

Analysis of the basic characteristics of demographic development in an urban, suburban and provincial district in the Czech Republic

Analýza základních charakteristik demografického vývoje městského, příměstského a venkovského regionu v České republice

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Abstract: This paper analyses and compares the basic demographic characteristics of the selected districts of the Jihomoravský region, namely the urban Brno-město district, the suburban Brno-venkov district and the provincial Břeclav district, in the period between 1990–2000. The methodology section describes the indicators we have used, the basic data were taken from the database of the Czech Statistical Office. Generally speaking, the life expectancy increases, the proportion of the post-productive population increases while there is a significant decrease in the proportion of the pre-productive population as well as in the rates of most demographic categories (marriage rate, birth rate, abortion rate and, to some extent, mortality). Natural reproduction has been negative for a long time. The results reveal that the provincial and the suburban district are similar in most indices as far as both the index level and the population development are concerned. On the other hand, the urban district shows significant differences.

Key terms: demographic development, districts of the Jihomoravský region of the Czech Republic, impact of different conditions

Abstrakt: Jsou analyzovány a porovnány základní demografické charakteristiky vybraných okresů Jihomoravského kraje, a to městského regionu Brno-město, příměstského regionu Brno-venkov a venkovského regionu Břeclav v období let 1990 až 2000. V metodice jsou popsány použité ukazatele, výchozí data byla převzata z databáze Českého statistického úřadu. Všeobecně platí, že se prodlužuje délka života, roste podíl poproduktivní části obyvatelstva a výrazně klesá podíl složky předproduktivní, klesá úroveň většiny demografických kategorií, jako je sňatečnost, porodnost, potratovost a mírně i úmrtnost. Přirozená reprodukce je dlouhodobě negativní. Výsledky prokazují, že ve většině ukazatelů jsou si venkovský a příměstský region podobné jak z hlediska úrovně ukazatelů, tak i z hlediska populačního vývoje. Naproti tomu městský region vykazuje podstatné rozdíly.

Klíčová slova: demografický vývoj, regiony Jihomoravského kraje České republiky, vliv rozdílných podmínek

Demographic data are the information that are important not only for reviewing and comparing the state of population and the development of a particular country, the living standard of its inhabitants, the country's economic strength and other characteristics. These data are of great importance for regional policy as well. They contribute to decision-making regarding potential investments, and are in general more and more often used for economic purposes of the entrepreneurial sphere.

This paper tries to analyse the development of the basic demographic indicators in an urban, a suburban and a provincial district of the Jihomoravský region, and to assess the dependence of demographic development and population behaviour on different regional conditions.

MATERIALS AND METHODOLOGY

The main source of information used in this paper is the data published by the Czech Statistical Office on its website at www.czso.cz.

The Jihomoravský region is one of the regions with a significant economic potential. Gross Domestic Product of this region constitutes more than one tenth of the Czech Republic Gross Domestic Product, which is the third biggest proportion, compared to other regions. The predominant position in the region's economy is occupied by the manufacturing industry, the share of which in gross value added generated in the region amounts to almost 25%. Agriculture, which has a long tradition es-

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pecially in the southern districts, makes the share of less than 5%. As far as the areas of production are concerned, the region's agriculture is focused on cereals, oilseed rape, sugar beet, potatoes and pulses. Specialized agricultural production in the region is represented by fruit growing and viticulture. In the region, there is almost 90% of the overall area of vineyards and more than one fifth of the total area of orchards in the Czech Republic.

The Jihomoravský region is the fourth largest region in the Czech Republic, with the total area of 7,066 km². As far as the number of inhabitants is concerned, it is third biggest region in the republic. There were 1,136 thousand inhabitants by the end of 2000.

For our analysis of the demographic differences between an urban, a suburban and a provincial district, we have selected districts that can be, with regard to our aim, considered typical. These are: the Brno-město, the Brno-venkov and the Břeclav districts (Table 1).

The urban region of Brno-město occupies the smallest area of the three regions under observation (it makes about one fifth of the area of the Brno-venkov and the Břeclav district), no more than 230 km². Despite this fact, the greatest number of people – 382 thousand – live there (which is almost three times the number of inhabitants of the other two, larger, regions). As it is an urban district, it shows the biggest population density: there are 1,664 people per square kilometre. In cities, there usually are more concentrated job opportunities, this is why there is the highest average pay and the lowest unemployment rate. The urban lifestyle is also connected with criminality and traffic accidents, which are the most numerous in this district.

The suburban district of Brno-venkov and the provincial district of Břeclav are similar as far as the area and the structure of population are concerned. Brno-venkov is more populated, therefore it has greater population density per square kilometre: 144 people. In the Břeclav district, there is a lower density of towns and villages, the lowest average pay and the highest rate of unemployment.

The analysis utilizes basic demographic indicators, including the number of inhabitants, their natural migration, the structure of population viewed from various perspectives and the changes in this structure, live-birth and mortality indices, changes in the marital status, the economic burden on the productive population etc.

The methodology of calculation of the selected demographic indicators:

Average age (\bar{x}) is the weighted arithmetic mean of the number of years up to which the individual inhabitants have lived (the data show the years that have actually been reached):

$$\bar{x} = \frac{\sum (x+1/2) P_x}{\sum P_x}$$

where x stands for the age, P_x stands for the number of persons at the age of x .

