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Item 5 of the provisional agenda

**Transitions in census methodology; plans, experiences and innovations**

## **Challenges to move to an administrative census in Israel: current situation and future plans**

**Note by Israeli Central Bureau of Statistics\***

### *Summary*

Israel started a programme to increase register-based data in population censuses as soon as the final traditional census ended in 1995. Israel conducted integrated censuses in 2008 and 2022, after which it was strategically decided that the following census would be administrative. As part of the census in 2022, the administrative census's preparations got more serious and focused on the population counts. In the area of the population counts, advancements have been made in order to establish the national population and develop the primary methods to determine usual residence. These methods will be evaluated using the 2022 census data, which will also be used as a database to improve the methods. We have surveyed all of the Israeli Central Bureau of Statistics data sources that are now accessible and will be used to create the socioeconomic statistics, including the household data. We are working on ways to improve their content and also include data from sources that are not yet available to us. In this paper, we outline the administrative census progress we have made as well as the challenges we currently face and the challenges that are expected in the future.

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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

1. For more than twenty years, Israel has been considering a transition to an administrative census. As part of the digitization programme of the Israeli Central Bureau of Statistics (ICBS), it was strategically decided to switch to a census that relies mainly on administrative data. Therefore, the 2022 census currently being conducted will be the last census in which massive data are collected directly from the population.

2. The population registry in Israel was established in 1948 and it includes features (including an identity number) that enable an administrative census to be carried out. Although the population registry was used in the previous censuses, we have so far avoided moving to a full administrative census as a result of inaccuracy in address registration and inaccuracy in measuring the number of Israelis living abroad (emigration). To these reasons we can add the lack of local data on foreigners in Israel.

3. In recent years we have succeeded in improving the inaccuracies in the population register. These improvements include: 1) establishing a database that includes a list of Israelis living abroad using data from the border control system; 2) improving the quality of address registration by finding "signs of life" in other administrative sources; 3) establishing a database of foreigners who are in Israel which makes it possible to know the length of stay and place of residence in Israel; and 4) establishing a register of dwellings and buildings linked to the population register.

4. In addition, there is progress in establishing registers for social and economic data such as a business register, an employee register and an education register.

5. Along with the significant progress towards an administrative census in the development of data sources, there are still a number of challenges that must be faced during the transition to an administrative census. The chapters below discuss the various challenges in transitioning to an administrative census.

## II. Population counts

6. The challenges in compiling a population count for an administrative census will be discussed in this section. The population count is based on the population register and serves primarily as a means of addressing accuracy issues with the register.

7. In order to increase the accuracy of the population register, we will concentrate on four main issues: address accuracy, emigration stock, the Bedouin community in the Negev desert, and the foreign population.

### A. Improving the accuracy of the usual address (the census address)

8. It was found in the last two censuses (1995 and 2008) that 20 per cent of the population is registered in the population registry at one address but actually resides at a different address. Reducing the proportion of individuals whose addresses in the population register are incorrect is necessary in order to switch to an administrative census.

9. The following factors are the main causes of inaccurate address registration: residing at a temporary address (students, institutional residents, etc.); getting additional benefits from the registered address (parking, tax reductions, choice of school, etc.); having other interests, such as where to vote in local elections; and the time required to update the new address.

10. Although the Population and Immigration Authority tries to remind residents to update their addresses before a move, the gaps are still significant.

11. We looked for additional administrative data sources where an address was different from that of the register. These addresses expected to increase the accuracy of the addresses in the population registry. Using the "signs of life" approach, these sources can provide the usual address (the census address). Currently, we obtain additional addresses from four data sources:

- (a) The address listed in the local authorities' tax database that identifies the owner and holder of the apartment (ARNONA);
- (b) The addresses of the employees found in the tax authority registrations, according to the employer reporting;
- (c) Students' addresses, as given by their parents;
- (d) The home address of the electricity bill payer.

12. An address in addition to the one listed in the population registry exists for about 30 per cent of the population. This is an excellent position to start working on improving the usual address since the additional addresses are largely found among those whose addresses in the registration are inaccurate.

13. Additionally, each year we submit an application to each of the institutions for long-term housing and receive a list of the residents residing there.

14. A model has been developed to predict the usual address from all the data sources mentioned above, based on data from the 2022 census's first test, which was conducted in 2017 and allowed for real data. The key conclusions are outlined in Table 1.

