Journal of Natural Sciences and Mathematics of UT, Vol. 5, No. 9-10, 2020

UDC: 314.117-053(497.7)"2006/2018"
314.117-055(497.7)"2006/2018"
Professional paper

CHANGES IN THE COMPOSITION OF THE POPULATION ACCORDING TO THE GENDER AND AGE IN THE REGIONS OF THE REPUBLIC OF NORTH MACEDONIA 2006/2018

Mireme Rushiti[1]*, Resul Hamiti[1], Fauzi Skenderi[1], Blenda Ismaili [1]

[1*]*Department of Geography, Faculty of Natural Sciences and Mathematics.*

[*]*Corresponding author e-mail:mireme.rushiti@unite.edu.mk*

Abstract

In this paper we will address changes in population composition by gender and age. The aim of this paper is to analyze the population structures by gender and age, for the period 2006-2018, according to regions in North Macedonia.

Population structures by gender and age represent a special area of research, as they are important factors on which future demographic and socio-economic development depends. Population reproduction also depends primarily on the overall mass and balance between the number of males and females, mainly the ratio between these two sexes at the time of fertile life. Therefore, through the paper we aim to identify the phenomenon of population aging in RNM.

Some of methods that are used in this paper are: descriptive method, analytical, comparative, statistical and cartographic method, by taking for study the official data of the State Statistical Office for population of Republic of North Macedonia.

The population structure is presented through population pyramids, which are different from each other, but what they have in common is that all pyramids are expressed with narrowing at their base and the extensions are emphasized in the age groups of the active working population.

Keywords: population, gender, age group, population pyramid, region

1. Introduction

In recent decades, the Republic of North Macedonia has been facing numerous demographic problems, and challenges posed by economic and social conditions that have a direct impact on the country's demographic trends. The age and gender structure of the population are two elements that can be presented together and represent the main characteristics of the population, as they show vitality, potential and biodynamics in a given territory. With the decrease in the birth rate, the participation of young people in the general structure of the population decreases, while the number of elderly people increases, which is accompanied by an increase in spending on social security, demand for centers for the elderly, and space for recreation (parks, gardens) etc. It is important that these needs are met without compromising the living standards of the population. North Macedonia also faces significant regional inequality in population growth.

Recently, especially in the two periods 2006/2018, which we have analyzed in this paper, it is noticed that the population structures have some changes. Regarding gender differences, we have

an increase in the female gender of the 70-74 age group and the most pronounced is at the age of over 85 years, as a result of the higher life expectancy of the female population.

Our hypothesis is that due to the lack of proper policies for population and economic development we have low birth rates and consequently low natural growth, which leads to demographic aging of the population. Therefore the state should take measures to create conditions for demographic development and the design of pro-natality policies that will promote fertility and prevent demographic aging of the population in the state. For this reason, this paper focuses on the movement of the population number and population structures, analyzing mainly the population structures by gender and age for the period 2006/2018.

2. Movement of the population

The total number population is the first statistical indicator, which reflects population changes that occur in time and space [6].

To present the general population movement in the Republic of North Macedonia, we used data from the State Statistical Office for 2006, 2010, 2014 and 2018. According to the data in the table, we note that the population in the Republic of North Macedonia is increased over the years, from 2041941 inhabitants in 2006, to 2077132 inhabitants in 2018, which means that the population from 2006 to 2018 has increased by 35191 inhabitants (or 1,70%) [9].

