

# CHALLENGE OF CROATIA- ACTIVE DEMOGRAPHIC POLICY

## RESEARCH WORK

**Key words:**

***Croatian County Depopulation Process,  
Net Migration Rate,  
Ageing Index,  
K-means Method,  
Croatian Counties Cluster Analysis***

- ❑ Croatia has no national demographic strategy and no national population policy is carried out.
- ❑ Some local governments are taking isolated policy measures but due to unsystematic and distress network at the national level it gives almost no significant effects.
- ❑ Croatian Parliament still in January 1996 enacted National Program of Demographic Development whose implementation from the very beginning stops chronic shortage of money.
- ❑ Nowadays in the Croatian nation began the process of demographic extinction.
- ❑ This process began even before the great emigration wave which started last three year.

# INTRODUCTION

- ❑ The process of demographic extinction is estimated that per year 30 000 citizens emigrate from Croatia and they are predominantly young people.
- ❑ This is an estimate based on demographics data from the countries in which they are moving.
- ❑ This data is not precise because the Croatian citizens do not have to formally sign out when they emigrate.
- ❑ If negative trends continue, Croatia would annually lose 50 000 domicile population due to natural increase rate and emigration.
- ❑ For a population that is among the oldest in the world with 4.284,889 million inhabitants according to the last census, this represents an unsustainable situation for all the aspects of social and economic survival of the nation.

- ❑ Besides, there are numerous studies confirming that the unsolved financial situation, unemployment and bad housing status in Croatia are the main factors of emigrations and delay having children.
- ❑ These main factors can and should be eliminated by fundamental structural changes at the national level.
- ❑ Anyway, this is confirmed by the “Croatian example” - the introduction of the three-year maternity leave, which has had a direct effect of a positive natural increase rate in 1996 year after a number of years with a negative population growth.
- ❑ All the above mentioned confirms that Croatia knows how, can and must decide to start applying active demographic policy.

# AGING AND DEPOPULATION OF THE CROATIAN PEOPLE

- ❑ Croatia, unfortunately, accompanies all demographic trends of the European Union (EU).
- ❑ Namely, EU is faced with the problem of the significant aging of the population.
- ❑ This demographic shift is inevitable consequence of the significant accomplishments of the greatly reduced company mortality rates and, therefore, a longer life expectancy. It is, moreover, accompanied by greatly reduced birth rates in almost all countries.
- ❑ According Eurostat data base for 1 January 2013 year, Croatian population is among the oldest population in the world with the median age over than the median population age of EU.

- The oldest average age in the EU has German with 45.3 years. Croatia population average age is only 11 month less according the data in the Table 1.

Census	Number of inhabitants	Average age of Croatian Population	Average age of Men	Average age of Women	The increase of age to the previous census (Croatian Population)
1961.	4 159 696	32,5	30,5	33,3	-
1971.	4 426 221	34,0	32,4	35,5	1,5
1981.	4 601 469	35,4	33,8	37,1	1,4
1991.	4 784 265	37,1	35,4	38,7	1,7
2001.	4 437 460	39,3	37,5	41,0	2,2
2011.	4 284 889	41,7	39,9	43,4	2,4

**Table 1:** Average age of Croatian Population by sex, 1961.-2011. by Censuses according to Croatian Bureau of Statistics

- ❑ **Average age** indicates the mean age of the total population in a certain area (country, town, etc.) and is calculated as an arithmetic mean of the age of the total population.
- ❑ The most common indicators of aging population are **Ageing index** and **Age coefficient**.
- ❑ **Age coefficient** is the percentage of the population aged 60 and over in the total population. It is the basic indicator in measuring the ageing level. When it exceed 12%, it means that the population of a particular area entered the ageing process.
- ❑ **Ageing index** is the percentage of the population aged 60 and over in relation to the number of persons aged 0-19. The index exceeding 40% indicates that the population of a particular area entered the ageing process.