Ageing index (ai) measures the process of demographic ageing, i.e. shows the number of persons over the age of 50 per 100 persons aged 0–14. It is, therefore, the ratio of the post-reproductive inhabitants (P_{50+}) to the children inhabitants (P_{0-14}). When doing the calculation, persons over the age of 60 are more often accounted for in the numerator:

$$ai = \frac{P_{60+}}{P_{0-14}} \times 100$$

Young persons dependence index (di_y) is constructed as the ratio of the children inhabitants to the productive inhabitants; in other words, the index shows the reproductive power of the population:

$$di_y = \frac{P_{0-14}}{P_{15-59}} \times 100$$

Old persons dependence index (di_o) is a simple characteristic of the economic burden, represented by the post-productive inhabitants, on the productive population:

$$di_o = \frac{P_{60+}}{P_{15-59}} \times 100$$

Economic burden index (ebi) describes how much the productive population is burdened, in the economic sense, with people who belong to a non-productive age group:

$$ebi = \frac{P_{0-14} + P_{60+}}{P_{15-59}} \times 100$$

Table 1. Selected indicators relevant to the districts, compared to regional and national data (as by 31 December 1999)

| Territories | Area km ² | Arable land km ² | Overall number of inhabitants | Population density per km ² | Number of municipalities | Number of cities | Average monthly pay Kč | Unempl. rate % |
|---------------------|----------------------|-----------------------------|-------------------------------|--|--------------------------|------------------|------------------------|----------------|
| Brno-město | 230 | 56 | 381,862 | 1,664 | 1 | 1 | 12,983 | 7.89 |
| Brno-venkov | 1,108 | 538 | 159,415 | 144 | 137 | 11 | 11,698 | 6.67 |
| Břeclav | 1,173 | 653 | 124,951 | 107 | 69 | 8 | 10,893 | 10.08 |
| Jihomoravský region | 7,065 | 3,596 | 1,135,586 | 161 | 647 | 45 | 11,803 | 9.35 |
| Czech Republic | 78,865 | 30,824 | 10,266,546 | 130 | 6,251 | 522 | 12,651 | 8.78 |

Gross live-birth rate (*clbr*) gives the number of live births (N^v) per 1000 inhabitants:

$$clbr = \frac{N^v}{P} \times 1000$$

Gross death rate (*cdr*) allows assessing mortality and gives the ratio of the number of deaths (D) to the mid-year population, i.e. number of inhabitants as by 1 July of the given calendar year. The overall number of deaths is the sum of dead people from the individual generations, who have, however, died at a different age:

$$cdr = \frac{D}{P} \times 1000$$

Vitality index (*vi*) compares the number of live births (N^v) to the number of deaths (D):

$$vi = \frac{N^v}{D} \times 1000$$

Gross marriage rate (*cmr*) shows the number of marriages (M) per 1000 persons of the mid-year population within one year:

$$cmr = \frac{M}{P} \times 1000$$

Gross divorce rate (*cdir*), which is given by the ratio of the number of divorces (DI) per 1 000 persons of the mid-year population:

$$cdir = \frac{DI}{P} \times 1000$$

Divorce index (*di*) is defined as the ratio of the number of divorces to the number of marriages in the given year:

$$di = \frac{DI}{M} \times 100$$

Gross natural increase rate (*cnir*), where the absolute natural increase (NI) is compared to the mid-year population within the given period of time. (It is the difference between the gross live-birth rate and gross death rate):

$$cnir = \frac{NI}{P} \times 1000$$

Migration increase per 1000 inhabitants (*mi*) is the difference between the number of immigrants and the number of emigrants, i.e. the migration balance (MB) per 1000 persons of the mid-year population:

$$mi = \frac{MB}{P} \times 1000$$

As far as quantitative statistical methods are concerned, we have applied relative numbers when calculat-

ing the utilized demographic indicators, and time series analysis for expressing their overall development direction (trend).

FINDINGS AND DISCUSSION

The number of inhabitants and the age structure of the population

The age structure of the population is given by the previous development of birth rate and death rate; the impact of migration is usually marginal. A continuous decrease in mortality and the prolongation of the average lifespan are reflected in the age structure continually, without significant variations, and manifest themselves in the continuous growth in the proportion of older inhabitants. Certain irregularities in the age structure of the population of the Czech Republic are caused by birth rate fluctuations influenced by international incidents, regularities of demographic development, and by the state's policies in the form of pro-population measures.

The demographic development in the Czech Republic shows itself also in the development of districts, although there are certain differences caused by the local conditions. It is evident that we can expect a different development with regard to some of the demographic indicators, depending on whether the district in question is an urban, a suburban or a provincial one (Table 2).

Since 1991, in the Brno-město and Brno-venkov districts, the post-productive portion of the population has been more numerous than the pre-productive portion. The gap between them is still widening, especially in the Brno-město district. This is witnessed by the trend of the ageing indices as illustrated by Figure 1, where the ageing indices for both districts have an increasing tendency. In the Břeclav region, on the other hand, the pre-productive portion still outnumbers the post-productive one, although there is a continuous convergence. The trend suggests that the ageing index in this district is going to exceed the value of 100 as well. The highest value of the ageing index was reached, for females, in the Brno-venkov district in 1999, where there were 140 women over the age of 60 per 100 girls of 14 or younger. The lowest value of all compared indices was shown by indices for males in the Břeclav district in 1990: the ageing index was only 56 (Figure 1).

The ageing index has, therefore, an increasing tendency, which means that the post-reproductive portion, compared to the infant portion, is going to grow further. This is caused by the continuous decrease in the live-birth rate as a result of changes in the lifestyle of young people, who prefer single-member families. But it is also caused by an adverse financial situation of young families. Paradoxically, the birth rate should be on the increase these days as the people born in the "baby-boom" periods of 1963–1964 and 1970–1979 are now reaching the peak of their productive age.

