recorded in the civil registration system. Yet the main difference between civil registration system and population registration system concerns the information about the place of residence and the continuous updating of the latter. To develop a population registration system some concepts were introduced already in the first part of the XIX century. The most important is the concept of residence that is close to the one of domicile. The place of residence is the postal address or cadaster unit where a given person lives with the distinction between the usual place of residence and a temporary place of residence, the first being qualified as permanent place of residence in some country.

According to the article 2 of the EU Regulation N° 62/2007, *the usual place of residence is the place at which a person normally spends the daily period of rest, regardless of temporary absences for purposes of recreation, holiday, visits to friends and relatives, business, medical treatment or religious pilgrimage or, in default, the place of legal or registered residence.*

Distinctly the UNECE 2020 Census Recommendations defined, in articles 392 and 393, the *'place of usual residence' as the geographic place where the enumerated person usually spends his/her daily rest, assessed over a defined period of time including the census reference time. The population base to be used for international comparisons purposes is the 'usually resident population'. The 'usually resident population' of a country is composed of those persons who have their place of usual residence in the country at the census reference time and have lived, or intend to live, there for a continuous period of time of at least 12 months. A 'continuous period of time' means that absences (from the country of usual residence) whose durations are shorter than 12 months do not affect the country of usual residence.*

According to these UNECE recommendations, countries are allowed to use administrative place of residence as place of usual residence. However, the situation is not comparable and registration systems existing in most of the EU countries use different definitions as to the administrative place of residence where a person should be registered:

- **Place of registration:** this is the broader concept where a person is linked to a given local administrative unit for all duties and rights managed at local level. To register, the proof of actual residence in a specific dwelling is not required.
- **Place of legal residence or domicile:** this concept is used in legal matters and related to the civil code. The domicile may be different from the place of administrative registration as well as from the place of usual residence. This concept is not used in the EU member states in the population registration system..
- **Place of principal residence and place of secondary residence:** if multiple places of residence are allowed in the population registration system, the person has to specify which is his/ her principal place of residence (according to rules about the duration of stay in each place of residence and in some

cases the size of the population in the different local administrations concerned). However, the choice is often based on self-declaration, and in this context the differences in taxation and other concrete local advantages are often the deciding factor.

- **Place of permanent residence and place of temporary residence:** if somebody changes his or her place of residence for a short period of time and retains the possibility of returning to live in the previous place of residence, the latter is defined the permanent place of residence while the former is considered a temporary place of residence. Both permanent and temporary residence can be included in the population registration system and links exist in the person's record with both local administrations. All changes of residence, both permanent and temporary, have to be declared. The concepts of permanent and temporary residences exist in most of the newer EU member states and the situation is inherited from the past, when the place of permanent residence was considered as the place where the person had the right to live and an internal passport attested this fact.

The registration of the place of residence does not imply that the exact address of the concerned person is recorded in the population registration system, just the local administration where the person is registered is needed. The registration of the exact address requires the capacity to identify and record all addresses of dwellings in the register and the obligation to declare all changes of address not only between different municipalities but also within the same municipality. Only in case the personal identification at the exact place residence (address) of each individual is recorded and updated, the population registration system can be called a **population register**.

However, the place of administrative residence in the population register is not necessarily the place of usual residence. The place of administrative residence is a broader concept which links a person to a given local administrative unit. To get access to services provided at local level, every person has to be registered in a administrative unit. When a change of place of administrative register is registered it is not always a requirement to prove that the concrete dwelling (address) declared by the person is his/her usual place of residence. Hence the place of administrative residence may differs from the place of usual residence, for reasons that may be financial, practical or simply sentimental. An administrative register employing only the broad concept of place of administrative residence should not be considered population register in a strict sense, as a population register should include information about the place of usual residence and record all changes of addresses. However, no EU member state running a population register follows this strict rule; they all employ a concept of place of administrative residence which is more or less close to the place of usual residence.

Depending on national practices, the administrative place of residence used in the population register may be either:

- (i) **just an address of administrative convenience or even a postal address so that the local or national authorities will have the possibility to contact a person;**
- (ii) **the address of a dwelling in which the reference person of the household knows where you may be contacted in person;**

- (iii) the address of the dwelling where a person is de facto spending most of his/her daily periods of rest following the EU and UN definition of the place of usual residence.**

To ensure an optimal cooperation between local administration and residents and to be able to provide reliable population information for decision-making, the third situation should be preferred.

3. Evidence obtained from individual countries

The following sections of the report detail the investigations carried out in the selected countries to assess the reliability of their population registration system with the focus on the accuracy of the place of usual residence.

3.1. Belgium

Contact person: Patrick Lusyne, STATBEL

I had two virtual meetings with Patrick Lusyne who is in charge of the demographic statistics in STATBEL and another person in charge of social surveys. The final information received by email on November 10 that is attached hereunder confirms that STATBEL is interested in investigating the accuracy of addresses in the Population Register but has neither time nor money to do this investigation. Moreover, there is no official request from the Ministry of Interior and the Population Register to carry out such an investigation.

“Since my time in the surveys (10 years ago now), they have standardized the contact sheet for surveys. Unfortunately, there is nothing in it to identify whether people live elsewhere than where they live. I also think that people in this case will not be found - and will therefore simply fall into the non-contacted category”.

From an academic perspective, I investigated the question in a context of the scientific support given to the Municipality of Namur (Capital-city of Wallonia, 110.000 inhabitants).

