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Item 3 of the provisional agenda

Census methodology**Comparability of census data****Note by the Statistical office of Montenegro***Summary*

The 2011 Census of Households and Dwellings was the first census organized independently in Montenegro. All previous censuses in Montenegro were conducted as part of the former Yugoslavia. During that period the methodology for the census was defined by the Federal Bureau for all the federal republics as well as according to international recommendations. Comparability of data within this single round of the census is fully guaranteed. The subject of this paper is the comparability of the census data over time.

Observed data series are from 1948 (when Montenegro first had a census after the Second World War), to 2011. The main goal of the paper is to discuss the comparability of definitions and data for the total population size at the census as well as review the comparability of data by thematic units (economic activity, education, migration, ethno-cultural characteristics, households and families).

I. Introduction

1. Population censuses represent reference moments for a country's history, recording the accurate state of its greatest value – its population. Comparing the situation at each of these moments results in an overview of the population development through decades and centuries, with an increase or decrease in the total population observed; changes in the population structure are evaluated.

2. It is well known that the size and geographic distribution of the population of a country is under constant change as a result of migration. In addition to these changes, the population census should provide accurate data both on total number and distribution of population down to the smallest geographic areas. Statisticians make efforts to deal with this issue by organizing the data collection and by applying the definition of time and place of enumeration for every enumeration unit.
3. In Montenegro the first census with the elements of a modern census was carried out in 1897. Afterwards, population censuses were carried out in 1921, 1931 before the World War II, then in 1948, 1953, 1961, 1971, 1981, 1991, 2003, and in 2011 when the latest population census was carried out.
4. One of the main quality principles and dimensions of statistical data production is based on its data comparability.
5. Two types of “comparability” exist in the literature and in practice:
 - (a) Space comparability;
 - (b) Time comparability.
6. Contrary to the economic statistics which do not use long historic trends (over time), the existence of long series of demographic statistics is of high importance.
7. This work is about the time comparability of the total population size according to the various censuses in Montenegro.

II. Population concepts used in censuses

8. The changes in the total population size that occur as a result of births and deaths do not represent difficulties in the enumeration, because the enumeration covers persons alive in the reference moment of census. The total population, and especially the population distribution, in a country can be influenced by migration. Because of migration, there is the issue of enumerating the persons who were absent from their place of living and temporarily were in another place in the reference moment. These persons can be enumerated or in their permanent/usual place of living or the temporary one. Until the 2011 Census, the data were collected by earlier censuses both about permanent and temporary place of living, thus enabling the data production for both present (de facto) population and permanent (de jure) population. But, the data published used the permanent population approach, thus all available publications comprise the data on permanent population. Permanent population covers persons living permanently in one place, regardless of whether they are present or not at the time of census. The concept of “permanent population” does not imply a complete comparability of census data from 1948 to 1991.
9. First of all, this is because the censuses 1948-1971 defined the active persons working out of place of permanent living, not returning to that place as population of place in which they worked. The 1981 Census and 1991 Census defined the population of individual settlements as persons living permanently in those settlements, i.e., having the place of residence regardless they were there or absent because of different reasons at the reference moment (work, education, medical treatment, military service, imprisonment, etc.).
10. The 2003 Census introduced the concept of usual place of residence, which included as a condition the criterion of residing one year in a given place. In 2011, in addition to the length of residence, the “intention” was also introduced. A practical example shows the difference of the “permanent population” concept and “usual place of residence” in the following way: The 1991 Census, which covered all citizens of Montenegro who worked or

resided (as family members) abroad under the permanent population, in addition to the population in the country, whereas the 2003 Census only included persons working or residing abroad up to 1 year in the usually resident population. Accordingly, foreign citizens working or residing in Montenegro 1 year and longer were included in the usually resident population in the 2003 Census, while in the 1991 Census foreign citizens working or residing in our country were not included in the permanent population.

11. The differences in the definitions of concept “usual place of residence“ used in 2003 and in 2011, and their influence on the change in the total population lead to the following effects:

12. The largest impact is caused by introducing the “intention” in the approach of 1 year presence. The population category which had the largest changes were students of Montenegro that study abroad. Namely, according to the 2003 Census, this category of the population is counted in the population of Montenegro, and can be identified through the issues raised by the census. An additional difference is persons residing in Montenegro for less than a year, but they intend to stay for period such that that their overall stay is one year. This information was not collected by the census 2003, so this category of the population could not be identified, and therefore could not be executed through methodological harmonization. For this reason the Statistical office has prepared a comparative review of population by municipalities, where the population census of 2003 was adjusted using the methodology of census 2011. Results of this topic have been published on the website of the Statistical office¹.

