The Ageing of Vojvodina's Population between 1953 and 2002 with Reference to Middle Adulthood and Ageing Index

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Received: March 2008 | Revised: August 2008 | Accepted: August 2008

Abstract

This is a study of population aging in Vojvodina (province of Serbia) that has for long experienced a low birthrate and now faces a long struggle for simple reproduction and very survival of nation. This study analyze aging in Vojvodina during period 1953-2002. The aging structure of population is an extremely important demographic characteristic used, along with gender structure, to analyze the stage of the development of a certain population. Since 1970s, Vojvodina's population is characterized by constant birthrate decline that directly influenced on aging structure of Vojvodina's population. Death rate is an important fact in studying adulthood of a population, and influences a lot the middle adulthood of population. Furthermore, migrations are also important but they did not influence the middle adulthood as much as birthrate and death rate. Middle adulthood of Vojvodina population has changed significantly in 50 years. Along with the aging index, it raised in all municipalities.

Key words: Vojvodina Province, aging index, middle adulthood

Introduction

The research covers a period of fifty years (1953-2002), including five census years, during which the population has increased from 1.70 to 2.03 milion with in-migration amply compensation for birth rate decline.

To demonstrate the age structure numerically, population is presented in five-year age groups, or in big adulthood groups. Afterwards, population's middle adulthood is calculated along with medial adulthood, aging index, coefficients of adulthood and youth. This paper presents aging of the population in Vojvodina on the basis of calculating the middle adulthood and aging index. Period of 50 years (1953 – 2002) is covered. During this period, the number of Vojvodina population increased from 1,699,545 in 1953 to 2,031,992 in 2002. During the same period of time, birthrate declined, so that migrations compensated the natural declined, and there was a significant increase in the number of the population.

Demographic Analysis

The main sources of information for this paper were Censuses. Results from the Censuses from 1953 to 2002 were consulted i.e., books with the information for age and gender in settlements.

Middle adulthood and population' aging index were calculated for the analysis in this paper. Aging index was calculated according to the following formula:

$$i = \frac{{}_{\infty}P_{60}}{{}_{19}P_{0}}$$

where *i* presents the aging index, $_{\infty}P_{60}$ – population over 60 years of age, and $_{19}P_0$ population under 19. Middle adulthood of population was calculated according to the following formula:

$$a = \frac{\sum (x + 0.5) \times V_x}{\sum V_x}$$

where a stands for the population's middle adulthood, x for years of age, and V_x is the number of inhabitnats that are x years old, (Đurđev, 1996).

Average Adulthood of the Population

This paper covers longer period, from 1953 to the last Census in 2002 in order to examine the tendencies in changes of the middle adulthood of Vojvodina population. Consequently to the changes in middle adulthood that happened during the observed period, some other indicators of adulthood structure of Vojvodina population have also changed.

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Table 1 Middle adulthood of the population in Vojvodina

	1953	1971	1981	1991	2002
total	30.9	33.9	35.3	37.5	39.4
m	29.9	32.9	34.2	36.1	38.1
f	31.9	34.9	36.5	38.9	40.9

Thus, Vojvodina went from demographic maturity to demographic adulthood, and in 2002 the population was inclining to deep demographic adulthood. Middle adulthood of population in all parts of Vojvodina was analyzed i.e., in Srem, Banat, and Bačka in order to establish whether there were significant differences in those parts along with the municipalities within.

Middle adulthood of Srem population was 30.2 years in 1953, in 1991 it was 36.4, and in 2002 they were 39.1 years old. Birthrate decline and longer lifetime were reflected in the increase of population's middle adulthood. These characteristics influenced the shifting of middle adulthood to higher level even with the population in Srem. Thus, between the Census in 1953 and the one in 1971, middle adulthood of Srem population increased from 30.2 to 31.6 in 1.4 years. However, this indicator of population's adulthood had a much intensified growth between the Censuses in 1971 and 1991. During this period and following significant birthrate decline, the average adulthood of population increased in 4.8 years (from 31.6 to 36.4). During the same period, from 1953 to 1991, the middle adulthood in Vojvodina increased from 30.9 years to 37.5 years, and to 39.4 years in 2002 (Table 1.) If we take a look at the complete territory of the country (Yugoslavia in those times), the average adulthood of population was from 29.3 in 1953 and 36.0 in 1991. Kosovo and Metohija has significantly younger population, with the average adulthood of 25.4 in 1991, when compared not only with Srem, but the whole of Vojvodina. This population changed its middle adulthood by only 0.4 years during the period under observation because of high birthrate. This is why the adulthood pyramid for Kosovo - Metohija has an expansive shape in contrast to the irregular, constricted forms of pyramida for Yugoslavia, Vojvodina and Srem with the base narrower than the top. It is not possible to track the changes during the next Censuses at the territories of Kosovo and ex-Yugoslavia because the frontiers have changed, as well as state names, so we could only concentrate at the territory of Serbia. According to the Republic of Serbia 2002 Census, the average adulthood was 40.2 years, in Central Serbia it was 40.4 years, and in Vojvodina it was 39.6 years. The oldest people live in Central Serbia because there are numerous villages in bordering municipalities towards Romania and Bulgaria. They are almost abandonrd and are mainly inhabited by older people. Besides that, this adulthood was affected by Albanian and Muslim population from Serbia south that did not vote.