With the support of the local police a survey was performed in 1995 and the results were analyzed in the framework of a Master Thesis in Demography:

LALLEMAND Claire (1996). *Analyse comparative de la situation de droit et de fait des ménages namurois*, Thèse de Maîtrise en Démographie, Institut de Démographie, Université catholique de Louvain, Belgique, 68 pp.

A scientific investigation has been carried out in 1995 in the city of Namur to assess the reliability of the administrative address and the household composition. The survey was based on a stratified sample to ensure that some types of households where more problems were expected will be well considered. These groups were (i) person aged 65 years and over who live alone (ii) household including at least one child aged between 18 and 29 years (iii) one parent households, either lone father or lone mother with children (iv) Unmarried couples with or without children. In total, 426 households identified in the PR were visited. For 284 of these, the composition of the entire HH was reported whereas in 140 only the person of reference was checked. For the latter, the person of reference was correct in all cases. For 239 out of 284 HH, the composition of the HH was exact as registered. For 24 (8.5%), the HH was similar but some difference appeared in the composition and 21 HH (7.4%) were fully different HH. When extrapolated to the whole population, 91,8, show an exact HH composition, 4.6% show a different composition and 3.6% did not exist anymore. Considering the types of HH mentioned above, it appears that 22.5% of single person HH aged 65+ are not living alone de facto. For HH with children aged 18 to 29, 6.1% show differences in the composition because of departure or return of a child. For one-parent HH, 12.2 % on men and 11.6% of women live with a partner

that is not registered as member of the HH. In administratively non-married couples, the HH composition differs in 9.8% of the cases for various reasons.

A special investigation was undertaken for buildings identified as potentially problematic in terms of administrative registration. The criteria to identify these dwellings were the following:

At least two different dwellings have been identified between 1990 and 1995, one of these being suppressed or added during that period. It may be that in case of change of renter, the address has been changed and was different from the previous one.

Among the 8352 'problematic' buildings,

- 6156 buildings were found as registered administratively (440 were 2 HH living in the same dwelling, 431 were empty buildings as registered and 242 were commercial buildings as registered;
- for 493 buildings, the person of reference was not found but was registered in the PR;
- for 1186 buildings, the PR was found to be different from the registered one;
- for 167 buildings, two HH are living therein but only one is registered;
- and for the remaining 337 + 13 buildings it was not possible to check the situation.

The stratified sample survey included 382 visits of which 21 were non-contacts. Among the 361 visited households, 39 were partial and the PR was only checked.

For 'problematic' buildings, 87.6% showed identical situation with the registered one, 5.7% showed differences in household composition and 6.6% had the new HH not registered in the dwelling.

3.2. Denmark

Contact person : Annika Klintefelt, Statistics Denmark

I visited her in August 2019 and exchanged emails thereafter to assess the situation in Denmark.

To date, Denmark has not conducted any sample survey to study the extent of errors in the Central Register of Persons.

During a personal communication with Annika Klintefelt, I got a report that she had prepared for Eurostat on behalf of Statistics Denmark. The report confirms that no checking of addresses is done. However, when I visited Statistics Denmark in August 2019, she explained that if a change of residence is self-declared electronically and the moving household intended to move in a dwelling already occupied by another household without any family relationship between the two households, some administrative investigations are undertaken to clarify the new situation.

Statistics Denmark: 'Methodological report on the feasibility of implementing the usual residence population definition according to regulation n°1260/2013 of the European Commission' (18 January 2018)

The data quality of the Civil Registration System

The Civil Registration System is used by the public administration in almost all cases which are related to individuals. This means that there are many possibilities of detecting and correcting errors and deficiencies in the register. Thus, a person cannot obtain work as an employee without giving information about his PIN-number to the employer who is to withhold the employee's provisional tax and remit it to the tax authorities. This and several other reporting channels provide a relatively safe guarantee that all persons are actually registered in the Civil Registration System, and that **the most frequently used information (addresses, family relations, etc.) are being correctly registered.**

3.3. Finland

Contact person: Jari Nieminen, Statistics Finland

Personal communication with Jari Nieminen by email. Here may be found the answer received on November 19, 2020.

The quality study you mentioned was a custom service ordered from Statistics Finland by the Population Register Centre. As far as I know there has not been a similar survey done recently. The Population register is nowadays a part of The Digital and Population Data Services Agency.

We use Population Register in our surveys, such as LFS (Labor Force Survey), and our interviewers report constantly if there is inconsistency or other mistakes in the address data. In this field work we have not seen any significant change of the quality of address data in recent years. One of the issues we have noticed is that people leaving the country do often forget to announce that to the population register. This over-coverage is corrected in statistics using so called "signs of life -method". (Quality of Statistics: Population Structure).

The following document has been downloaded from the website of Statistics Finland on November 2, 2020.

Measuring the Quality of the Finnish Population Register with a Survey

Special focus on non-response

The Register is maintained by the Population Register Centre and local register offices. Registration of information is based on statutory notifications made by private individuals and public authorities. The Finnish Population Register is recognised as a high-quality register also at the international level. The information about citizens in particular is considered as very reliable.

The quality of the Finnish Population Register is supervised with many different means. The aim of these activities is to catch out possible defects in the register and to correct them. However, the only systematic and repeated measurement of register quality is the Quality Study, which is presented in this paper.

The controlling of the quality of some basic variables in the Population Register was started with the help of a survey in 1998. The idea of the Quality Study is to ask the people directly, whether the register information on them is correct or not. This survey study has been conducted by Statistics Finland once a year. Because the interview takes only a few minutes, the questions have been added to the end of Statistics Finland's Labour Force Survey.