13. Table 1 shows the number of total population at the various censuses and the growth rate in the period between censuses. Data are given according to the methodology of the census time. Note the constant population growth, except for the last census, where there is a decline in comparison with the previous years. The data listed in Table 1 have been published in the Statistical Yearbook and are used in the analysis of changes in population in Montenegro. However, the growth rates do not show a simple population growth in the inter-census period and do not take into account the change in the methodology for the definition of the total population. In all publications with such data, the methodological notes highlight incomparability of this data.

Table 1: Population by Census and the rate of population change in the period between censuses.

Year	Total population by concept of census at the time of census conducted	Rate of population change
1921	311 341	
1931	360 044	115.64
1948	377 189	104.76
1953	419 873	111.32
1961	471 894	112.39
1971	529 604	112.23
1981	584 310	110.33
1991	615 035	105.26
2003	620 145	100.83
2011	620 029	99.98

¹ <http://www.monstat.org/userfiles/file/popis2011/saopstenje/Saop%20uporedno%202003-2011%2026%2011%202012%20PDF.pdf>

Figure 1: Population by concept / methodology at the time of census

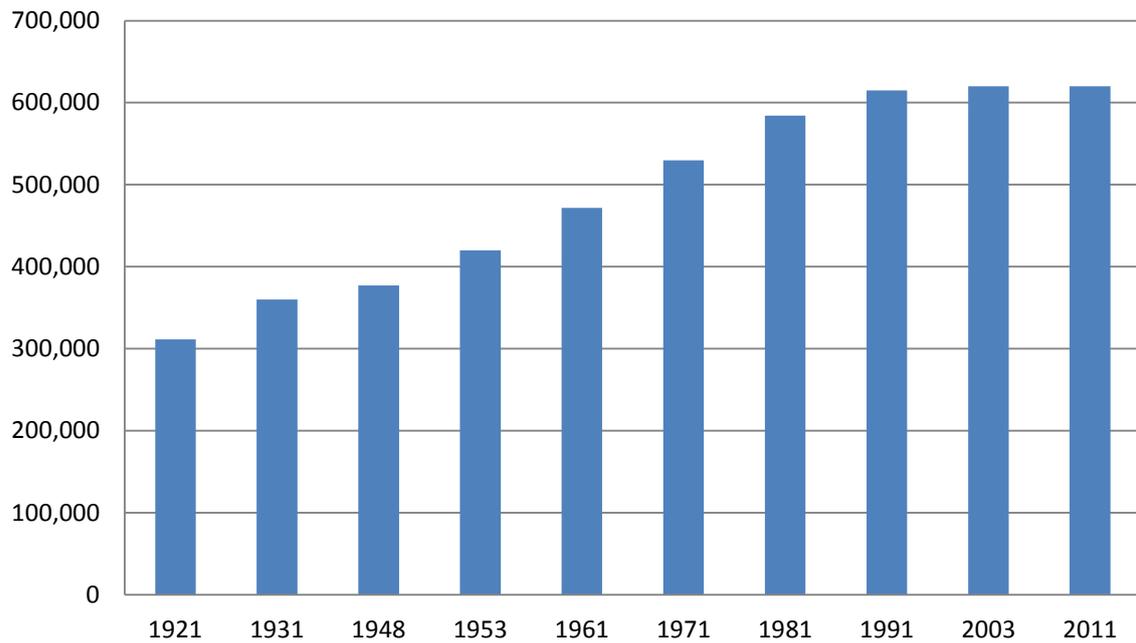
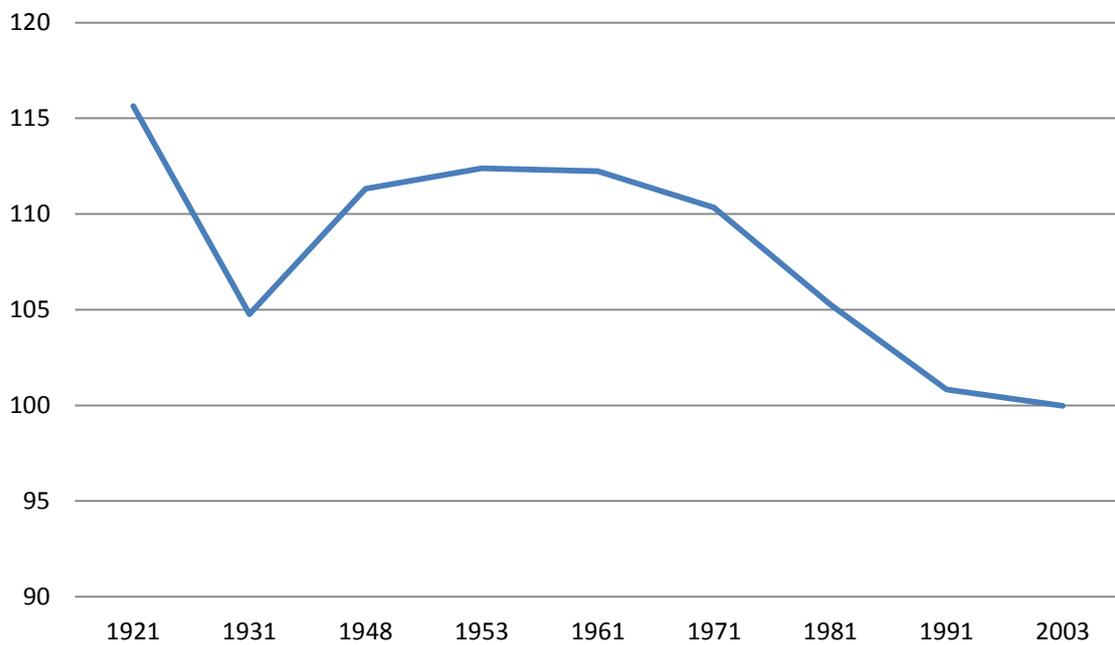


