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**CENSUS QUALITY ASSURANCE AND EVALUATION**

**Preparation, organization and conducting of the post-enumeration survey in the State  
Statistical Office of the Republic of Macedonia**

Note by the State Statistical Office, The Former Yugoslav Republic of Macedonia

**Summary**

Immediately after the 2002 population census, the State Statistical Office of the Republic of Macedonia conducted an independent Post-enumeration survey (PES) for evaluating the coverage and quality of the census data. The present paper describes the methodology adopted for the PES, the activities connected with its implementation, and some of the main results obtained. It is considered that the PES was conducted successfully. Based on the analyses of the PES results, the coverage of the Census 2002 was considered good. The quality of census data was also considered good for the largest part of the census items.

## **I. INTRODUCTION**

### **A. NECESSITY OF POST-ENUMERATION SURVEY FOR STATISTICAL CONTROL**

1. The last Census of Population, Households and Dwellings in The former Yugoslav Republic of Macedonia was conducted from 1 to 15 November 2002. The Census methodology, organization and management were in line with international standards and UN recommendations.

2. The Census of Population, Households and Dwellings is a very important operation, and its evaluation should not be limited only to the standard methods and procedures to evaluate the coverage and the quality of the data collected. Therefore, the State Statistical Office of the Republic of Macedonia conducted in November 2002 an independent Post-enumeration survey for a statistical control of the coverage and quality of the census data. Data collected in this survey provided the opportunity to estimate coverage and reliability of the census, as well as to discover some possible errors.

### **B. OBJECTIVES OF THE POST-ENUMERATION SURVEY**

3. The basic objective of the Post-enumeration Survey is to give, through an independent (repeated) enumeration of a small sample of the census units (the population, households and dwellings), an evaluation of the validity, preciseness and confidentiality of the census data from the aspect of their quality.

4. The statistical control of the coverage enabled to assess whether all of the census units were covered and properly located, i.e. whether some of these units were missed during the enumeration or were enumerated twice.

5. The validity of the answers on some questions in the census was evaluated with the statistical control of the quality of the census data, as well as the consistency of the application of the instructions, definitions and classifications specified in the census methodology during the data collection for some of the census topics.

## **II. METHODOLOGY**

### **A. METHODOLOGICAL PRINCIPLES**

6. The main methodological principles for preparing and conducting the PES are:

- a) The PES is an independent survey;
- b) The PES should be conducted immediately after the census, in a short period of time;
- c) The PES is a sample survey;
- d) The same definitions and classifications should be used in the PES as in the Census;
- e) The census resources should be used for the PES;
- f) The PES data should be matched and compared to the Census data.

## **B. UNITS OF OBSERVATION AND CONTENT OF POST-ENUMERATION SURVEY**

7. The units of the PES are persons, households and dwellings, as specified in the definitions given in the document “Methodology for preparation, organization and conduction of the 2002 Census of Population, Households and Dwellings in the Republic of Macedonia”.

8. The coverage control referred to the number of households, the number of households’ members, the number of persons living in the observed households and whose place of residence was not at the place where the census took place, as well as to the number of dwellings.

9. With regard to the evaluation of the quality of the census data through the Post-enumeration survey, certain characteristics of the enumerated persons were controlled:

- a) Geographical characteristics (place/country of birth and immigration);
- b) Demographic characteristics (date of birth, sex, marital status);
- c) Educational characteristics (educational attainment, school currently attended);
- d) Socio-economic characteristics (employment, occupation, status of employment, industry, working hours, unemployment).

10. For the households, data on the tenure status and the ownership of land and livestock were evaluated.

11. For the dwellings, the following topics were evaluated: type of living quarter, occupancy status, living floor space, availability of dwelling facilities, and subsidiary rooms.

## **C. MODE AND DATA COLLECTION**

12. The Post-enumeration survey, as an independent survey, was planned as a repeated visit and enumeration of the census units in a small number of sampled census districts.

13. The PES was conducted immediately after the end of the census, during the period from 16 to 22 November 2002, and the data collected were related to the conditions at 1 November 2002 at 0.00 hours (the census reference moment).

## **D. SAMPLE DESIGN**

14. The frame for the PES was the total number of census enumeration districts (7,712), covering the whole territory of the country.

15. The sample for the Post-enumeration Survey was designed as a stratified, two staged random sample.

16. In the first stage, the enumeration districts were randomly selected. In the second stage, in the selected enumeration districts, 10 per cent of the households were selected systematically with random beginning.

17. The stratification was geographical and by the type of settlement. For the purpose of the Census 2002, the country was divided into 41 regions which were used as geographical strata.

18. The stratification by settlement type consisted in dividing the census districts of the 41 regions between those belonging to urban and those belonging to rural settlements.

19. In consideration of the scope of the work during the matching of the data from the PES and the data from the Census, the time needed for conduction of the PES, as well as the limitation of funds for conducting the PES, a sample of 80 enumeration districts was established.

20. The sample allocation by strata was made proportionally to the number of the enumeration districts and the population in the stratum.

21. With such sample, approximately 1.3 per cent of the enumeration districts and households, as well as approximately 1 per cent of the population were comprised.

