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Lessons learned from censuses of the 2020 round

Census Household Data: Challenges to Keep it Up-to-Date

Note by the Statistical Office of the Slovak Republic*

Summary

The 2021 census in Slovakia introduced several new concepts and approaches, including the concept of "current residence", which identifies where inhabitants actually reside and with whom they live in their dwelling household. During the data processing, two outputs were generated for household data: one based solely on registers, and another based on current residence as identified by the census. To answer questions about annual household creation, a comparison was made between these two outputs. This paper aims to provide valuable lessons learned from the challenges of keeping census household data up-to-date and accurate. As society changes rapidly, maintaining reliable household data pertaining to shorter periods is becoming increasingly challenging. This raises important questions about how best to address this issue and maintain accurate household data.

* Prepared by Kristián Óvári and Andrej Chromeček.

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I. Introduction

1. One of the key results of the population and housing census is data on numbers and structure of families and households. During the 2021 census, two categories of households were created, namely: dwelling households and census households. The data on dwelling households are used mainly to assess the level of housing, while the data for census households provide unique information on family behaviour. A dwelling household consists of all persons who jointly occupy a single dwelling, i.e. each occupied dwelling represents one residential household. A dwelling household may be identical to a census household, or one dwelling household may be divided into several census households. A census household consists of persons who occupy a single dwelling together and it is defined on the basis of mutual family or kinship relations. The census household is the basic unit of households and is not further divided. The main criteria are shared housing and family/relative relationships. Furthermore, census households are the smallest social collectivities that can be analyzed in the Slovak Republic. The concept of census households has been surveyed in Slovakia by means of censuses since 1961. Census households are a type of household allowing a detailed view of the structure of members living together. We can divide them into family or other non-family households. They are therefore the most important source of information on families as a social phenomenon. Census households are also significant information in researching the causes of demographic, especially reproductive, behaviour of the population. In our paper, we focus primarily on the methodological creation of census households. In addition to explaining the process of creating census households in Slovakia, we analyze primarily the possible sustainability of information on census households in the intercensal period.

II. Census process

2. The 2021 census in Slovakia was the first fully electronic census, without the use of paper forms. It was also the first integrated census, which means that a combination of data obtained from administrative sources with data collected directly from the population was utilized. The fact that an inhabitant is included in a given household is directly related to the process by which we determined the residence of a given individual. In the 2021 census we can distinguish two types of residents. Firstly, the register-based residence reflects the place of permanent ‘*de jure*’ residence in the territory of the Slovak Republic, which was obtained primarily from the Register of Natural Persons and from other administrative sources. For the first time in the history of its censuses, Slovakia collected information about the ‘current residence’, which represents the actual *de facto* place of residence. It was filled in by the inhabitants themselves on the electronic census form. The place of current residence may be identical to the register-based residence or different from the place of register-based residence. For the construction of census households from census data, the question of interrelationships between persons was also important. In the electronic census form, respondents answered the question "With which persons do you live in your current place of residence?". It was possible to answer either "I live alone" or "I do not live alone". If the respondent chose the second option, he/she was then given a choice of 24 options of family and non-family relationships detailing with whom the respondent lives in the same dwelling.

III. Creation of dwelling and census households

3. For dissemination purposes, census households were created according to the current residence. However, we also processed census households based on register-based residence in a similar way in order to compare the two sets of households, to see how consistent they are and how sustainable it is to update them in the future from purely registered administrative data.

4. The first step in the process of the creation of households was to define the dwelling households within an address point. In other words, we had to group together the right people to the right dwelling within each address point. The key variables for this process were the flat number and the family relations, which came from various different sources (from

administrative data sources and census forms). With combinations of variables from Figure 1 we derived the structure of dwelling households for the register-based residence and for current residence.