The Labour Force Survey is a continuous, monthly survey which produces information about the participation in work, employment and unemployment of the Finnish population. The data collection is based on a random sample drawn from the Statistics Finland population database. The monthly sample consists of some of 11,000 people aged between 15 and 74. **For ten years now, the Population Register Quality Study has conducted in each November for the entire sample of the Labour Force Survey.**

Statistical interviewers collect the data mainly by phone. The register variables checked in the interview are permanent address, form of tenure of permanent home, native language and occupation. If the respondent has a temporary address or a separate postal address in the Population Register, these are also verified.

The most important aim of the Quality Study is to get information about the quality of the permanent address data of a citizen in the Population Register. In November 2007, 97.6% of the respondents reported their permanent address to be exactly correct in the Population Register. Of the respondents 1.2% lived at the address, but reported some minor errors in it. Finally, 1.2 % of the respondents did not live at the Population Register address. In most cases in which the address was totally incorrect, the respondent had moved away. The wrong address was in the register probably because the person had not notified the Population Register Centre about the move, even though such a notification is required by law.

The Digital and Population data services Agency has charged Statistics Finland with the task of conducting a sample survey on the correctness of the address information. Around 11,000 people are asked whether their address in the Population Information System is correct. In the 2012 survey, the address was correct for 99.0 per cent of the respondents. The non-response of this survey was 16.9 per cent. As regards the non-response, attempts were made to check the addresses from other sources. The address could be ascertained as correct for 92.3 per cent and as incorrect for 5.9 per cent of the persons included in the non-response. The address of 1.8 per cent of the persons in the non-response could not be checked. If we assume that all the unchecked data of persons in the non-response are incorrect, **the final proportion of correct addresses would be 98.1 per cent.**

Incorrect addresses influence population statistics by municipality only if the incorrect address is in a different municipality than the correct one. Only some of the incorrect addresses are in the wrong municipality.

In connection with municipal elections, returned notifications of voting sent to foreigners usually reveal around 1,000 persons who have moved from the country without giving notice and are thus still included in the Finnish population. The Population Register Centre removes them from the resident population in the Population Information System before the following turn of the year.

A total of 15,555 persons who have probably moved abroad have been removed after analyses from the population data derived from the Population Information System for the end of 2019. These persons are mainly foreign citizens whose address is unknown and who have not received wages and salaries, capital income, entrepreneurial income, unemployment benefit, pension income, income support or compensation from sickness insurance between 2017 and 2018.

In general, the Population Information System of the Digital and Population data services Agency can be considered very exhaustive as regards persons. In order that a person obtains a personal identity code, he or she has to be registered in the Population Information System. It is practically impossible to live in Finland without a personal identity code. A personal identity code is needed so that one can work legally, open a bank account, have dealings with authorities and so on. It can be safely assumed that Finland cannot have any substantial numbers of

'moonlighters' who receive their pay in cash for periods of over one year, for example. Staying in Finland for at least one year is the prerequisite for registering into the population of Finland.

3.4. Norway

Contact person: Kare Vassenden, Statistics Norway

We had numerous contacts in the past and, in the context of RITA Mobilne Elu project, he sent me several useful documents. The first document, a **periodic report on the quality of registered addresses, is dated 24 June 2004**. Therein the question addressed in this report is whether the registered residence is right.

For 75 percent of the population has a completely "normal" address situation. This means that

- their status is 'ordinary resident',
- the official address is complete (ie has at least municipality, street / farm number and house / party number)
- the address type is street address (not cadastral address),

For these people, the postal address is exactly the same as the official registered address.

The next larger category is in a similar situation, except that their official address is cadastral address (11 percent, 480,000). For these, there is a distinction between official address and postal address. This category has filled in the field for address names, which makes their postal address something more than just the postcode. However, it is doubtful whether one can say that these people, like the previous category, have a postal address that is similar to the residential address. The address name is often too imprecise to indicate the place of residence accurately. In the field is usually the name of the village or postal routes. When the name of the farm or farm is given, however, the location is of course much better.

For the next 9 percent (390,000), the postal area is a rather imprecise indication of the place of residence and most of them only have a zip code. Accordingly, a total of 970,000 people (20 per cent) only have a cadastral address in Norway.

The last five percent consists of ordinary residents with different combinations of completed additional address and / or postal address.

For 75% of the population, residential and postal addresses are one and the same, while for a quarter, residential and postal addresses are different.

A 2008, Norwegian study estimates that 97.1 per cent of the address information in the was accurate at the time (Thorsdalen, 2008).

In 2008, the quality of address data in the Population Register, DSF (*Det sentrale folkeregister*) was assessed by checking it against the GAB-registeret (*Grunneiendommer, Adresser og Bygninger*) Cadaster- Register of properties and housing (Skatteetaten, 2015). The study identified likely errors in the form of, for example, many residents in the same dwelling, lack of apartment numbers and population registered in properties that are not dwellings.

The quality survey of addresses in the Central Population Register

Bjørn Thorsdalen / Kåre Vassenden (Statistics Norway)

The two first paragraphs of this report on quality and control strategy are worth to be transcribed.

The working group has aimed to provide input on why and how a quality and control strategy for the National Population Register can be established. A quality and control strategy for a national common component should take care of society's needs and be well rooted in the users of the register. The report has been prepared on the basis of input and participation from 17 different companies, and highlights the consequences for society that result from errors and omissions in the information in the register. The report provides input to a control methodology, which can contribute to society being able to utilize the overall control resources more efficiently.