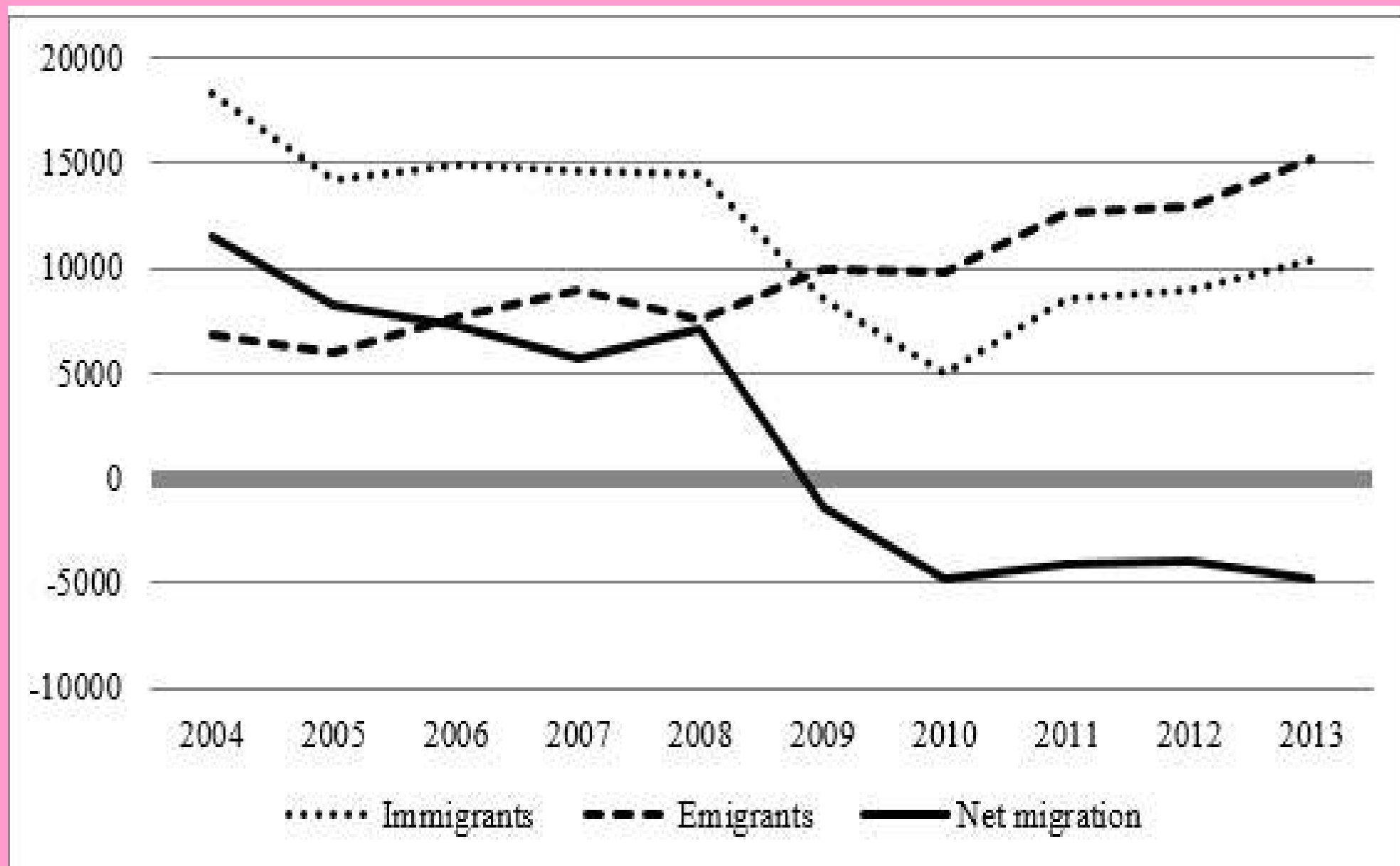


Census	Ageing index			Age coefficient		
	Total	Men	Women	Total	Men	Women
<b>1953.</b>	27,9	22,2	33,8	10,3	8,8	11,6
<b>1961.</b>	34,3	27,7	41,1	11,8	10,1	13,3
<b>1971.</b>	47,2	38,5	56,2	15,0	12,9	16,9
<b>1981.</b>	52,6	40,4	65,3	15,0	12,1	17,6
<b>1991.</b>	66,7	50,8	83,3	17,7	14,3	21,0
<b>2001.</b>	90,7	71,6	110,8	21,6	18,1	24,9
<b>2011.</b>	115,0	92,3	139,0	24,1	20,5	27,4

**Table 2:** Croatian Population Ageing index and Age coefficient by Censuses 1953.-2011., according to Croatian Bureau of Statistics

# NET MIGRATION RATE AND CRUDE RATE OF NATURAL CHANGE

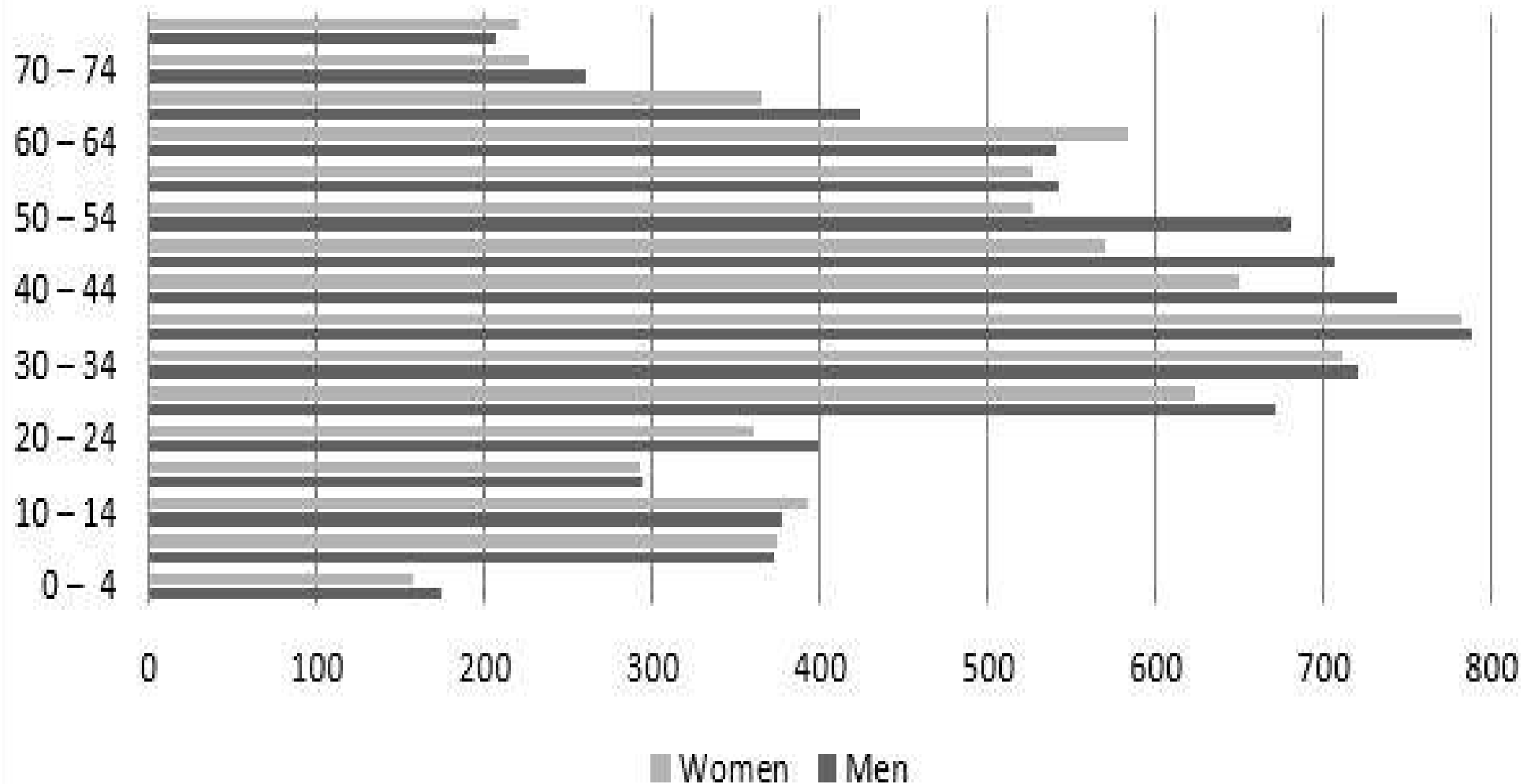
- ❑ **Net migration rate of population** (migration balance) is the difference between the number of immigrants and emigrants of a particular area or country in a given period of time.
- ❑ **Crude rate of natural change** is the ratio of the natural change during the year (live births minus deaths) to the average population in that year. The value is expressed per 1 000 persons.



