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AGE-SEX STRUCTURE OF THE POPULATION OF NORTH MACEDONIA IN THE BEGINNING OF THE 21st CENTURY

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Abstract: The population sex and age structure is of exceptional importance, because of the remarkable demographic and economic consequences it leaves behind, so, its detailed analysis allows us to estimate the present and future potential of the structure's progressive tendencies, as well as the differences existing within the territory we want to analyze. Also, the sex and age population structures are extremely important for the future demographic and economic development of the country. These basic biological structures, in addition to the population's natural change, are conditioned by the modern general, social, and economic flows, i.e., the demographic transition, which spatially redistributes the population and thereby determines the characteristics of the population's sex and age structure in different areas. This paper aims to analyze the changes in the population sex and age structure in the Republic of North Macedonia according to the data from the two censuses conducted in 2002, and 2021 on a national and regional level and to point out the changes that have occurred during this period and their connection and relatedness to the demographic, social, economic and overall development.

Keywords: population, population age and sex structure, spatial distribution, aging, North Macedonia

Sažetak: Struktura stanovništva po polu i starosti je izuzetno značajna, zbog demografskih i ekonomskih posledica koje ostavlja za sobom, pa nam njihova detaljna analiza omogućava da procenimo sadašnji i budući potencijal progresivnih tendencija strukture, kao i razlike koje postoje na teritoriji koju želimo da analiziramo. Takođe, definišu velicinu i obim radnog kontingenta, zbog čega su od izuzetnog značaja za budući ekonomski razvoj zemlje. Ove osnovne biološke strukture, pored prirodnih promena stanovništva, uslovljene su savremenim opštim, društvenim i ekonomskim tokovima, odnosno demografskom tranzicijom, koja prostorno preraspoređuje stanovništvo i time određuje karakteristike polne i starosne strukture stanovništva u različitim oblastima. Ovaj rad ima cilj da analizira promene u polnoj i starosnoj strukturi stanovništva u Republici Severnoj Makedoniji prema podacima iz dva popisa objavljena 2002. i 2021. na nacionalnom i regionalnom nivou i da ukazuje na promene koje su se desile i njihovu povezanosti sa demografskim, društvenim, ekonomskim i ukupnim razvojem.

Cljučne reči: stanovništvo, starosno-polna struktura stanovništva, prostorni raspored, starenje stanovništva, Severna Makedonija

INTRODUCTION

According to the last census data conducted in 2021, an unfavorable situation was established in terms of the volume and dynamics of the total population and the indicators of the population's sex and age structure. Namely, from 2002 to 2021, the total population decreased by 185,834 inhabitants, or by 9.2%. At the same time, the population natural increase rate dropped from 3.1‰ in 2002 to -5.4‰ in 2021.

Dominant characteristics of the population age-sex structure are imbalanced share of the sexes and an emphasized demographic aging of the population that are especially expressed at the regional and municipal level. These changes may have had a significant impact on family formation, births and labor force contingent, resource utilization, and overall economic development.

Research on the population's sex and age structure are of great importance for realizing the potential for demographic and economic development, creating appropriate social and economic policies, as well as policies for spatial planning and balanced development. Changes in the age-sex structure affect all social institutions and are drivers of social change.

Sex and age structure are dependent on biological determinants, such as age-sex specific birth and death rates, migrations, length of life as well as several other factors. In the analyzed period of about twenty years, the existing economic, social, and political conditions, to a large extent, influenced the volume and dynamics of migration. The high unemployment rate, which was the basis for poverty, and social exclusion, were a strong push factor for emigration (Apostolovska Toshevska et al., 2012; Nikoloski

& Apostolovska Toshevska, 2019). Ethnic tensions also play an additional role, especially after the events of 2001.

More information on population sex structure, age structure, the aging process, and their consequences in the region can be found in the papers by Aleksandrova and Velkova (2003); about the population aging and its consequences in the Balkan countries, (Magdalenić & Galjak, 2016); Hoff (2011), on aging in Central and Eastern European countries; Jakovljević and Laaser (2015), for 17 countries in transition from SE Europe; the aging trend of the early 21st century in Serbia (Penev, 2014); on aging and demographic change in European societies (Muenz, 2007); on the impact of the aging process of the working-age population in the Republic of Macedonia in the paper of Dimitrieva and Janeska (2001); the impact of aging on the working-age population in the Republic of Macedonia in the paper of Risteski (2016); about the demographic components as a basis for forming the working-age population in the Pelagonia region in R. Macedonia, (Apostolovska Toshevska & Madjevikj, 2012); the age structure of the population in the East region of the Republic of Macedonia in the aspect of spatial planning (Madjevikj et al., 2014); the population aging and its impact on the economic development of RNM (Apostolovska Toshevska et al., 2023). About the sex and age structure of Serbia (Penev, 1995, 2015; Живковић & Јовановић, 2006; Кубуровић, 2007; Ковачевић et al., 2006; 2008; Павловић & Јанчић, 2009; Јокић, 2013; Стаменић, 2016) and many more.

The aim of this research refers to the spatial distribution, size, and dynamics of the population by sex and age. Such an analysis is a good basis for understanding human resources from this aspect and implementing the specific information in creating strategic economic and social policies, especially important for the possibility of revitalizing particular areas. Because through the population sex and age structure the past is seen, the present is read, and the future of population movement is glimpsed (Friganović, 1990).

The gained results should be further used in the creation of better living conditions, planning to meet the needs following the population age structure, planning the functional development according to the population by sex and age, planning the scope and structure of the capacities of the institutions in a ratio that is adequate to the population age and sex structure.

RESEARCH METHODOLOGY

The age structure belongs to the group of the most important characteristics of the demographic picture and the development of the population, which exerts its influence in all areas of social life, and therefore

the analysis of the population age structure is the basis, not only for demographic, but also for all other social researches (Гиговић, 2012).

The basic indicators of the analysis of the population age structure are the share of large age groups (young population up to 14, middle-aged from 15 to 64, and old population (including persons at the age of 65 and older), the aging index as a synthetic indicator of the ratio of young and old population, and the average population age. None of the above-mentioned indicators is sufficient by itself to provide a true picture of the aging population, but it is necessary to analyze and compare several indicators in different periods (Стаменић, 2016).

The conclusions about the population's sex and age structure are drawn based on the calculation of several indicators such as:

Population aging index

Indicator of the ratio of people aged 65 and over and young people up to 14 years. The aging index's limit value is 0.44. It is assumed that the population has begun to grow old when the index exceeds this value (Wertheimer-Baletić, 1973; Kjurchiev et al., 2011).