The value and use of population register information in society is a natural basis for a risk-based approach, prioritization and resource utilization in the line. The information in the National Register is used as a basis for users' case processing, assessments and decisions. Incorrect information in the National Population Register could lead to a wrong decision by the users of the register. Assessments of rights and obligations will then be based on an incorrect factual basis, and result in decisions that are made being wrong. The quality of the information in the National Population Register, in this way has a direct impact on the quality of case processing for those who use the register. The Population Register is in some cases used as a tool to commit fraud and other serious crime, in that incorrect information is provided with the intention of the Population Register in order to obtain unjustified benefits from the users of the register. Depending on whether the incorrect information has been provided intentionally or unproven incorrectly, various targeted measures and instruments are required to raise the quality.

Concretely, Statistics Norway received the assignment to carry out a survey to map the quality of residential and postal addresses in DSF (*Det sentrale folkeregister*)

The survey was conducted as a supplementary survey to the Labor Force Survey 1st quarter 2008 for a total of 24,089 interviewees aged 15-74, a representative sample in relation to geography, age and gender. The response rate: 86.3 percent.

Questions were asked about residential and postal addresses as of 30 November 2007

"Is your correct and complete residential address today...?"

Students / conscripts were asked to answer for their home address if it was the one who was read out

95% (18.475) answered that their addresses were correct.

If no: "What's wrong with the address?"

Among the 877 persons who answered 'no', 538 had changed their residence more or less recently before the survey. For 147 people, the address is incorrect as they temporarily lived at another address due to school / studies, work or vacations. For the remaining cases the addresses were partially incorrect.

If the persons who changed their place of residence were included, **97.1 percent would probably be encountered by contacting the registered address**

When extrapolating the figures for the whole Norwegian population aged 15-74 years, the authors estimated that 100,000 people have an incorrect address in DSF (*Det sentrale folkeregister*).

The following figure provided by Kare Vassenden compares the results obtained in Norway

with the similar ones from Finland.

	Personer med annen faktisk adresse enn formell er ikke tatt hensyn til	
95,0 prosent	Helt korrekt adresse	98,2 prosent
	+	
1,6 prosent	Flyttet etter uttrekksdato	0,3 prosent
	+	
0,5 prosent	Kun liten feil i adressen	0,9 prosent
	=	
97,1 prosent	Personer vi sannsynligvis ville påtreffe på den folkeregistrerte adressen	99,4 prosent

Moved after withdrawal date

Only small error in the address

People we would probably find at the registered address

From the *Methodological report on the feasibility of implementing the population definition according to regulation n°1206/2013 of the European Commission* presented by Statistics Norway on 23 December 2016 and prepared by Kare Vassenden, we extracted the following information.

Traditionally in Nordic public administration, to be resident or not, has very often been a decisive question. **On top of this, major financial resources are distributed in the Norwegian welfare state, which also contributes to the position of the residence concept.**

Either way, the PR resident concept implies a form of standardisation for Norwegian society that is impossible to ignore. The existence of a common, official residence concept for society is of great importance for population statistics.

In Norway, there exists a simple way to check personal data in the DSF. Hereunder is the information found on the website to correct errors or discrepancies related to personal data.

Tips concerning possible errors or discrepancies in the National Population Register for private individuals

When a discrepancy is detected in the National Population Register, please send us a tip so that we can investigate and register any changes. For private individuals.

Download, fill out and send us. (The form in Norwegian)

The discrepancy form is used for discrepancies concerning third parties. If the discrepancy concerns your own circumstances as a private individual, we ask you to fill out the relevant form (for instance change of address notification, notification of change of name) or contact us through [contact us form](#). Please note that the National Population Register does not correct past circumstances (for instance address history), and that tips should concern discrepancies in what is currently registered. All information submitted will be checked before the National Population Register is updated. The Tax Administration receives and processes all tips concerning discrepancies, and your tip will be processed in accordance with rules and routines for the National Population Register and the Public Administration Act.

Due to the confidentiality obligation, the National Population Register cannot provide you with feedback concerning the result of your tip, as we have limited options to disclose information about anyone other than yourself.

You can enclose evidence with the tips form. If you, for instance, provide a tip that someone is incorrectly registered at your address, but you do not own the residence, please enclose a confirmation from the owner of the residence

3.5. Sweden

The information concerning Sweden has been extracted from several reports. We did not have a contact person in Sweden.

Kvalitetsuppföljning i folkbokföringsregistret

Published by SKATTERVERKET

<https://www.skatteverket.se/download/18.35c34f651660af3747c1503/1538118209239/2018-skv-kvalitetsuppfoljning-i-folkbokforingsregistret.pdf>

In addition to taxation, the administration of the population register is part of the mission of the Swedish Tax Agency. The authority's instructions stipulate that the information in the population register must reflect the population's residence, identity and family law conditions so that the various functions of society have a correct basis for decisions and measures.

The National Audit Office stated in 2017, in its audit of population registration activities, that **there was largely a lack of knowledge about the frequency of different forms of errors in the population register and the consequences that may result from such errors.**

The report presents some estimates of the different types of register errors. Knowledge of the number of people registered at incorrect addresses is also rare. The Swedish Tax Agency (2013) notes that between 2010 and 2012, approximately 250,000 impulses were received about incorrect marital status or addresses. About half of these impulses resulted in a change in the register, of which about 45,000 changes were made without the person's participation in the change. Based on these observations, it is concluded that **the number of such errors was between 45,000 and 128,000 during the period.** The same report mentions that the number of students erroneously registered in the country may amount to about 30,000. The estimate is based on surveys conducted by Uppsala Municipality on population registers among students in the city.