Table 1

**Results of the usual resident prediction model**

Type of result	Per cent of the total	Notes to improve the results
Total	100	
Prediction the usual address	93	
When the usual address is present in one of the sources, the model predicted an inaccurate address	4	In these cases, it is required to improve the model by including new features and/or additional sources for the address.
All data sources are missing the usual address	3	In these cases, new sources for the address must be found.

15. Similar results were obtained when we applied the model to data from the social survey and the labour force survey.

16. Because of the original situation, we are in a really good position. We keep looking for and analysing new data sources while simultaneously working to improve the model itself.

17. The above strategy was only effective in Jewish towns where people used specific addresses (city, street and house number). We will need to develop a separate model because people of Arab towns only use the name of the town as their address, making it difficult to divide the population into the community's statistical areas. The precise location of the residence exists in part of the data sources we used above (coordinates or block and plot). We can develop a model for the Arab towns by combining these sources with additional

sources. We will be able to offer data if the model results do not allow statistical area division of the town's population.

18. The model mentioned above does not cover the foreign population either. We'll discuss more about the foreigners later.

19. The 2022 census data will provide a broad database (about 20 per cent of the households in Israel) that will allow us to evaluate the various models, and thus also improve them. Population counts according to the various models and comparing them to the real results of the census are the basis for population counts in an administrative census.

## **B. Emigration stock**

20. Separating residents with their usual addresses in Israel from those with their usual addresses overseas is one of the prerequisites for conducting an administrative census. This can be accomplished by using Israel's border control system to look for signs of life.

21. We are fortunate that Israel has an extremely effective border control system, which is demonstrated by the registration of each and every individual who crosses the border in both directions. These figures are frequently used to estimate the emigration flows.

22. We have been counting the number of emigrants leaving each year (outflows) and the number of emigrants returning to reside in Israel (inflows) using these data for the past 25 years. We have adopted a continuity-based strategy when traveling abroad. It is necessary to continuously spend at least one year away to be counted in outflows. After at least a year away, three continuous months in Israel are required to be counted in inflows. We can only create a stock of emigrants from statistics on flows for people who left within the last 25 years. People who emigrated before 1996 are not covered by this stock.

23. The continuity strategy does not adhere to the international definitions of migration and does not account for the ways in which international travel is affected by changes in the global economy. For the past two decades, there have been more and less expensive flights between Israel and other countries, enabling those whose usual residence is outside of Israel to make quick trips there. The counting method should therefore adapt to international definitions and take into account these changes.

24. A stock of emigrants that also includes historical migration must be produced and managed according to the flows in order for an administrative census to be adequate between the population counts and the population growth component from international migration.

25. A stock of emigrants was established for the 2008 census, and it includes the historical emigrants. After the census, evaluations of this stock showed a high level of accuracy (over coverage of 3.2 per cent and under coverage of 7.6 per cent - that means over estimation of the population of 0.31 per cent). This stock has been updated consistently since 2008 in accordance with the flows described below.

26. A departing emigrant is a person who is not already in the stock of emigrants, who has undergone an event involving a continuous stay of three months abroad (in which case, the date of departure serves as the emigration-determining date), and who, within a year of the emigration-determining date, has spent at least 275 days abroad (including the first three months). A departing emigrant is removed from the population stock and added to the stock of emigrants.

27. A returning emigrant is someone who is listed in the emigrant stock, who has gone through the event of arrival and been in Israel for three continuous months (using the return date as a reference), and who has spent a minimum of 275 days in Israel over the course of

the year following the determined date. An emigrant who returns is moved from the emigrants stock to the population stock.

28. It is possible to distinguish between short-term and long-term emigration using this approach of monitoring the emigration stock, and it also offers a wealth of data for studies on emigration in Israel.

29. In 2020, the corona crisis provided an opportunity to evaluate the emigrant stock. We computed the percentage of people who took a Covid-19 PCR test in 2020 from two groups: those who have their usual resident in Israel and those who are emigrants. Only 3.5 per cent of those in the emigrant stock took the test, compared to 40 per cent of those with a usual residence in Israel. Because all Israelis living abroad who visited or returned to live in Israel during the crisis were compelled to take the test when they arrived in Israel, I believe the percent of emigrants who took the test is higher than expected.