No	Regions of N. Macedonia	Year									
		2006	%	2010	%	2014	%	2018	%	2006-2018	%
1.	Vardar R.	154161	7.54	153880	7.47	153272	7.40	152022	7.32	-2139	-0.22
2.	Eastern R.	180791	8.85	179695	8.73	177411	8.57	174877	8.42	-5914	-0.43
3.	Southwest R.	222141	10.87	221811	10.78	220065	10.63	219580	10.57	-2561	-0.3
4.	Southeast R.	172067	8.42	173024	8.41	173572	8.39	173327	8.34	1260	0.08
5.	Pelagonia R.	235861	11.55	233952	11.37	231500	11.19	227919	10.97	-7942	-0.58
6.	Polog R.	310853	15.22	315413	15.33	319532	15.44	322338	15.52	11485	0.3
7.	Northeast R.	174076	8.52	175211	8.51	176174	8.51	176196	8.48	2120	0.04
8.	Skopje R.	591991	28.99	604298	29.37	617646	29.85	630873	30.37	38882	1.38
*	**N. Macedonia**	**2041941**	**100**	**2057284**	**100**	**2069172**	**100**	**2077132**	**100**	**35191**	**1.70**

Source: SSO, 2006-2018 *(data processed by the author)*

From the table we see that we have an increase in population in the Skopje Region, in the Polog Region, in the Northeast Region and in the Southeast Region, while we have a decrease in the population in the Pelagonia Region, the Eastern Region, the Southwest Region and the Vardar Region, these regions have declining population because they have low rates of natural increase and an aging population.

The regions with the largest population growth are the Skopje Region and the Polog Region. The Skopje Region has an increase in population by 38882 inhabitants from 591991 inhabitants in 2006, an increase of 630873 inhabitants in 2018, as well as at the state level, participating with 28.99% in 2006, while in 2018 by 30.37%, where the difference between this period is by 1.38% higher. Regarding the Polog Region, the population difference during this period is 11485 more inhabitants, from 310853 inhabitants in 2006, to 322338 in 2018, while participation at the state level also

increased by 0.3%, with 15.22% in 2006 and 15.52% in 2018. During the period 2006-2018, an increase in population has been recorded by the Northeast Region for 2120 inhabitants and the Southeast Region for 1260 inhabitants [10].

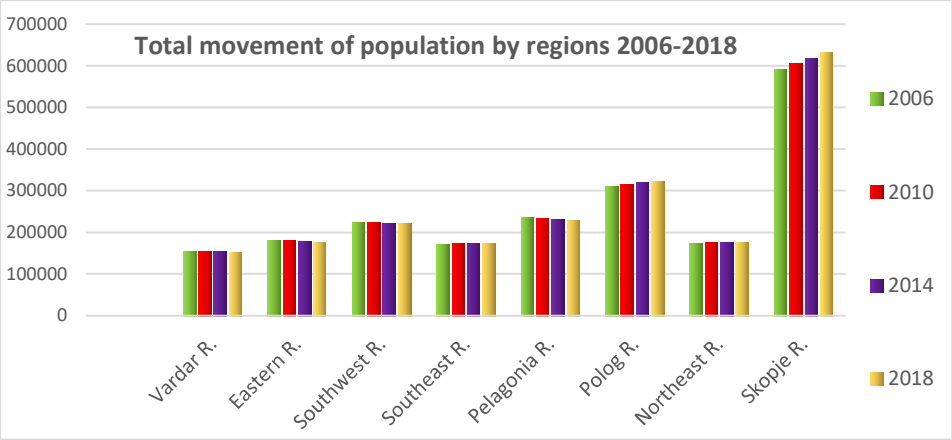

Figure 1. Total movement of population by regions (2006-2018)

The regions with the largest population declines are the Pelagonia Region and the Eastern Region. The Pelagonia region has a decrease in population of 7942 inhabitants from 235861 inhabitants or at the state level with 11.55% in 2006, a decrease of 227919 inhabitants or 10.97% in 2018, where the difference at the state level for this period it is -0.58% lower. Regarding the Eastern Region, the population difference during this period is 5914 fewer inhabitants or -0.43% lower at the state level, from 180791 inhabitants or 8.85% in 2006, to 174877 inhabitants. or 8.42% in 2018. During the period 2006-2018, the population of the Southwest Region decreased by 2561 inhabitants or -0.3% and the Vardar Region by 2139 inhabitants or -0.22%.