In the Swedish Tax Agency's Citizen Survey 2016, they asked if you know someone who is registered at the wrong address. Of the respondents, 10 percent answered yes to the question, which is the same proportion as in the corresponding survey in 2012. The target population for the survey is the population aged 18 to 74, a total of 7.1 million people. **The survey concludes that more than 700,000 people know someone who is registered at the wrong address.** However, it is difficult to comment on the number of people registered at the wrong address based on this proportion of respondents to the citizen survey. Responses could refer to far fewer than 700,000 "unique" people registered at the wrong address, as many respondents may have the same person in mind in their response.

The method of estimating the existence of incorrect vital statistics addresses was developed by Statistics Sweden in the framework of the ongoing cooperation of the Development Authority with the Swedish Tax Agency.

Five suspicious subgroups are identified, which are described in the following paragraphs.

1. Students with long commuting distances. Of the approximately 328,000 students (excluding those pursuing distance education) who studied at Swedish

colleges and universities in 2016, 181,000 had studied at the same location for at least three semesters. Just over a third of them, 69,700, were registered in municipalities other than the place of study. The majority of them had a relatively long distance between the place of registration and the place of study: about 38,200 of them were at least 36 kilometers away. Of these, about 14,500 had 100 km or more between the population registry and the study site. Of the latter group, 10,300 were registered with their parents. In this way, the selection of suspected cases of incorrect address of civil status can be reduced step by step. The question is how to set a limit that separates suspects from those to be included as registry errors. Here SCB chooses to take an average of the sizes of the last four groups (instead of, for example, setting the limit at 36 kilometers) and thus receives an estimate of 33,200 "false" study commuters.

2. Employees with long commuting distances. By studying individual establishments in the STAND database, the distance between the population register location and the workplace can be estimated. However, a long distance between the place of residence and the place of work does not necessarily mean that the person is wrongly included in the population register. It is not uncommon for individuals to bend over long distances or to work entirely at a distance. Perhaps the main reason for folding and working at a distance is that you live with your family in your hometown. Therefore, in order to find suspected cases of incorrect population registration within the group with long distances between the head office and the workplace, only those individuals who are not married, registered as partners or in a couple are studied. In 2016, about 14,200 people in this group had 600 km or more between the place of population registration and the place of employment. Of these, 10,300 were at least 700 km away and 2,300 were at least 100,000 km away. Taking the average number of people gives an estimate of 7,300 "false commuters" with incorrectly registered addresses.
3. Individuals in the small living space. In 2016, more than 60,000 individuals were registered in dwellings where the members (three or more) were not relatives. This may be fully compatible with the Vital Statistics Act if, for example, five students share a five-room apartment. However, if so many people are registered in the same apartment, the living space per household member becomes unreasonably small, there is reason to suspect that more household members are incorrectly registered. Of the 60,000 people in this type of household, 6,200 were registered in an apartment of such size that the living space per person was less than 10 square meters. Almost half of them had less than 7.5 square meters of living space per person; about 700 people had less than 5 square meters. Statistics Sweden takes the average of these figures and receives an estimated 3,200 such figures.
4. People in large households. In this category, the approximately 60,000 people in households where none were close relatives are again studied. More than 16,000 of them were registered in apartments of eight or more persons, of which 6,600 were registered in apartments of ten or more persons. Statistics Sweden (2018) takes the average number of people in these three groups, giving an estimate of 27,700 incorrectly registered addresses.
5. Individuals associated with the impulses that led to the correction. In 2017, the Swedish Tax Agency received about 80,000 impulses concerning errors, of

which about 54,000 were related to unique individuals. Just over half of these impulses, 29,000, led to some form of correction in FBR. Statistics Sweden uses this as an indicator that at least 29,000 incorrect addresses were entered in the register in the previous year, i.e. in 2016.

In the sum of the five components above, individuals are erased occurring more than once. This gives a total of about 100,000 cases of incorrect population registration addresses for

Method for systematic monitoring of the quality of the population-accounting register

This is the methodological approach that the Swedish Tax Agency intends to use in order to systematically monitor the quality of the population register in the future.

Evaluation of the population register by evaluation of RTB

The Register of Total Population (RTB kept by Statistics Sweden) is largely a mirror image of the Population Register (FBR managed by the Swedish Tax Agency). The mirror image relationship between the registers means that an assessment of the quality of RTB is also a quality assessment of FBR. In other words, suspicious (or confirmed) errors found in RTB are found at the same time even in FBR. This also means that indicators of errors in RTB also constitute indicators of errors in FBR.

A fundamental difficulty in measuring the occurrence of errors in FBR is that the errors are difficult or impossible to find only by studying the register itself. Only a very demarcated type of error could be found in this way, such as unrealistic dates of birth, obvious error spellings in names and addresses, or the absence of certain information (which can also be seen as a registry error).

In order to identify **incorrect population registration addresses** some form of estimation of the occurrence of errors must be made. Such estimates may be based on sampling checks, studies of corrections based on errors received or on various forms of indicators of the existence of any form of error. The Tax Agency intends to use the latter method.

Restrictions on random checks

A result of the above reasoning could be created for a limited sample of individuals by sampling. Such a check could consist of **visiting a number of addresses to verify that the right persons live there in relation to what is stated in the population register**. If the sample in such a control is assumed to be representative of the population as a whole, the incidence of the error for the whole population can be estimated. In other words, if the sample check covers 5 000 people and it appears that 100 people (2%) had incorrect registered address, it could be concluded that 2% of the total population (i.e. just over 200 000 persons) have incorrect registered address. Similarly, if 7 individuals were discovered in the control that is not registered, but should have been, it could be concluded that the undercoverage error is equivalent to 1.4 per mille of the entire population, that is, about 14 000 people. Such estimates also need to be given for uncertainties. The smaller the sample in relation to the population as a whole, the greater these uncertainties. In order to

estimate the incidence of various errors (some of which occur to a relatively small extent) with satisfactory uncertainty intervals, a sample check needs to cover a large number of individuals, making the method resource-intensive.

