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Delaying a census due to external crises: impacts and lessons for the future

The census in France: impact of the 2021 census delay on outcomes

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Summary

In France, the population census is based on the annual collection of information across all municipal territories in succession over a five-year period, an up-to-date residential building register and tax data. The data collection scheduled for 2021 was postponed due to the health crisis. Nevertheless, the French statistical institute INSEE has managed to disseminate annual population data and statistical results from the population census every year, thanks to an adaptation of the calculation methods. This paper presents this adaptation and analyses the quality of the estimates produced by this new methodology.

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NOTE: The designations employed in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

I. Introduction: the rolling census in France

1. Since 2004, France has moved from a traditional census to a rolling census. The law (n°2002-276 of February 27, 2002 articles 156 to 158) establishes the principles for carrying out the annual surveys and disseminating the population data of every municipality (there are around 35,000 municipalities in France). These official population figures are mentioned in about 350 laws or orders especially those regarding the calculation of the financial contribution that the State grants every year to each municipality. The dissemination of the official municipal population counts from the census is thus a quite important part of French democratic life.
2. The population census is also, of course, used to learn more about France's diverse and changing population. Since 2009, it has provided each year statistics on the country's inhabitants and their characteristics at the municipal level, but also for sub-municipal areas of around 2,000 inhabitants: composition by age and sex, occupation, housing conditions, means of transportation used to commute to work, etc.
3. The administrative and local authorities use these results in order to set up public facilities such as schools, sport facilities, public transport, etc. They are also used by companies and associations to improve knowledge on people living in a particular area.
4. Since 2004, the annual census survey (ACS) has been carried out in cooperation with each municipality. The process is managed and controlled by the French statistical institute (INSEE), but the data collection is implemented by the municipalities, which hire the enumerators and manage the field survey.
5. The complete rolling census process is organized over a five-year period. Each year, around 8,000 municipalities are involved in the census:
 - (a) 1,000 municipalities of more than 10,000 inhabitants. In these municipalities, a survey of 8 per cent of the dwellings is conducted each year. The sampling frame is the register of localized residential buildings (RIL) which is exhaustive and updated throughout the year in cooperation between INSEE and the municipalities;
 - (b) 7,000 municipalities of less than 10,000 inhabitants. In these municipalities, a full enumeration of the population takes place. These 7,000 municipalities represent one fifth of all municipalities of less than 10,000 inhabitants. Each municipality of less than 10,000 inhabitants is enumerated once every five years.
6. Each year, across 4 to 5 weeks (from mid-January to mid-February), 5 million dwellings and 9 million inhabitants are enumerated. The census is carried out as follows:
 - (a) 26,000 enumerators are hired throughout the country to visit inhabitants at their place of residence. Census response by Internet is preferred but answer by paper questionnaires is also possible. There are two different questionnaires: one for the whole dwelling with 15 questions on the dwelling's characteristics, including a list of the permanent inhabitants according to the international definition; and a questionnaire for each person living in the dwelling with 25 questions on age, nationality, place of birth, education, and occupation. In 2022, 70 per cent of surveyed inhabitants responded by Internet.
 - (b) These enumerators are supervised by 8,000 managers, also hired by the municipalities.
7. It is mandatory to answer the census; people who refuse may be fined. However, penalties are rarely applied. The communication around the census is more focused on the fact that answering the census is a civil act, important for the municipalities to implement appropriate public policies and that it doesn't take long (about 5 minutes for a questionnaire). Thanks to a strong communication campaign before and during the census period, the response rate stays at a high level: 95 per cent in 2022.
8. Then, each year, data collected over the last five years and other administrative data are used to produce updated population estimates for each municipality of France and detailed characteristics of population and housing for all geographic levels. January 1st of

the median year of the cycle is the reference date. For instance, the population disseminated in December 2020 was based on the data collected from 2016 to 2020, and had a reference date of January 1st, 2018. The method for producing estimations varies according to the size of the municipalities.

II. Population estimates from the census

9. For municipalities with less than 10,000 inhabitants, the method for calculating the population for year N, disseminated at the end of year N+2, depends on the year of the last census survey:

(a) If the last enumeration took place before the reference date, N-1 or N-2, the population is estimated by extrapolating the results of the last enumeration. In metropolitan France and Reunion Island¹, the extrapolation rate used for the population is the growth rate of the number of dwellings in tax data minus a “decohabitation” rate (variation in the average number of people per main residence between the last two enumerations).

(b) If the last enumeration took place during the reference year, N, the result of the enumeration is used directly.

(c) If the last enumeration took place after the reference year, N+1 or N+2, the population is estimated by linear interpolation between the last disseminated population (N-1) and the enumerated population.

10. Figure I schematically represents the usual method for calculating the official populations of municipalities with less than 10,000 inhabitants for the 2019 population census (in the absence of the 2021 EAR postponement).