Figure 1

Completeness of sources and variables in dwelling household creation

Sources & Variables (multi-dwelling buildings)	Register based residence	Completeness - % of population of multi-dwelling buildings	If current residence is different than register based	Completeness - % of population of multi-dwelling buildings
Register of Natural Persons				
family relations	✓	83.9%	✓	79.9%
flat numbers (only multi-dwelling buildings)	✓	33.6%	✗	-
Cadastral				
flat number of the owner (only multi-dwelling buildings)	✓	20.0%	✗	-
Census forms				
flat number	✓	76.8%	✓	72.7%
Relationships to persons living in the same dwelling household	✗		✓	92.5%

Source: Census of the Slovak Republic (SR) 2021.

5. The challenging address points proved to be those which contained numerous dwellings with low completeness of flat numbers and family relations. In the end each occupied address point must contain at least one occupied dwelling. A dwelling household is then made up of all persons residing together in a single dwelling unit, which means that every single occupied dwelling represents one dwelling household. The only common criterion of a dwelling household is mutual residence, whereby the members of a household may or may not have family or kinship relations with each other. A dwelling household is either identical to a census household or may be made up of multiple census households. A census household is made up of persons who occupy a housing unit together but who are also related by family or kinship. A census household is the smallest collective unit which is no longer subdivided. Therefore, the main variables that allowed us to form households are the flat numbers, and the inter-family relationships of the occupants within the dwelling unit.

6. From the registers, only first-degree direct family relationships could be obtained for residents for the purpose of constructing census households for permanent residence: husband/wife, father/mother, son/daughter. However, from these relationships it was also possible to infer other extended family and kinship relationships through a number of interrelated persons: brother/sister, grandfather/grandmother, cousin, uncle/aunt, father-in-law/mother-in-law, cohabiting couple with a child in common, and others. Relationships reported by residents on the census form were used to construct households for current residence. Each resident was given the opportunity to indicate his or her family relationship or other relationship to all other members within the residential household (Figure 2).

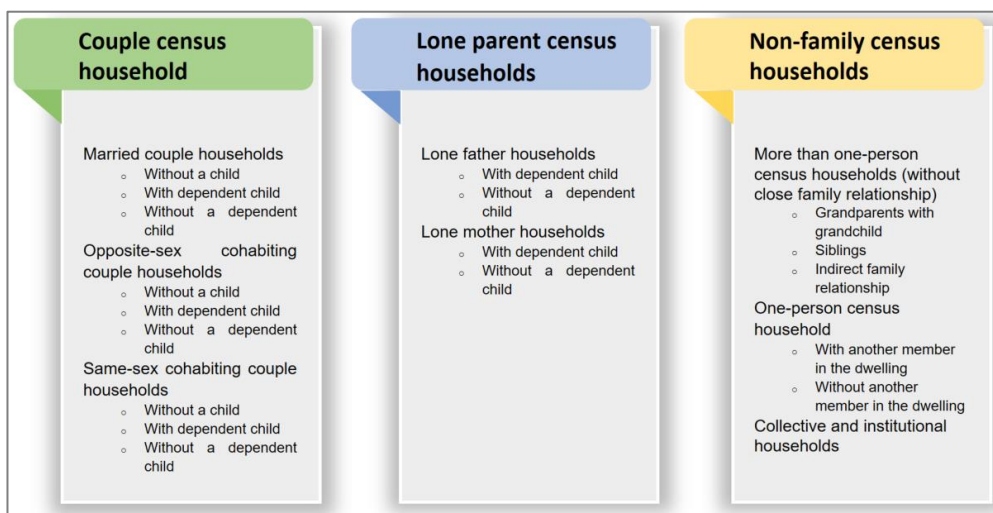
Figure 2
Sample question from the census form