Mean or average population age

Average years of life of the population at the time of the census. It is calculated as a weighted arithmetic mean

$$\bar{x} = \frac{\sum x \times f}{\sum x}$$

x – is the mean or average population age, $\sum x \times f$ – is the total distribution (x = dilute mean of age groups), and f – population frequency (Wertheimer-Baletić, 1973; Kjurchiev et al., 2011).

Sex ratio (SR)

The ratio between the number of males and the number of females, expressed as the number of males per 1,000 females.

Population aging ratio

The share of people aged 60 and older or 65 and older in the total population. The limit value of the population aging ratio is 12%.

Total-age dependency ratio¹

The ratio between the sum of persons aged 65 and older and the population under 15 to the number of persons aged 15 to 64.

$$K_p = \frac{P_{(0-14)} + P_{65+}}{P_{(15-64)}} * 100$$

Indicators were calculated using data from the State Statistical Office of North Macedonia², that is data from the 2002 and 2021 censuses. As for 2002, data processing by age groups does not include the population marked as unknown. Hence, the difference in the total number of persons appears. For better visualization and comparison, maps, graphs, and sex and age pyramids have been created. A graphical presentation of the age groups by sex would be the pyramid which displays the percentage of a population according to sex and age (Breznik, 1980, Kovačević et al., 2006; Kovačević et al., 2008).

According to the Law on Territorial Organization of the Republic of Macedonia from 2014, analyses for the volume, dynamics, and population structures by sex and age are undertaken at the national level, regional level (NUTS 3 - eight planning regions), and municipality level (NUTS 4 - 80 municipalities). The data for the municipalities are divided into three categories: municipalities with a headquarter in a city (urban), municipalities with a headquarter in a village (rural), and municipalities of the city of Skopje.

An urban settlement (city) is defined as a settlement that: “has more than 3,000 inhabitants, with a developed structure of activities in which more than 51% of the people employed are outside the primary sector; it has a built-up urban physiognomy with a zone for activities, economy zones, recreation zones, green areas, a square, a built-up road system, communal services and represents the functional center of the settlements in its surrounding”. The village is defined as a populated place with one functional meaning and one predominant activity, and the area it covers has an agrarian physiognomy and function. Hence, an urban municipality is considered the municipality with a headquarter located in an urban settlement, while a rural municipality is considered the municipality with a headquarter located in a rural settlement. As a third category of municipalities are considered those located in the area of the city of Skopje (Влада на Република Северна Македонија, 1996, 2014).

¹ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Total-age_dependency_ratio

² State Statistical Office [Online] Available at www.stat.gov.mk (last accessed in July, 2023).

RESULTS

Sex structure

The population is viewed as a sex-specific entity, which implies the relevance of gender roles as a factor in demographic development. The sex perspective is a necessary instrument when explaining the causes and considering the effects of demographic processes and changes. Sex peculiarities of the age structure and sex imbalances manifested differently among the young, middle-aged, and old are accepted as the result of differences in the position and behavior of women and men in the private and public sphere. Data on the age structure of women and men and the sex composition of members of different generations point to sex differences in mortality and migratory movements (Шобот, 2010).

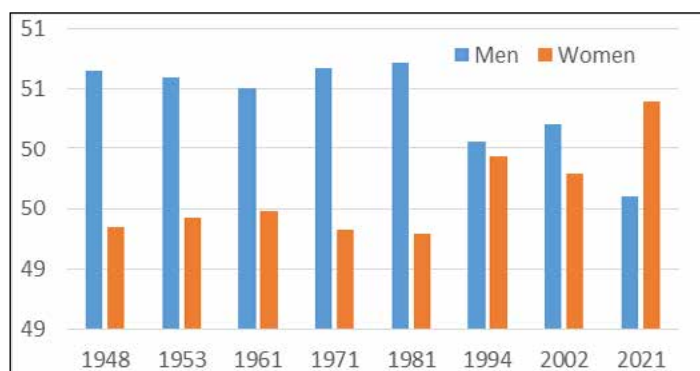
In the 2021 census data, a total of 911,087 men and 925,626 women were recorded (Table 1). It is the first time since the Second World War, that the female population is more represented than the male with a ratio of 49.6%, vs 50.4% (Figure 1). More specifically, in 2021, there were 14,539 more women than men, or 984 men per every 1,000 women. In the same time period, a decrease in numbers is present in both sexes, namely -8.1% for women and -10.3% for men. Or in absolute numbers, in the analyzed period, a decrease was recorded in the male population by 104,290 persons, and in the female population by 81,544 persons.

Table 1. Population by sexes according to the censuses from 1948 to 2021 in the Republic of North Macedonia

Year	Total	Men	Women	Difference between men and women	SR
1948	1152986	584002	568984	15018	1026
1953	1304514	659861	644653	15208	1024
1961	1406003	710074	695929	14145	1020
1971	1647308	834692	812616	22076	1027
1981	1909136	968143	940993	27150	1029
1994	1945932	974255	971677	2578	1003
2002	2022547	1015377	1007170	8207	1008
2021	1836713	911087	925626	-14539	984

Source: SSO in Republic of North Macedonia and authors' calculations

Figure 1. Share of men and women - censuses from 1948 to 2021 in the RNM



Source: SSO in Republic of North Macedonia

By region, the Skopje region differs in the scope and dynamics of the population sex structure compared to other regions (Table 2). Since 2002, there are more women than men in the region, while in other regions the situation is reversed. According to the last census, there are 12,347 more women than men in the Skopje region. That is, the population in the region increased by 5% from 2002 to 2021, while the female population by 6%. In the period from 2002 to 2021, more women immigrated to the region compared to men, or out of a total of 63,085 people involved in internal migrations, 46,004 were women. Even 38% have settled in the Skopje region. More than 90% of the total number of migrants and almost 60% of the total number of persons involved in internal migrations are directed mainly toward the municipalities Aerodrom, Kisela Voda, Centar, and Karposh (Apostolovska Toshevska et al., 2017).

The population in these municipalities is stimulated by their position within the city, the intensive housing construction, and the bank credit offers. The government measures for buying a living space through the project “Buy a house, buy an apartment”, where young married couples are offered financial assistance, favorable interest rates, and generally favorable payment terms has an important influence on the immigration process (Apostolovska Toshevska & Gorin, 2016).