The impulses received if errors give a partial picture

One way to measure actual – confirmed – register errors is to study the impulses about suspected errors that are received in the population register at the Swedish Tax Agency every year. Earlier in the report, for example, 45,000 of the impulses received between 2010 and 2012 led to a change in FBR. However, the extent to which this constitutes the total extent of a particular error is impossible to comment on. However, it can probably be considered as a lower limit for the occurrence of the respective type of error. In other words, the fact that 45 000 corrections were made in 2010-2012 based on impulses received can be interpreted as at least 15 000 such errors being made each year. However, systematically studying the existence of registry errors in this way is difficult, as the number of errors according to this measurement method depends both on the propensity of individuals, companies and authorities to report suspected errors and on the Swedish Tax Agency's ability to investigate and correct the impulses received.¹⁸

Register-based indicators of likely errors

A third, and more indirect, way of studying the existence of registry errors is to create indicators of the existence of different types of errors. These indicators are based on some form of information, in addition to the information provided by a snapshot of the registry itself.

The principle of the method set out in the following sections can be summarised as follows. Indicators at the individual level are created based on information from several of the individual registers administered by Statistics Sweden, including the Income and Assessment Register, the Register of Higher Education and the Statistical Integration Variables Database (STAND). An indicator of **incorrect population registration address** is, for example, that according to the Register of Higher Education, an individual conducts campus-based university studies in a particular location and according to RTB **is registered in a place more than 100 kilometres away**. Based on this form of indicators, different individual groups are then identified for which there is a certain probability of any form of register error in RTB. Based on these groups, a total extent of the respective errors in RTB is estimated. The number of errors in RTB in turn gives the number of errors of each type in FBR.

Cooperation with Statistics Sweden

Linking of data in different individual registers as described above can only be carried out by Statistics Sweden (and under certain conditions by researchers for research purposes). As a statistical authority, Statistics Sweden not only has this unique opportunity for cross-registering; The Authority also has extensive experience in quality evaluation and quality assurance of statistics, including register-based statistics relating to individuals and businesses.

In its previous evaluation work, Statistics Sweden has used various methods to measure the coverage error in RTB, which according to Statistics Sweden is the biggest quality problem in the register. In 2015, a model was developed specifically for this purpose. The model consists in using data from several registers to create indicators that individuals belong to the coverage or the actual population.

A description of the Total Population Register published in 2017 by Statistics Sweden provided some additional information (reference BE0102, publication date: 19/6/2017)

In recent years, a priority task of the Swedish Tax Agency has been to improve the quality of the population register. For this reason, in 2012 and 2013, the Swedish Tax Agency conducted an analysis of the population register error and the consequences and costs that the error leads to in society. The analysis included overcoverage and undercoverage, as well as persons who were registered in the incorrect property. The Swedish Tax Agency is continuing to work on the findings in the analysis report. It is used as helping information and as support for planning future activities, and has concretely led, through more directed sampling, to improved checks.

Since most population register information is used widely in society, the chance of detecting errors increases. Some government agencies, such as the Swedish Social Insurance Agency, the Swedish Migration Agency and the Swedish National Board of Student Aid, by regulation, are obligated to report errors in the population register to the Swedish Tax Agency. In addition, the birth certificate issued by the Swedish Tax Agency can be regarded as an important check on data accuracy. The individual submits a request for a birth certificate, which shows the data contained in the population register. A birth certificate is required, for example, when acquiring identity cards, applying for Swedish citizenship or applying for divorce. Every year about 2.6 million birth certificates are issued.

In 2015, indicators were produced to measure accuracy in Statistics Sweden's base register, in which the Total Population Register is included. This resulted in indicators that measure coverage errors, linking errors, classification errors and contact information errors.

Incorrect links to a dwelling, which can be due to incorrectly reported dwelling number, affect both composition (household type and household status), and size, both with regard to the household to which they actually belong, but are not registered in, as well as the household in which they are registered but do not belong.

A high percentage of Other households is a warning sign, since a number of these households are incorrectly classified due to incorrect household links.

The data for the Total Population register is retrieved from the Swedish Tax Agency's population register and has an administrative character. The collection, measurement and registration of the information are done by the Swedish Tax Agency. Most data in the population register comes from other government agencies, where reporting is included as part of the working duties of, for example, midwives, wedding officials, courts or doctors. Notification to the Swedish Tax Agency by individuals is only done in a few cases. Nevertheless, as reporting is handled by the person in question, there is a larger risk of measurement error, mainly because of ignorance, due to lack of knowledge of the rules on population registration. To reduce measurement errors, the Swedish Tax Agency disseminates information to those in contact with the groups in which errors often occur, and simplifies reporting. For example, e-services will be

introduced for deregistration of registered students who are returning to their home country.

Another example is students who are registered in the wrong municipality. According to the Population Registration Act, a person in post-secondary education should be registered at the place of study. There are studies that suggest that students continue to be registered at their home location, rather than at the place of study. This introduces a bias when the Total Population Register is used, for example, for regional population statistics. A report from the Swedish Tax Agency estimated that about one out of four students may be incorrectly registered. This conclusion led the Swedish Tax Agency to extend information to students and to the universities before the beginning of term. In 2011, Uppsala Municipality carried out a survey which showed that 85 percent of the full-time students residing in Uppsala were also registered there.