The screenshot shows a digital census form interface. At the top, there are navigation tabs: Residence, Family (highlighted in red), Education, Occupation, Ethnicity, Religion, and Summary. Below the tabs is a progress indicator with icons for each section. The main question is: "What persons do you live with in the flat at the place of your current residence?" followed by a sub-question: "If you lived with children and/or grandchildren, type in with how many of them as of 1 January 2021." There are two radio button options: "I live alone" and "I do not live alone". To the right, a box titled "I live with:" contains a list of relationship categories, each with a checkbox: husband, wife, father, mother, son, daughter, brother, sister, father-in-law, mother-in-law, son-in-law, daughter-in-law, grandfather, grandmother, grandson, granddaughter, great-grandfather, great-grandmother, great-grandson, great-granddaughter, other relative (e.g. uncle, aunt, cousin, brother-in-law, sister-in-law), cohabiting partner (man), cohabiting partner (woman), and person with no family relation. At the bottom left, there are "Back" and "Next" buttons.

Source: Census SR 2021.

7. For some relationships such as son, daughter, brother, sister, grandfather, grandmother, unrelated person, and others, the respondent also entered the number of such persons to whom he or she has a given relationship in the dwelling. No direct identification of these residents was sought on the form. Therefore, on the basis of these relationships, the so-called ‘mirror’ relationships were created subsequently between the individuals. For example, for a person who stated that he/she lived with a husband and a son, we looked for the person who stated that he/she lived with a wife and a son as well as for the person who lived with a father and a mother. When these relationships were incomplete and were useless we derived the relationships from the Register of Natural Persons, which has a relatively high completeness rate of family relations. Once the inter-relationships and family relationships between individuals were identified, these were categorized into different types of census households on the basis of these relationships (Figure 3).

Figure 3
Types of census households



Source: Census SR 2021.

IV. Constraints on coherence of households by register-based residence and current residence

8. The differences between the households by register-based residence and current residence are the result of two main factors. First, there are numerous inhabitants with

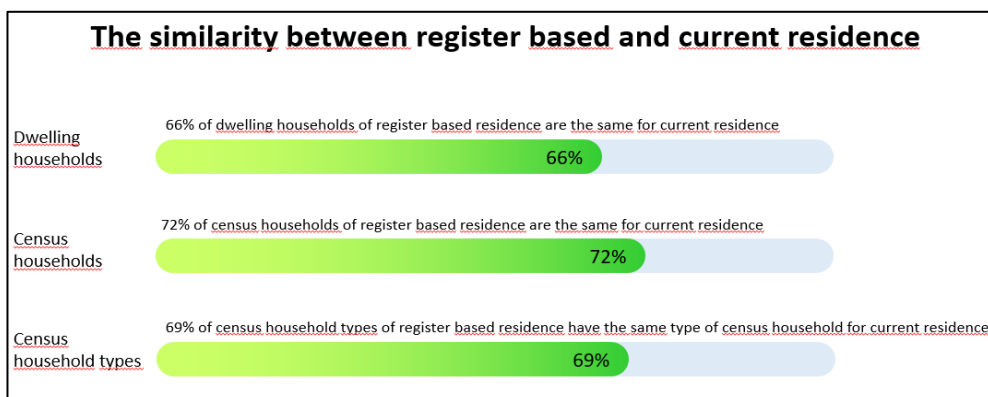
different register-based and current residence. Second, it was not possible to extract all the relationships from registers, especially for cohabitants. In the Slovak Republic, a total of 5,449,270 inhabitants had permanent administrative residence as of 1 January 2022. This number can be updated sustainably on the basis of administrative sources based on the demographic balance. There were 5,233,612 inhabitants having current residence, i.e. as a real place of living in Slovakia, on the same date. Since we can only obtain the place of current residence using the census, we are only able to update this variable once every 10 years. Within the borders of the Slovak Republic, 573,058 inhabitants have a different current and permanent residence. There are 264,269 inhabitants registered with current residence abroad but with permanent residence in Slovakia. Another 48,611 inhabitants had current residence in Slovakia, but at the same time did not have a permanent residence in the republic. As a result of the above-mentioned different register-based and current residences, a given person can live with other persons for both types of residence. The result is that they can be part of different type of census household for each type of residence. Therefore, in the dissemination, preference was given to census households by current residence that are formed based on the real place of residence and the real relationships of the residents.