**Figure 1:** Croatian Population migrations over the period from 2004.-2013.;  
 Authors' creation according to Croatian Bureau of Statistics

- ❑ Besides negative emigrations effects Croatian population has extremely negative natural change rate.
- ❑ Population natural change rate or so called the crude rate of natural. Crude rate of natural change has constantly decreasing and the value of 5.0 in 1974 dropped to - 2.7 in 2014.
- ❑ The contribution of migration to overall population growth or decline is due to positive or negative net migration.
- ❑ Moreover, the migration balance negative effects in Croatia reinforce the fact that the largest part of emigration waves from the very beginning until today are young people.
- ❑ This is confirmed by data from the Figure 2.

## Emigrants by age groups, 2013



**Figure 2:** Croatian Population emigrated abroad in 2013.by age and sex; Authors' creation according to Croatian Bureau of Statistics

# DATA BASE FOR MULTIVARIATE ANALYSIS OF CROATIAN COUNTIES

- ❑ Croatian Counties have numerous natural, geographical, cultural, socio-economic and demographic specifics which have been investigated according to the numerous statistical indicators available by the national and regional statistical offices.
- ❑ All this represents theoretical basis as well as statistical data base for this research.
- ❑ Same of the most important indicators by Croatian Counties are given in the Table 3. and in the Table 4.

**Table 3:** Incomes, source incomes, education, population movements and development index by Croatian Counties 2001-2012. according to Croatian Bureau of Statistics

COUNTY	Values of the standardized indicators in relation to the national average					Development Index
	Average income per capita	Average source incomes per capita	Average unemployment rate	Population movement	Educated population share in the population 16-65 old	
	2010-2012	2010-2012	2010-2012	2010-2001	2011	
County of <u>Virovitica-Podravina</u>	1,56%	11,93%	2,71%	17,17%	5,36%	5,56%
County of <u>Slavonski Brod-Posavina</u>	0,00%	0,70%	4,87%	69,14%	47,64%	18,43%
County of <u>Vukovar-Sirmium</u>	9,81%	3,76%	29,47%	50,30%	44,68%	18,73%
County of <u>Bjelovar-Bilogora</u>	23,99%	16,55%	64,66%	19,91%	19,87%	23,29%
County of <u>Požega-Slavonia</u>	14,02%	0,00%	17,81%	37,06%	35,63%	33,81%
County of <u>Sisak-Moslavina</u>	64,20%	49,83%	24,71%	1,14%	64,39%	38,70%
County of <u>Osijek-Baranja</u>	54,30%	38,27%	59,09%	59,46%	69,46%	46,07%
County of <u>Karlovac</u>	77,15%	41,14%	106,88%	10,53%	77,17%	56,34%

County of <u>Križevci-Koprivnica</u>	36,89%	66,01%	97,59%	53,32%	0,00%	59,19%
County of <u>Lika-Senj</u>	56,70%	68,69%	120,22%	0,00%	73,73%	64,82%
County of <u>Međimurje</u>	28,21%	18,37%	131,76%	101,40%	57,10%	69,65%
County of <u>Krapina-Zagorje</u>	64,24%	20,81%	87,34%	49,80%	47,05%	73,24%
County of <u>Šibenik-Knin</u>	54,89%	64,64%	136,20%	100,72%	108,00%	80,93%
County of <u>Varaždin</u>	68,18%	36,59%	64,80%	74,47%	78,52%	86,34%
County of <u>Split-Dalmatia</u>	70,54%	88,67%	109,58%	154,04%	135,13%	93,75%
County of <u>Zadar</u>	50,60%	93,00%	127,80%	211,23%	101,52%	106,39%
County of <u>Dubrovnik-Neretva</u>	89,11%	109,70%	148,76%	152,47%	139,34%	120,84%
County of <u>Zagreb</u>	108,59%	75,08%	134,29%	180,66%	93,98%	124,23%
County of <u>Primorje-Gorski Kotar</u>	143,57%	174,46%	183,15%	98,24%	147,46%	139,21%
County of <u>Istra</u>	134,80%	181,01%	154,81%	153,41%	119,98%	156,80%
City of <u>Zagreb</u>	244,20%	238,28%	100,00%	127,78%	160,27%	186,44%



Table 4: Maternal age, child's birth order and number of children born by this birth unto Croatian Counties 2013. according to Croatian Bureau of Statistics

COUNTY	TOT AL	Maternal age			Child's birth order			No. of children born		
		- 19	20-29	40 & more	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup> & more	one	two	three & more
Republic of Croatia	39939	1276	37545	1110	18420	13974	7242	38662	1259	18
County of Zagreb	3077	71	2935	69	1407	1137	495	2988	89	0
County of <u>Krapina-Zagorje</u>	1152	44	1087	21	538	400	206	1120	32	0
County of <u>Sisak-Moslavina</u>	1337	60	1246	31	629	415	278	1291	46	0
County of Karlovac	1048	24	1003	21	490	369	182	1012	36	0
County of <u>Varaždin</u>	1519	59	1430	28	670	546	287	1463	56	0
County of <u>Križevci-Koprivnica</u>	1113	82	1007	24	474	379	253	1074	39	0
County of <u>Bjelovar-Bilogora</u>	1092	70	999	23	466	332	281	1058	34	0