Figure 2: The rate of population change according to the census by methodology used in the time of the census.



14. In the currently available literature, total population by censuses was defined in accordance with the concepts given in Table 2.

Table 2: Concepts of censuses and changes in methodology

Year	Concepts of censuses	changes in methodology
1921	present ² (de facto)	No
1931	Present ¹ (de facto)	No
1948	permanent ³ (de jure)	Yes
1953	Permanent ² (de jure)	Yes
1961	permanent ² (de jure)	Yes
1971	permanent ² (de jure)	Yes
1981	permanent ² (de jure)	Yes
1991	permanent ² (de jure)	Yes
2003	Usual place of residence	Yes.
2011	Usual place of residence	Yes.

15. In the censuses 1948, 1953, 1961 and 1971, the workers, as well as other active population who worked out of their permanent place of residence (or place where their households were), and would not come in that place every day, were considered as a resident population of working place. In the censuses 1953 and 1961 years students of secondary school (in economy school) who were educated outside the place of residence of parents, were considered permanent residents in the place of study. In the 1948 census seasonal workers who worked outside of place where their household was living, were considered to be permanent residents of the place where their household lived, regardless of how long they were absent from this place because of seasonal work. Such treatment in the 1953, 1961 and 1971 census was applied only to workers who were seasonal workers for less than a year before the census, while the others were considered as inhabitants in the workplace.

16. To consider the impact of the definitions of the population on comparability, we analysed the census of 1981-2011.

17. Following the publication of data from the 2011 census, data from 2003 census was adjusted to the methodology of census 2011, according to elements from databases. In that way, it is estimated that in 2003 the number of inhabitants was 612 267. The data for that year show that, when comparing data from census by methodologies applied at the time of the census, we find a population decline, whereas when we adjust data according to rules of the 2011 census there is a population growth. For all prior periods there is population growth in both concepts but with different dynamics. Figure 3 shows the rate of population change based on concepts used during the implementation of the census, as well as the rate of population change based on the methodology of census 2011.

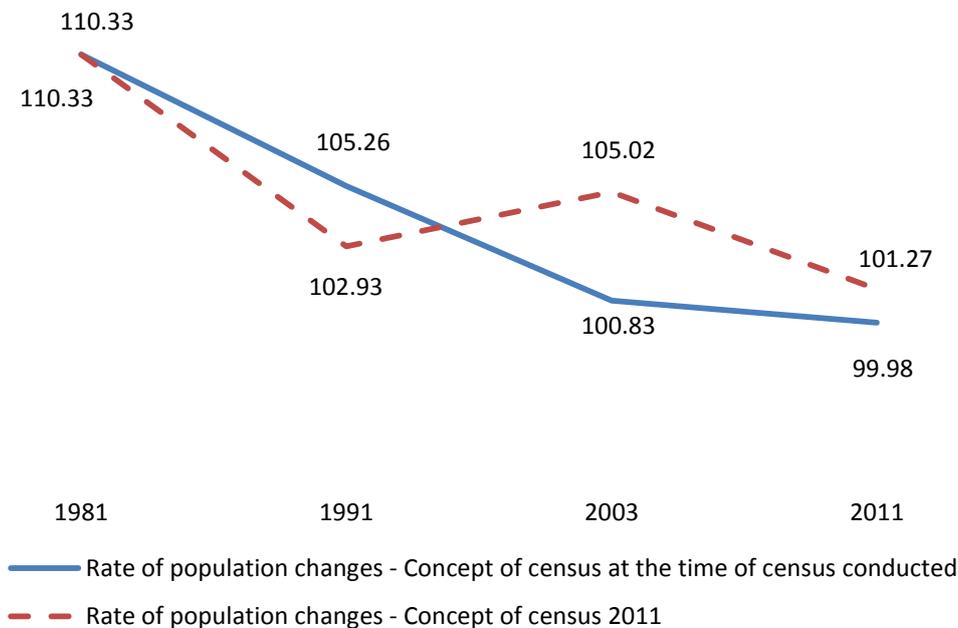
² The present population includes persons who at the time the census were present in the place and were inhabitants of the place.