30. Checking the accuracy of the emigrant stock is now available thanks to preliminary census statistics from 2022. We compared individuals who indicated on the census form that they had lived abroad five years prior (in 2017) with the 2017 emigrant stock with. Of these individuals, 95 per cent of were discovered to be included in the 2017 emigrant stock; 4.5 per cent were not. It was discovered through a study of their departures and arrivals that they had spent a significant amount of time abroad but did not fulfil the criteria of the definitions above. Additionally, 0.5 per cent of them was absent from the emigrant stock and had no indication that they were living abroad.

31. These evaluations clearly point to a high level of emigrant stock and a high-level approach to managing emigrants flows. Of course, this stock can be used in an administrative census due to its high degree of accuracy.

32. Finally, some figures to indicate the amount of emigration in Israel: the stock of emigrants at the end of 2021 included 1,064<sup>1</sup> thousand people while the total population is 9,453 thousand, 31.5 thousand people left Israel that year, and 29.4 thousand people arrived back to reside there.

### C. Bedouin community in the Negev desert

33. About 300,000 Bedouins with very poor socioeconomic level reside in Israel's Negev desert. There are two primary groups of Bedouins that may be distinguished: those who reside in towns and villages that are under regulation (approximately 80% per cent) and those who live in villages that are not under regulation and are not recognized by the state authorities (about 20 per cent) – unrecognized villages.

34. The cooperation of the Bedouin people in surveys and the CBS's population census is limited due to several obstacles. Field conditions are challenging, and population cooperation is quite low. As a result, the data obtained in the field are poor. On the surface, it would appear that the challenges of counting the Bedouins are resolved by an administrative census, which does not necessitate the active participation of the population and field work. However, the situation is more complicated, as will be discussed below, and we still need to find solutions to the problem of the location of the population.

35. A Bedouin can register in one of the recognized towns or under the name of his tribe if he resides in one of the unrecognized villages by entering his address in the population registration. Without a specific location in the field, the tribe's members could be dispersed

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<sup>1</sup> The figure includes those who passed away outside of Israel but did not report in the Israeli Population Register.

throughout the desert. It should be noted that residents do not always know where the boundaries of recognized towns are, and it is possible for Bedouins to live within the boundaries of a recognized town while continuing to be listed as members of the tribe on registration document, particularly considering that the state authorities only recently acknowledged a substantial portion of the towns that are recognized today. The location of the Bedouin residents was not found in any administrative data sources. At the same time, a solution was discovered using the traditional 1995 census in combination with other administrative data that also included indication for the location where they reside.

36. The location of the majority of the Bedouin population was reported in the population census that was conducted in 1995 (the last traditional census). The Bedouin typically settle in recognized towns or have fixed residences in unrecognized villages. This makes it easy to locate the Bedouin who were included in the 1995 census, together with every member of their family and their descendants, in the area identified in that year. We place the family in the same recognized town identified if there is proof that they relocated to a recognized town, revealed by using administrative data such as local taxes and marriage registration.

37. The location accuracy of the Bedouin population residing in unrecognized villages was tested in a pilot in 2018. A sample of 100 people was taken, and it was discovered that more than 80 per cent of them were in the same place as in 1995.

38. In order to perform an administrative census among the Bedouins and collect data for the population living in unrecognized villages, we will check the accuracy of the selected locations using the 2022 census results.

#### **D. Foreigners**

39. Foreigners are those who have been granted a long-term residency permit in Israel but do not have Israeli citizenship or permanent residency status (workers, students, volunteers, priests, etc.). When their permits expire, these people are expected to leave Israel.

40. Israel has a strict policy towards foreigners who are not covered by the Law of Return<sup>2</sup>. The visa of a foreign worker, for instance, is provided for a year in accordance with the policies of the Population and Immigration Authority that are based on the Law of Entry into Israel. This visa may be extended for a maximum of 63 months.

41. We estimate the national population count of foreigners based on their visa status at the time of entry into Israel using data from the border control system. The Population and Immigration Authority, which is in charge of maintaining a database of foreigners, also provided information on changes to visas made while the foreigners were residents of Israel, as well as information on their residential address.

42. Approximately 180,000 foreigners holding visas for extended stays in Israel were found at the end of 2021. Fifty-one per cent are workers; 17 per cent are so-called ‘infiltrators’<sup>3</sup> (mostly from Sudan and Eritrea who crossed the Egyptian border illegally and are seeking protection in Israel); 12 per cent are students; 13 per cent are eligible for the Law of Return and their family members who have chosen not to become Israeli citizens; and 7 per cent are volunteers and clerics and their companions.