County of <u>Primorje-Gorski Kotar</u>	2422	48	2289	85	1290	857	269	2354	68	0
County of <u>Lika-Senj</u>	396	17	375	4	198	122	73	386	10	0
County of <u>Viroviti-Podravina</u>	790	59	717	12	344	275	168	765	22	3
County of <u>Požega-Slavonia</u>	703	32	663	8	283	235	185	673	30	0
County of <u>Slavonski Brod-Posavina</u>	1512	87	1396	29	608	530	369	1475	37	0
County of <u>Zadar</u>	1688	39	1600	49	768	605	311	1633	55	0
County of <u>Osijek-Baranja</u>	2786	141	2589	55	1367	902	500	2717	69	0
County of <u>Šibenik-Knin</u>	890	23	623	27	410	287	185	868	22	0
County of <u>Vukovar-Sirmium</u>	1593	69	628	37	650	544	383	1558	35	0
County of <u>Split-Dalmatia</u>	4313	74	2153	148	1894	1559	855	4165	142	6
County of <u>Istra</u>	1801	31	978	65	863	712	225	1753	48	0
County of <u>Dubrovnik-Neretva</u>	1252	19	1024	48	537	444	267	1211	38	3
County of <u>Međimurje</u>	1201	109	450	23	529	371	282	1171	30	0
City of <u>Zagreb</u>	8254	118	5226	303	4005	2953	1188	7927	321	6

- ❑ Statistical analysis results of the main socio-economic, educational, development and demographic characteristics of each Croatian County leads to the conclusion that there is no significant statistical correlation between them.
- ❑ For example, let's see composite indicator Development index 2010-2012 from Table 3. and child's birth order by that birth in 2013 by Croatian Counties in Table 4.
- ❑ There is very weak and negligible correlation between these two indicators which is furthermore statistical insignificant.

- ❑ After comprehensive analysis of the entire data and indicators dealing with Croatian Counties available by national and regional statistical institutions it has been concluded that
- ❑ *„The only demographic indicators itself can be statistically significant base for Croatian Counties grouping in a smaller number of spatial units”.*
- ❑ It's very important for these spatial units to be homogeneous according demographic characteristics for the successful implementation of active demographic policy measures.

- ❑ For active demographic policy measures, for example, is very important educational level of maternal women by each Croatian County.
- ❑ Mothers with higher level of education generally can be stimulated to bear a child more by quite different privileges given by active demographic policy measures than lower educated mothers.
- ❑ For the purpose of this research in the group "less educated mothers" are aligned those who have completed a maximum four-year vocational school or high school.

- ❑ In another group of “maternal women with higher level of education” are the ones that have the higher education level than predefined.
- ❑ That’s why among demographic indicators by Croatian Counties given in Table 5. maternal women level of education is very important.
- ❑ The measures of active demographic policy are significantly determined by population age.
- ❑ That’s why in Table 5. some important demographic characteristics of Croatian population by Counties are given.

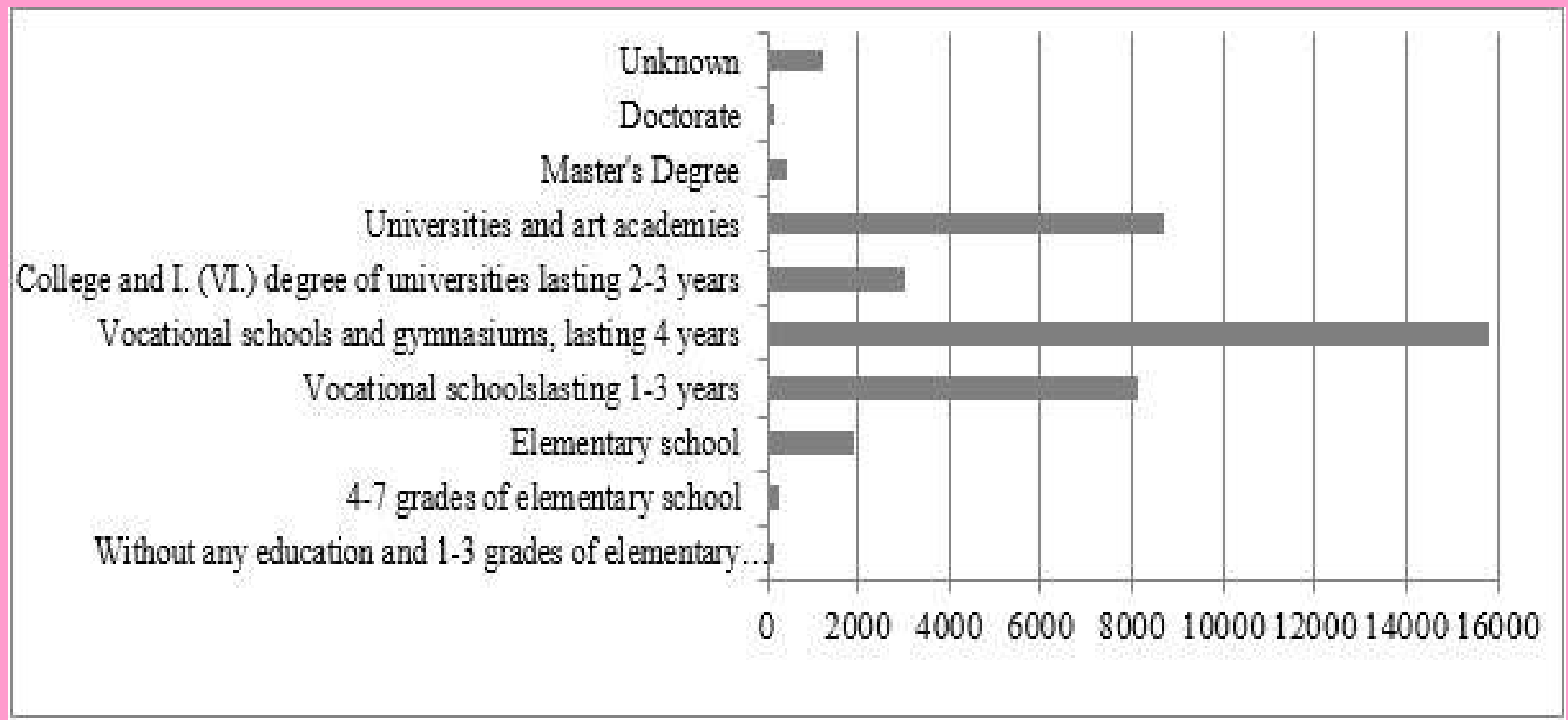
**Table 5:** Some Age Population indicators by Census 2011 and maternal women level of education per Croatian Counties in 2013.