As shown in Table 2, in 2021, only the Vardar, Northeast, and Southeast regions had more male than female populations. In the East region, both sexes are almost equally present, but the female population has a slight advantage of 12 women. The situation in the Polog region is interesting, where in 2002 the male population was more numerous by 1,289 persons, while in 2021 there were 3,198 more women than men.

Table 2. Population sex structure according to the censuses in 2002 and 2021, by regions

Year	percentage share		SR
	Men	Women	
Republic of North Macedonia			
2002	50,2	49,8	1008
2021	49,6	50,4	984
East Region			
2002	50,7	49,3	1028
2021	50,0	50,0	1000
Pelagonia Region			
2002	50,1	49,9	1006
2021	49,9	50,1	996
Polog Region			
2002	50,2	49,8	1009
2021	49,4	50,6	975
Skopje Region			
2002	49,6	50,4	983
2021	49,0	51,0	960
Southeast Region			
2002	50,8	49,2	1031
2021	50,1	49,9	1006
Southwest region			
2002	50,2	49,8	1007
2021	49,8	50,2	992
Northeast Region			
2002	50,8	49,2	1031
2021	50,2	49,8	1009
Vardar region			
2002	50,9	49,1	1036
2021	50,4	49,6	1015

Source: SSO in Republic of North Macedonia and authors' calculations

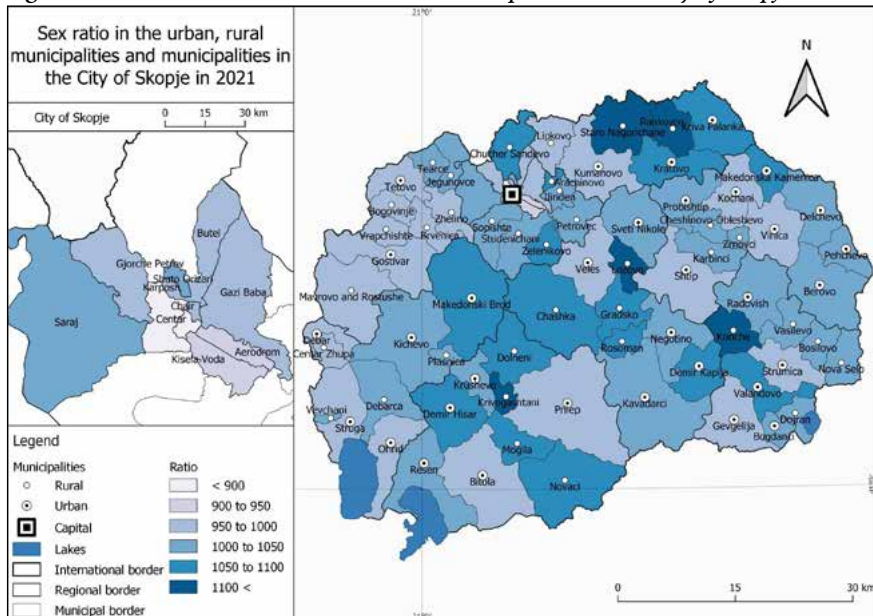
In the municipalities of the city of Skopje, from 2002 to 2021, the female population doubled compared to the male population. Hence, the percentage share of both sexes has a greater difference compared to 2002, namely 48.7% male and 51.3% female population.

The male population is more numerous only in two municipalities in the scope of the city of Skopje, i.e., Saraj and Shuto Orizari. The largest percentage difference between the sexes was recorded in the municipalities of Centar (46.5% male and 53.5% female) and Karposh (47.3% versus 52.7%) which were characterized by the lowest sex ratio in 2021 (867 in Centar and 896 in Karposh). (Figure 2)

More than half of the total male and female population in the country lives in urban municipalities, and the female population is more numerous than the male. Rural municipalities have a larger male-than-female population. (Table 3)

Even though for the first time, the female population is more numerous than the male, still, in the Republic of North Macedonia more males than females are born (in 2002, of the total number of births, 51.6% were males and 48.4% were females, and in 2021 that ratio was 51.1% versus 48.9%). Also, mortality rates for the male population are higher than for the female population. But despite these facts, it seems that the existing distribution and ratio between the male and female population is largely conditioned by the selectivity of migration by sex. Compared to the male population, the female population is more involved in migrations that take place at the local level, primarily due to getting married or getting a job (Madjevikj et al., 2020). On the other hand, the male population is more present in international migrations. The feminization of particular municipalities, especially among the young middle-aged, is mainly associated with better living conditions, education, and the possibilities of marriage (Emirhafizović & Zolić, 2017) that is, they are conditioned by the socioeconomic development of the area, the activity rate of women and the demand for a specific workforce.

Figure 2. Sex ratio in the urban, rural and municipalities in the City of Skopje in 2021



Source: SSO in Republic of North Macedonia and authors' calculations

Table 3. Percentage share of the population by sex in the urban, rural municipalities and municipalities in the City of Skopje in 2002 and 2021

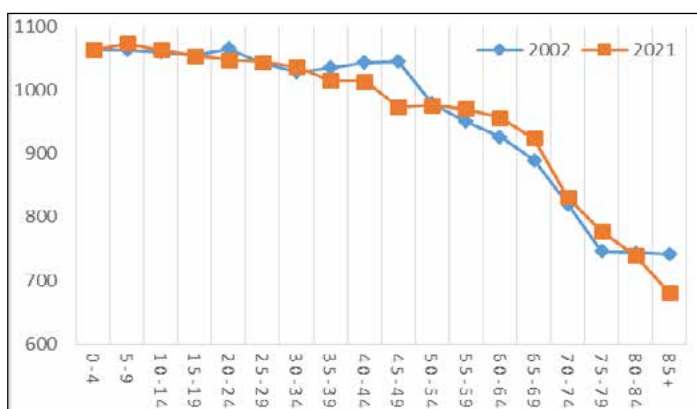
	2002			2021		
	Total	Men	Women	Total	Men	Women
Urban municipalities	100,0	50,3	49,7	100,0	49,8	50,2
%	56,6	56,7	56,5	53,9	54,1	53,7
Rural municipalities	100,0	51,2	48,8	100,0	50,6	49,4
%	18,3	18,7	18,0	17,4	17,8	17,1
Municipalities in the City of Skopje	100,0	49,3	50,7	100,0	48,7	51,3
%	25,1	24,6	25,5	28,7	28,1	29,2
Total	100,0	100,0	100,0	100,0	100,0	100,0

Source: SSO in Republic of North Macedonia and authors' calculations

Age-sex structure

The male population is more present in the young and young middle-aged population, while the female population is more numerous in the older middle-aged and old population (Figure.3). In 2021, males are more numerous in the 40 – 44 year-old cohort group, which is a shift of one cohort group above compared to 2002. Analyzed by individual years of age, the male population is more numerous up to the age of 43. Starting from the 68th year of people's life, the absolute difference in numbers between the male and female populations is more and more pronounced.