In 2012, the Swedish Tax Agency received about **100 000 reports of incorrect population registration**. Reports can come from other government agencies, but also from individuals. Of these reports, nearly 40 000 were selected for an in-depth residence check. This checking resulted in a changed population registration in **80 percent of the cases**.

From 2014, the Swedish Tax Agency uses a collected pre-review of all impulses about errors in order to achieve greater uniformity and traceability in the survey operations. With regard to which errors should be investigated, a combination of efficiency and serious errors is being considered. Currently, about 40 percent of impulses received are investigated, but the goal is 60 percent.

The population register sometimes checks address details on items that do not reach the addressee in connection with mass mailings of letters such as tax bills and voting cards. The aim is to examine whether migration is reported in a timely manner or reported at all, and to verify if the actual residency agrees with the registered data. In 2011, 26 700 tax bills were returned out of a total of 6.5 million. This represents 0.41 percent.

In the initial collection of dwelling numbers in 2010-2011, for which the Swedish Tax Agency was responsible, there were instances of people specifying a dwelling number that did not exist at that address. In such cases, it is not possible to link the person with any dwelling, and the person thereby cannot belong to any household. Now, the dwelling number must always be included in the address when moving to a dwelling in a multi-dwelling building, and in connection with notification of a move, a reconciliation is made to ensure that the dwelling number exists at the address. It is likely that, as a result of this, some of the deficiencies that arose in the construction phase will decrease with time. If a dwelling number other than the correct one has been specified, the person will subsequently erroneously belong to a household other than the correct one.

After the Swedish Tax Agency's data collection in 2010-2011, non-response was at four percent. As people move, and as this requires specifying a dwelling number, non-response decreases. Non-response in this year's Total Population Register is 2.3 percent. With regard to 20 000 persons, we have been able to impute a value, and thereby reduce non-response to 2.1 percent, or just over 212 000 persons. When the link between an individual and a dwelling is missing, it means that we cannot create households for persons based on the dwelling number

Data registration is carried out by the local tax authorities. When the data is prepared, registered and processed in the population register, manual and automated checks are implemented that can generate corrections.

Once the data is reported to Statistics Sweden, they are reviewed in the various stages of processing before they are approved for input into the Total Population Register's final observation register. Reviewing policies are developed in cooperation with representatives of the population statistics and each review is logged and stored in SQL tables.

In 2011, the first entirely register-based Population and Housing Census was carried out in Sweden. An evaluation of the 2011 Census was done. It measures the difference between actual and registered residence.

Data on household type, household size and household status is based on the household that can be created based on registration by dwelling. The quality of data on the household depends to a large extent on how well the population registration manages to match the household's composition.

The evaluation shows that 92.1 percent (± 0.8 percent) of households in the 2011 Census were classified correctly with regard to the number of residents. The largest percentage of errors were in the households with 6 or more residents. Among other classes, the percentage of errors was largest in households with 3 or 5 residents by 17.9 percent and 22.2 percent erroneously classified respectively. The erroneously classified three-person households are mainly one- or two-person households.

The net errors show that the number of one- and two-person households are underestimated by 10.3 percent and 9.3 percent respectively in the 2011 Census, while the number households with 5 or more residents are overestimated instead. For three- or four-person households, the net error cannot with certainty be regarded as differing from zero.

In total, 93.9 percent (± 0.7 percent) of dwelling households are classified correctly in the 2011 Census with regard to the variable household type in the above classes. The percentage of erroneously classified households is highest in the categories "Multi-person households" and "Households with two or more families". In other categories, the percentage of erroneously classified households is highest in the category "Households with single parents and children" (9.3 percent). Most of these erroneously classified households should constitute "Single-person households" or "Households with cohabitants with children". The percentage of erroneously classified households is lowest in the category "Single-person households" (2.0 percent).

The net errors show that the number of single-person households and households with cohabitants without children are underestimated by 12.1 percent and 10.1 percent respectively in the 2011 Census, while instead, the number multi-person households and households with two or more families are overestimated. In households with single parents with children and households with cohabitants with children, the net error cannot with certainty be said to differ from zero.

3.6. The Netherlands

Contact persons: Carel HARMSEN and Hans NICOLAAS from the Dutch Statistical Office, Central Bureau for Statistics (CBS) via Lindekin.

The Central Bureau for Statistics (CBS), reports that a project was launched in 2015 to study the quality of local population registers.

- On the one hand, about 12,000 targeted home visits were made to addresses where there was reason to suspect errors, resulting in the correction of about 5,000 address details.
- On the other hand, surveys were conducted on random samples to study the accuracy of individuals' address data. It revealed that more than 96 per cent of individuals had accurate address information in the registers. The Dutch Statistical Office has also studied the extent of under-coverage in its population register. The method is based on the fact that the population register is twinned with two other registers - an employment register and a criminal record. Individuals in the latter two registers, but not the population register, are assumed to be under-covered. In total, the under-coverage is estimated to be between 57,000 and 151,000 peoples (Gerritse et al., 2016).

We examined the following publication that gave the results of that investigation:

Centraal Bureau voor de Statistiek, Adreskwaliteit 2018 – Onderzoek naar de kwaliteit van adresgegevens in de BRP (Basis Registratie Personen).

The address data in the *Basis Registratie Personen* (BRP) is used for many purposes. It is therefore important to know how reliable these details are. The Ministry of the Interior (BZK) has been conducting a survey on this subject since 2013. In 2013 and 2014, address quality research was conducted by the ICT Implementation Organisation (ICTU) in collaboration with a number of municipalities. In 2016, the survey was taken over by Statistics Netherlands (*Centraal Bureau voor de Statistiek*, CBS). This report deals with the quality of addresses in 2018.