COUNTY	Age group (in %)			Average age of population	Ageing index (in %)	Maternal women with higher level of education	No. of children per women older than 15 year
	0-24	25-65	66 and over				
Republic of Croatia	27,03	56,08	16,88	41,7	115,0	34%	1,56%
County of Zagreb	28,07	56,95	14,96	40,6	100,1	30%	1,53%
County of Krapina-Zagorje	27,27	55,99	16,73	41,7	112,6	27%	1,62%
County of Sisak-Moslavina	25,81	55,46	18,71	43,0	131,1	32%	1,63%
County of Karlovac	24,07	55,62	20,30	44,0	149,0	32%	1,55%
County of Varaždin	27,46	56,54	15,99	41,2	107,3	29%	1,61%
County of Koprivnica-Križevci	27,65	55,44	16,89	41,6	110,5	25%	1,60%
County of Bjelovar-Bilogora	27,66	54,72	17,61	42,0	114,9	20%	1,68%

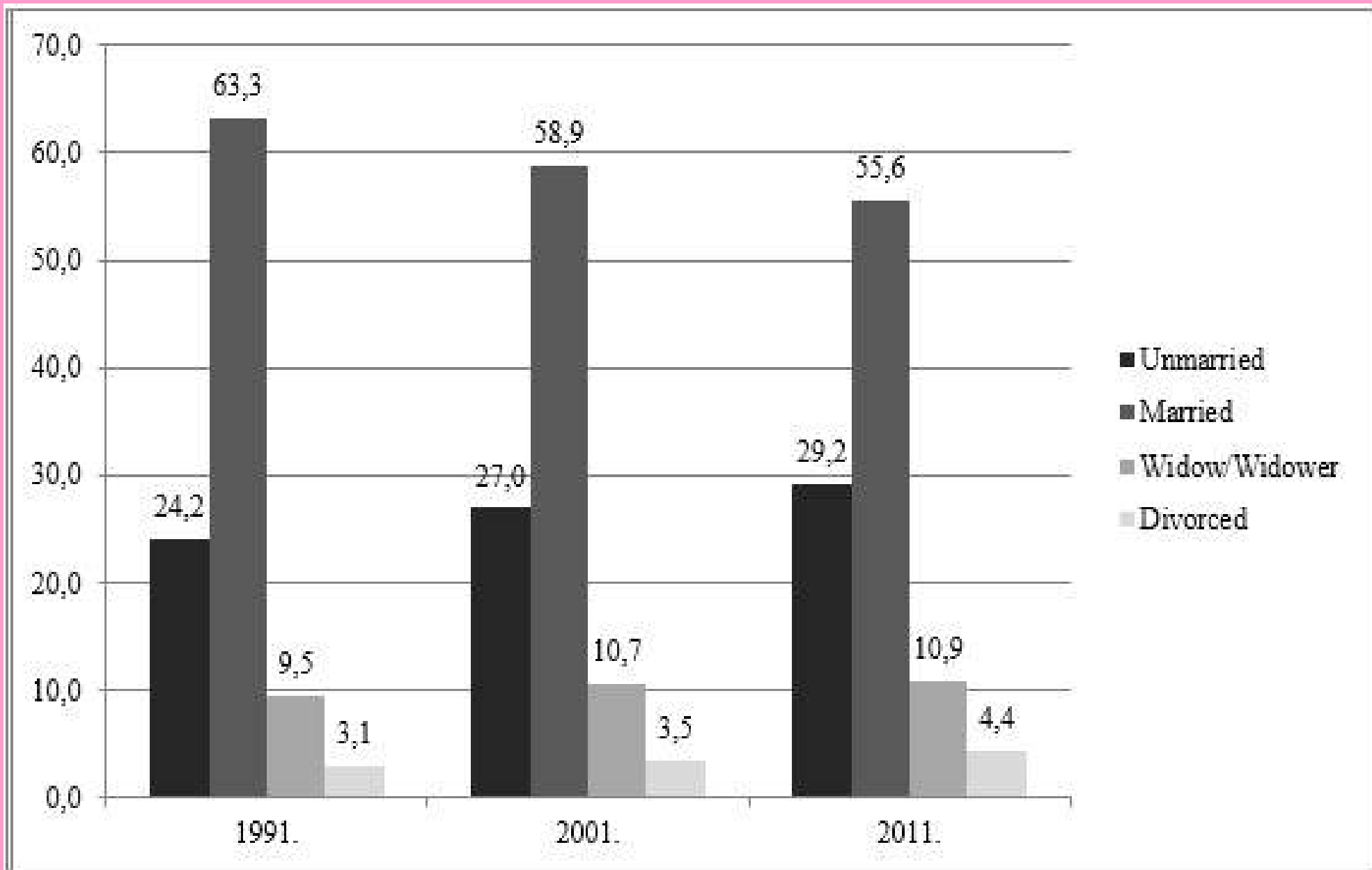
Primorje-Gorski Kotar	22,80	59,09	18,10	43,9	155,3	42%	1,35%
County of Lika-Senj	24,07	52,10	23,82	45,3	166,0	30%	1,72%
County of Virovitica-Podravina	28,67	54,86	16,45	41,2	103,3	18%	1,73%
County of Požega-Slavonia	30,24	52,54	17,21	40,9	99,2	22%	1,81%
Slavonski Brod-Posavina	30,59	52,66	16,74	40,6	96,5	20%	1,81%
County of Zadar	27,71	54,72	17,55	41,9	117,4	32%	1,73%
County of Osijek-Baranja	28,00	55,89	16,09	41,2	106,3	22%	1,64%
County of Šibenik-Knin	25,57	53,44	20,97	44,1	146,1	41%	1,76%
County of Vukovar-Sirmium	29,91	53,77	16,30	40,6	98,3	20%	1,81%
County of Split-Dalmatia	28,91	55,26	15,82	40,8	102,3	38%	1,65%
County of Istra	24,06	58,64	17,29	43,0	136,8	37%	1,45%
County of Dubrovnik-Neretva	28,35	54,58	17,05	41,5	109,4	39%	1,61%
County of Međimurje	29,45	55,71	14,82	40,0	91,8	21%	1,76%
City of Zagreb	25,76	57,80	16,42	41,6	118,9	49%	1,22%