9. In addition to the mismatch between the two types of residence among the residents, another issue is to capture unregistered cohabitant relationships between residents for register-based residence. In Slovakia, we do not yet have any institution to formalize and legalize the relationships of cohabiting couples, and therefore we cannot detect them from registers. The only exceptions are opposite-sex cohabiting couples who live together but also have at least one child in common, through whom we can infer this type of relationship indirectly. Same-sex cohabiting couples are also unidentifiable through the registers, as there is no legislative regulation in Slovakia yet, such as registered partnership or same-sex marriage, which would allow these persons to formalize their relationship. For current residence, we extracted from the census form the self-declaratory relationships of cohabitants who identified each other within the census household as cohabitant partner (men)/cohabitant partner (women), cohabitant partner (men)/cohabitant partner (men), or cohabitant partner (women)/cohabitant partner (women).

V. Comparison of results of households based on current and permanent residence

10. Approximately two-thirds of residential households are completely identical on register-based and current residence. That means, that the same persons live in the same shared dwelling for both types of residence. Census households constructed according to both types of residence are 72 per cent made up of the same persons in the same dwelling, but they may belong to a different type of census household for each type of residence. Census households which for both types of residence are made up of the same persons living together in the same dwelling and forming the same type of census household are 69 per cent identical (Figure 4). The difference between the latter two categories is due to the fact that we cannot detect relationships between cohabiting couples from registers unless they have a common child. Therefore, persons living in informal union (cohabitation) without children have a different type of census household from the register.

Figure 4
Similarity between households based on current and permanent residence



Source: Census SR 2021.

11. The types of census households constructed from registers and by current residence are different, due to the limitations of the methods used. In Figure 5 we can observe the quantification of differences among register-based and current residence. Comparing married couple households for both types of residence, we see that for census households for current residence, we capture over 97,000 more households of couples without children, and conversely, almost 72,000 fewer households of married couples with children. This difference is mainly due to the fact that some of the children keep their register-based residence at their parents' house, but their current residence as their real place of living is elsewhere. The absence of a possibility for official declaration of cohabitation in Slovakia makes it impossible to capture this category from registers. The exception is only for cohabiting partners who have a common child through whom we can link them together. Therefore, cohabiting couples without children and cohabiting same-sex couples have different types of census households from the register. Lone-parent census households are also overestimated in register-based residence. The reasons can be found in the fact that in these households, children are considered to live only in the register-based residence with their parent, but in reality, they are already living separately in different households. Households of individuals living with other persons are significantly over-represented among households constructed for current residence compared to register-based residence. These are often individuals living in sublet accommodation, with their register-based residence at a different address. Such persons occupy only part of the dwelling unit independently, while the rest of the dwelling is occupied by other persons with whom they do not form a joint census household.

Figure 5
Differences between census households for register-based and current residence

Types of census households	Register based res.	Current res.	Difference
Married couple without a child	262 933	360 007	97 074
Married couple with child	656 170	584 257	-71 913
Opposite-sex cohabiting couple without a child	No data	49 705	-
Opposite-sex cohabiting couple with child	67 390	83 793	16 403
Same-sex cohabiting couple without a child	No data	1 087	-
Same-sex cohabiting couple with child	No data	30	-
Lone fathers	65 224	51 632	-13 592
Lone mothers	435 332	305 567	-129 765
Non-family households	58 012	52 472	-5 540
One-person household without another member in the dwelling	410 072	488 853	78 781
One-person household with another member in the dwelling	353 040	346 761	-6 279

Source: Census SR 2021.