Table 2. Basic and ordinal index of population, by regions (2006-2018)

No	Regions of N. Macedonia	2006		2010		2014		2018	
		Basic index	Ordinal index	Basic index	Ordinal index	Basic index	Ordinal index	Basic index	Ordinal index
1.	Vardar R.	100	/	99.8	99.8	99.4	99.6	98.6	99.2
2.	Eastern R.	100	/	99.4	99.4	98.1	98.7	96.7	98.6
3.	Southwest R.	100	/	99.8	99.8	99.0	99.2	98.8	99.8
4.	Southeast R.	100	/	100.5	100.5	100.9	100.3	100.7	99.8
5.	Pelagonia R.	100	/	99.2	99.2	98.2	98.9	96.6	98.4
6.	Polog R.	100	/	101.5	101.5	102.8	101.3	103.7	100.9
7.	Northeast R.	100	/	100.6	100.6	101.2	100.5	101.2	100.0
8.	Skopje R.	100	/	102.1	102.1	104.3	102.2	106.6	102.1
*	**N. Macedonia**	100	/	100.7	100.7	101.3	100.6	101.7	100.4

Source: SSO, 2006-2018 *(data processed by the author)*

In the table we have presented the index of increase and decrease of population for the observed period. According to the table, we see that the basic index has an increase in the regions: Southeast Region, Polog Region, Northeast Region and Skopje Region, while decrease we have in Vardar Region, Eastern Region, Southwest Region and Pelagonia Region.

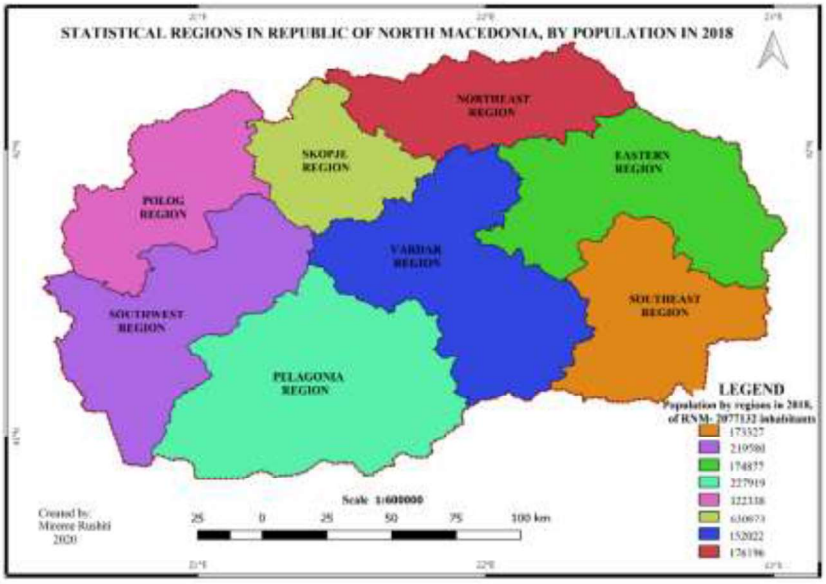

Figure 2. Map of the statistical regions in RNM by population (2018)

3. Gender structure of the population

The structure of the population by gender varies depending on the degree of natural population growth. The reproduction of the population in the regions or the state of North Macedonia in a certain period of time depends first of all on the general mass and the balance between the number of males and females, the ratios between these two sexes at the time of fertile life.

According to the data to date, men have dominated the population of North Macedonia. The gender structure has not changed and is currently dominated by males, which make up over 50.08% of the population of North Macedonia and 49.92% females. Compared to 2006, we notice that the male gender has decreased by 0.06% while the female gender has increased by 0.06%.