Figure. 3 Sex ratio by five-year age groups in 2002 and 2021 in the Republic of North Macedonia



Source: SSO in Republic of North Macedonia and authors' calculations

Table 4. Sex ratio by five-year age groups in 2021, by regions

Age group/ Region	Republic of North Macedonia	East Region	Pelagonia Region	Polog Region	Skopje Region	Southeast Region	Southwest Region	Northeast Region	Vardar Region
Total	984,3	1000	995,6	974,9	960,1	1005,7	992,5	1009,2	1014,9
0-4	1063,6	1036,5	1064,1	1079,9	1060,3	1046,2	1072,5	1055,6	1089,0
5-9	1073,8	1057,7	1061,7	1095,4	1077,9	1048,6	1088,0	1056,8	1068,6
10-14	1064,3	1062,7	1063,8	1091,5	1061,4	1030,1	1050,9	1086,0	1052,8
15-19	1054,8	1070,3	1087,0	1095,3	1035,4	988,2	1081,3	1060,7	1029,1
20-24	1048,0	1046,3	1040,8	1042,9	1044,3	1013,3	1062,5	1069,0	1079,2
25-29	1045,1	1047,6	1077,5	1022,5	1030,6	1064,8	1055,3	1050,9	1072,5
30-34	1037,7	1060,0	1101,5	991,4	988,8	1082,9	1082,8	1071,3	1109,5
35-39	1015,9	1099,9	1048,7	974,2	974,6	1085,9	1020,7	1036,4	1059,0
40-44	1014,6	1052,4	1010,4	999,5	984,7	1072,5	999,5	1032,8	1092,0
45-49	973,8	1043,9	980,3	863,5	949,7	1101,5	945,6	1020,6	1073,2
50-54	976,3	1005,6	1021,9	910,8	961,9	1052,0	951,6	979,3	1010,3
55-59	970,8	995,1	992,3	915,9	943,5	1037,1	961,0	1016,1	1004,4
60-64	956,8	976,2	1003,8	936,0	895,7	1015,2	974,1	985,6	993,6
65-69	924,4	997,4	986,1	911,3	845,1	928,4	962,4	964,7	978,8
70-74	831,4	860,9	847,5	848,8	785,2	855,6	840,0	881,7	857,6
75-79	778,1	778,9	752,6	782,9	764,5	763,8	818,8	833,0	786,9
80-84	739,8	743,2	695,2	750,6	760,9	749,6	715,8	750,2	724,4
85-89	690,4	713,8	628,5	718,2	689,0	638,8	806,4	668,4	722,5
90-94	641,5	599,0	641,5	713,5	624,4	561,6	886,4	571,4	610,7
95+	653,6	791,7	530,6	478,3	776,2	538,5	394,7	769,2	687,5

Source: SSO in Republic of North Macedonia and authors' calculations

In 2002, in the Skopje region, women were more numerous in the cohort group 35-39 (T4). In 2021, this region had the lowest sex ratio, lower than that at the national level, while the advantage of women over men is evident already in the cohort group of 30-34 years. In the Polog region, which has the most striking change in terms of sex structure, the female population begins to outnumber the male population starting from the age group of 30 to 34 years. The situation is different in all other regions.

Age structure

Age is a very important element within the age-sex structure of the population revealing important differences at all levels of analysis but especially on some basic indicators of the population dynamics like fertility, nuptiality, mortality, etc., having multiple consequences on society and the developing economy. The population age structure shows the demographic

development of a certain population over a longer period (Војковић & Девеџић, 1997).

According to data shown in Table 5, it is more than evident that the population age structure in North Macedonia shows continuous changes. In 1948, the young population recorded a share of 38%, and the old population participated with 6.2%. Through the data from the following censuses, especially after 1961, it is evident that the share of the young population is continuously decreasing, and the share of the old population is increasing. According to the last census data, the number of old people has exceeded the number of young people. Compared to 2002, the young population decreased by 114,933 persons or by 27%, and the elderly increased their number by 101,619 persons or by 47.5%. This situation is mainly the result of the low birth rate and migration. In 2021, only 18,648 were born, which is the lowest number of children born since 2002.

Analyzed by individual age, the largest number of people is in the age group of 56, i.e., people born in 1965. People who are part of the generation born from 1946 to 1964, participate with a significant share of 22.6% of the total population. In the following years, they will maintain the size of the middle-aged population, with a two-thirds share in the total population since the 1970's.

Table 5. Population age structure according to the censuses from 1948 to 2021 in the Republic of North Macedonia

Year*	Total	0-14	%	15-64	%	65+	%
1948	1152986	437986	38,0	643313	55,8	71635	6,2
1953	1304514	481713	36,9	745535	57,2	77127	5,9
1961	1406003	522919	37,2	806761	57,4	74891	5,3
1971	1647308	535713	32,5	1012359	61,5	94859	5,8
1981	1909136	555177	29,1	1221155	64,1	128261	6,7
1994	1945932	483923	24,9	1294028	66,6	164678	8,5
2002	2022547	426280	21,1	1381352	68,3	213712	10,6
2021	1836713	311347	17,0	1210035	65,9	315331	17,2

Source: SSO in Republic of North Macedonia

During the analyzed period, in all regions, the young population is decreasing, and the old is increasing, with the fact that in five regions (Vardar, Pelagonia, Southwest, Southeast, and East regions) the number of old people is greater than the number of young people (Table 6). According to the 2021 census, the largest share of people aged 65 and over was recorded in the East region (21%), where, in the period between the two censuses, the elderly population increased by 56%. The old population records its smallest share in the Polog region (13%). The East region has the smallest share of

the young population (13.8%), and the largest is recorded in the Skopje and Polog regions with 18.6%.