#### **E. INSTRUMENTS FOR CONDUCTION OF THE POST-ENUMERATION SURVEY**

22. The instruments used in the PES were Control Form, Questionnaire for Household and Dwelling, Questionnaire for Personal Data and Form for Controller Report. These were actually shortened/condensed Census instruments with additional columns for Census data/results which were filled in the matching process. Also, the Methodology for the Preparation, Organization and Conduction of the Post-enumeration Survey was prepared.

### **III. IMPLEMENTATION OF POST-ENUMERATION SURVEY**

23. All the activities concerning the preparation and implementation of the Post-enumeration Survey, according to the period of their performance, were divided into three groups:

- a) Activities conducted prior to the data collection;
- b) Activities conducted in the field;
- c) Activities conducted after the data collection.

#### **A. ACTIVITIES CONDUCTED PRIOR TO THE DATA COLLECTION**

24. These activities were related to preparation of the lists of the selected enumeration districts with all the necessary identification data, maps and descriptions of the enumeration district boundaries for the selected enumeration districts. Particular attention was paid to the selection of instructors (28) and controllers (80) for the PES and their training.

25. The instructors and the controllers were selected from the best instructors or enumerators who participated in the Census. Particular care was taken that they were not engaged in the PES in the same area as that in the Census. During the one-day training, particular attention was paid to the approach to households on a second visit and to the matching process.

## **B. ACTIVITIES CONDUCTED IN THE FIELD**

26. The first activity of each controller was to visit the area within the boundaries of the assigned enumeration district (ED), and to prepare a plan for visiting all households and dwellings in the ED by using the map and the description of the enumeration district. After that, the controller should visit and enumerate all households and dwellings, as well as the number of household members on the census reference day (31 October 2002 at 24.00), according to the reasons for presence or absence established by the Census Methodology.

27. In every tenth of the re-enumerated households, controllers made quality control filling in a Questionnaire for Persons for every member of the household. Instructors were responsible for selecting and giving the controllers a random number for beginning and also to aid the controller if any problem appeared.

## **C. ACTIVITIES CONDUCTED AFTER THE DATA COLLECTION**

28. After completion of the data collection in all households and dwellings, as well as the enumeration of persons in the selected households, the instructor, the controller and one person appointed by the local authorities matched materials from the PES and the Census for the selected ED, found the appropriated households, and filled the census data in the columns in PES instruments designed for this purpose. This activity of matching and comparing the PES and the Census data was very important and crucial for finding similarities and difference between the PES and the Census, and for the evaluation of the census quality.

29. At the end, the instructors had to prepare a detailed report for the matching and comparing process, as well as for all field work, and to deliver the PES materials and reports to the SSO.

30. In the SSO, all PES materials were controlled in detail and the instructors' reports were analyzed.

31. The entry and processing of the PES materials had to be done after the entry of the Census materials.

32. The calculations of totals, rates, indices, percentages and coefficients of variation were done using ordinary estimation model for stratified cluster sample using SAS software package. In this estimation process special attention was paid to the evaluation of the discrepancies between the Census and the PES results, from which it was possible to conclude whether the census data were underestimated or overestimated.

33. During all phases of the Census and the PES (field work, controls, data entry, data processing and analyzing of the results) different monitoring groups from the European Commission were present. The PES results were discussed with some members of these groups.

#### **D. ANALYSIS OF THE RESULTS**

34. The PES results were analyzed and a document was written for SSO's purposes only.
35. Some conclusions resulted from analyzing the instructors' reports:
  - a) Some parts of the population had negative reaction to a repeated visit of controllers and second enumeration of the household, which resulted in refusal of PES in 4 EDs.
  - b) The boundaries of some EDs were not very well described and precisely drawn, which resulted in entering of controllers from one ED to another.
  - c) In some EDs with large number of households which were divided between two enumerators for better and quicker ending of the enumeration process, the prescribed procedures were not respected; this resulted in discrepancies in the matching process.
  - d) It appeared that some discrepancies between the number of households in the same dwellings in the Census and in the PES could be attributed to the fact that different persons answered to the Census and the PES questionnaires.
  - e) All controllers and instructors were selected from the best Census staff, which contributed to an accurate PES data collection.
36. By analyzing the processed PES data, it resulted that:
  - a) The Census population was underestimated by 1.4 per cent.
  - b) Data on ethnicity was of highest quality, without discrepancies between the Census and the PES data.
  - c) The variables for economic status were not of such a good quality; discrepancies especially occurred between the Census and the PES data for categories "self employed" and "unpaid family worker" in rural strata.
  - d) The data on agricultural items for the households were reported very badly and incorrectly both in the Census and in the PES
37. From all the analyses, one general conclusion can be drawn: the Census 2002 had a good coverage and the large majority of the census topics were of a good quality. Some of the topics, like the agricultural items, were characterized by insufficient quality. This represented an additional reason for planning and conducting the Agricultural Census in June 2007.

## REFERENCES

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SSO RM document: “Methodology for preparation, organization and conduction of the Post-enumeration Survey for statistical control of the coverage and the quality of the Census data”, 2002

SSO RM document: “Methodological basis for the control of the scope and the quality of the Census data, 1994”

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