Table 2. Overall number and the age structure of inhabitants (as by 31 December)

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Brno-město | | | | | | | | | | |
| Overall | 392,507 | 388,454 | 389,999 | 390,112 | 389,965 | 388,899 | 387,570 | 385,866 | 384,727 | 383,569 |
| Aged 0-14 | 78,144 | 75,148 | 73,049 | 70,935 | 68,247 | 65,825 | 63,482 | 61,123 | 59,202 | 57,182 |
| Aged 15-59 | 237,769 | 236,509 | 239,744 | 241,906 | 244,747 | 246,275 | 247,289 | 248,092 | 248,551 | 249,230 |
| Aged 60+ | 76,594 | 76,797 | 77,206 | 77,271 | 76,971 | 76,799 | 76,799 | 76,651 | 76,974 | 77,157 |
| Average age | 37.7 | 37.9 | 38.1 | 38.3 | 38.5 | 38.8 | 39.1 | 39.4 | 39.7 | 40.0 |
| Brno-venkov | | | | | | | | | | |
| Overall | 155,888 | 155,223 | 155,176 | 155,208 | 155,412 | 155,695 | 157,042 | 157,672 | 158,335 | 158,974 |
| Aged 0-14 | 31,653 | 30,861 | 30,079 | 29,529 | 28,835 | 28,260 | 27,945 | 27,577 | 27,110 | 26,659 |
| Aged 15-59 | 94,076 | 94,451 | 95,194 | 95,740 | 96,724 | 97,508 | 98,963 | 99,843 | 100,758 | 101,748 |
| Aged 60+ | 30,159 | 29,911 | 29,903 | 29,939 | 29,853 | 29,927 | 30,134 | 30,252 | 30,467 | 30,567 |
| Average age | 37.2 | 39.0 | 37.4 | 37.5 | 37.7 | 37.9 | 39.1 | 38.4 | 38.6 | 38.9 |
| Břeclav | | | | | | | | | | |
| Overall | 125,659 | 124,875 | 125,294 | 125,577 | 125,818 | 125,803 | 124,605 | 124,662 | 124,788 | 124,928 |
| Aged 0-14 | 28,193 | 27,180 | 26,605 | 26,005 | 25,218 | 24,412 | 23,429 | 22,789 | 22,252 | 21,675 |
| Aged 15-59 | 76,633 | 76,979 | 77,931 | 78,840 | 79,837 | 80,675 | 80,719 | 81,356 | 81,956 | 82,490 |
| Aged 60+ | 20,833 | 20,716 | 20,758 | 20,732 | 20,763 | 20,716 | 20,457 | 20,517 | 20,580 | 20,763 |
| Average age | 35.1 | 35.3 | 35.4 | 35.6 | 35.8 | 36.1 | 36.4 | 36.8 | 37.1 | 37.4 |

Ageing index

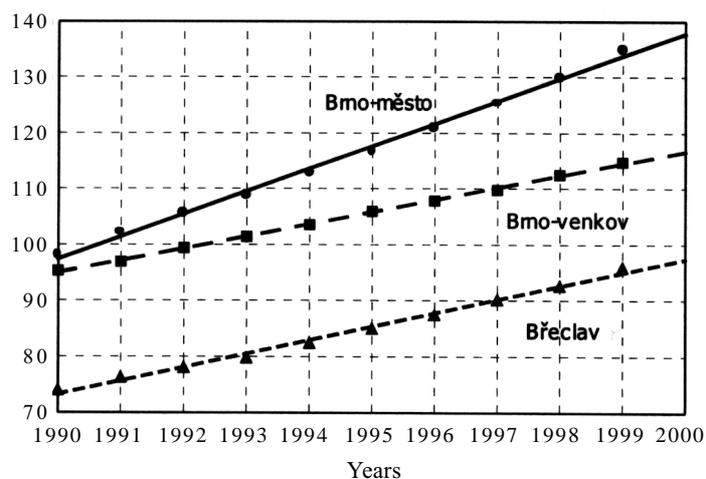


Figure 1. The trend of ageing indices in the compared districts

The population of the 1990s is getting older; this is witnessed also by the average age, which has increased by about two years throughout the surveyed period. The highest value of the average age is found in the Brno-město district (40.0), the lowest in the Břeclav region (37.4). It is directly proportional to the ageing index.

The economic burden on the productive population

The adverse development in the age structure of the population will reflect itself in the future in an increased burden on the economically active portion of the population (Table 3).

In the past ten years, the rate of economic dependence has decreased; however, it is only because there is a negative development in the number of children. During the surveyed ten-year period, the number of non-productive people in the given three districts has decreased by 10 to 12 per 100 productive people. While the amount of changes is approximately the same, there are differences in the rate. The lowest, i.e. the most favourable, rate of the index of the economic burden on the productive population is in the Břeclav district; a slightly worse rate is found in the Brno-město district, and the highest rate of economic burden is in the Brno-venkov district (Figure 2).

However, the dropping tendency of the economic burden index is going to stagnate in the near future, and is,

Table 3. Indices of the burden on the productive population

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Brno-město | | | | | | | | | | |
| Young persons depend. i. | 32.87 | 31.77 | 30.47 | 29.32 | 27.88 | 26.73 | 25.67 | 24.64 | 23.82 | 22.94 |
| Old persons dependency i. | 32.21 | 32.47 | 32.20 | 31.94 | 31.45 | 31.18 | 31.06 | 30.90 | 30.97 | 30.96 |
| Economic burden index | 65.08 | 64.24 | 62.67 | 61.27 | 59.33 | 57.91 | 56.73 | 55.53 | 54.79 | 53.90 |
| Brno-venkov | | | | | | | | | | |
| Young persons depend. i. | 33.65 | 32.67 | 31.60 | 30.84 | 29.81 | 28.98 | 28.24 | 27.62 | 26.91 | 26.20 |
| Old persons dependency i. | 32.06 | 31.67 | 31.41 | 31.27 | 30.86 | 30.69 | 30.45 | 30.30 | 30.24 | 30.04 |
| Economic burden index | 65.70 | 64.34 | 63.01 | 62.11 | 60.68 | 59.67 | 58.69 | 57.92 | 57.14 | 56.24 |
| Břeclav | | | | | | | | | | |
| Young persons depend. i. | 36.79 | 35.31 | 34.14 | 32.98 | 31.59 | 30.26 | 29.03 | 28.01 | 27.15 | 26.28 |
| Old persons dependency i. | 27.19 | 26.91 | 26.64 | 26.30 | 26.01 | 25.68 | 25.34 | 25.22 | 25.11 | 25.17 |
| Economic burden index | 63.98 | 62.22 | 60.78 | 59.28 | 57.59 | 55.94 | 54.37 | 53.23 | 52.26 | 51.45 |