Ruma municipality recorded the biggest increase in the average adulthood of population in Srem municipalities during the observed period, and that was in 10.6 years and in the municipalities of Indija 10.4, and Bačka Palanka (part of it) in 10.8 years. The smallest increase was in the part of Novi Sad municipality belonging to Srem.

Highest middle adulthood of Srem population in 1991 was in Irig municipality - 38.9 years, and part of Bačka Palanka - 38.3 years. Up to 2002, the municipalities mentioned above had highest average adulthood but now much higher, so that it was 43.0 years in the part of Bačka Palanka municipality that belongs to Srem, and in Irig municipality it was 41.3 years. These settlements are in the mountainous regions, at Fruška Gora Mountain and are characterized by migration and low birthrate. Ruma had the lowest average adulthood at the 1953 Census and up to the Census in 1991, its value raised over Srem's average. In 2002 the youngest population lives in Beočin municipality (close to Novi Sad), the Srem section of Novi Sad and Stara Pazova. Female population had highest average adulthood than the male population at all Censuses, and in all municipalities, because female population lives longer (Table 2).

In 1953, the middle adulthood of Bačka population was 31.3 years, while in 2002 it was 39.2 years. Middle adulthood of Bačka population increased between the two Censuses in 1953 and 1971 in 3.3 years from 31.3 to 34.6. That is much bigger than in Srem, where during the same period the population was older in 1.4 years. However, this indicator of population's adulthood increased significantly in between the 1971 and 2002 Censuses. During this period, and because of the significant birthrate decline, the average adulthood of population increased in 4.6 years (from 34.6 to 39.2).

Middle adulthood of male population in Bačka was lower than those of the female population at all Censuses and in all municipalities, and that is the consequence of longer life of women in Bačka, as well as in other parts of Vojvodina, and also in Serbia. According to data processed after the 1953 Census, all municipalities in Bačka had middle adulthood in between 28 and 34 years. The youngest population was in those municipalities that were mainly settled by postwar immigrants from the regions of Bosnia and Herzegovina, Croatia, and Macedonia. Thus, Temerin, Novi Sad, Bačka Palanka, Apatin, and Vrbas have the youngest population. The oldest population lives in the municipalities that had fewer immigrants, i.e., Mali Idoš, Ada, and Kanjiža. Difference in middle adulthood between male and female population is mainly in between one and two years. Middle

Table 2 Middle adulthood of the population in Srem municipalities according to 1953-2002 Censuses

Municipality		1953	1971	1981	1991	2002
Bačka Palanka (part)	total	32.2	35.5	36.0	38.3	43.0
Beočin	total	31.4	31.7	33.3	35.4	38.1
Inđija	total	29.1	32.2	34.2	36.4	39.5
Irig	total	31.9	35.8	37.6	38.9	41.3
Novi Sad (part)	total	32.1	32.1	32.3	34.7	38.1
Pećinci	total	30.5	33.7	35.2	36.6	38.9
Ruma	total	29.0	33.0	34.8	37.1	39.6
Sr. Mitrovica	total	30.4	32.2	33.9	36.7	39.3
Sr. Karlovci	total	33.2	35.2	35.1	37.1	39.7
St. Pazova	total	29.8	33.0	33.0	34.8	38.3
Šid	total	30.5	33.7	35.8	37.8	39.6
	total	30.2	32.9	34.3	36.4	39.1
Srem	m	29.0	31.6	33.0	35.2	37.8
	f	31.3	34.2	35.5	37.7	40.4

Table 3. Middle adulthood of Bačka municipalities population according to 1953 – 2002 Censuses