Table 6. Population sex and age structure in 2002 and 2021, by regions, in %

	Age groups	2002			2021		
		Total	Men	Women	Total	Men	Women
East Region	14 and younger	18,4	18,5	18,4	13,8	14,2	13,4
	Between 15-64	70,5	71,6	69,2	65,2	66,3	64,1
	Older than 65	11,1	9,9	12,4	21,0	19,5	22,5
Pelagonia Region	14 and younger	17,8	18,3	17,4	15,0	15,4	14,5
	Between 15-64	67,1	68,4	65,8	65,4	66,6	64,2
	Older than 65	15,1	13,3	16,8	19,6	18,0	21,3
Polog Region	14 and younger	26,1	27,0	25,1	18,6	19,7	17,6
	Between 15-64	66,1	65,7	66,6	68,4	68,2	68,4
	Older than 65	7,8	7,3	8,3	13,0	12,1	14,0
Skopje Region	14 and younger	20,3	21,1	19,6	18,6	19,6	17,6
	Between 15-64	69,6	69,8	69,5	64,7	65,4	64,1
	Older than 65	10,1	9,1	10,9	16,7	15,0	18,3
Southeast Region	14 and younger	19,8	19,8	19,9	15,8	16,0	15,5
	Between 15-64	69,5	70,8	68,1	65,3	66,8	63,8
	Older than 65	10,7	9,4	12,0	18,9	17,2	20,6
Southwest Region	14 and younger	23,4	24,0	22,8	16,0	16,6	15,4
	Between 15-64	66,5	66,9	66,0	67,1	67,7	66,6
	Older than 65	10,1	9,1	11,2	16,9	15,7	18,0
Northeast Region	14 and younger	22,6	23,1	22,1	17,0	17,4	16,5
	Between 15-64	67,2	67,8	66,5	66,8	67,6	66,1
	Older than 65	10,2	9,1	11,4	16,2	15,0	17,4
Vardar Region	14 and younger	18,7	19,0	18,3	15,6	16,0	15,2
	Between 15-64	69,9	70,8	68,9	65,9	67,0	64,8
	Older than 65	11,4	10,2	12,8	18,5	17,0	20,0

Source: SSO in Republic of North Macedonia and authors' calculations

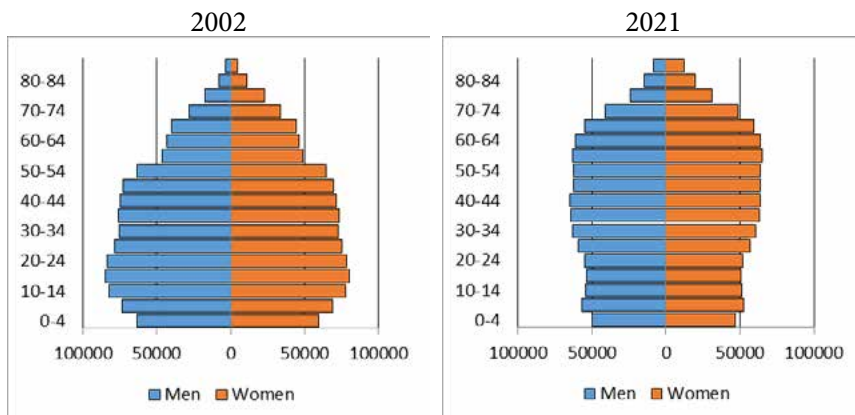
The Skopje region, where a higher number of births and share of young people are present as a result of the increased immigration of young people, has the smallest decline in the share of the young population. The evident decline in the birth rate and the emphasized emigration contributed to the decline in the share of the young population even in the Polog and Northeast regions.

As a result of such ratios between age groups, it is expected that the aging index in all regions exceeded the limit value of 0.4. The East region has the highest value of the aging index (1.5), which means that the old population is more numerous than the young by 50%. The lowest value of this indicator of the population age is in the Polog region (0.7), where the young population is more numerous than the old by 30%, a situation that is expected to

change in the following years, due to the change in the birth rate and the pronounced migration of the population. Namely, from 2002 to 2021, this region recorded the largest absolute decline in the young population of 32,330 people or a decrease of 40.8%. The decrease in municipalities within the region ranges from 24.7% in Tetovo to 50.9% in Gostivar and 65.7% in Mavrovo-Rostushe. On the other hand, the Southwest region recorded the largest percentage decrease of persons under 14 years of age, by 45.8%.

In all three above-mentioned types of municipalities, from 2002 to 2021, there is a decrease in the population up to 14 years old and from 15 to 64 years old, while the old population recorded an increase. In municipalities with headquarters in the city (urban), the population decreased by 13.5%, i.e. 154,117 inhabitants. The largest percentage decrease of 34% was observed among the young population (79,797 persons), followed by the population aged 15 to 64 by 16.4% (128,550). On the other hand, the elderly population increased by 54,230 persons or by 43.9%. Among the municipalities with headquarters in the village (rural), the biggest decrease of 33.3% is in the age group younger than 14 years (30,810 people). Then follows the decrease in the age group from 15 to 64 years by 11.9% (28,647 persons). In the municipalities of the city of Skopje, the population of up to 14 and from 15 to 64 years decreases by about 4%, but the increase of the old population of 72.6% is notable. To a large extent, this is due to the presence of people from the generation born after the Second World War somewhere up to the sixties of the last century. Nearly one-fifth of these people live in the municipalities of Skopje and they mainly immigrated there during the period of intensive industrialization and urbanization of the capital in the sixties and seventies of the last century.

Figures 4 and 5. Age-sex pyramids for the Republic of North Macedonia for 2002 and 2021



Source: SSO in Republic of North Macedonia

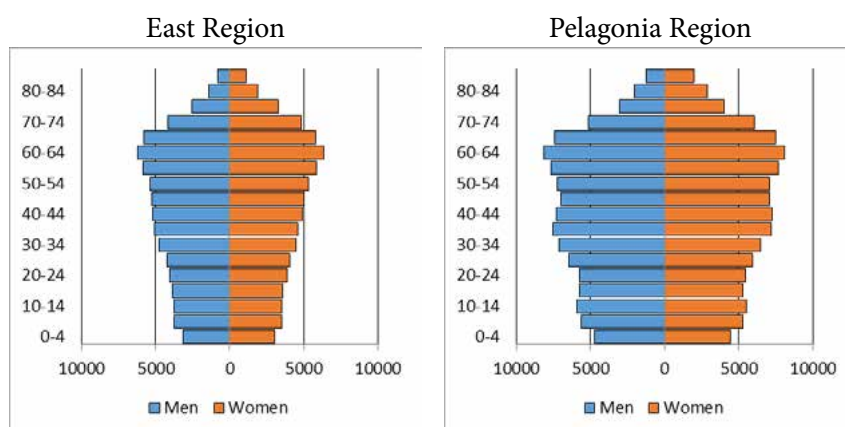
The difference in the shape of age pyramids (Figures 4 and 5) in 2002 and 2021, is more than obvious. In 2021, the base of the pyramid narrows and expands in the middle and narrows again towards the top. The dominance of the mature population from 30 to 59 years old is visible.