³ The permanent residents include persons in a permanent residence, regardless of whether they are present or not at the moment the census.

Table 3: Population and growth rates, according to Census 1981-2011, based on the concepts used at the time for conducting the census, versus that of the 2011 census, together with differences caused by different methodologies

Census	Total population by concept of census at the time of census conducted	Total population by concept of census 2011	Difference	Rate of population changes - Concept of census at the time of census conducted	Rate of population changes - Concept of census 2011
	529604	513380	16224		
1981	584310	566410	26962	110.33	110.33
1991	615035	582999	32036	105.26	102.93
2003	620145	612267	7878	100.83	105.02
2011	620029	620029	0	99.98	101.27

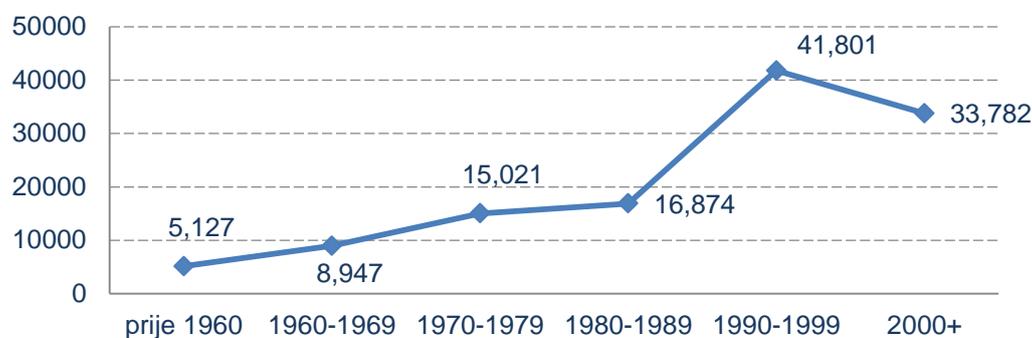
Figure 3: The rate of population change according to the censuses of 1981 to 2011, by the methodology at the time of implementation of the census and the methodology of the census 2011



18. At first glance, the rate changes according to the concept of the census, at the time of its implementation, would seem more realistic and more regular. However, bearing in mind the war events in the former Yugoslavia and the changes in population caused by forced migration, the rate of population change based on the methodology of the census in 2011 shows a very realistic picture of actual events in the region. This especially since Montenegro in the period between the two censuses from 1991 to 2003, was recognized as a country that has received a large number of refugees and displaced persons from former Yugoslavia area is quite impressive. So, as a country that was not directly affected by the

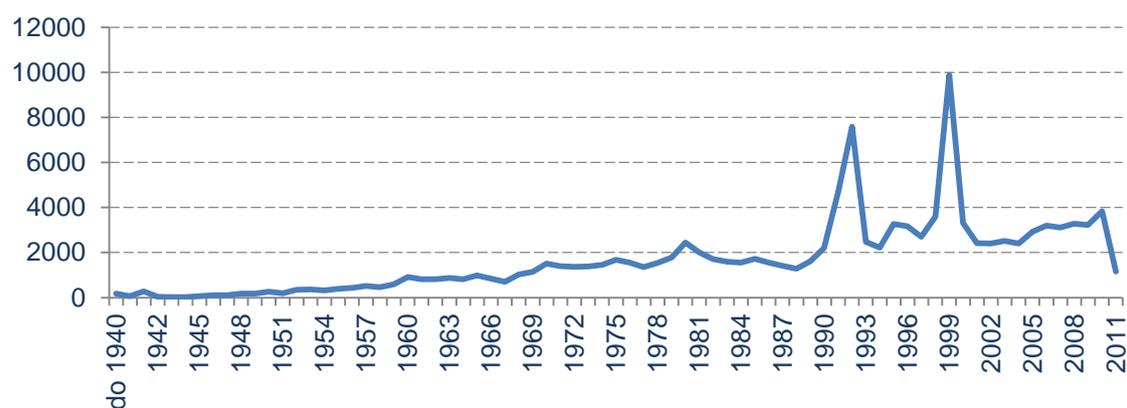
war, it was a "safe" destination for people who wanted to avoid the conflict. In support of that, the following information is published in the release *Migration of population Census of Population, Households and Dwellings 2011*⁴.

Figure 4: In which ten years period most people migrated to Montenegro?



19. In the last 50 years the largest number of migrants were recorded in the nineties. From 1990 to 1999, almost 42 thousand current residents moved to Montenegro.