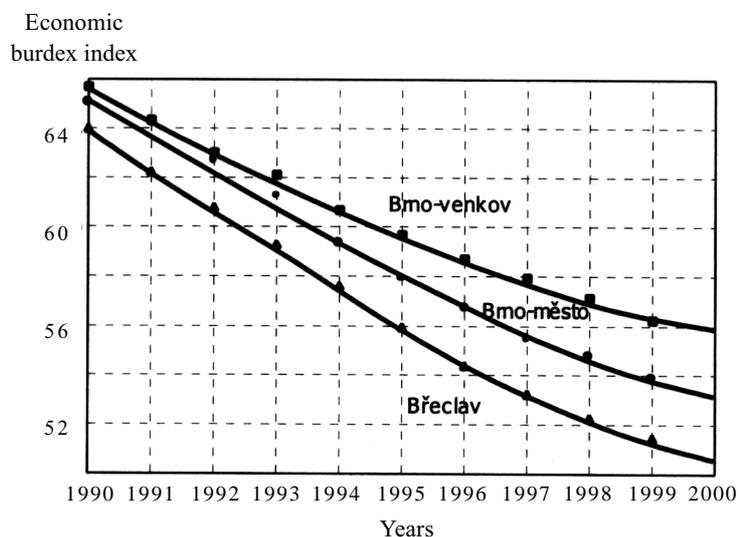


Figure 2. The trend of economic burden indices in the compared districts

conversely, going to grow gradually. It is because people from the post-war “baby-boom” period will gradually become part of the post-productive portion of the population, which will weaken the productive portion. Furthermore, less young people will become part of the productive portion (due to the smaller number of children) while more people will reach the post-productive age. Therefore, there will be a significant disproportion between the productive and the non-productive population, which will be (economically) difficult to bear for the working population.

Throughout the surveyed period, none of the three districts showed greater number of males compared to females, although in all the districts the number of males has been on the increase. The biggest ratio of males to females was recorded in the Brno-venkov and the Břeclav districts in 1999, when there were 96 male per 100 female inhabitants. The Brno-město district, too, reached its maximum in 1999, as there were 90 males per 100 females. The lowest value in Brno-město was recorded in

1991: 89 males per 100 females. The Brno-venkov and Břeclav districts reached their minimum of 95 males per 100 females, but in different years. It is generally true that the lowest ratio of male to female inhabitants is in the urban region, where there are about 90 males per 100 females, while in the suburban and the provincial region, there is the same situation and the ratio of males to females is almost equal, as there are only 4 more females. This relatively balanced state is caused by a high number of young men: up to about 40 years of age, there are more men than women, but in the older categories, women constitute a significant majority.

Birth rate and mortality

The key problem of the population development in this period is a decreasing birth rate, which is a phenomenon typical of developed countries (Table 4).

There is a dropping negative tendency in all three districts, and, in general, more boys than girls are born there.

Table 4. Birth rate and death rate characteristics

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|-----------------------|---------|---------|---------|---------|---------|-------|-------|-------|-------|-------|-------|
| Brno-město | | | | | | | | | | | |
| Gross live-birth rate | 11.6 | 11.6 | 10.6 | 10.4 | 9.0 | 8.1 | 7.7 | 7.7 | 7.8 | 8.0 | 8.2 |
| Gross death rate | 12.3 | 12.2 | 11.6 | 11.5 | 12.1 | 11.5 | 11.0 | 11.3 | 10.5 | 10.9 | 10.8 |
| Vitality index | 938.3 | 953.0 | 908.1 | 907.5 | 748.3 | 700.4 | 704.5 | 679.5 | 738.4 | 732.2 | 756.9 |
| Brno-venkov | | | | | | | | | | | |
| Gross live-birth rate | 12.4 | 12.7 | 12.2 | 12.1 | 10.7 | 9.4 | 9.0 | 8.9 | 9.0 | 9.0 | 8.6 |
| Gross death rate | 13.1 | 12.5 | 12.1 | 11.9 | 11.8 | 11.2 | 11.2 | 10.7 | 10.2 | 10.5 | 11.2 |
| Vitality index | 944.3 | 1 022.8 | 1 009.1 | 1 015.2 | 905.3 | 842.2 | 803.5 | 827.8 | 875.2 | 860.8 | 768.2 |
| Břeclav | | | | | | | | | | | |
| Gross live-birth rate | 12.9 | 12.8 | 13.0 | 12.8 | 11.0 | 9.2 | 8.7 | 8.3 | 8.9 | 9.0 | 8.5 |
| Gross death rate | 11.4 | 11.3 | 11.3 | 11.0 | 10.1 | 10.5 | 10.5 | 9.8 | 9.9 | 9.5 | 9.1 |
| Vitality index | 1 122.4 | 1 131.5 | 1 144.8 | 1 171.0 | 1 087.6 | 870.9 | 824.8 | 846.3 | 894.1 | 942.8 | 931.6 |

The smallest number of live births is in Brno-město, where the minimum of 7.7 live births per 1000 inhabitants was reached in 1996 and 1997. The comparison of the Brno-venkov and Břeclav districts, where the birth rate is somewhat higher, shows that in the Břeclav district (where there used to be higher birth rate in the past years) the birth rate has been levelled since 1995, and that in some years of the period, the rate was even slightly lower than in Brno-venkov. In 2000, there are minimal differences between the three districts, which means that as far as the live-birth rate is concerned, the difference between the city and the country ceases to exist. The gradual convergence is witnessed also by the direction of the trend functions: the annual drop in the gross live-birth rate in Brno-město amounts to 0.42 per 1000 inhabitants, while in Brno-venkov it is 0.47, and in the Břeclav district no less than 0.55.