Figure I

Usual method for calculating the official populations of municipalities with less than 10,000 inhabitants for the 2019 population census (in the absence of the 2021 EAR postponement)

	2016	2017	2018	2019	2020	2021
Municipalities ; RG 1				Enumeration		
Municipalities ; RG 2				← Enumeration		
Municipalities ; RG 3	Enumeration			← Interpolation	← Enumeration	
Municipalities ; RG 4		Enumeration		→ Extrapolation		
Municipalities ; RG 5			Enumeration	→ Extrapolation		

Note: RG stands for rotation group

¹ In the Antilles-Guyana and in the communities of Saint-Pierre-et-Miquelon and Saint-Barthélemy, the extrapolation consists in making the population evolve at the growth rate observed between the last two census surveys (trend extension), as tax data are not of sufficiently good quality to apply the method used for the other territories.

11. In metropolitan France², the population of municipalities with more than 10,000 inhabitants relative to the year N is obtained by multiplying the number of dwellings from the register of localized residential building (RIL) by the average number of people per dwelling estimated from the last five annual surveys, N-2 to N+2. It therefore contains an exhaustive component (the number of dwellings) and an estimated one on the basis of a survey (the average number of people per dwelling).

III. The postponement of the 2021 annual census survey

12. In the summer of 2020, INSEE was preparing to carry out the annual census survey (ACS) in 2021, according to the usual schedule, i.e. with data collection in January and February. A few changes in protocol were considered to reduce physical contacts between the surveyed population and the enumerators due to the health crisis: strong promotion of Internet response, quarantining of paper forms, implementation of the so-called "letterbox" protocol for depositing Internet connection identifiers to the online questionnaire in the letterboxes of individual houses (which does not require contact with the enumerator, unlike the usual protocol), etc. In early autumn, information meetings with municipal elected representatives were held mainly remotely. In October, training sessions with municipal coordinators had begun, when the number of people testing positive for Covid-19 suddenly increased. The French government then announced a second lockdown of the population from 30 October 2020.

13. Meanwhile, there was increasing feedback from the field that some municipalities were reluctant to carry out the annual census survey in early 2021. Many municipalities encountered major difficulties in preparing for the survey because of the autumn lockdown, particularly in hiring enumerators. The risk of a slow or incomplete enumeration was very high. INSEE urgently studied the different possible scenarios: maintaining the survey in January-February; delaying the survey to the spring; postponing the survey by one year.

14. Maintaining the census collection in January-February 2021 was dismissed because the training of field enumerators was made difficult by the lockdown and the future health situation was too uncertain. Indeed, the field collection of the census survey entails numerous trips and contacts with the inhabitants; even if they are short and limited, they are hardly compatible with a deteriorated health situation. Moreover, reduced support from the population would have led to many refusals to respond, resulting in a deterioration of the results produced.

15. The option of delaying the census to the spring of 2021 was also ruled out, again in connection with the unpredictable health situation. INSEE was well advised, as a third lockdown was introduced from 3 April 2021 for one month.

16. In the end, on 27 November 2020, INSEE decided to postpone by one year the collection of the 2021 annual census survey (ACS), with the exception of the territory of Mayotte³ and the census of sailors⁴.

17. In accordance with the law and despite this postponement, INSEE undertook to produce and disseminate the official populations according to the usual schedule. In particular, the official populations for 1 January 2019 were disseminated before the end of 2021. The statistical results of the census were also disseminated annually, according to the usual schedule. However, to achieve this, the methods for calculating the official populations and statistical results had to be adapted.

² In the overseas territories, the method is different, but the adaptation presented in this document applies equally to these territories.

³ Mayotte entered the rotating census system from the 2021 annual census survey. In order not to delay the first dissemination of results from the new scheme, it was important to carry out the survey in this territory in 2021. As an anecdote, a lockdown was announced on the second day of collection; the survey was suspended during the lockdown and resumed when it was lifted.

⁴ The enumeration of sailors is done by post only.

IV. What does the postponement of the ACS 2021 mean in practice?

18. The postponement of the ACS 2021 has led to one-year successive postponements of enumeration for each municipality with less than 10,000 inhabitants:

- (a) the municipalities to be enumerated in 2021 were enumerated in 2022
- (b) the municipalities to be enumerated in 2022 will be enumerated in 2023;
- (c) the municipalities to be enumerated in 2023 will be enumerated in 2024;
- (d) the municipalities to be enumerated in 2024 will be enumerated in 2025;
- (e) the municipalities to be enumerated in 2025 will be enumerated in 2026.

19. It was not possible to carry out a “double collection” in 2022 with the enumeration of two fifths of the municipalities of less than 10,000 inhabitants in the same year because this was considered too expensive, particularly for INSEE, which supervises the data collection of all the municipalities. For these municipalities, the gap between two enumerations is therefore temporarily 6 years instead of the usual 5 years.

20. In municipalities with more than 10,000 inhabitants, the survey is carried out each year by sampling. It did not take place in 2021. A new sample of dwellings to be enumerated has been drawn for the annual census survey of 2022.

