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Economic and Social Council

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Distr.
GENERAL

ECE/CES/GE.41/2007/4
2 April 2007

Original: ENGLISH

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ECONOMIC COMMISSION FOR EUROPE

CONFERENCE OF EUROPEAN STATISTICIANS

Group of Experts on Population and Housing Censuses

Tenth session
Astana, 4-6 June 2007
Item 3 (a) of the provisional agenda

CENSUS PLANNING AND MANAGEMENT

Towards an integrated model of management and quality control for population and housing census at the local administrative level

Submitted by Portugal [*]

This meeting is organised jointly with Eurostat.

Summary

The Bureau of the Conference of European Statisticians (CES), at its meeting held in Washington, D.C. (United States) on 19-20 October 2006, approved the renewed terms of reference for the Steering Group on Population and Housing Censuses and the plan for future CES activities on population and housing censuses. The CES Bureau also agreed that the Steering Group would coordinate the work on the diverse types of meetings.
The present paper was prepared on request by the Steering Group on Population and Housing Censuses, for presentation and discussion at the Joint UNECE/Eurostat Meeting on Population and Housing Censuses in Astana (Kazakhstan), 4-6 June 2007. The paper provides substantive basis for the discussion in the session of the meeting dedicated to "Census planning and management".

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[*] This document has been submitted late in order to include information on the latest progress in this work. The document has been prepared by National Statistical Institute of Portugal.

GE.07-21438

I.   INTRODUCTION

1.   The population and housing censuses in Portugal are carried out since 1864 in accordance with international standards and constitute, since then, the largest and oldest statistical information source duly harmonized and disaggregated to the basic administrative unit – the parish. It is since that date that the different statistical units (building, housing unit, household and individual) are observed in an individual manner, following moreover the recommendations of the Brussels International Statistical Congress, which took place in 1853. As an autonomous statistical unit, the building started to be enumerated only from 1940 on.

2.   Since 1864 and up to 1960, the variables related with the population clearly dominated the content of the census. Also the data collected fell only upon some characteristics of the housing units, usually known as "fogos". From 1970 on, two censuses operations were carried out simultaneously – population and housing, making use of the strong interconnection of the respective field work and in order to turn them more cost-effective. Autonomous sets of variables also started to exist for each one of these two statistical areas.

3.   These censuses operations have been carried out with decennial periodicity, so that the censuses of 2001 represented the fourteenth Population Census and the fourth Housing Census, known in brief as 2001 Census. In the 2001 Population and Housing Censuses there were enumerated 10,356,117 resident persons, 3,650,757 private households and 5,046,544 housing units. The forthcoming censuses to be implemented in 2011 should follow this sequence and are briefly known as 2011 Census.

4.   All the population and housing censuses carried out in Portugal were subject to specific legislation considering that these are statistical operations involving an active participation of the Central, Regional and Local Administration. The legislation defines the competences of all the intervening entities and ensures that their global coordination and responsibility are exerted by INE (the National Statistical Institute). The funding of these operations is totally ensured by the Central Government through a specific provision assigned to the budget of INE. This one being the entity responsible for the entire budget execution and control, at all the levels of the participant entities.

5.   The implementation of these censuses operations in Portugal has always been based on the traditional model, on the basis of the collection and exhaustive treatment of the questionnaires referring to each statistical unit. The sole exception dates from 1970 when definitive results, due to technical difficulties, had only been produced with a sample of 20 per cent of all the collected questionnaires even if the collection has been made to 100 per cent. On the other hand, the whole process of local implementation concerning the questionnaires delivery and collection remains based on the local administrative structure (municipalities and parishes), which is directly responsible for the organization and coordination of this process, naturally supported by INE.

6.   The 2001 Census had a quality assurance and control programme, quite demanding and exhaustive in order to keep the effective control of the whole production process. The anticipated preparation of alert indicators on population and housing was one of the determining elements of this system, making possible to estimate the expected values, at least, at the level of the basic administrative unit. In this way, the choice was for integrating the whole administrative and

managing component with the data collection quality control, thus ensuring a local and prompt analysis of situations with more doubtful coverage. This process enabled the detection and rechecking, in due time, of several doubtful situations, contributing to a great extent to the quality indicators achieved in this statistical operation. Also the existence of integration between financial data and physical data enabled the local responsible to easily perceive the differences between expected data and effectively collected data, before they proceeded with the respective payments.

7.   This system will be improved for the 2011 Census through further and more updated administrative information, rendering the alert indicators more efficient in the rechecking of the areas with effective problems of census coverage.