The trend functions of the gross live-birth rate:

| | | |
|-------------|-------------------------------|-------------|
| Brno-město | $T_{BM} = 11.691 - 0.423 t_i$ | $I = 0.886$ |
| Brno-venkov | $T_{BV} = 13.173 - 0.468 t_i$ | $I = 0.930$ |
| Břeclav | $T_{Bř} = 13.780 - 0.553 t_i$ | $I = 0.901$ |

This is caused by a considerable change in the attitude to family life, as in the provincial district numerous families were quite common and a shift towards having one or two children is, therefore, more striking. During twenty years the value of the gross live-birth rate decreased as follows: by 5.1 in Brno-město, by 6 in Brno-venkov and by up to 8 in the Břeclav district.

It is a positive phenomenon that throughout the observed years, there was a significant decrease in the number of stillborn children. This is due to more sophisticated methods used in obstetrics and medicine in general. In all three districts, there is also a decreasing number of abortions. 35% of all abortions are represented by spontaneous abortions, 65% are induced abortions. This decrease is caused mainly by the wide use of modern contraception, and also by the state's system of laws, which tries to minimize induced abortions. The

gross abortion rate giving the overall number of abortions per 1000 inhabitants fluctuated between 12.7 and 3.5, the rate was the lowest in the Brno-venkov district. At the beginning of the 1990s, there was an adverse situation, as in the urban district there were more abortions than live births in 1990.

As a result of better health service, there are less deaths in all three districts; this is, to a certain extent, contributed to also by the decreasing number of inhabitants. The lowest value was recorded in the Břeclav district, where there were only 9.1 deaths per 1000 inhabitants. The biggest number of deaths was documented in Brno-venkov in 1990, where there were 13.1 deaths per 1000 inhabitants. Among the most common causes of death, there are: neoplasms, diseases of the circulatory system and injuries.

The trend functions of the gross death rate:

| | | |
|-------------|-------------------------------|-------------|
| Brno-město | $T_{BM} = 12.382 - 0.159 t_i$ | $I = 0.881$ |
| Brno-venkov | $T_{BV} = 12.920 - 0.238 t_i$ | $I = 0.896$ |
| Břeclav | $T_{Bř} = 11.758 - 0.226 t_i$ | $I = 0.953$ |

The comparison of the trend lines for the individual districts clearly shows that the most rapid decline in mortality was in the district of Brno-venkov, and the slowest in Brno-město.

The ratio of live births to 1000 deaths expresses the vitality index. Brno-město, as the only one of the compared districts, never exceeded the value of 1000 in the surveyed period, which means that there always were more deaths than live births. It may generally be stated that the vitality index gradually declines and is a clear proof of the dropping tendency of the birth rate; overall, it speaks of inadequate exchange of generations. Low vitality indices and great differences between birth rate and mortality at the end of the 1990s are caused, above all, by the post-war "baby-boom" generation. These people reach old age at the present time and, therefore, deaths are quite common among them.

Table 5. Marriage rate and divorce rate characteristics

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---------------------|------|------|------|------|------|------|------|------|------|------|------|
| Brno-město | | | | | | | | | | | |
| Gross marriage rate | 8.16 | 6.67 | 6.57 | 5.96 | 5.28 | 5.06 | 4.68 | 5.53 | 5.01 | 5.33 | 5.72 |
| Gross divorce rate | 3.41 | 3.24 | 3.45 | 3.62 | 3.40 | 3.56 | 3.38 | 3.44 | 3.44 | 2.37 | 3.01 |
| Divorce index | 41.7 | 48.6 | 52.5 | 60.7 | 64.4 | 70.1 | 72.2 | 62.3 | 68.6 | 44.5 | 52.6 |
| Brno-venkov | | | | | | | | | | | |
| Gross marriage rate | 8.60 | 6.19 | 7.01 | 6.50 | 5.54 | 5.17 | 4.98 | 5.46 | 5.13 | 4.95 | 5.29 |
| Gross divorce rate | 2.01 | 1.98 | 1.73 | 2.35 | 2.59 | 2.29 | 2.72 | 2.35 | 2.13 | 1.85 | 2.52 |
| Divorce index | 23.4 | 32.1 | 24.8 | 36.1 | 46.7 | 44.3 | 84.6 | 43.1 | 41.6 | 37.3 | 47.6 |
| Břeclav | | | | | | | | | | | |
| Gross marriage rate | 8.57 | 7.29 | 7.80 | 6.03 | 5.68 | 5.39 | 5.24 | 5.10 | 4.87 | 5.29 | 4.78 |
| Gross divorce rate | 2.21 | 2.13 | 1.62 | 2.22 | 2.68 | 2.71 | 2.74 | 2.17 | 2.11 | 1.62 | 2.63 |
| Divorce index | 25.7 | 29.2 | 20.8 | 36.8 | 47.2 | 50.3 | 52.2 | 42.5 | 43.3 | 30.6 | 55.1 |

Marriage and divorce rate, marital status

There is a decrease in the number of marriages. This is brought about by a change in the lifestyle of young people, who prefer pursuing career to starting a family; young people, too, often live without getting married for a long time (Table 5).

During the surveyed period, the highest marriage rate was recorded in the Brno-venkov district in 1990, when 8.6 marriages were concluded per 1 000 inhabitants. In the other two districts, maximum rates were reached in 1990 as well. The years in which the marriage rate fell to its minimum are different for the individual districts; the absolute minimum was reached in Brno-město in 1996 (4.7 marriages per 1 000 inhabitants). Traditionally, the smallest number of marriages is concluded in May as, according to popular belief, getting married in May leads to an unhappy marriage.

As far as the divorce rate is concerned, the greatest number of divorces in the surveyed period was in the district of Brno-město, where the gross divorce rate is about 3.3 divorces per 1000 inhabitants. Only once the rate got under the value of 3, in 1999 (2.4 divorces); the maximum was reached in 1985 (3.9 divorces). In the other two districts, the rate is about 2 divorces. As interesting we may consider a significant drop in the gross divorce rate in 1999 and a sharp rise recorded the following year. Generally, it may be stated that the divorce rate is higher in the urban district, while in suburban and provincial districts, the rate is lower. It is caused, above all, by the greater proportion of believers in the country, where people have a more responsible attitude to marriages and do not conclude them injudiciously.