V. Quality results were produced, despite the absence of an ACS 2021

21. The methods for calculating the results of the population census are very dependent on the 5-year cycle. The postponement of the ACS 2021 therefore had a significant impact, both on these methods and on the IT process. The challenge was to adapt the methods in order to produce quality results within the usual deadlines. It should be remembered that the population of each municipality is very important for local authorities, as they determine quite a large number of items: the amount of the financial contribution that the State grants every year each municipality, the number of pharmacies, the size of the municipal council, etc. The quality of the results of the census, particularly the population size, is therefore essential.

22. For municipalities with less than 10,000 inhabitants, the gap between two data collections was increased by one year – from 5 to 6 years. As a result, the use of tax data increased. In the usual calculation method, tax data (especially growth rate of the number of dwellings) are used to extrapolate the population for the two years following the enumeration⁵. Due to the postponement of the ACS, this method was applied for one additional year. Thus, for the municipalities that should have been surveyed in 2021, the 2019 population was calculated by extrapolating the results from the last available survey – 2016 – instead of interpolating from the 2021 data – because they were not available. For the other municipalities – enumerated between 2017 and 2020 – the calculation method is unchanged (see Figure II).

⁵ In the two following years, the population is calculated by interpolation with the new collection.

Figure II
Adapted method for calculating the 2019 legal populations for municipalities with less than 10,000 inhabitants

	2016	2017	2018	2019	2020	2021
Municipalities : RG 1				Collection		
Municipalities : RG 2					Collection	
Municipalities : RG 3	Collecti	3rd extrapolation				No collection
Municipalities : RG 4		Collection				
Municipalities : RG 5			Collection			

23. In municipalities with more than 10,000 inhabitants, the usual method is to estimate the average number of people per dwelling from 5 ACS and to multiply it by the number of dwellings from the RIL, which is exhaustive and was still updated during the health crisis period. No natural method emerged, given the absence of the 2021 ACS. The method finally implemented consisted of producing a pseudo 2021 ACS. This pseudo-ACS had to be as close as possible to the 2021 ACS if it had been carried out, under normal conditions, in terms of number and category of dwellings and average size of households. In practice, municipal targets for number of dwellings, rate of main residences and average size of households in 2021 were estimated respectively from the register of localized residential buildings and by extending the trend from past ACS. These three variables, which contribute to the population estimate, were updated, the other variables (share of women, share by age, etc.) were kept constant. A pseudo 2021 ACS was then created from the data of the 2016 ACS by changing the weights of the individuals to reach the 2021 targets. This pseudo 2021 ACS was then used instead of the missing 2021 ACS for the population estimates and statistical results.

24. To validate these choices, we estimated the performance of these methods by simulating the absence of an ACS in the past, and by comparing the results of these methods with the published population. We showed that the estimated population was very close to the published population at national level (0.05 per cent difference). The deviations at the municipal level may be greater, but remain moderate: the deviation in absolute terms is less than 2 per cent for 92 per cent of municipalities with fewer than 10,000 inhabitants. The population estimated by the adapted method lies within the 95 per cent confidence interval⁶ of the published population for 92 per cent of municipalities with more than 10,000 inhabitants.

25. In the end, the estimated populations are probably of much better quality than those that would have been produced if an enumeration had taken place in 2021, given the difficulties that would have been encountered in this period of health crisis with a high risk of a large increase in non-response rate. The 2022 annual census survey confirms this assumption: the non-response rate increased from 4.1 per cent in 2020 to 4.8 per cent in 2022, with high increases in some municipalities. Even though the 2022 survey was carried out

⁶ Confidence interval due to survey in these municipalities.

during a high wave of the epidemic, the health situation was really less favourable at the beginning of 2021, with a very low proportion of the population already vaccinated. The reluctance of people to be enumerated would probably have been even greater, which would have affected the quality of the results.

26. Census data are not just about population estimates. They provide extensive socio-demographic data on individuals and information on dwellings at a geographically detailed level. The methods mentioned above led to the freezing of socio-demographic structures at the level of the previous year. To hold these structures constant for one year is acceptable insofar as it is recommended to compare two census datasets over distant periods (at least 5 years previously and at least 6 years following the postponement of the 2021 ACS). Socio-demographic evolutions take place slowly, and the French census was not designed to track short-term trends due to the 5-year cycle.

27. While these methods are effective in overcoming the postponement of one survey, they are less effective in the case of postponement of several surveys. This observation was confirmed by simulations which show that the quality of the results would be much lower if two surveys were postponed during a census cycle.

VI. Conclusion: In 2022, a near return to normal?

28. The 2022 ACS started on 20 January 2022 and was carried out successfully. The increase in the non-response rate – which could be expected due to the health conditions – was limited (4.8 per cent in 2022 compared with 4.1 per cent in 2020) thanks to a higher number of authorisations to extend the collection period. The 2022 ACS showed above all a strong increase in the internet response rate. The implementation of the "letterbox" protocol in individual houses, initially planned for 2021, contributed to this increase in Internet responses.

29. The 2022 survey, which is currently being processed, will soon enter the usual process for the production of population census results.

30. The results are eagerly awaited for statistical studies, as it is the first census survey carried out after the onset of the health crisis. In particular, it will make it possible to study the evolution of the distribution of people in France and the migratory flows towards the rural areas in connection with the health crisis and the development of remote working.