Municipalities		1953	1971	1981	1991	2002
Ada	total	32.7	36.2	37.7	38.8	40.7
Apatin	total	29.2	33.4	35.6	38.1	40.7
Bač	total	28.8	33.5	36.0	37.9	39.8
Bačka Palanka	total	28.9	33.8	35.3	37.2	39.9
Bačka Topola	total	33.6	37.1	38.3	39.1	40.8
Bački Petrovac	total	33.7	36.0	37.6	38.9	40.3
Bečej	total	32.9	36.6	37.6	38.3	39.5
Vrbas	total	28.1	31.9	33.7	35.6	38.2
Žabalj	total	31.4	34.1	35.5	36.5	37.9
Kanjiža	total	32.6	36.6	38.1	39.0	40.7
Kula	total	29.3	32.9	35.0	37.0	39.4
Mali Iđoš	total	32.0	36.4	37.7	37.7	39.0
Novi Sad	total	31.6	33.3	34.4	36.5	38.9
Odžaci	total	26.8	33.3	36.4	38.4	41.0
Senta	total	33.3	36.3	37.7	38.8	40.7
Sombor	total	31.5	35.2	36.8	38.6	41.0
Srbobran	total	33.7	36.8	38.2	38.9	39.5
Subotica	total	32.5	35.9	36.8	38.1	39.9
Temerin	total	30.3	33.8	34.4	35.5	38.1
Titel	total	31.7	35.1	36.5	37.6	38.9
	total	31.3	34.6	36.0	37.6	39.2
Bačka	М	30.2	33.4	34.7	36.1	38.0
	f	32.2	35.8	37.3	39.0	41.1

adulthood of population in all Bačka municipalities drastically increased up to 2002, and it was from 37 to 41 years (Table 3). Immigrants that came after the World War 2 contributed less the medium adulthood, and the influence of village to town migrations is growing, just as vicinity of bigger centers. Municipalities that have disadvantageous geographical location also have weaker economy and are thus less attractive to immigrants, and a good number of young population is leaving and their population gets older every day. The difference between middle adulthood of men and women increased in fifty years, from 1953 to 2002. According to the last Census, women are older even up to four years.

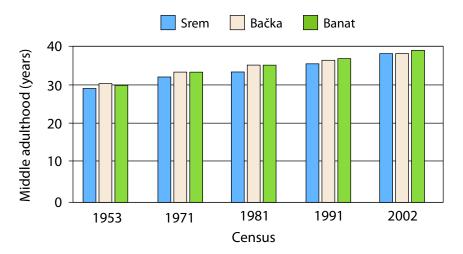
According to the 1953 Census, middle adulthood of Banat population was 30.9 years, while in 2002 it was 39.9 years. Birthrate decrease and prolonging of human lives are reflected in the increase of population's middle adulthood. Those characteristics influenced shifting of middle adulthood to higher level with Banat population. Thus, between the Censuses of 1953 and 1971, the average adulthood of Banat population increased in 3.4 years, from 30.9 to 34.3 that is a significantly bigger increase then in Srem, where in the same period of time, the population was older in 3.3 years. However, this population age index had much intensive rise between the Censuses in 1971 and 2002. During this period and following significant birthrate decline, the average adulthood of population rose from 34.3 to 39.3 years in 5.6 years.

Table 4. Middle adulthood of the population in Banat municipalities according to the Censuses from 1953 to 2002

Municipalities		1953	1971	1981	1991	2002
Alibunar	total	32.9	35.3	37.6	39.6	41.3
Bela Crkva	total	31.2	34.8	35.2	37.1	39.3
Vršac	total	31.8	35.4	36.5	38.2	40.0
Žitište	total	31.1	36.8	40.0	41.1	41.6
Zrenjanin	total	30.9	32.2	35.6	37.6	39.9
Kikinda	total	29.5	34.0	35.9	37.3	39.8
Kovačica	total	32.5	35.7	37.3	38.7	40.1
Kovin	total	30.8	34.5	35.8	37.1	39.2
Novi Bečej	total	31.8	36.2	37.9	38.2	39.6
Novi Kneževac	total	33.4	37.4	39.3	40.0	40.4
Nova Crnja	total	30.2	36.9	35.1	40.5	41.2
Opovo	total	31.4	35.6	37.3	38.5	39.9
Pančevo	total	29.9	32.4	33.7	36.1	38.9
Plandište	total	29.0	34.4	37.9	40.4	42.2
Sečanj	total	29.7	35.7	38.9	39.7	41.3
Čoka	total	31.3	36.7	38.9	40.3	41.4
	total	30.9	34.3	36.1	37.9	39.9
Banat	m	30.1	33.7	35.0	36.6	38.4
	f	31.8	34.9	37.2	39.2	41.3