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<sup>2</sup> The Law of Return applies to those with Jewish ancestry (mainly Jews and their family members). This law generally provides citizenship to immigrants, giving them the right to live permanently in Israel.

<sup>3</sup> This term, used by the government of Israel, refers to migrants who have entered the country without documentation

43. The population counts of foreigners has four key challenges:

(a) Determining the usual residential address:

The Population and Immigration Authority's data are used to determine an address for 75 per cent of the foreign population. There are no informational sources that make it possible to evaluate the accuracy of these addresses. Given the circumstances, we are compelled to use these addresses in order to conduct the census. We will have to allocate/impute addresses to the remaining 25 per cent of the population in accordance with the data that are now available.

(b) Defining the usual address and inclusion in the national population:

The duration of stay approach and the intent approach are the different options used by international definitions to determine whether or not to count immigrants as part of the national population. Foreigners in Israel tend to move around a lot. Although their visas allow them to stay for longer than a year, many of them visit Israel for less time than that. However, due to constant replacement by others, the overall foreign population remains steady at around 180,000. Since there is always a steady number of foreign workers, we tend to use the intentions approach rather than the length of stay approach.

(c) Social and economic data:

In an administrative census, we are restricted to counting the population by age, gender, country of citizenship, place of residency in Israel, time of arrival, duration of stay in Israel, and reason for stay due to the absence of administrative data on social and economic variables.

(d) Over-stayers:

Another 30,000 foreigners, in addition to those who were previously mentioned, entered Israel on tourist visas and stayed there even after their visas expired. We are still debating whether or not to count them as part of the population. If so, we anticipate using the length of stay approach.

### III. Household composition and definition

44. In Israel, household and family definitions are based on currently accepted international definitions. Household is defined as "One person or a group of persons living together in one dwelling on a permanent basis most of the week, who have a joint expense budget for food". They may be related or unrelated persons or a combination of persons both related and unrelated. A family is defined as "A nuclear family of two persons or more who share the same household and are related to one another as husband and wife, as an unmarried couple, or as parent and child (including an adopted child)".

45. We need to know the list of residents at the apartment, their familial relationships, and their economic relationships in order to use these definitions in an administrative census.

46. The address selection model mentioned above is expected to provide a list of those who reside in the apartment. The family ties contained in the population register can be used to determine the ties. The economic relationships between people who share an apartment cannot be determined by administrative statistics.

47. As a result, the term "household" in an administrative census must be modified from "economic household" as is it now defined, to "apartment household" (all people residing in an apartment, regardless of their economic relationships).

48. Apartment households are expected to have fewer specific household types than those in the existing definition. It can cover both non-family households and family households (with or without others). This means that we can miss data on families like cohabitation and same-sex families that are not listed as families in the population register.

49. In order to develop a statistical model that will predict the list of individuals residing in the apartment, we expect to use the outcomes of an address selection model, the results of the 2022 census, the dwelling and building registration, and the population registry.

#### **IV. Socio-Economic Data**

50. An administrative census in Israel can use a variety of data sources, including the education registry, building and dwelling registry, business registry, employee registry, disability registry, welfare registry, driver registry, etc. The evaluation of the coverage and data quality for these registers has just begun.

51. According to a preliminary analysis of the administrative data, some sources do not have complete coverage, such as the education register for the older population, and these sources do not contain all of the essential topics for population census (for example, there are no data on occupation and no data on commuting).

52. We will need to encourage improvements in the socioeconomic data using one or more of the following strategies to bridge the gap between what is needed and what is found:

- (a) Look for more data administrative sources to help with the coverage and/or to fill in the gaps.
- (b) Use additional data sources, like big data, to supplement missing data, like using mobile phone data to gather data about commuting.
- (c) Use statistical tools like imputation.
- (d) The use of additional surveys, through which uncovered populations will be looked into and information that does not appear in administrative data, such as occupation, will also be examined.

#### **V. Evaluation**

53. Israel's administrative census is expected to draw from a variety of data sources and make several statistical and probabilistic decisions that either correct or supplement the administrative data. A detailed evaluation plan must be in existence to examine the various sources and the accuracy of the statistical and probabilistic decisions.

54. Conducting a survey to evaluate the level of accuracy of the statistical decisions taken during the census construction is one alternative to evaluating the census results.

55. Another alternative is to evaluate the quality of the data by using existing surveys conducted for other purposes. The labour force survey and the social survey provide a good basis for evaluating the census results.

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