The divorce index compares the number of divorces to 100 marriages. It is possible to say that between 1990 and 1994 the divorce index declined, reaching its minimum in

Table 6. The structure of the population according to marital status, per 1000 inhabitants (as at 1 March 2001)

| District | Single | Married | Divorced | Widowed | Not found |
|-------------|--------|---------|----------|---------|-----------|
| overall | | | | | |
| Brno-město | 366.5 | 451.6 | 97.8 | 77.3 | 6.7 |
| Brno-venkov | 363.9 | 494.2 | 58.5 | 80.3 | 3.0 |
| Břeclav | 384.8 | 470.0 | 63.2 | 77.7 | 4.3 |
| males | | | | | |
| Brno-město | 411.0 | 475.3 | 80.9 | 25.4 | 7.4 |
| Brno-venkov | 412.6 | 503.9 | 53.9 | 26.4 | 3.2 |
| Břeclav | 436.0 | 478.6 | 58.2 | 22.7 | 4.5 |
| females | | | | | |
| Brno-město | 326.4 | 430.3 | 113.1 | 124.1 | 6.1 |
| Brno-venkov | 317.1 | 484.9 | 63.0 | 132.2 | 2.8 |
| Břeclav | 335.6 | 461.6 | 68.0 | 130.7 | 4.1 |

1992. After 1995, the index value began to gradually rise, except for a sharp peak in 1996, and declined slowly again until 1999. In Brno-město, the index value was significantly higher, compared to the other two districts; however, in 1999 it began to decline and in 2000 the index for Brno-město showed even lower value than the index for the provincial district of Břeclav (where there was a sharp negative rise). The declining number of divorces will lead to an increasing number of existing and new marriages. In the long run, however, the overall number of marriages will stay constant because the marriage rate declines as well.

The average duration of marriage gradually increases; this is contributed to, above all, by the declining divorce rate. The relatively short duration of marriage, despite the great number of long-lasting marriages, is possibly caused by the fact that divorces usually happen during the first years of marriage, which significantly decreases the average value of marriage duration (Table 6).

As far as marital status of the population is concerned, the biggest number of married men and women live in the Brno-venkov district – up to 494 persons per 1000 inhabitants – which means that almost one half of inhabitants are married there. In this district, there are 19 married men in excess of married women. The least number of marriages is found in Brno-město. There are from 364 to 385 single people per 1000 inhabitants. There are more single males, the difference being up to 100 males per 1000 inhabitants.

In the suburban and the provincial district, there are about 60 divorced persons per 1000 inhabitants; in Brno-město, it is up to 100 divorced people. In all three districts the majority of the divorced are women.

The number of widowed people is balanced in all three districts; it is about 80 persons. Here the numbers clearly depend on sex: the number of widowers is about 25 per 1000 males but the number of widows is up to 130 per 1000 females. It is so mainly because women reach older age than men.

Reproduction and migration of the population

The natural increase is expressed as the difference between the number of live births and deaths in a certain period. At the present time, the number of inhabitants continually decreases; this is caused by the decreasing proportion of the infant population, which cannot compensate for the number of deaths. During the period under observation, no increase in the number of inhabitants was recorded in the Brno-město district. In the suburban and the provincial district, there was a slight population increase before 1995; however, starting from this year the increase definitely turned into decrease.

The migration increase shows the difference between the number of immigrants and emigrants. The development of this indicator in Brno-město reflects the immigration wave of 1980–1990; starting from 1991, the number of immigrants decreases and in 1996 a decline in the number of inhabitants as a result of migration was recorded. In the suburban and the provincial district, on the other hand, the number of inhabitants decreased in the 1980s. The apparent tendency of the 80s – moving into cities – has stopped and since 1996 has been replaced by gradual abandonment of cities. Starting from the middle of the 1990s, there has been an increase in the number of immigrants in the suburban district, which corresponds with the trend of working in the city but living outside the city. At the national level, migration was influenced also by the opening of the Czech Republic's borders after 1993, when there was an efflux of workers who went to work abroad; this also made the migration balance negative because the number of people who came to live in the country was by far lower than the number of emigrants (Table 7).

As for the overall direction of development in the surveyed period of 1990–2000, the natural increase per 1000 inhabitants is negative in all three regions, therefore, it is possible to speak of the general decline. This decline is the most significant in Brno-město, the suburban district

Table 7. Characteristics of natural reproduction and migration of the population

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Brno-město | | | | | | | | | | | |
| Natural increase | -0.76 | -0.57 | -1.07 | -1.06 | -3.04 | -3.46 | -3.25 | -3.62 | -2.75 | -2.91 | -2.63 |
| Migration increase | 4.64 | 1.17 | 5.04 | 1.35 | 2.66 | 0.72 | -0.18 | -0.79 | -0.21 | -0.10 | -1.83 |
| Overall increase | 3.88 | 0.59 | 3.97 | 0.29 | -0.38 | -2.74 | -3.42 | -4.41 | -2.96 | -3.02 | -4.46 |
| Brno-venkov | | | | | | | | | | | |
| Natural increase | -0.73 | 0.28 | 0.11 | 0.18 | -1.11 | -1.76 | -2.20 | -1.85 | -1.28 | -1.46 | -2.61 |
| Migration increase | -3.29 | 0.55 | -0.41 | 0.03 | 2.43 | 3.58 | 2.80 | 5.85 | 5.47 | 5.49 | 5.38 |
| Overall increase | -4.02 | 0.83 | -0.30 | 0.21 | 1.31 | 1.82 | 0.60 | 4.00 | 4.20 | 4.03 | 2.77 |
| Břeclav | | | | | | | | | | | |
| Natural increase | 1.40 | 1.48 | 1.64 | 1.87 | 0.88 | -1.36 | -1.85 | -1.51 | -1.05 | -0.54 | -0.62 |
| Migration increase | -1.67 | 1.21 | 1.71 | 0.38 | 1.03 | 1.24 | 2.29 | 1.97 | 2.06 | 1.67 | 0.81 |
| Overall increase | -0.27 | 2.69 | 3.35 | 2.26 | 1.92 | -0.12 | 0.44 | 0.46 | 1.01 | 1.12 | 0.18 |