VI. Data quality and sustainability

12. As demonstrated above, the creation of census households based on register-based and current residence, due to the use of different data sources and variables, did not lead to the same result, despite both being processed to the same date. Census households for current residence, which we can construct based on the census, are considered closer to reality compared to census households based on registered residence. In Figure 6, it can be seen that the distribution of residents according to current residence in the individual dwellings was limited by the low completion rate of the variables used, as well as the high error rate by respondents in the census form. This caused complications in creating dwelling and census households, especially in apartment buildings with a larger number of units. The mirror relationships between residents created based on mutually declared relationships among individuals in the household were also burdened with considerable incompleteness and errors. On the other hand, these mutually-declared relationships in the forms were the only available source from which it was possible to identify the cohabitation of opposite-sex cohabiting couples without children, as well as same-sex cohabiting couples. For some individuals who were not enumerated, we did not have the apartment number or family relationships from the form. When deriving census households based on register-based residence, we sought the same variables: flat numbers and family relations taken from administrative sources. The flat numbers were assigned to residents from the Real Estate Cadastre or the Register of Natural Persons. These sources are updated regularly and can therefore be utilized in creating census households based on register-based residence at more frequent intervals. The advantage of these sources was the high data quality for apartment numbers from the cadastre and the clear possibility of assigning residents to specific units. On the other hand, even in administrative sources, the information on flat numbers often was missing. Family or kinship relationships derived from the Register of Natural Persons are a relatively accurate and valuable basis for constructing census households. However, their limitation is that they can capture only a portion of residents living in cohabitating unions, and during the intercensal period, they can only be used to create households based on registers.

Figure 6

Advantages and limitations of the sources used for creation of dwelling and census households

	Family relations from register (RNP)	Flat number from registers (Cadaster & RNP)	Flat number from census forms	Mirror relations from census forms
Advantages	<ul style="list-style-type: none"> Broad scale of family relations Relatively precise family relations 	<ul style="list-style-type: none"> Precise and unique identifier for dwellings High quality for flat number from Cadaster 	<ul style="list-style-type: none"> Only flat number for people with different current residence 	<ul style="list-style-type: none"> Only information about how people living together in one dwelling in current residence Contains cohabitants
Limitations	<ul style="list-style-type: none"> Do not completely cover cohabitants Without census only for register based residence 	<ul style="list-style-type: none"> High missing rate Low quality for flat number from RNP 	<ul style="list-style-type: none"> High non-response rate High error rate 	<ul style="list-style-type: none"> High error rate

Source: Census SR 2021.

VII. Conclusion

13. By constructing census households separately by both register-based and current residence, we were able to compare the matching rates of the two sets of households. Significant differences were identified among these types. These differences are due to the fact that some of the residents have their register-based and current residence in different places, which may result in different census household types for the same person, and due to

the impossibility of detecting relationships between cohabiting couples without children. As a result, we consider the census household data by current residence as more accurate and more realistically reflective of the objective state of family behaviour. As a result, at this point in time, relationship data obtained through the census are the only valid source covering the full range of cohabitation types, including informal ones. In the context of considerations for future censuses that could be based purely on register data, as well as a result of the more frequent intervals of household data required by Eurostat, we are faced with the question of how we can construct census households without an exhaustive statistical survey. With the current state of administrative data sources, we are able to construct census households on the basis of kinship for permanent residence. Assuming we can improve the quality of the flat number variable in the Register of Natural Persons, we will be able to construct dwelling households with high precision, and then derive census households from them. Currently, we are only able to construct census households of cohabiting couples with a common child. If Slovakia passes legislation allowing some form of registered partnership, it will be possible to cover a wider range of currently informal cohabitations. Another possible way to detect such non-institutionalized relationships may be through a sample survey and subsequent extrapolation of the results to the whole population. The results obtained through the census are an indispensable source of data for the construction of census households and the study of family behaviour. At present, they cannot be replaced fully by register data without informational and qualitative loss.