Table 7. Large age groups by sex in urban, rural and municipalities in the City of Skopje in 2002 and 2021

	Urban municipalities			Rural municipalities			Municipalities in the City of Skopje		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
2002									
14 and younger	100,0	51,5	48,5	100,0	51,8	48,2	100,0	51,4	48,6
Between 15-64	100,0	50,8	49,2	100,0	51,7	48,3	100,0	49,3	50,7
Older than 65	100,0	44,8	55,2	100,0	46,5	53,5	100,0	44,8	55,2
Total	100,0	50,3	49,7	100,0	51,2	48,8	100,0	49,3	50,7
2021									
14 and younger	100,0	51,6	48,4	99	51,5	47,9	100,0	51,6	48,4
Between 15-64	100,0	50,4	49,6	100	51,0	49,0	100,0	49,2	50,8
Older than 65	100,0	45,8	54,2	100	47,4	52,6	100,0	43,7	56,3
Total	100,0	49,8	50,2	100	50,6	49,3	100,0	48,7	51,3

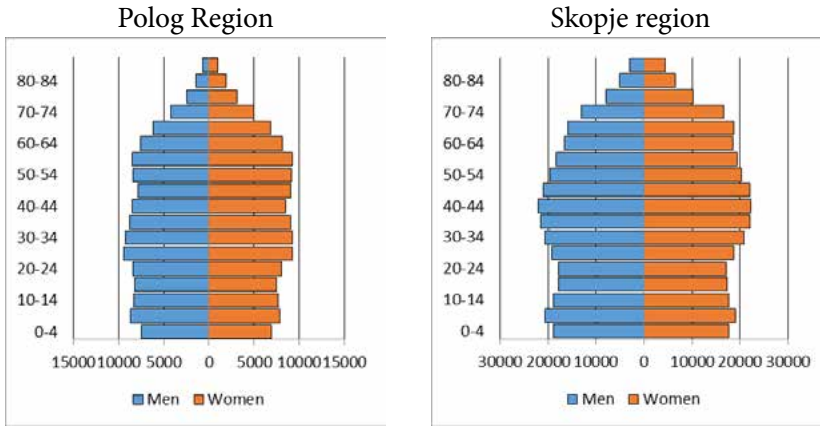
Source: SSO in Republic of North Macedonia and authors' calculations

Figures 6 and 7. Age-sex pyramids for the East and Pelagonia Regions in 2021



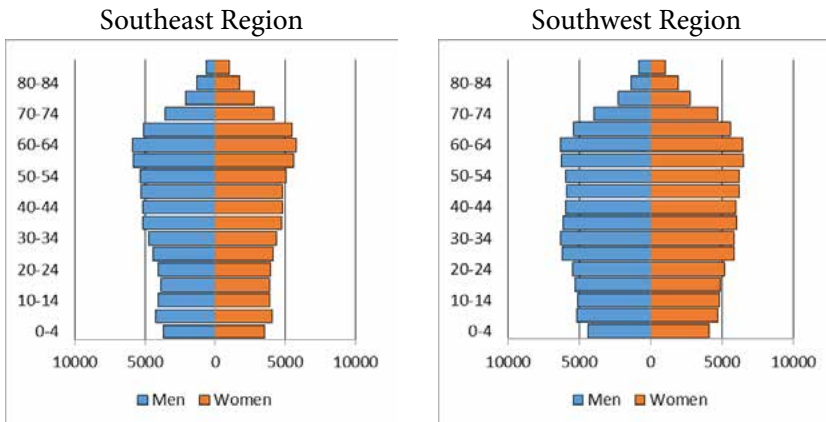
Source: SSO in Republic of North Macedonia

Figures 8 and 9. A pyramids for the Polog and Skopje Regions in 2021



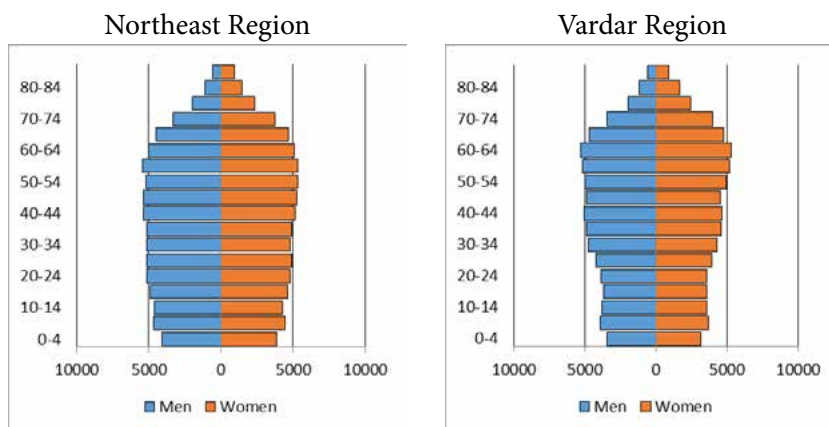
Source: SSO in Republic of North Macedonia

Figures 10 and 11. Age-sex pyramids for the Southeast and Southwest Regions in 2021



Source: SSO in Republic of North Macedonia

Figure 12 and 13. Age-sex pyramids for the Northeast and Vardar Regions in 2021



Source: SSO in Republic of North Macedonia

According to the ratios, volume, and dynamics of the age groups, it is evident that the population is undergoing the process of demographic aging (Figure 14). In addition to this finding, and the previously mentioned aging index, which is above the critical value, is the increase in the average age of the population from 35 years in 2002 to 40.8 years in 2021, (the critical value of this indicator is 30 years) (Friganović 1990; Ристески, 1996).