Natural increase

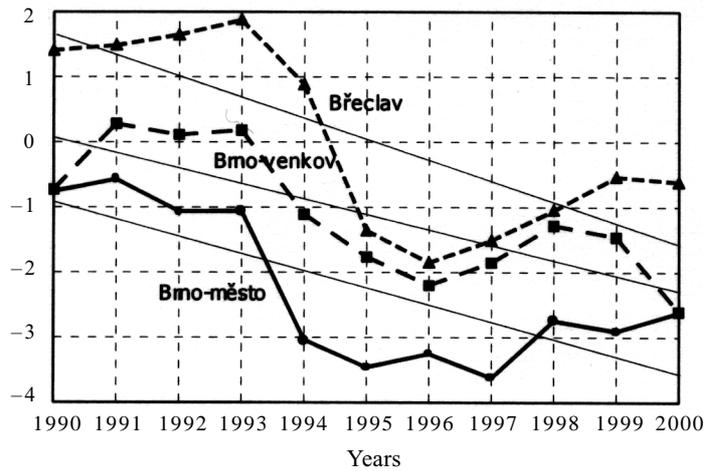


Figure 3. The development of natural increase per 1000 inhabitants in the compared districts, including the trend

Migration increase per 1000 inhabitants

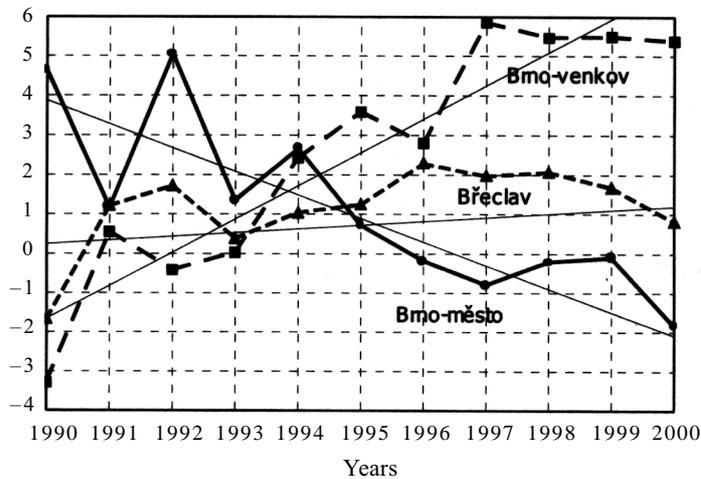


Figure 4. The development of migration increase per 1000 inhabitants in the compared districts, including the trend

of Brno-venkov is slightly better in this respect, and relatively the best values are recorded in the provincial district of Břeclav, although it has the biggest average variation.

The trend functions of the natural increase per 1000 inhabitants:

| | | |
|-------------|-------------------------------|-------------|
| Brno-město | $T_{BM} = -0.697 - 0.264 t_i$ | $I = 0.751$ |
| Brno-venkov | $T_{BV} = 0.271 - 0.233 t_i$ | $I = 0.783$ |
| Břeclav | $T_{Bř} = 1.980 - 0.325 t_i$ | $I = 0.754$ |

The migration increase per 1000 inhabitants gives a completely different picture. While in relative figures there is a sharp increase in the Brno-venkov district and a significant drop in Brno-město, the Břeclav district witnesses only a slight gradual growth.

The trend functions of the migration increase per 1000 inhabitants:

| | | |
|-------------|-------------------------------|-------------|
| Brno-město | $T_{BM} = 4.423 - 0.548 t_i$ | $I = 0.833$ |
| Brno-venkov | $T_{BV} = -2.525 + 0.843 t_i$ | $I = 0.930$ |
| Břeclav | $T_{Bř} = 0.078 + 0.179 t_i$ | $I = 0.541$ |

The overall increase comprises the change in the number of inhabitants due to both natural increase and mi-

gration. In Brno-město, the growth throughout the 1980s was brought about mainly by migration, the decline at the end of the 1990s was caused largely by the predominating number of deaths. In Brno-venkov, on the contrary, the wave of increase at the end of the 1990s was produced by immigration. In the Břeclav district, the ratio of natural increase to migration is almost balanced and none of the aspects predominates there.

CONCLUSION

Having analysed the basic demographic indicators in three districts with different demographic conditions, we can now draw a conclusion that summarizes the differences and identical points of the population development. The comparison given in the table below shows similarity between the suburban and the provincial district, and the uniqueness of the urban district (Table 8).

- Life expectancy and the average age become longer. During the surveyed period, the average age increased by 2 years in all three districts. The highest average age is