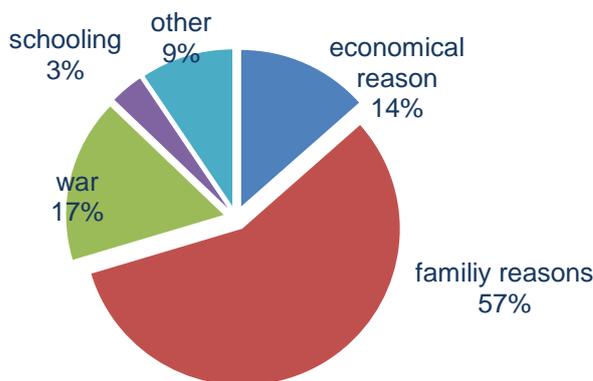
Figure 5: In which years the most people immigrated to Montenegro?



20. 9,888 of current population of Montenegro arrived in Montenegro in 1999, 7,595 arrived in 1992. These migrations have been identified as violent due to the war in former Yugoslavia.

⁴ available at <http://www.monstat.org/userfiles/file/popis2011/saopstenje/Migracije%20stanovni%C5%A1tva%20PDF.pdf>

Figure 6: What are the migrants reported as the reason for the return to Montenegro?



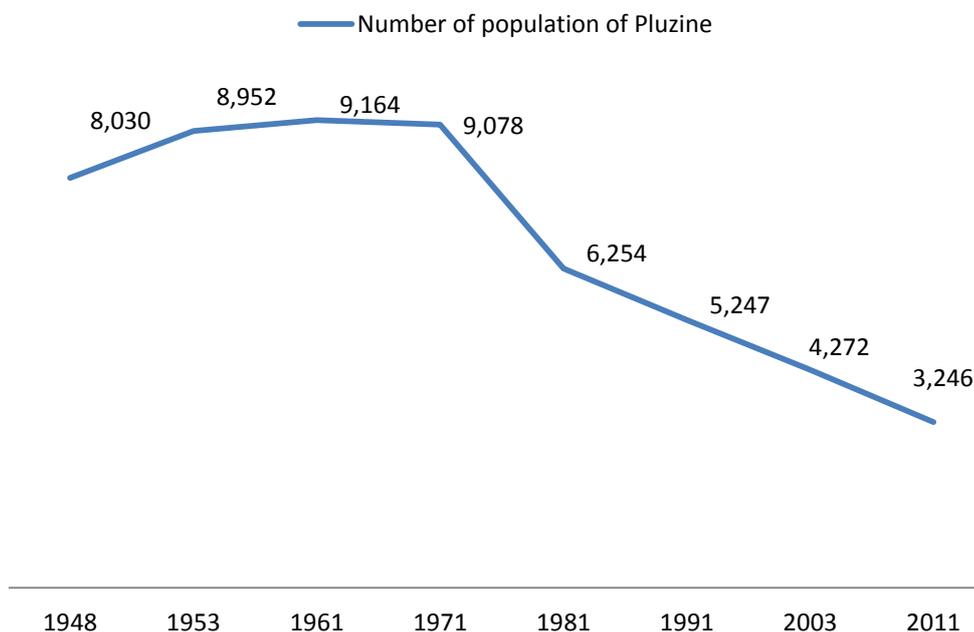
21. According to the migrants, the most common reason for settling in Montenegro is for family reasons, and about 69 thousand persons moved to Montenegro for family reasons.

- (a) 17% or more than 20 thousand migrants reported that they changed the residence to Montenegro due to the war.
- (b) Economic reasons account for about 16 thousand or 14% of migrants.
- (c) For education there have been 3% or 4 thousand migrants to Montenegro.

22. It was shown previously that the forced migration in the period 1991-2003 was significantly influenced by the number and structure of the population of Montenegro, and the rate of population change calculated on the basis of the methodology of the 2011 census reflect much more realistically the actual situation.

23. The effect of changes in definition to population change are even more pronounced at lower geographical levels. The most prominent example is the number of inhabitants of the municipality of Pluzine. Specifically, the population did not change significantly according to censuses from 1948 to 1971, but it was not an accurate picture. As previously explained, in the 1953, 1961 and 1971 censuses, workers were considered to be living in their workplace. Work on Hydroelectric Power Plants in Pluzine was started around 1960 and was completed around 1975. All workers who worked on the construction of this important facility were considered inhabitants of Pluzine at the censuses 1961 and 1971. This figure did not represent a major change because workers Pluzine population increased only slightly. However, according to the census in 1981, when a power plant was built, there was a significant population decline of 31%. The decline was due to the departure of workers to their households in other areas of the former Yugoslavia.