II.   THE ROLE OF LOCAL GOVERNMENTS ON CENSUS ORGANISATION

8.   Besides the legal tradition which starts with the first censuses, Local Government bodies are virtually indispensable in the carrying out of these statistical operations; not only by reason of the detailed knowledge they have of their territory but also because they have an ever growing interest in the results obtained and of their use; the most important aspects of this involvement are as follows:

(a)   Many of the indicators used for calculating the transfer of funds from Central to Local Administration are estimated based on data from censuses;

(b)   The control and planning of territorial occupation is regulated by the Municipal Directive Plans (PDMs) and is one of Local Administration's most important tasks by reason of its present and future impact on the citizens' quality of life;

(c)   Most municipalities are concerned about their population's evolution, either because they are losing population or because the uncontrolled territorial occupation may be caused by population flows.

9.   For these reasons, the involvement of Local Governments (Municipalities and Parishes) in these statistical operations, in addition to making them easier to carry out, because of their knowledge also makes it possible to evaluate the results obtained and to hold local government jointly responsible for them. However, the involvement of the municipalities do not free the NSI to follow and dynamize such involvement. It must also be stressed that leaders of municipalities and parishes are subject of political elections every 4 years.

III.   FIELDWORK ORGANIZATION USED FOR POPULATION AND HOUSING CENSUSES IN PORTUGAL

10.   The Portuguese territory is organized into statistical and planning areas, which fully integrate the basic administrative structure with the Central and Regional Administration. This territory organization also integrates the European Union community structure with the so-called Nomenclature of Territorial Units for Statistics (NUTS). The statistical and administrative structure, harmonized with the European Union, leads into the smallest administrative division, the parish. However, the production and dissemination of census statistical information needs major breakdowns than the basic administrative unit having into account, over all, the statistical

information needed for the smaller statistical areas, which led Portugal to organize its own territory, for statistical purposes, in finer units. In 2001, the organization of the territory comprised the following units:

a)   Portugal (92,090 km2)
b)   NUTS I – 3 regions (Mainland-88,967 km^2; Azores-2,322 km^2; Madeira-801 km^2)
c)   NUTS II – 7 regions
d)   NUTS III – 30 regions
e)   NUTS IV/LAU1 – 308 municipalities
f)   NUTS V/LAU2 – 4,241 parishes
g)   Statistical section (it corresponds to the working area for an enumerator, containing about 300 housing units) – 16,094
h)   Statistical subsection – 177,893
i)   Locality – 26,898

11.   Excepting the Locality, all the remaining territorial units are totally integrated in the nearest higher respective unit. The Locality is the population agglomerate with 10 or more housing units and corresponds to the sum of the contiguous statistical sub-sections belonging to the same locality; one locality can be inserted within one or more parishes.

12.   The census content and organizational model are appreciated, at first stage, by the Statistical Council (CSE) with the analysis of the respective Action Programme. In the Statistical Council there are represented all the national statistical users, as much the public sector as the private one, including the institutions of the third educational level as well as of scientific research. Taking into account the local governments' importance, their representative at the Council assured, in 2001, the presidency of the corresponding section devoted to the census operations. All the remaining executive structure is of the exclusive direct responsibility of INE, up to the local level.

13.   The local administrative structure, in 2001, comprised 308 municipalities, which were divided into 4,241 parishes. In this way, the local census structure was leaded by the Municipal Delegate (450, because some larger municipalities had more than one Delegate), who supervised all the administrative and technical local organization, with the support of the Municipal Administrative, for administrative support, and of the Parish Coordinators, who supervised the whole area of the corresponding parishes. For parishes with major dimension, there were also the parish sub-coordinators who depended directly on their respective Coordinator. The Enumerator, to whom the delivery and collection of the questionnaires was assigned, constituted the basic element of the structure. The enumerator also had to complete the census form whenever it was incorrect or simply not filled in.

IV.   QUALITY ASSURANCE AND CONTROL PROGRAMME

14.   Census data are very important not only by themselves but also because they constitute the benchmark for large number of other activities including the statistical ones. Then, for 2001 census we have designed a Quality Assurance and Control Programme consisting of the following main components:

a)   Control of the execution process;
b)   Analysis of indexes and alternative data sources;
c)   Post Enumeration Survey (PES).

15.   Final indicators on the census quality had to be assumed on the basis of the results of PES, once this last survey was designed with the main purpose of assessing the quality on coverage and content of census data. Its sample was designed in order to release data by NUTS II, what means that there is no any direct implication to any individual municipality in what concerns the final results of the PES. But the general assumption is that if we control carefully the quality at the lowest level, results at the higher levels must reflect those concerns and are much more consistent.