Table 2. The structure of population according to the gender by regions (2006 and 2018)

No	Regions of N. Macedonia	Year				Difference between 2006-2018	
		2006		2018			
		Male	Female	Male	Female	Male	Female
1.	Vardar R.	78258	75903	77196	74826	-1062	-1077
2.	Eastern R.	91534	89257	88348	86529	-3186	-2728
3.	Southwest R.	111396	110745	110151	109429	-1245	-1316
4.	Southeast R.	87184	84883	87635	85692	451	809
5.	Pelagonia R.	118057	117804	114253	113666	-3804	-4138
6.	Polog R.	156425	154428	162 306	160032	5881	5604
7.	Northeast R.	88498	85578	89691	86505	1193	927
8.	Skopje R.	292387	299604	310620	320253	18233	20649
*	**N.Macedonia**	**1023739**	**1018202**	**1040200**	**1036932**	**16461**	**18730**

Structure in %							
No	**Regions of N. Macedonia**	**2006**		**2018**		**Difference between 2006-2018**	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**
1.	Vardar R.	50.76	49.24	50.78	49.22	0.02	-0.02
2.	Eastern R.	50.63	49.37	50.52	49.48	-0.11	0.11
3.	Southwest R.	50.15	49.85	50.16	49.84	0.01	-0.01
4.	Southeast R.	50.67	49.33	50.56	49.44	-0.11	0.11
5.	Pelagonia R.	50.05	49.95	50.13	49.87	0.08	-0.08
6.	Polog R.	50.32	49.68	50.35	49.65	0.03	-0.03
7.	Northeast R.	50.84	49.16	50.90	49.10	0.06	-0.06
8.	Skopje R.	49.39	50.61	49.24	50.76	-0.15	0.15
*	**N.Macedonia**	**50.14**	**49.86**	**50.08**	**49.92**	**-0.06**	**0.06**

Source: SSO, 2006-2018 *(data processed by the author)*

Comparing the data on gender structure for the regions, we will see that the male gender has dominated in all regions except in the Skopje Region, where the female gender dominates both in 2006 with 50.61% and in 2018 with 50.76 %, also with an increase of 0.15%, while the male gender in 2006 with 49.39% and in 2018 with 49.24%, with a decrease of -0.15%.

4. Age structure of the population

The structure of the population by age is important in demographic and socio-economic processes. From this structure we can see the past, the present and the future development of the population movement. The table below provides an overview of the population structure by age for the period 2006-2018, in the regions of the Republic of North Macedonia, where we have presented in three divisions that 0-14 years, 15-59 years and over 60 years, from which we can easily notice the reproductive potential of the population or the assessment of the able-bodied population.

From the data in the table we can see that the young population (0-14 years old) in 2006 accounted for 18.92% of the population, while in 2018 it decreased to 16.37%, the age group of 15-59 years from 65.48% in 2006 it decreased to 63.41% in 2018, while the population over the age of 60 constitutes 15.60% of the population in 2006, while in 2018 it participates with 20.22%. Referring to the data on the structure of the population according to the three age groups in the last census, there is a decrease of 2.55% in the young age group, a decrease of 2.07% in the working age population (active) and an increase of 4.62% in the age group 60 years and above, indicating that the population of the Republic of North Macedonia has demographic aging.

Table 3. The structure of population according to the age group by regions (2006 and 2018)

No	**Regions of N. Macedonia**	**Year**						**Difference between 2006-2018**		
		2006			**2018**					
		0-14	**15-59**	**60+**	**0-14**	**15-59**	**60+**	**0-14**	**15-59**	**60+**
1.	Vardar R.	26078	101855	26228	24032	93829	34161	-2046	-8026	7933
2.	Eastern R.	29409	120821	30561	24067	109288	41522	-5342	-11533	10961
3.	Southwest R.	44351	146639	31151	31921	147529	40130	-12430	890	8979
4.	Southeast R.	30734	113694	27639	27886	108548	36893	-2848	-5146	9254
5.	Pelagonia R.	38495	150339	47027	34706	138284	54929	-3789	-12055	7902
6.	Polog R.	69217	205757	35879	52052	222681	47605	-17165	16924	11726
7.	Northeast R.	35801	112 574	25701	29337	113088	33771	-6464	514	8070
8.	Skopje R.	112163	385445	94383	115954	383917	131002	3791	-1528	36619
*	**N. Macedonia**	**386248**	**1337124**	**318569**	**339955**	**1317164**	**420013**	**-46293**	**-19960**	**101444**