Middle adulthood of male population in this part of Vojvodina is lower than the middle age of female population at all Censuses and in all municipalities. According to the data processed after the 1953 Census, all Banat municipalities had the middle adulthood in between 29 and 32 years (Table 4). The youngest population was in those municipalities that were inhabited after the war by the immigrants from Bosnia and Herzegovina, Croatia, and Macedonia. Thus, Kikinda, Sečanj, Plandište and Pančevo had the youngest population. The oldest population lives in the municipalities that had fewer immigrants i.e., Alibunar, Kovačica, and Novi Kneževac. Difference in the middle adulthood with male and female population is mainly in between one and two years. By 2002, the middle adulthood of population drastically increased in all Banat municipalities. As with Bačka, the more Censuses are further from the WW2 migrations, the less is the impact of immigrants to middle adulthood, while the influence of village to town migration is increasing, and the vicinity of bigger centers, and thus the municipalities of Pančevo, Novi Bečej, Kovin, Kikinda, and Zrenjanin had insignificantly younger population (Plavša, Bubalo-Živković, 2002).

Population in Srem has the lowest middle adulthood at all Censuses, while Banat has the oldest population. Banat has the biggest number of deserted villages and they are mainly in the border region towards Rumania. A lot of population is leaving this part of Banat and this makes the old inhabitants dominant and they increase the average age. The average age in Bačka was slightly higher according to the Censuses in 1953 and 1971. Bačka had majority of population that came after the Second World War and they influenced the increase of middle age. That rise was decreased



Graphic 1. Middle adulthood of the population of Srem, Bačka, and Banat according to the above mentioned Censuses

by assimilating with the indigenous population, so that middle adulthood is slightly lower than in Banat.

Aging Index

Age index presents the relation between old and young population and it varies from 0.1 to 0.65, while 0.4 or 40% presents the critical value. Population with higher index is characterized by aging and vice versa, if the index is lower the population is younger. Even if it does not take into account the middle generation, the importance of the aging index is in that it indicates the proportion between the old and young population. Thus it emphasizes the importance of the youth and the factors that relate to their number (Đurđev, 1996).

Aging index in Yugoslavia was between 0.2 in 1953 and 0.5 in 1991. It was 0.31 in Vojvodina in 1953, 0.71 in 1991, and 0.94 in 2002 (Table 5). Aging index in Srem was 0.3 in 1953, ando.6 in 1991, and it rose to 0.95 by 2002. If the process of demographic aging in Srem continues at this rate, the index could surpass the value of 1.0 by the next Census. Therefore, there is one old inhabitant to each young one. Values of the aging index of Kosovo and Metohija that were from 0.15 to 0.14 in this period, indicated that the population of northern Serbia is significantly older than the population of the southern province

The aging index had higher values in all municipalities at every Census. At the beginning of the period being observed, it had the lowest value of 0.2 in the municipalities of Ruma and Indija, and highest in the municipalities of Sremski Karlovci and Novi Sad i.e., o.4. The index reached its maximal values up to the 1991 Census in the municipality of Irig - 0.9, and minimal values were in the municipality of Novi Sad (it maintained the same value as at the beginning of the period i.e., 0.4). At 2002 Census, the

Table 5. Aging index of Vojvodina population

	1953	1971	1981	1991	2002
total	0.31	0.49	0.55	0.71	0.94
М	0.25	0.42	0.45	0.57	0.77
f	0.36	0.57	0.66	0.86	1.12

highest aging index was recorded in part of Bačka Palanka municipality that belongs to Srem i.e., 1.43, and in Irig municipality – 1.12, and the lowest values were in a part of Novi Sad municipality on the Srem side - 0.78, and in the municipality of Beočin and Stara Pazova - o.8o. The biggest increase in the aging index was in the part of Bačka Palanka municipality that belongs to Srem - 1.13. Aging index with female population at this territory of Fruška Gora crossed the critical value and is 1.60. However, the aging index crossed the critical value in the municipalities of Indija, Irig, Paćinci, Ruma, Stara Pazova, and Šid. Therefore, the female population is old. According to the 1991 Census, the female population is in the category of old population in all the municipalities except in Stara Pazova and a part of Novi Sad municipality, and was still there by 2002. Male population is around the critical value and is heading towards old population (except in the two municipalities mentioned above). Aging index of this population group is within the interval from 0.4 to 0.7 according to the 1991 Census, and from 0.66 to 1.26 according to the 2002 Census (Table 6).