16.   The control of the production process is similar to that used in any other production series in which quality control instruments are used to evaluate the different areas in which errors can occur. While the second and third components did not involve directly the municipalities, the first component dealt with several activities ranging from the personnel selection and training up to the data treatment, some of them, like the delivery and collection of questionnaires, constitute the key elements to control and achieve a good quality in the census data. The local activities selected beforehand in which this control was implemented are:

a)   Selection, training and technical evaluation of the regional and local participants;
b)   Delivery and collection of questionnaires

17.   As regards the selection, training and technical evaluation of the regional and local participants, in addition to the instruments used to evaluate already existing knowledge and knowledge gained and the introduction of minimum acceptable levels of knowledge, we introduced a salary plan that have turned the work carried out at a local and regional level sufficiently attractive. In addition, the training plans used were such that the training period was as short as possible while at the same time being long enough to permit a standard training pattern adapted to the average skills necessary. Thus the control instruments that were used at this stage are:

a)   Tests for the selection of training candidates;
b)   Control of the length of the training period;
c)   Technical models for the evaluation of knowledge acquired;
d)   Models for the control of practical training.

18.   The delivery and collection of questionnaires are the central tasks, which most influence the quality of these censuses. Every quality control instrument is fundamental to this phase, but we should not make the mistake of trying to achieve an "iron" grip on things only to end up making it impossible to carry out the normal flow of work as a result of introducing an excessive workload into the production process. Thus, in addition to the individual control of work carried out, we built up an "alert system" based on "expected values" at the parish level. This system enabled the detection and rechecking of situations in which large deviations between data from different sources occurred. Thus the control instruments taken into account in this phase are:

a) In terms of individual control, the local supervisor (Parish Coordinator) checks the indicators for the coverage and content of the questionnaires distributed and collected by the enumerator involved in carrying out the census;

b) A systematic sample of 5 per cent of the questionnaires collected are subject of re-interviewing using a combination of questions on housing and population (occupancy status and number of rooms in the housing unit questionnaire and number of residents in the housing unit); these procedures were subject of a specific payment and the results had to be checked and confirmed by the respective Municipal Delegate before the payment occurs;

c) The "alert system" was prepared on the basis of the best indicators existing by the end of 2000 and its main purpose was to check immediately collected data on population and housing units at the lowest level possible (Parish for population and statistical section for housing units) for the main indicators available at that time; this system was built up with data coming from the following data sources: Census 1991, BGRI-Geographic Information System, CTT-Mail Company Register, EDP-Electricity Company Register, Electoral Census Register, natural balance for the decade and annual statistics on housing.

19.   The alert indicators system aimed mainly to ensure that all the parishes, where collected data on population and housing units were found beyond the limits of the respective interval, had an additional checking ensuring that data were correct. This checking procedure, more than requiring a major attention from the regional and local executive structure, has enabled the correction and control, in due time (before concluding the questionnaires collection in each parish), of all the doubts and eventual coverage errors that might be happening. The deviation model in relation to the expected values was established in more or less 10 per cent for the housing units and population, at the parish level. Significant deviations at the statistical section level were also analysed and rechecked, since the census cartography updating enabled us to dispose of indicators on the number of housing units at that level. In this way, more demanding controls were made in:

a) 457 parishes whose results, on population and housing units, were beyond the estimated interval;

b) 1,259 parishes whose results, only on population, were beyond the estimated interval;

c) 1,434 parishes whose results, only on housing units, were beyond the estimated interval.

20.   The implementation and results of the Quality Assurance and Control Programme were oriented and audited by a highly respected university institution in the statistical area. This fact contributed for the permanent independent feedback on the more adequate manner to lead the Programme's implementation and the analysis of its results. The whole process of the PES sample selection and data treatment was carried out by the referred university institution. The selected areas for the respective sample were known by INE only after receiving in Lisbon the questionnaires collected in the municipalities concerned.

V. MONITORING SYSTEM FOR MANAGEMENT AND QUALITY CONTROL

21.   It was possible, for the first time in 2001, to implement software doing the integration of all the administrative procedures of the fieldwork management and control. This software, known in brief as AOCTC (Application for the Organization and Control of the Fieldwork) was developed and prepared by INE and resided in a portable computer which was distributed to all the Municipal Delegates who could only work and accede to the respective municipality's data. It was aimed to support the Municipal Delegate's work, as much in the perspective to organize and control his permanent activity as in the one to send the respective information for the higher levels of the fieldwork control and evaluation. Each instance in the AOCTC only had available the data concerning his administrative area; the production of tables could also be done only for the respective geographical area of responsibility within each instance. Furthermore, the higher levels of instances can only accede to the respective lower levels. The different features and the intervening instances are listed in the table below:

Table 1. Main features of the AOCTC/2001

Feature	AOCTC – Type of instance		
	Municipal Delegate	Regional Director	National Coordinator
Persons			
Registration questionnaire (for fieldwork)	X	X	X
Assigned statistical sections	X		
Production			
Delivery of questionnaires	X		
Cover for the statistical subsection	X		
Cover for the statistical section	X		
Payments			
Payment receipt for the Enumerator	X		
Payment receipt for the Subcoordinator	X		
Payment receipt for the Coordinator	X		
Payment receipt for the Parish Administrator	X		
Payment receipt for the Municipal Administrator	X	X	

Payment receipt for the Municipal Delegate		X	
Payment receipt for the Training	X		
Tables			
List of Candidates	X	X	X
List of Contacts	X	X	X
Report on the data collection	X	X	X
Report on the common minimum area	X	X	X
Analysis of deviations (Alert System)	X	X	X
Preliminary results	X	X	X
Municipality and Parish expenses	X	X	X
Geography			
DT CC FR SEC SSEC (Coding)	X		

Legend:
X – The instance may execute the feature.
Others – The feature may not be executed at the respective instance. However the respective instance can see what was done at the lower instances.

Remarks:
- The Census Department is the highest instance;
- The feature "Geography" controls the existing chances of changing/adapting the delimitations of the statistical subsections.

22.   As verified in the previous table, the Municipal Delegate was the primary responsible for the execution of all the AOCTC features, with the exception of his own payment. Analysing the Alert Indicators deviations compelled the Municipal Delegate and the Parish Coordinator to find a descriptive explanation on the differences found, before the Municipal Delegate concluded the respective parish. In addition, another financial and administrative control tool (Parish Expense Table) was also checked and signed by the Parish President, also enabling a prompt local assessment between the collected data and the values expected by the local government. Whenever a significant deviation arose, this table also functioned as an element of evaluation and administrative explanation of the differences found, before proceeding to the respective payments.

23.   The deviations assessment for the alert system control was made through the "deviations table" which gathered the information previously loaded in the alert system with the one resulting from the data collected by each enumerator in the respective statistical section.

VI. MAIN RESULTS AND CONCLUSIONS TO BE HIGHLIGHTED, AS WELL AS APPOINTMENTS FOR 2011

24.   As verified in the table below, the final results of the PES point out to coverage net rates quite close to 100 per cent, emphasizing some situations where these rates have even exceeded that value, while the most common situation at the international level points out to undercoverage. This was due to a strong engagement of the executive structure, with special emphasis on the local one, strongly supported by a system enabling to assess at present the relation between the collected data and the expected data. The existence of previous and quite geographically disaggregated estimators, for the population and housing units, has functioned as a stimulator of additional checking on census coverage, which added a positive pressure element on coverage quality. Overcoverage is mostly due to those statistical units, which are wrongly enumerated, and his final balance becomes positive with the units wrongly not enumerated.

Table 2. Net coverage rates (%) for each statistical unit, by NUTS II

	Building	Housing unit	Private household	Resident person
PORTUGAL	99,7	99,5	101,1	100,7
North	99,7	99,7	99,8	101,0
Centre	99,9	100,0	101,4	100,9
Lisboa	98,7	99,0	101,6	99,7
Alentejo	100,9	100,6	102,1	100,8
Algarve	96,8	96,7	101,5	102,4
Açores	99,9	99,9	104,6	102,4
Madeira	99,3	99,2	101,2	101,8

25.   Local governments had no significant negative reaction to the 2001 Census data, in opposition to what had happened in the past. This fact was particularly emphasized in the minutes concluding the census activities in the respective Statistical Council Section, presided over by the local governments representative: "The President of the Section has expressed her satisfaction for the work carried out in the framework of these censuses, having pointed out that in a global manner it was possible to note an enlarged consensus close to the public opinion in relation to the success of the operation; it has not been found any initiatives contesting the quality of the information disseminated."

26.   For the 2011 Census it is intended to improve the whole executive infrastructure previously described, with particular emphasis for the following:

a)   Local governments are to continue their determining role within fieldwork, although systematically supported by INE;

b) The alert indicators system should be improved in order to contain more updated data and better weighed at the local level, as to avoid the additional checking burden that was observed in 2001. In this sense, we are re-evaluating the data of an enlarged group of statistical and administrative sources for obtaining more accurate indicators related to each basic administrative unit. One of the procedures being adopted may be the use of several limits for obligatory rechecking depending on the size of the local unit;

c) Once we are integrating the Internet response of questionnaires, the whole alert indicators process, as well as the local indicators corresponding re-evaluation, should fast integrate data resulting from the electronic responses;

d) The control of the local executive process should count on one systems application with similar features, although more user-friendly as to the functioning and to data exportation towards higher structures;

e) Final indicators on coverage and content quality should be produced on the basis of the respective PES.

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