Table 8. The comparison of selected demographic indicators for 1999 and of the changes during the surveyed ten-year period (the difference between 1999 and 1990)

| Demographic indicator | Brno–město <i>urban district</i> | | Brno–venkov <i>suburban district</i> | | Břeclav <i>provincial district</i> | |
|--|-------------------------------------|---------|---|---------|---------------------------------------|---------|
| | year 1999 | Δ 99–90 | year 1999 | Δ 99–90 | year 1999 | Δ 99–90 |
| Average age | 40 | +2 | 39 | +2 | 37 | +2 |
| Ageing index (per 100) | 135 | +37 | 115 | +20 | 96 | +22 |
| Young persons dependence index (per 100) | 23 | –10 | 26 | –8 | 26 | –11 |
| Old persons dependence index (per 100) | 31 | –1 | 30 | –2 | 25 | –2 |
| Economic burden index (per 100) | 54 | –11 | 56 | –10 | 51 | –12 |
| Crude live-birth rate (per 1000) | 8 | –3.6 | 9 | –3.4 | 9 | –3.9 |
| Crude death rate (per 1000) | 10.9 | –1.4 | 10.5 | –2.6 | 9.5 | –2 |
| Vitality index (per 1000) | 732 | –206 | 861 | –83 | 943 | –179 |
| Crude marriage rate (per 1000) | 5.4 | –2.9 | 5 | –3.6 | 5.3 | –3.3 |
| Crude divorce rate (per 1000) | 2.4 | –1 | 1.9 | –0.1 | 1.6 | –0.6 |
| Divorce index (per 100) | 44.5 | +2.8 | 37.3 | +13.9 | 30.6 | +4.9 |
| Natural increase (per 1000) | –2.9 | –2.2 | –1.5 | –0.8 | –0.5 | –1.9 |
| Migration increase (per 1000) | –0.1 | –4.7 | 5.5 | +8.8 | 1.7 | +3.4 |

reached in Brno–město, the lowest in the Břeclav district. Compared to the urban district, people living in the suburban district are one year younger and people living in the provincial district are up to 3 years younger.

- The ageing index grows, which means that the disproportion between the pre-productive and post-productive population becomes more pronounced, to the infant population's disadvantage.
- The absolute number and proportion of children under 14 years of age decrease. This is caused by a change in the behaviour of young people. At the turn of the millennium, the numerous generation of the 1970s reached the peak of fertility; however, there was no increase in the birth rate due to the young generation's changed attitude to family life. The financial situation of young families has deteriorated, too.
- The proportion of older inhabitants grows, the wartime and post-war "baby-boom" generations reaching the upper limit of the productive age and slowly approaching retirement age. The number of people in the productive portion of the population should be constant, as the numerous 1970s generation reaches the productive age and thus compensates for the great number of retiring people.
- The overall number of inhabitants decreases, for the number of deaths exceeds the number of live births. The biggest difference between the birth rate and death rate is in the urban and the suburban district, the lowest difference is found in the provincial district of Břeclav.
- Although there is growth in the proportion of males, the number of females is greater in all three districts. The biggest disproportion was in the urban district in 1999, where there were 100 females in excess of males per 1000 inhabitants; in the other two districts the difference makes only 40.
- The live-birth rate declines in all compared districts. The lowest birth rate value throughout the surveyed period was recorded in Brno–město.
- The death rate gradually declines. The highest mortality values are in Brno–město, the lowest in the Břeclav district. The most significant decline in the ten-year period was recorded in Brno–venkov – by up to 3 deaths per 1000 inhabitants.
- The economic burden index had the value of about 52 in all three districts in 1999, which means that there was one non-productive inhabitant per two people of the productive age. Although this index has dropped in the surveyed period, it will stagnate or grow in the future, because people of the productive portion of the population will come over to the post-productive portion but there will not be enough children to compensate for them.
- The marriage and abortion rates decline. The value of both rates is the highest in the urban district.
- In the suburban and the provincial district, the divorce rate has begun to grow, while it drops in the urban district. But despite this declining tendency, the divorce rate in the Brno–město district reaches the highest values.
- The natural increase of the population has been negative for a long time, with the most significant decline in Brno–město again. The provincial region of Břeclav always showed the highest values throughout the surveyed period.
- There is an increase in migration between the individual districts of the Czech Republic. The urban district witnesses, due to migration, a drop in the population, while the population in the suburban and the provincial district increases. The most considerable growth was in the Brno–venkov district, to which the city inhabitants have moved.

- Nationality and citizenship are similarly distributed in the given districts: 75% of inhabitants claim Czech nationality, 99% claim the citizenship of the Czech Republic.
- The least number of believers is found in Brno-město (36% only). In Brno-venkov, there are 45% of believers, and 46% in the Břeclav district. In all three districts there are more female than male believers.
- The standard of education is the highest in the city, where there are more educational institutions, but to which also people travel in order to acquire education. The higher the degree of education, the more of these people live in the city; people with a lower degree of education are mostly found in districts outside the city.
- The number of working inhabitants is comparable in all three districts: 45% of inhabitants work. The rate of unemployment is the highest in the Břeclav district, where agriculture predominates. The lowest rate of unemployment is in Brno-venkov.
- Most of the people who commute to work live in the suburban district (68%); it is because they live near the city, where there are more job opportunities. In the Břeclav district, there are 50% of commuters, and only 11% in Brno-město. Similar percentage holds good for people who have to travel in order to acquire education.

REFERENCES

- Dufek J. (2001): Prognóza zatížení produktivní populace v České republice (A Prediction of the Economic Burden on the Productive Population in the Czech Republic). In: Sborník MZLU v Brně, IL, (2): 19–25.
- Dufek J. (1999): Reprodukce a migrace obyvatelstva Jiho-moravského kraje České republiky v období let 1993–1997 (Reproduction and Migration of inhabitants of the Jiho-moravský Region of the Czech Republic between 1993–1997). In: Sborník MZLU v Brně, XLVII, (2): 103–112.
- Chalupa P., Tarabová Z. (1991): Vybrané kapitoly z demografie (Selected Chapters on Demography). Brno, MU.
- Kalibová K. (1997): Úvod do demografie (An Introduction to Demography). Prague, Karolinum.
- Roubíček V. (1997): Úvod do demografie (An Introduction to Demography). Prague, CODEX Bohemia.
- Sýkorová D. (1991): Úvod do demografie (An Introduction to Demography). Olomouc, UP.
- Šotkovský I. (1998): Úvod do studia demografie (An Introduction to Demography Studies). Ostrava, VŠB-TU.
- Veselá J. (1997): Demografie (Demography). Hradec Králové: Gaudeamus.
- The website of the Czech Statistical Office: www.czso.cz.

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