Table 8. Population by age groups and indicators of demographic age of the population by sex in the Republic of North Macedonia, in 2002 and 2021

Age group/indicator	2002			2021		
	Total	Men	Women	Total	Men	Women
14 and younger	21,1	21,6	20,5	17,0	17,6	16,3
15-39	38,5	39,2	37,8	31,4	32,3	30,6
40-64	29,8	29,6	30,0	34,5	34,3	34,6
Older than 65	10,6	9,5	11,7	17,2	15,7	18,6
Older than 80	1,3	1,1	1,5	3,1	2,6	3,5
Aging index	0,5	0,4	0,6	1,0	0,9	1,1
Total - age dependency ratio	46,4	45,2	47,5	51,8	50,1	53,5
Average age (years)	35	34,3	35,7	40,8	39,9	41,7

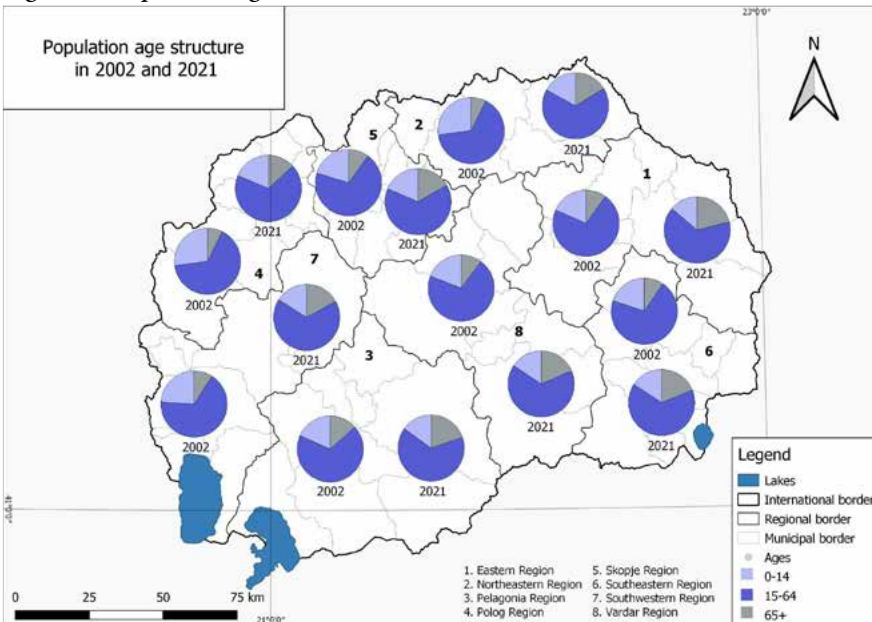
Source: SSO in Republic of North Macedonia and authors' calculations

Analyzing the data from the last census of 2021, it can be concluded that the female population is demographically older than the male population

considering the share in the young and old population, but also according to the indicators for defining old age. The average age of the female population is 41.7 years which is 1.8 years higher than the average age of the male population. Compared to 2002, a pronounced process of demographic aging among the entire population is more than evident (Table 8).

In 2021, the average age of the population in the Polog region, Skopje, the Northeast, and the Southwest regions is lower than the state average, whereas Vardar, Pelagonia, the East, and the Southeast regions have an average age of over 40 years. The Pelagonia, East, and Southeast regions are “the oldest regions”, while the Polog region has characteristics of a “younger” region based on the share of young and old population, but, the shift from the stadium of a threshold of demographic age to a stage of demographic aging is visible.

Figure 14. Population age structure in 2002 and 2021



Source: SSO in Republic of North Macedonia and authors' calculations

DISCUSSION

The population in the country has gone through all stages of the demographic transition in a very short time (between 1930 and 2000),

(Даскаловски, 2002), which radically changed the natural processes of population renewal (Ристески, 1996).

Through the reduction of birth and mortality rates, and under the influence of some other factors, favorable conditions for changing the population's age and sex structure have been created. Although the changes were already visible in 2002, in the last census of 2021, extremely unfavorable conditions are evident for both age and sex characteristics, especially visible at the municipal and regional level. The uneven population distribution by age and sex brings concrete problems and challenges. A fact is that we live in a society where there is a certain "pressure" to find a partner and to start a family and have children. The impossibility of doing so, apart from being an individual problem, can also be seen as a problem in a broader framework, because of its negative impact on the entire demographic and economic development of the area.

The situation in the rural areas where the male population is faced with the problem of starting a family, mainly due to the perception and attitude of a larger part of the young female population for the unattractiveness of living in the village among other reasons can be specially emphasized. More precisely, rural women face many challenges, such as social exclusion, unemployment, discrimination, the dominance of traditional norms, deprivation of ownership of agricultural land and property, deprivation of the right to paid mothers' leave, limited access and supply of education, information, health care, public and social services (Министерство за локална самоуправа на Република Северна Македонија., 2021). Such conditions force rural women into a life of greater poverty and encourage emigration.

But, the problem in the rural areas is much more complicated. Over the years, rural municipalities have been marginalized and out of the sphere of interest of the authorities and today's conditions of demographic exhaustion and their population age and sex structure are just a normal outcome of such inappropriate actions. In 2021, rural municipalities account for approximately 18% of the overall population of the country, with the Polog region accounting for one-third. In the following ten years, only four municipalities in the Polog region, along with Studenichani and Arachinovo from the Skopje region, will be the main carriers of the total rural population. The unfavorable demographic characteristics in rural municipalities made their development far more difficult because where the population is, there are investments in the infrastructure, in the economy, and vice versa. Therefore, the population policy for rural municipalities must be based on an appropriate, mutually coordinated, economic, social, rural, and regional development policy, which will differ from the previous one that pushed out young people, especially women (Jokić, 2013).

Although very often when we talk about population aging, we focus on the rural population, the analysis shows that the aging process in the Republic of North Macedonia is very advanced at all levels, which visibly entails demographic, social, economic, and political consequences. It seems that despite the fact that the state has made certain attempts through laws, incentives, offers, strategies (Family Law, Law on the Protection of Children, Social Protection Law, Law for Equal Opportunities for Men and Women, National Strategy to Fight against Poverty and social exclusion, The National Strategy for Demographic Development of the Republic of Macedonia, Strategy for Balanced and Sustainable Regional Development, Strategy for Youth, Strategy for Demographic Development, etc.) in order of creating a pro-natal population policy, did not provide the expected result.

Looking at the reasons, we cannot help noticing that all of the above-mentioned laws, benefits, and strategies are probably insufficiently implemented, poorly organized in practice, or perhaps drafted too late. An environment where there is a devaluation of values, pronounced partisanship of the system, and corruption in institutions from the very start is a strong obstacle to expecting concrete favorable results. These last-mentioned descriptions of the society in North Macedonia are strong push factors for the young population.

The analysis of the age-sex structure opens up new dimensions of problems in the country regarding the pension system, the workforce, care for the elderly, etc. Enormous challenges that will be essential in the future development of the country. Therefore, a dedicated demographic research institution that will work on demographic problems is necessary, and state support in the formation of appropriate demographic staff is also needed (nowadays, this process only takes place at the Institute of Geography, where this kind of study existed and still exists as such), increased attention by the states to demographic events and their consequences, something that in the last years was only a populist measure in the political campaign.