Figure 7: Population of municipality Pluzine according to methodology of the census at the time of its implementation



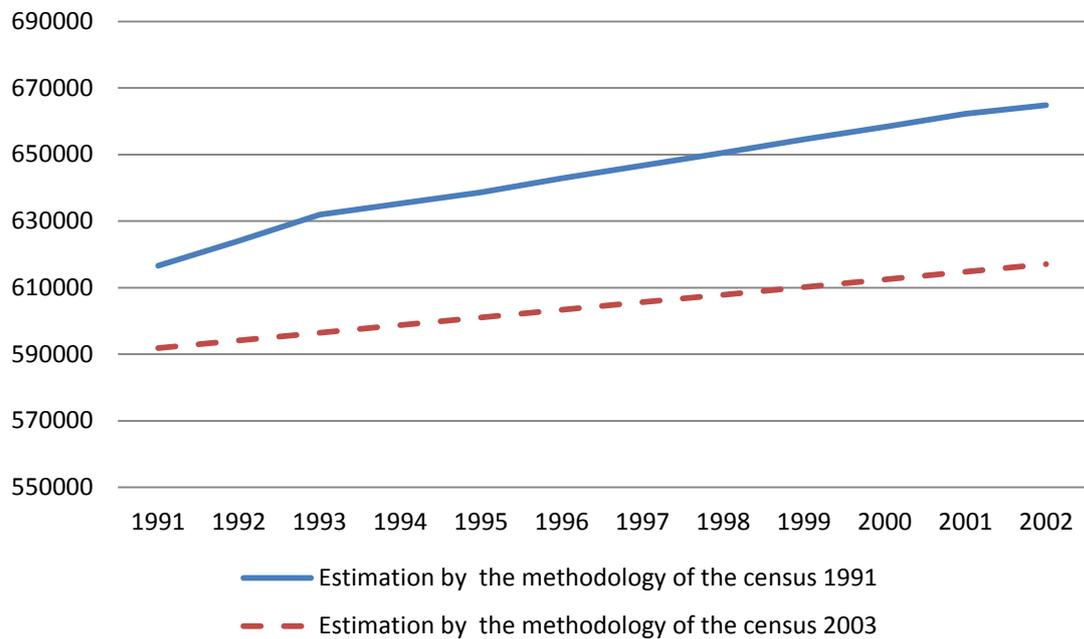
III. Inter-census period

24. The Statistical office conducted a revision of the estimated population in the inter-census period 1991-2003 according to the methodology of the census 2003. Table 4 presents data on the population for that period:

Table 4: Population estimates for the periods by methodology of census 1991 and 2003, as well as differences caused by different methodologies

Year	Estimation by the methodology of the census 1991	Estimation by the methodology of the census 2003	Differences in %
1991	616632	591843	95.98
1992	624043	594137	95.21
1993	631933	596432	94.38
1994	635287	598727	94.25
1995	638649	601022	94.11
1996	642890	603317	93.84
1997	646740	605611	93.64
1998	650575	607906	93.44
1999	654540	610201	93.23
2000	658280	612496	93.04
2001	662195	614791	92.84
2002	664865	617085	92.81

Figure 8: The population of inter-census period estimated according to methodology of the census 1991 and 2003

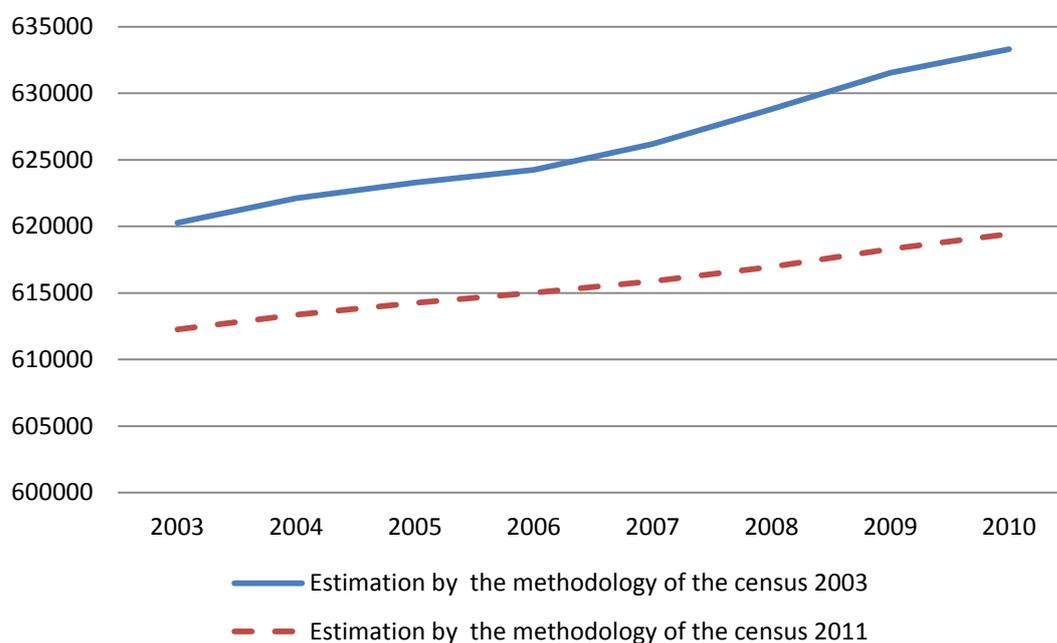


25. A similar exercise was done after the 2011 census to 2003 census data.

Table 5: Population estimates for the periods by methodology of census 2003 and 2011, as well as differences caused by different methodologies

Year	Estimation by the methodology of the census 2003	Estimation by the methodology of the census 2011	Differences 2011/2003 in %
2003	620279	612267	98.7
2004	622118	613353	98.6
2005	623277	614261	98.6
2006	624241	615025	98.5
2007	626188	615875	98.4
2008	628804	616969	98.1
2009	631536	618294	97.9
2010	633321	619428	97.8

Figure 9: Population of inter-census period estimated according to methodology of the census 2003 and 2011



26. The revision of the estimated total population required an audit of series of basic demographic indicators for this particular period, which has certainly implied an additional burden for staff, as well as additional questions from users.