Structure in %										
No	**Regions of N. Macedonia**	**2006**			**2018**			**Difference between 2006-2018**		
		0-14	**15-59**	**60+**	**0-14**	**15-59**	**60+**	**0-14**	**15-59**	**60+**
1.	Vardar R.	16.92	66.07	17.01	15.81	61.72	22.47	-1.11	-4.35	5.46
2.	Eastern R.	16.27	66.83	16.90	13.76	62.50	23.74	-2.51	-4.33	6.84
3.	Southwest R.	19.97	66.01	14.02	14.54	67.19	18.27	-5.43	1.18	4.25
4.	Southeast R.	17.86	66.08	16.06	16.09	62.63	21.28	-1.77	-3.45	5.22
5.	Pelagonia R.	16.32	63.74	19.94	15.23	60.67	24.10	-1.09	-3.07	4.16
6.	Polog R.	22.27	66.19	11.54	16.15	69.08	14.77	-6.12	2.89	3.23
7.	Northeast R.	20.57	64.67	14.76	16.65	64.18	19.17	-3.92	-0.49	4.41
8.	Skopje R.	18.95	65.11	15.94	18.38	60.85	20.77	-0.57	-4.26	4.83
*	**N. Macedonia**	**18.92**	**65.48**	**15.60**	**16.37**	**63.41**	**20.22**	**-2.55**	**-2.07**	**4.62**

Source: SSO, 2006-2018 *(data processed by the author)*

If we analyze the percentage of participation of the population of the regions in the total population for the period 2006-2018, we will notice that in all regions we have a decrease in the percentage of the young population from 0-14 years and an increase in the population over 60 years, while in terms of the active population aged 15-59 years, it increases only in two regions, also that in the Polog Region by 2.89% and the Southwest Region by 1.18%, while all other regions have a decrease of population at this age.

In the Republic of the North Macedonia,Child-Elderly ratio (CER)- the number of children under the age of 5 per number of persons aged 80 and over in 2018 was 46.90%, while in the regions we had this ratio:Vardar Region 51,35%, Eastern Region 63,13%, Southwest Region 47,17%, Southeast Region49,17%, Pelagonia Region70,24%, Polog Region28,72%, Northeast Region 43,34and Skopje Region 44,48%.

If we analyze the results of aging for the contingent over 65 years, for 2018, which is used today as a criterion for determining the type of population according to the rate of aging, the flows have almost the same functional order by region. [5].

Table 5. The types of ageing in RNM, by the regions (2018)

No.	**Regions of N. Macedonia**	**Age groups**		**Old age dependency ratio**	**Type of demographic age**
		15-64	**65+**		
1.	Vardar R.	104304	23686	22.71%	Old age
2.	Eastern R.	122075	28735	23.54%	Old age
3.	Southwest R.	160564	27095	16.87%	Old age
4.	Southeast R.	120183	25258	21.02%	Old age
5.	Pelagonia R.	154907	38306	24.73%	Old age
6.	Polog R.	238950	31336	13.11%	Old age
7.	Northeast R.	123794	23065	18.63%	Old age
8.	Skopje R.	420300	94619	22.51%	Old age
*	**N. Macedonia**	1445077	292100	20.21%	Old age

Source: SSO, 2018*(data processed by the author)*

According to the data in the table, based on the old age dependency ratio with 20,21% in the Republic of the North Macedonia we have old age, while in the regions this ratio is as follows: in Vardar Region 22,71%, Eastern Region 23,54%, Southwest Region 16,87%, Southeast Region

21,02%, Polog Region 13,11%, Northeast Region 18,63%, Skopje Region 22,51%, and Pelagonia Region24,74% (which is close to very old age).

These changes prove that the population of the Republic of the North Macedonia is in the stage of demographic old age.[7].

5. Changes in the structure of the population by gender and age in the Republic of North Macedonia

The age structure of the population represents the number of certain age groups, which is often related to the gender structure and these two elements can be presented together. From this it can be said that these two elements together represent the main characteristics of the population, as they show vitality, potential and biodynamics in a given territory.