Both aging index and middle adulthood lead to the conclusion that birthrate decrease and prolonging of human life influenced the huge leap of the above mentioned indexes, especially from the 1991 Census.

Bačka has the following values of the maturity index in 1953, and that is 0.32, and it was 0.71 in 1991. However, the aging index reached the value of 0.94 in 2002. Therefore, there is one old inhabitant to each young one.

Following the previous analysis of the middle adulthood according to gender, the aging index is also lower with male population. The maturity index with men was 0.26 and 0.38 with women in 1953. Following fifty years witnessed the constant rise of the value of the population's middle adulthood, so that the aging index crossed from lower values to very high ones, and for male population it was 0.76, and 1.13 for female population, and those are critical values, especially with women (Table 7).

The lowest values of the aging index in 1953 were in the municipalities of Apatin, Bač, Bačka Palanka, and Odžaci. There was a low percentage of aging in the majority of municipalities, except in the municipality of Bačka Topo-

Geographica Pannonica • Volume 12, Issue 1, 39—44 (2008)

Table 6. Aging index in Srem municipalities

Municipality		1953	1971	1981	1991	2002
Bačka Palanka (part)	total	0.35	0.60	0.61	0.77	1.43
Beočin	total	0.32	0.89	0.42	0.53	0.80
Inđija	total	0.22	0.35	0.48	0.62	0.95
Irig	total	0.34	0.58	0.83	0.88	1.12
Novi Sad (part)	total	0.37	0.39	0.39	0.44	0.78
Pećinci	total	0.29	0.47	0.56	0.63	0.88
Ruma	total	0.22	0.40	0.55	0.68	0.95
Sr. Mitrovica	total	0.27	0.37	0.46	0.64	0.95
Sr. Karlovci	total	0.41	0.57	0.62	0.66	0.95
St. Pazova	total	0.25	0.41	0.44	0.51	0.80
Šid	total	0.28	0.43	0.62	0.76	0.95
	total	0.27	0.40	0.50	0.62	0.91
Srem	m	0.21	0.33	0.39	0.49	0.75
	f	0.32	0.48	0.62	0.76	1.07

la, Bački Petrovac, Bečej, and Senta where it crossed 0.40. All the municipalities had high percentage of aging up to the year 2002 and it was above one in the municipalities of Sombor, Senta, Kanjiža, Bačka Topola, Apatin, and Ada. Biggest difference between the aging indexes in 1953 and 2002 was recorded in Apatin municipality, where the index increased in 0.87 in fifty years, as the consequence of a peripheral position of this municipality. Besides Apatin municipality, the municipalities of Odžaci, Kula, and Ada also have higher values in the aging index in Bačka.

Aging index in **Banat** was 0.31 in 1953, and in 1991 it was 0.75. However, in 2002 the aging index reached the value of 0.97. Thus, for every young inhabitant, there is an old one.

The aging index with men was 0.26, and with women it was 0.36 in 1953. In the following fifty years, population's middle adulthood was rising constantly so that the aging index crossed from low values to very high ones, and it was 0.79 for male population, and 1.17 for female.

Municipalities of Kikinda, Pančevo, Plandište, Sečanj, and Nova Crnja had the lowest aging index in 1953. The population was characterized with the low degree in aging in the majority of municipalities, except in the municipalities of Alibunar and Novi Kneževac, where it crossed 0.40. All the municipalities had a very high aging index up to the year 2002, and in the municipalities of Alibunar, Vršac, Žitište, Novi Kneževac, Nova Crnja, Plandište, Sečanj and Čoka, the value was above 1 (Table 8) Biggest discrepancy in the aging index in 1953 and in 2002 was in Plandište municipality, where the index increased in 1.04 in fifty years, and that is the consequence of peripheral situation of this municipality. Besides Plandište municipality, municipalities of Žitište and Nova Crnja also have peripheral position and also have lower values of aging index in Banat.

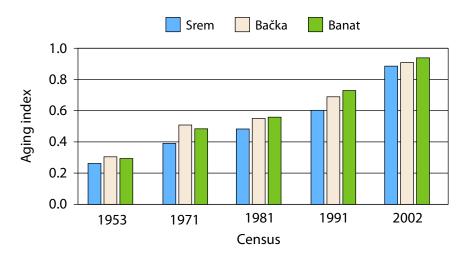
Aging index has a similar flaw as the middle adulthood according to the Censuses observed in Vojvodina micro-regions. It is the lowest in Srem, and highest in Banat. It was only in the Censuses of 1953 and 2002 that its value was higher in Bačka than in Banat.