27. Additional analysis of the differences in inter-census data was not undertaken due to lack of data on international migration flows. We estimated the profile of the average annual number of net migrants by sex and single year of age, and the same is used as a constant for the statistical adjustment of the estimated population in the period after the census 2011.

IV. Effect of definitions on other indicators from the census

A. Economic characteristics

Figure 10: Population by activity and sex in latest censuses

4 – 5. STANOVNIŠTVO PREMA AKTIVNOSTI I POLU			POPULATION BY ACTIVITY AND SEX							
	Svega <i>All</i>	Stanovništvo 15 i više/ <i>Population age 15 and over</i>	Aktivno / <i>Economically active</i>			Neaktivno <i>Inactive</i>	Stopa aktivnosti <i>Activity rate</i>	Stopa zaposlenosti <i>Employment rate</i>	Stopa nezaposlenosti <i>Unemployment rate</i>	
			svega <i>All</i>	zaposleni <i>Employees</i>	nezaposleni <i>Unemployed</i>					
POPIS 1991. GODINE / CENSUS 1991										
Svega	591 269	459 577	237 280	188 333	48 947	353 989	51,6	41,0	20,6	Total
Muški	291 940	225 998	145 741	119 498	26 243	146 199	64,5	52,9	18,0	<i>Males</i>
Ženski	299 329	233 579	91 539	68 835	22 704	207 790	39,2	29,5	24,8	<i>Females</i>
POPIS 2003. GODINE / 2003 CENSUS										
Svega	620 145	492 684	264 276	171 325	92 951	353 900	53,6	34,8	35,2	Total
Muški	305 225	239 322	152 107	103 425	48 682	151 826	63,6	43,2	32,0	<i>Males</i>
Ženski	314 920	244 470	112 169	67 900	44 269	202 074	45,9	27,8	39,5	<i>Females</i>
POPIS 2011. GODINE / 2011 CENSUS										
Svega	620 029	501 278	232 010	175 171	56 839	268 288	46,3	34,9	24,5	Total
Muški	306 236	253 362	130 839	98 483	32 356	113 142	51,6	38,9	24,7	<i>Males</i>
Ženski	313 793	256 808	101 171	76 688	24 483	155 146	39,4	29,9	24,2	<i>Females</i>

28. The approach for earlier censuses was completely different and the same table was as depicted in Figure 11.

Figure 11: Population by activity and sex in earlier censuses

4 – 6. STANOVNIŠTVO PREMA AKTIVNOSTI I POLU					POPULATION BY ACTIVITY AND SEX				
	Ukupno <i>Total</i>	Aktivno <i>Economically active</i>	Lica sa ličnim prihodom <i>With personal incomes</i>	Izdržavano <i>Dependants</i>	Struktura prema aktivnosti u % <i>Structure by activity in %</i>				
					svega <i>All</i>	aktivno <i>Economically active</i>	lica sa ličnim prihodom <i>With personal incomes</i>	izdržavano <i>Dependants</i>	
POPIS 1981. GODINE / 1981 CENSUS									
Svega	565467	192852	54458	318159	100,0	100,0	100,0	100,0	Total
Muški	278692	129750	28296	120648	49,3	67,3	52,0	37,9	<i>Males</i>
Ženski	286775	63102	26162	197511	50,7	32,7	48,0	62,1	<i>Females</i>
POPIS 1991. GODINE / 1991 CENSUS									
Svega	591269	237280	74531	279458	100,0	100,0	100,0	100,0	Total
Muški	291940	145741	39134	107065	49,4	61,4	52,5	38,3	<i>Males</i>
Ženski	299329	91539	35397	172393	50,6	38,6	47,5	61,7	<i>Females</i>
POPIS 2003. GODINE / 2003 CENSUS									
Svega	620145	264276	102223	251677	100,0	100,0	100,0	100,0	Total
Muški	305225	152107	50913	100913	49,2	57,6	49,8	40,1	<i>Males</i>
Ženski	314920	112169	51310	150764	50,8	42,4	50,2	59,9	<i>Females</i>

29. Therefore, the development of comparable data for earlier census was possible only as estimations. Estimates for the total population are referenced against the method of the census 2011 and the structure of the population related to economic activity.