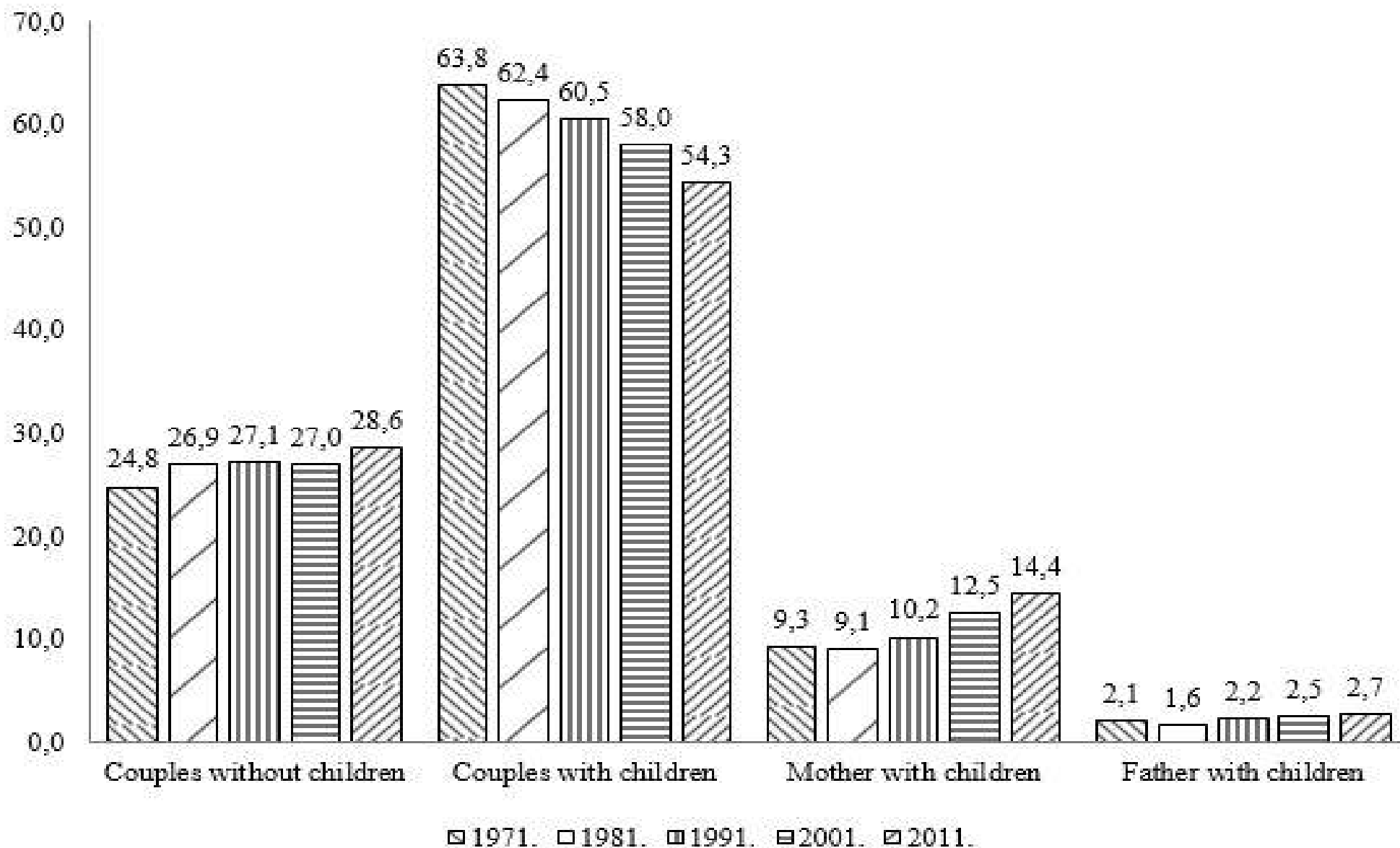
- Furthermore, educational structure of maternal women can vary from year to year. Figure 3. presents educational structure of women who have given birth in 2013 in Croatia.