Table 7. Aging index of Bačka municipalities according to 1953 – 2002 Censuses

Municipality		1953	1971	1981	1991	2002
Ada	total	0.39	0.66	0.75	0.85	1.02
Apatin	total	0.24	0.43	0.52	0.75	1.11
Bač	total	0.23	0.41	0.51	0.78	0.98
Bačka Palanka	total	0.24	0.45	0.51	0.67	0.98
Bačka Topola	total	0.44	0.71	0.79	0.88	1.06
Bački Petrovac	total	0.47	0.60	0.70	0.86	0.99
Bečej	total	0.39	0.68	0.73	0.80	0.90
Vrbas	total	0.22	0.34	0.39	0.55	0.80
Žabalj	total	0.32	0.47	0.54	0.65	0.77
Kanjiža	total	0.38	0.68	0.75	0.86	1.06
Kula	total	0.25	0.41	0.47	0.66	0.94
Mali Iđoš	total	0.36	0.63	0.75	0.76	0.87
Novi Sad	total	0.32	0.41	0.42	0.60	0.88
Odžaci	total	0.17	0.39	0.56	0.79	1.09
Senta	total	0.41	0.67	0.73	0.82	1.05
Sombor	total	0.34	0.56	0.61	0.81	1.09
Srbobran	total	0.44	0.69	0.76	0.88	0.90
Subotica	total	0.37	0.62	0.67	0.76	0.97
Temerin	total	0.28	0.47	0.47	0.53	0.76
Titel	total	0.33	0.55	0.61	0.74	0.85
	total	0.32	0.52	0.57	0.71	0.94
Bačka	m	0.26	0.53	0.46	0.56	0.76
	f	0.38	0.50	0.68	0.86	1.13

Table 8. Aging index of the population in Banat municipalities according to 1953 – 2002 Censuses

Municipalities		1953	1971	1981	1991	2002
Alibunar	total	0.43	0.56	0.69	0.96	1.14
Bela Crkva	total	0.33	0.53	0.53	0.70	0.92
Vršac	total	0.35	0.55	0.63	0.80	1.01
Žitište	total	0.32	0.65	0.89	1.16	1.19
Zrenjanin	total	0.30	0.46	0.52	0.70	0.98
Kikinda	total	0.26	0.47	0.56	0.69	0.94
Kovačica	total	0.39	0.58	0.68	0.83	0.98
Kovin	total	0.29	0.49	0.57	0.72	0.88
Novi Bečej	total	0.34	0.62	0.74	0.79	0.92
Novi Kneževac	total	0.43	0.72	0.87	0.98	1.02
Nova Crnja	total	0.28	0.63	0.61	1.09	1.12
Opovo	total	0.32	0.57	0.68	0.81	0.97
Pančevo	total	0.27	0.36	0.40	0.57	0.87
Plandište	total	0.24	0.46	0.71	1.08	1.28
Sečanj	total	0.27	0.57	0.78	0.98	1.14
Čoka	total	0.32	0.65	0.81	1.01	1.12
	у	0.31	0.50	0.58	0.75	0.97
Banat	m	0.26	0.44	0.49	0.62	0.79
	f	0.36	0.57	0.67	0.89	1.17



Graphic 2. Aging index of Srem, Bačka, and Banat population according to the Censuses

Conclusion

Population in Vojvodina is getting older as the consequence of low birthrate and emigrations. This is evident from the analysis of the middle adulthood of the population and the aging index. Demographers could not resolve this problem alone, not only in Vojvodina, but in the whole of Serbia. The assistance of economists and politicians is required in solving this problem. In order to have rise in birthrate and decrease emigration, people need security in employment with the rise of standard as its consequence. Birthrate was higher in the post war period and even before the World War Two, and standard of people then was lower. However, changes in the way of taking care of children, moral changes, brought about the fact that parents today are aiming to provide the best possible conditions for raising their children. The consequence of this is even lower birthrate. The assistance of the state is necessary for significant demographic changes in Vojvodina and in the whole of Serbia.

Acknowledgments

This paper is a part of the Project No. 146017D financed by the Ministry of Science and Protection of Living Environment of the Republic of Serbia.

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