CONCLUSION

The population age-sex structure is significant in determining the activities for planning and directing the socio-economic development at the local, regional, and national levels. The directions, measures taken in the domain of social policies, population policy, employment policies, balanced regional development planning, urban and rural planning, security situation, etc., depend on them. The unbalanced population age and sex structure have a negative impact on the total population growth, other population structures, the volume of the working-age contingent, and the overall economic development.

According to the data from the last census, the female population is more numerous than the male, with a share of 50.4%, against 49.6%, or we have 14,539 women more than men. Rural municipalities count more male than female populations, while in urban municipalities there are more women mainly due to immigration because of marriage, better living conditions, education, and so on. The male population is more present in the young and young middle-aged population, while the female population is more numerous in the older middle-aged and old population. In 2021 census data, the record is a decrease in the young population and an increase in the old population. The number of old people has exceeded the number of young people. In five regions (Vardar, Pelagonia, Southwest, Southeast, and East regions) the number of old people is greater than the number of young people. According to the 2021 census, the largest share of people aged 65 and over was recorded in the East region where, in the period between the two censuses, the elderly population increased by 56%. The old population records its smallest share in the Polog region, while the East region has the smallest share of the young population, and the largest is recorded in the Skopje and Polog regions. All indicators for understanding the process of demographic aging point out that the population in the country is intensively aging. A process that is particularly noticeable in rural municipalities. Hence, in the country's population policy, greater importance must be given to the rural environment and appropriate conditions must be created so that the young population, especially the female population, is not squeezed out. It is necessary to take into account the sustainability of the functions in the regions that are affected by depopulation, the scope and capacity of the institutions, and their sustainable functioning.

Areas with pronounced differences and unfavorable population structures, especially the age structure, settlements, and municipalities with pronounced unfavorable trends should be put on the priority list of places for finding appropriate measures to alleviate the situation. The aging of the population is an unstoppable process, which takes place intensively, but it should not be left to take place spontaneously. Through various demographic and economic measures, the pace of population aging can be moderated. Otherwise, it will only contribute to the reduction of opportunities for more balanced regional development and an even greater population imbalance.

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STAROSNO-POLNA STRUKTURA STANOVNIŠTVA U REPUBLICI SEVERNOJ MAKEDONIJU POČETKOM 21. VEKA

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REZIME

Rad ima za cilj da stvori kompletnu sliku prostornog rasporeda, veličine i dinamike stanovništva prema polu i starosti u Republici Severnoj Makedoniji na početku 21. veka, kada su uočene velike demografske promene. U zadnjih dvadeset godina od 2002. do 2021. godine, ukupan broj stanovnika smanjen je za 9,2%, stopa prirodnog priraštaja stanovništva je opala sa 3,1‰ u 2002. na - 5,4‰ u 2021., a zbog postojećih ekonomskih, društvenih i političkih uslova povećao se obim i dinamika migracija. Prema podacima sa poslednjeg popisa, prvi put nakon Drugog svetskog rata ženska populacija je brojnija od muške sa učešćem od 50,4%, naspram 49,6%. U seoskim opštinama ima više muškog nego ženskog stanovništva, dok je u gradskim opštinama više ženskog, uglavnom usled doseljavanja zbog braka, boljih uslova života, obrazovanja itd. Muška populacija je zastupljenija u mladoj i mladoj sredovečnoj populaciji, dok je ženska populacija brojnija u starijoj sredovečnoj i staroj populaciji. U podacima Popisa iz 2021. godine beleži se rekordan pad mladog stanovništva i porast starog stanovništva, s tim što je broj starih premašio broj mladih. U pet regiona (Vardarski, Pelagonski, Jugozapadni, Jugoistočni i Istočni region) broj starijih je veći od broja mladih. Prema Popisu iz 2021. godine, najveći udeo lica starosti 65 i više godina zabeležen je u Istočnom regionu, gde je u periodu između dva popisa starija populacija povećana za 56%. Staro stanovništvo ima najmanji udeo u Pološkom regionu, dok Istočni region ima najmanji udeo mladog stanovništva, a najveći je zabeležen u Skopskom i Pološkom regionu. Od 2002. do 2021. godine najmanji apsolutni pad mladog stanovništva beleži Skopski region, a šest opština beleži porast broja mladih. S druge strane, opštine kao što su Aračinovo, Saraj, Šuto Orizari i Studeničani, uglavnom naseljene albanskim ili romskim stanovništvom, zbog proširenog modela reprodukcije, iako beleže veće učešće mladog stanovništva u obe popisne godine, od 2002. do 2021. svi osim Studeničana imaju smanjenje ukupnog broja mladog stanovništva. Evidentan pad nataliteta i izraženo iseljavanje doprineli su smanjenju učešća mladog stanovništva čak i u Pološkom i Severoistočnom regionu, gde je emigracija stanovništva u regionu bila delimično nadoknađena u dužem vremenskom periodu zbog veće stope fertiliteta. U regionu Polog, iako je mlado stanovništvo i dalje brojnije od starog za oko 30%, očekuje se da će se odnos između starosnih grupa promeniti u narednim godinama, uglavnom zbog intenzivne emigracije stanovništva koja pogađa region. Tačnije u regionu, od 2002. do 2021. godine uočava se najveći apsolutni pad mlade populacije od 32.694 lica ili pad od 41,1%. Svi pokazatelji ukazuju na to da stanovništvo u zemlji intenzivno stari. Prosečna starost stanovništva u zemlji je 40,8 godina, indeks starenja je daleko premašio kritičnu vrednost, odnosno 1,0.

Istraživanje je od velikog značaja za sagledavanje potencijala održivog demografskog i ekonomskog razvoja u konkretnom području jer određeni starosno-funkcionalni kontingenti određuju resurse potrebne za pravilno funkcionisanje društva. Istovremeno, poznavanje karakteristika stanovništva po polu i starosti, na različitim teritorijalnim nivoima, definiše delovanje institucija u kreiranju odgovarajućih društvenih i ekonomskih politika, kao i politika prostornog planiranja sa krajnjim ciljem da se odgovori na potrebe i zahteve stanovništva.

Ključne reči: stanovništvo, starosno-polna struktura stanovništva, prostorni raspored, starenje stanovništva, Severna Makedonija