Changes in the age structure of the population in the period 2006-2018 in the Republic of North Macedonia are expressed in the narrowing of the pyramid's base, which shows the decline in the birth rate in recent years, where from the comparison of the pyramid of 2006 and 2018, we distinguish a very pronounced narrowing for ages 0-29 years, as a result of declining birth rates and increasing population migrations of middle age groups, mainly towards western countries in recent times.

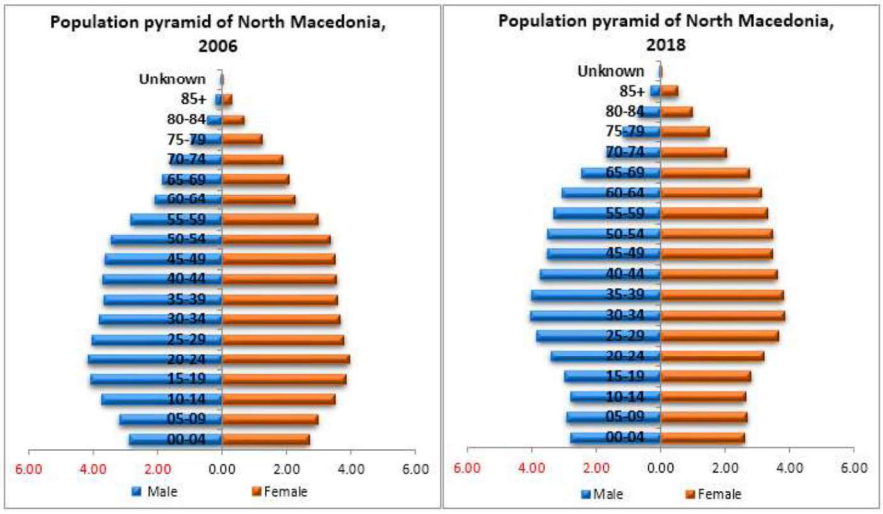

Figure 4. Population pyramids of North Macedonia, 2006 & 2018

In the pyramid of 2018, what draws the attention is the expansion of the pyramid at the age of 30-39, which means that we have an increase in the workforce, for which employment opportunities should be created, because in this case the workforce exceeds the young people who are addicted, and the elderly. There is also a marked expansion in the age group 50-59 years, then 60-64 and 80-84 years, which shows that the population of the Republic of Macedonia is in demographic aging. While in terms of gender differences an expansion of the pyramid of 2018 is noticed in the female gender of the age group 70-74 and more pronounced it is at the age over 85 years, as a result of the higher life expectancy of the female population.

6. Changes in the structure of the population by gender and age in the regions of the RNM

The age and gender composition of the population play an important role in planning the health care needs and other services of a socio-economic and cultural nature, and help to identify the dynamics of structural changes in time and space.

In the following map we have reflected the data on the gender and age structure of the regions of the Republic of North Macedonia, through population pyramids, which will serve us to compare and analyze the population movement by gender and age at the regional level and state for 2018.

During the analysis of population pyramids by regions for 2018, comparing them with previous years, we will notice that all regions of the Republic of North Macedonia have a narrower base, which means that we have a decrease in the level of fertility in all regions, with the exception of the Skopje region, which has a slightly wider base in the 0-9 age group. A more disordered pyramid is observed in the Pelagonia Region and the Eastern Region, which are presented to us with a narrow base and with extensions in the age group 20-39 years and then 50-64 years, which means that we also have labor force, and which is intended for aging. Population pyramids are somewhat similar to those in the Southeast and the Vardar Region. The Pyramid of the Polog Region and the Southwest Region have a similar structure, with a narrow pyramid base, which expands into the age groups of the active population, mainly the workforce, for whom employment opportunities must be created. The Northeast Region, on the other hand, is the narrowest part of the pyramid, but expands into active working age groups.