**Figure 3:** Educational structure of women that had birth in 2013. Authors' creation according to Croatian Bureau of Statistics



**Figure 4:** Population in Croatia by marital status, censuses 1991-2011. according to Croatian Bureau of Statistics

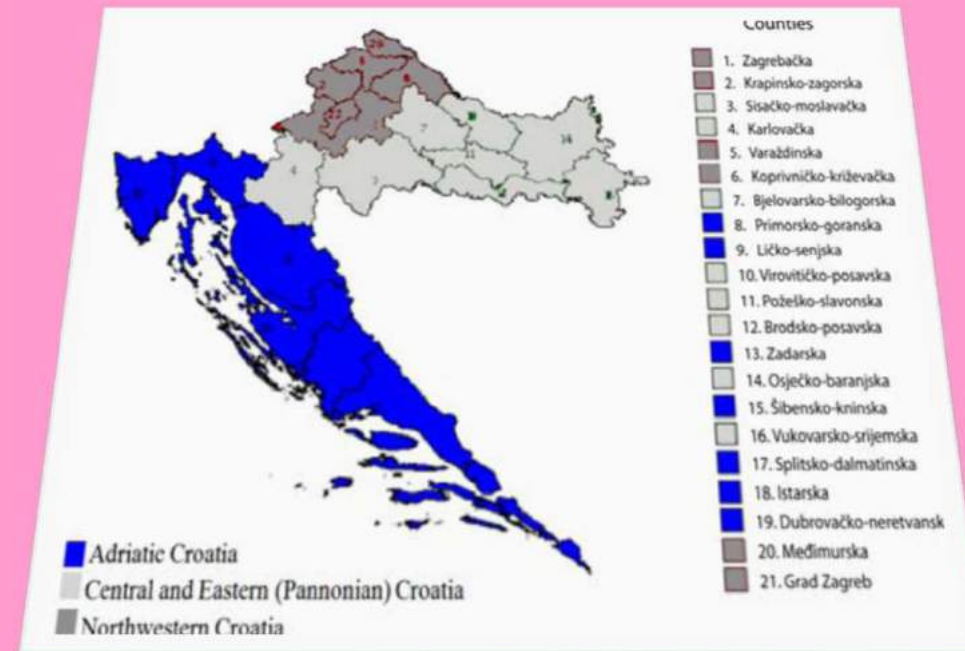


**Figure 5:** Families by type 1971-2011. according to Croatian Bureau of Statistics

# CROATIAN COUNTIES CLUSTER ANALYSIS ACCORDING DEMOGRAPHIC CRITERIA

- ❑ Between the methods and techniques of multivariate analysis, **K- means method** has been chosen as the most appropriate one for Croatian Counties clustering.
- ❑ Among other advantages K-means method is especially effective because it provides opportunity that the number of clusters can be pre-determined in advance.
- ❑ In the first phases of the process of clustering all demographic indicators that are monitored by Croatian Bureau of Statistics in 2013 as well as those from regional statistical institutions have been used as the clustering criteria.

- Unfortunately, greater number of these 57 demographic indicators haven't been statistically significant as a multivariate analysis criteria.



- Therefore, clustering process is finally completed with 15 criteria that were statistically significant as it is evidenced by the results shown in Table 6 in which are also listed the ranking criteria themselves.

**Table 6: The Analysis of Variance (ANOVA) table with Cluster Analysis criteria**

**ANOVA**

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Share of population between 0-24 years old, 2013.	12,674	5	2,194	15	5,775	,004
Share of population between 25-65 years old, 2013.	9,779	5	1,483	15	6,592	,002
Mother to 15 years old that gave birth in 2013.	,000	5	,000	15	.	.
Mother between 15-19 years old that gave birth in 2013.	15,624	5	,856	15	18,262	,000
Mother between 20-29 years old that gave birth in 2013.	122,862	5	3,567	15	34,447	,000
Mother between 30-39 years old that gave birth in 2013.	162,040	5	2,850	15	56,856	,000
Mother above 40 years that gave birth in 2013.	2,579	5	,283	15	9,101	,000
Mother that had first child birth in 2013.	36,990	5	2,533	15	14,602	,000
Mother that had second child birth in 2013.	11,545	5	4,006	15	2,882	,051
Mother that had third or more child birth in 2013.	60,345	5	2,894	15	20,849	,000
Lower educated mother that had given birth in 2013.	267,267	5	12,111	15	22,068	,000
Higher educated mother that had given birth in 2013.	206,114	5	7,778	15	26,500	,000
Working active mother that had birth in 2013.	111,248	5	11,533	15	9,646	,000
Mother with personal income that had given birth in 2013.	,000	5	,000	15	.	.
Mother without personal income that had given birth in 2013.	123,440	5	12,517	15	9,862	,000

- ❑ Clustering criteria definitions given in the Table 4 are generally known except two criteria: “Lower educated mother that had given birth in 2013” and “Higher educated mother that had given birth in 2013”.
- ❑ The first group “less educated mothers”, are those who have completed a maximum four-year vocational school or high school. In another group of “more educated mothers” are the ones that have the higher education level than predefined.
- ❑ Final results of Croatian Counties clustering by K-means method in the six unique spacious units which are homogenous in their demographic indicators are shown in Table 7.