B. Educational characteristics

30. The introduction of rules that students of the third level who study abroad are not included in the population has a great impact on the age structure of the population of Montenegro. This is particularly important when making estimates of the population according to the methodology of census 2011 for the earlier censuses. In the past, Montenegro as a small and underdeveloped republic within Yugoslavia had only one university and only a few faculties. For this reason the majority of young people decided to go to study in Belgrade. Only recently in Montenegro new universities and colleges were opened, providing students with a wider choice of studies. The data show that the number of students studying outside Montenegro has declined.

C. Ethnic characteristics

31. Introducing the concept of usual place of residence in the 2003 census has changed the ethnic picture of Montenegro. Thus, the structure of population in Montenegro shows that the percentage of Muslims declined from 15% (in 1991) to only 12% of Muslims and Bosniaks (in 2003), and Albanians from 7% to 5%. This decline is reflected in the structure of Montenegrin citizens abroad who are enumerated by the 2003 census. It is these two ethnic categories that compose 60% of Montenegrin citizens abroad.

32. The table in Figure 12 shows the change in the ethnic structure of the population of Montenegro according to censuses.

Figure 12: Population by nationality/ethnic affiliation

	4 – 7. STANOVNIŠTVO PREMA NACIONALNOJ ILI ETNIČKOJ PRIPADNOSTI - POPIS 1981, 1991. I 2003. GODINE			POPULATION BY NATIONALITY OR ETHNIC AFFILIATION-CENSUSES 1981, 1991 AND 2003			
	1981	1991	2003 ¹⁾	Struktura Structure			
				1981	1991	2003	
UKUPNO	584310	615035	620145	100	100	100	TOTAL
Crnogorci	400488	380467	267669	68.54	61.86	43.16	Montenegrins
Srbi	19407	57453	198414	3.32	9.34	31.99	Serbs
Jugoslaveni	31243	26159	1860	5.35	4.25	0.3	Yugoslavs
Albanci	37735	40415	31163	6.46	6.57	5.03	Albanians
Bošnjaci	-	-	48184	-	-	7.77	Bosniaks
Egipćani	-	-	225	-	-	0.04	Egyptians
Italijani	45	58	127	0.01	0.01	0.02	Italians
Makedonci	875	1072	819	0.15	0.17	0.13	Macedonians
Mađari	238	205	362	0.04	0.03	0.06	Hungarians
Muslimani	78080	89614	24625	13.36	14.57	3.97	Moslems
Njemci	107	124	118	0.02	0.02	0.02	Germans
Romi	1471	3282	2601	0.25	0.53	0.42	Roma
Rusi	96	118	240	0.02	0.02	0.04	Russians
Slovinci	564	369	415	0.10	0.06	0.07	Slovenians
Hrvati	6904	6244	6811	1.18	1.02	1.1	Croats
Ostali	816	437	2180	0.14	0.07	0.35	Other
Neizjašnjeni – neopredjeljeni	301	1944	26906	0.05	0.32	4.34	Undeclared and undefined
Regionalna pripadnost	1602	998	1258	0.27	0.16	0.2	Regional identity
Nepoznato	4338	6076	6168	0.74	0.99	0.99	Unknown

¹⁾ Broj stanovnika na bazi nove koncepcije stalnog stanovništva

¹⁾ Population in 2003 is given according to a new concept

V. Geographic Comparability

33. While the primary focus of this paper is the comparability over time, it is important to also mention the issue of geographic comparability. Specifically, new trends in obtaining inputs for a census from registers or surveys for some variables could be problematic because of comparability of the data in space.

34. The population obtained by combining registers most often is not comparable with the number of inhabitants according to the definition of "usual place of residence" traditionally adopted for the census. Definition of population registers can be defined as "the closest definition of the usual place of residence." However, the use of the sample for some variables from the census is problematic due to the purpose of data collection in the census for those variables. These apply in particular to the variables on the economic activity which occupy about 1/5 of the space of the questionnaire and are fairly complicated to collect during fieldwork. This is confirmed by the fact that most countries regularly conduct Labour force surveys (LFS), which provide all relevant indicators of the economic activities of persons. Additionally, it is very difficult to explain to users the differences that arise during the census years between indicators from a census or LFS.

VI. Conclusion:

35. At this moment, preparing for the next census and analysing changes related to the previous censuses, the results presented in this paper remind us that one of the basic principles of statistics and data quality is comparability over time. Therefore, with regard to possible changes to the definition of population for future censuses, in order to ensure comparability, it would be better to have just limited changes.

VII. References:

1. Census Montenegro - 1879 - Volume I-II, Publisher: National Archives of Montenegro, Department of Statistics of Montenegro, Cetinje, 2009
2. Publications: Census conducted on the territory of Montenegro from 1948 to 2011
3. Releases published on the web site from the census 2011 <http://www.monstat.org/eng/page.php?id=243&pageid=57>
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