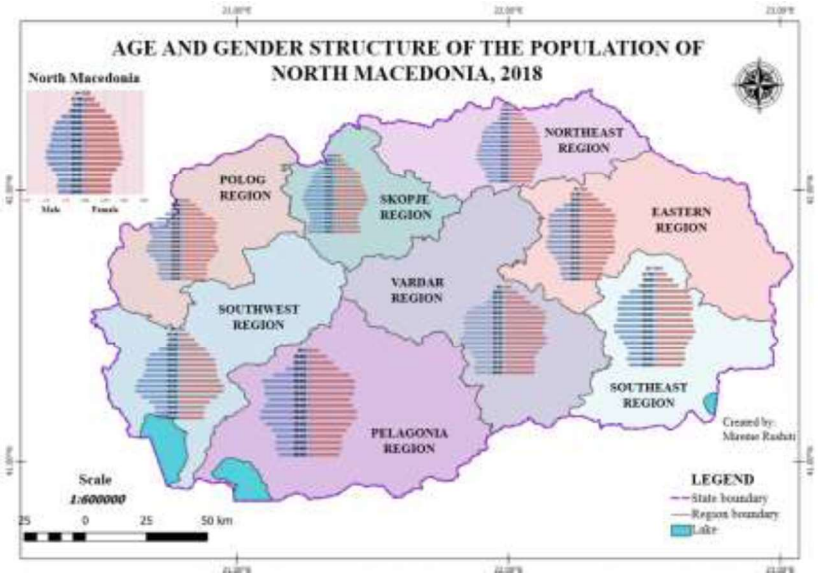

Figure 5. Map of the age and gender structure of the population of North Macedonia 2018, (Rushiti, 2020)

Comparing the population pyramids for the regions of the Republic of North Macedonia, the pyramid of the Polog Region and the Eastern Region stands out for drastic changes in the composition of the population by gender and age, which we will analyze below.

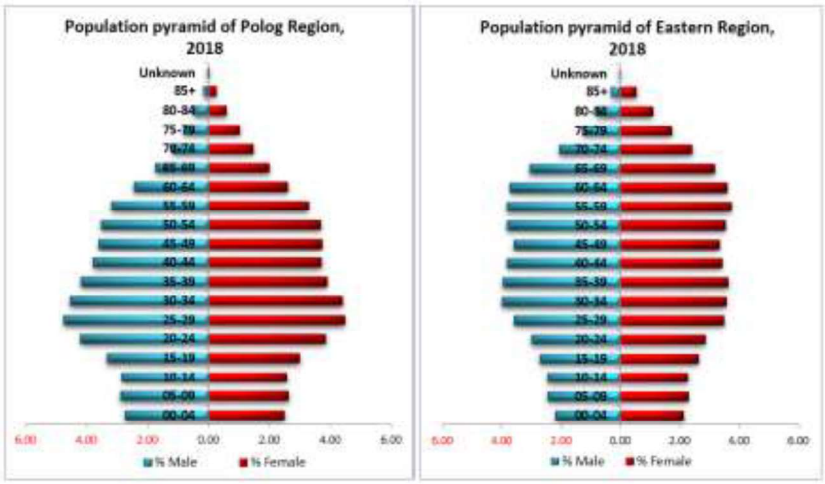

Figure 6. Population pyramid of Polog Region and Eastern Region, 2018

Changes in the age structure of the population in 2018 in the Polog Region and the Eastern Region express a narrow base of the pyramid, where in the pyramid of the Eastern Region we see a very pronounced narrowing for ages 0-24 years, which shows a decrease in birth rate. The difference between these two population pyramids lies in the fact that the largest expansion of the pyramid of the Polog Region occurs mainly in the ages of 15-34 years, so the young population, mainly productive, while in the Eastern Region we have two not very large extensions pronounced at the age of 25-34 and the second aged 50-64 years, i.e. an active population destined for aging. While gender difference is observed in old age, as a result of the higher life expectancy of the female population.

7. Conclusion

This paper focuses on changes in population numbers, mainly the structure of the population by gender and age. In recent decades, the Republic of North Macedonia has been facing numerous demographic problems, and challenges posed by economic and social conditions that have a direct impact on the country's demographic trends.