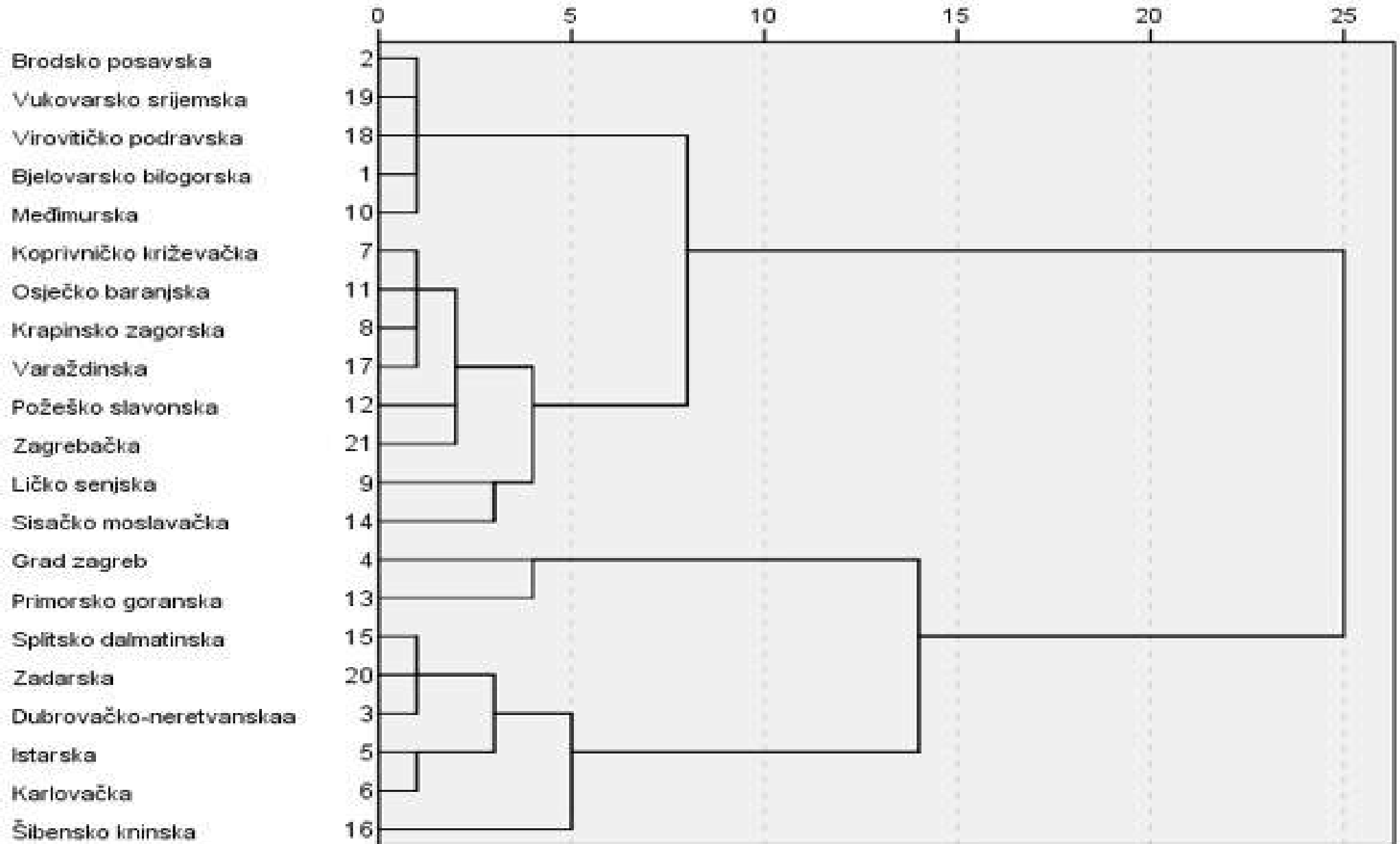
Case Number	County	Cluster	Distance
1	Bjelovar-Bilogora	1	4,750
2	Slavonski Brod-Posavina	3	3,528
3	Dubrovnik-Neretva	2	2,739
4	City of Zagreb	4	6,782
5	Istra	5	5,745
6	Karlovac	6	7,814
7	Koprivnica-Križevci	1	5,879
8	Krapina- Zagorje	6	11,433
9	Lika-Senj	6	5,513
10	Međimurje	1	7,587
11	Osijek-Baranja	6	10,217
12	Požega-Slavonia	3	5,637
13	Primorje-Gorski Kotar	4	6,782
14	Sisak-Moslavina	6	8,508
15	Split-Dalmatia	2	5,292
16	Šibenik-Knin	2	7,810
17	Varaždin	6	8,290
18	Virovitica-Podravina	1	7,215
19	Vukovar-Sirmium	3	2,906
20	Zadar	2	5,244
21	Zagreb	5	5,745

**Table 7:** Cluster Analysis results by author's calculation in SPSS with the numbers of Croatia Counties in each Cluster, according to K-means Method



# Dendrogram using Average Linkage (Between Groups)

Rescaled Distance Cluster Combine



**Figure 6:** Dendrogram, Cluster Analysis results by author's calculation in SPSS according to Croatian Bureau of Statistics data basis

- ❑ So, according to the Cluster Analysis by K-means method Croatian Counties are arranged in six clusters - spacious units which are homogenous in their demographic indicators and in which similar measures of the Croatian active demographic policy should be implemented.
  
- ❑ First cluster consists of County of Bjelovar-Bilogora, County of Koprivnica-Križevci, County of Međimurje and County of Virovitica-Podravina.
  
- ❑ In the **second cluster** are: County of Dubrovnik-Neretva, County of Split-Dalmatia, County of Šibenik –Knin and County of Zadar.

- ❑ **Third cluster** consists of County of Slavonski Brod – Posavina, County of Požega –Slavonia and County of Vukovar-Sirmium.
- ❑ In the **fourth cluster** are grouped: City of Zagreb, County and Primorje-Gorski Kotar.
- ❑ **Fifth cluster** consists of County of Istra and County of Zagreb.
- ❑ Finally, in the **sixth cluster** are grouped: County of Karlovac, County of Krapina-Zagorje, County of Lika-Senj, County of Osijek-Baranja, County of Sisak-Moslavina and County of Varaždin

# CONCLUSION REMARKS

- ❑ The results of Croatian Counties clustering by K-means method offers the clusters that form a spatial county units with the similar demographic indicators.
- ❑ To, the process of active demographic policy can start with less money and can be limited maybe only to spaces with poorest demographic characteristics.
- ❑ Moreover, the results of this study would stimulate "richer" administrative units to apply the appropriate active demographic policy measures in their areas without waiting for the adoption of laws and regulations at the national level of government.



*Thanks for Your  
Attention*