As part of this project, surveys were conducted to measure the quality of addresses in 2018. A total of 2,500 addresses were included in the sample, with each address having an equal chance of being included in the sample. During October and November 2018, these addresses were then visited by an interviewer to find out, for each address, who actually lived there or had a mailing address. It was also verified which addresses the BRP indicated as living at the time of the interview.

In the end, 2,070 addresses were included in the quality calculation.

To determine whether the actual situation corresponds to the record, the responses of the residents interviewed (or by the interviewer's observations in the case of uninhabitable houses) were compared with the BRP data. For each address, this comparison was made at the personal and address level. By weighing the results, it is possible to estimate the quality of address recording throughout the Netherlands. The percentage of quality at the personal level indicates which part of the people who were registered at an address according to the BRP was actually known at that address. The percentage quality at the address level indicates in which part of the addresses the persons found correspond exactly to the persons registered according to the BRP.

The percentage of quality at the personal level is 96.3% with a 95% confidence interval of 1.7%. This means that the quality of addresses at the personal level is between 95.4% and 97.1% with a 95% confidence interval. A total of 5,082 people were registered at the addresses visited. Of these, 4,777 people were correctly registered. For those who were not registered correctly, 196 registered persons were not found and 12 persons were found with the wrong type of registration. An unregistered person was found in 97 cases.

The quality percentage at the address level is 93.8% with a confidence interval of 2.0% to 95%. This means that the quality at the address level is between 92.8% and 94.8% with a confidence interval of 95%. Out of a total of 2,070 addresses visited, one or more errors were found in 133 cases. For 91 addresses, one or more registered persons were not found and for 69 addresses, one or more unregistered persons were found at the address. For 10 visited addresses, an incorrect record type was found.

For comparison: the percentage of quality at the personal level in 2016 was 96.3% with a 95% confidence interval of 1.1%. This means that there is no significant decrease or increase in quality.

In addition, the current study examined factors that are significantly related to the likelihood that the actual occupancy of an address matches the BRP record. The study looked at the number of people, people aged 15 to 24 years, the number of people in HBO or WO programs, student municipalities, low-income municipalities, municipalities with a lot of low income, home ownership, and the size of a municipality. This shows that all these factors are related to the quality of the address. However, when the factors are examined together, there are still five factors that are significantly related to address quality. An address is more likely to be incorrect in the following cases:

1. More people live there;
2. More people are living and attending HBO or WO;
3. The address is in a student community;
4. The address refers to a rented house that does not belong to a housing society;

Of the 2,500 addresses drawn, 2,455 addresses were actually visited once or several times. Of these addresses visited, according to the BRP, 66 were not occupied dwellings at the time of the interview for the following reasons:

- Under construction, demolished, house to be demolished (13)
- No residential address (e.g., business premises) (5)
- Vacant Temporarily uninhabited (48)

In addition, 227 addresses were unsuccessfully visited because they were not opened or because no occupants were found. There were also 11 cases that were not possible due to language, while cooperation was refused at 68 addresses and an interview was conducted in 9 cases that were prematurely aborted and 4 various situations were also unsuccessful.

$$2500 - 2455 - 66 - 227 - 11 - 68 - 9 - 4 = 2070$$

The visit is successful when one of the two conditions:

- either the interviewer interviewed a resident in order to be able to determine which people he or she thought were at the address = 2070 cases
- either it could be established from the outside that the address was not inhabited, which led to the conclusion that the persons registered at that address were not registered correctly = 66 cases.

Determination of the percentage of quality on the level of the person and the address

In a few cases, an address at the time of the interview, according to the BRP, was found to be empty. For the calculation of the quality percentages, only addresses with at least one person registered were considered. It turned out that 66 addresses, according to the BRP, were empty at the time of the interview and, for this reason, were not included in the determination of the quality percentages.

The quality is therefore determined on the basis of the remaining 2,070 addresses.

This section focuses on the number of people who were incorrectly registered. Here no weighting was performed; it is the number of persons visited in the selected addresses or persons are registered there according to the BRP but were not found.

5,082 persons are registered according to the BRP at the drawn addresses. Of these persons, 4,777 had an exact match with the BRP. Thus, 305 individuals are incorrectly registered. 196 persons registered with the BRP were not found, 12 persons were registered with a correct address but with the wrong type of registration (residence versus mailing address), and 97 persons were found who were not registered at that address with the BRP.

The percentage of quality at the personal level indicates the extent to which people at an address were actually found at the time of the visit. The percentage of quality at the personal level is 96.3 per cent with a 95 per cent confidence interval of 1.7 per cent. The percentage of quality at the address level indicates the extent to which the persons who, according to the interview, are registered at a complete address match the entry in the BRP. The address quality percentage is 93.8% with a confidence interval of 2.0% to 95%. For both the personal quality percentage and the address quality percentage there is no significant difference compared to 2016.

What is new in this study is that it was investigated which factors are significantly related to the possibility that the address found occupied is the same as that of the BRP. It examined the number of people, people aged 15-24, the number of people taking an HBO or WO course, student communities, low-income households, municipalities where incomes are often low, the type of home ownership, and the size of a congregation. This shows that all these factors are related to the quality of the address.

However, if you look at the factors together, there are still five factors that are highly correlated with address quality. It follows that an address is more likely to be incorrect if:

1. There are more people living there;
2. There are more people alive who are trained in HBO or WO;

3. The address is in a student community;
4. The address is in a housing company;
5. The address is in a municipality with a high population.