According to what is analyzed in the paper, we note that the population in the Republic of North Macedonia has increased by 35,191 inhabitants, during 2006 and 2018. The gender structure has not changed and is currently dominated by men, with a ratio of 50.08% men and 49.92% female. While the age structure gives us this overview of the population, where the age group 0-14 years from 18.92% (2006) has decreased to 16.37% (2018), the age group of 15-59 years from 65.48% in 2006 decreases to 63.41% in 2018, while the population over the age of 60 with 15.60% of the population in 2006, in 2018 participates with 20.22%.

Recently, especially in the two years 2006/2018, which are analyzed in this paper, it is noticed that the structures of the population have changes, which is shown by the analysis of the structure by age and gender presented through pyramids. During the analysis of pyramids of the population by regions for 2018, comparing them with previous years, we noticed that all regions of the Republic of Macedonia have a narrower base, which means that we have a decrease in the birth rate in all regions, with the exception of the Skopje Region, which has a slightly larger base in the 0-9 age

group, which is associated with increased spending on social security, requests for centers for the elderly, recreational areas (parks, gardens), etc. It is important that these needs are met without compromising the living standards of the population.

From all that was analyzed in this paper we can conclude that the significant decrease of the population at a young age 0-14 years is a result of the decrease in the birth rate and the increase of emigration of the population of the middle age groups, mainly to the western countries lately. While the increase of the active age group for work 15-59 years old means that we have an increase in the labor force, for which employment opportunities should be created, because in this case the labor force exceeds the young people who are addicted and the elderly. Also, the significant increase of the elderly population in the age group over 60 years represents the demographic aging of the population in the Republic of North Macedonia. To change the composition of the population and the effects of the growth of new age groups, we think that specific policies should be undertaken, such as jobs, improvement of family planning programs and reduction of infant mortality, which will affect growth, fertility rate and prevention of demographic aging in the Republic of North Macedonia.

References

[1]. Aziri, E., 2002. Proceset dhe lëvizjet socio-ekonomike në Pollog, Shkup, Maqedonia e Veriut.
[2]. Hamiti, R., 2013. Rajoni i Pollogut, Shkup, Maqedonia e Veriut.
[3]. Daskallovski, B., 1995. Demogravskiot razvoj na naselenietovo R. Makedonija, Skopje. Maqedonia e Veriut.
[4]. Pushka, A., 2000. Aspektet gjeopopullative në Kosovë dhe rreth saj, Prishtinë, Kosovë.
[5]. Selmani, A., 2004. Popullsia e Maqedonisë, Shkup, Maqedonia e Veriut.
[6]. Skenderi, F., 2019. Demogjeografia, Tetovë, Maqedonia e Veriut.
[7]. Skenderi, F.,2006. Popullsia dhe vendbanimet shqiptare në Maqedoni, Kumanovë. Maqedonia e Veriut.
[8]. Skenderi, F., &Rushiti, M., 2018. Demographic characteristics of the population in Macedonia. *Journal of Natural Sciences and Mathematics of UT*, Vol.3, No. 5-6 (ISSN: 2545-4072), p. 104-113.
[9]. Republic of North Macedonia State Statistical Office. (2007-2019). Statistical Yearbook 2007-2019. (Статистички годишник 2007-2019). Statistical review for the analyzed period (2006-2018). Skopje, Republic of North Macedonia: Republic of North Macedonia State Statistical Office. Retrieved May, 2020, from http://www.stat.gov.mk/PublikaciiPoOblast.aspx?id=34&rbrObl=37
[10]. Republic of North Macedonia State Statistical Office. (2019). Regions of the Republic of North Macedonia 2019. (Регионите во Република Северна Македонија, 2019). Statistical review for the analyzed -2018). Skopje, Republic of North Macedonia: Republic of North Macedonia State Statistical Office. Retrieved May, 2020, from. http://www.stat.gov.mk/PublikaciiPoOblast.aspx?id=32&rbrObl=37